McAleer Creek Basin Plan

November 2015

Table of Contents

List of Tables ii
List of Figures iii
Appendices iv
List of Acronyms/Terms iv
Executive Summary 1
1. Introduction 9
2. Previous Studies 11
3. Basin Characteristics 12
3.1 Built Landscape 12
3.1.1 Age of Development 14
3.1.2 Park Properties 18
3.1.3 Potential Future Development 18
3.2 Topography 21
3.3 Geology and Geomorphology 21
3.3.1 Geology 22
3.3.2 Geomorphology 25
3.3.2.1 Main stem McAleer Creek NE 196th Street to 15th Avenue NE (downstream to upstream) 25
3.3.2.2 Main stem McAleer Creek 15th Avenue NE to Confluence with West Tributary McAleer Creek (downstream to upstream) 25
3.3.2.3 Main stem McAleer Creek Confluence with West Tributary to Forest Park Drive NE (downstream to upstream) 25
3.3.2.4 West Tributary McAleer Creek 25
3.3.2.5 Echo Lake Creek 26
3.3.2.6 Whisper Creek and Tributaries 26
3.3.2.7 Un-named Tributary Channel to Lake Ballinger 26
3.4 Surface Water 27
3.4.1 Flooding 29
3.4.2 Rainfall 31
3.5 Groundwater 31
3.6 Stormwater Infrastructure 31
3.6.1 Stormwater Treatment Facilities 32

3.6.2 Condition Assessment ... 34
3.7 Infrastructure Service Requests ... 39
3.8 Biological Conditions ... 42
3.8.1 Wetlands ... 42
3.8.2 Stream and Aquatic Habitat Conditions ... 46
3.8.3 Fish Use and Barriers ... 50
3.8.4 Water Quality ... 54
4. Community and Regulatory Framework ... 61
4.1 Community Stakeholders ... 61
4.2 Public meetings and outreach ... 61
4.3 Regulatory Framework ... 61
4.4 City of Shoreline Comprehensive Plan and the McAleer Creek Basin ... 65
5. Summary of Basin Issues and Recommended Strategies ... 66
5.1 Recommended Strategies ... 68
5.1.1 Previous Recommendations Carried Forward ... 68
5.1.2 Capital Projects ... 73
5.1.3 Planning Projects ... 76
5.1.4 Operational Projects ... 78
6. Project Prioritization and Costs ... 79
6.1 Criteria ... 79
6.2 Matrix of Projects ... 79
6.3 Project Cost Summary ... 82
7. Partnerships/Grant Opportunities ... 83
8. References ... 84

List of Tables

Table 2-1. Summary of Data Sources and Relevance to McAleer Creek Basin Plan ... 11

Table 3-1. Zoning Statistics (as of 9/30/2015) within McAleer Creek Basin in Shoreline ... 13
Table 3-2. List of Parks in the McAleer Creek Basin in Shoreline ... 18
Table 3-3. McAleer Creek Estimated Flow Data ... 27
Table 3-4. HEC-RAS Modeling Results for McAleer Creek Culverts and Bridges within Shoreline ... 29
Table 3-5. Ten Greatest Precipitation Events in Seattle between 1948 and 2014 ... 31
Table 3-6. Summary of Conveyance Types, Materials and Lengths ... 32

Table 3-7. Stormwater Ponds 32
Table 3-8. Stormwater Vaults 33
Table 3-9. NASSCO Rating Criteria per defect 35
Table 3-10. Summary of Pipes and Structures Inspected by CCTV in McAleer Creek Basin 36
Table 3-11. Pipe Condition Summary 36
Table 3-12. Whisper Creek/Cedarbrook Creek Area Wetlands 43
Table 3-13. Main stem McAleer Creek Wetlands and Echo Lake 45
Table 3-14. Summary of McAleer Creek Conditions 47
Table 3-15. Water Type Conversion Table 48
Table 3-16. Summary of Water Quality Criteria and Data in McAleer Creek Basin 56
Table 3-17. Summary of Water Quality Indices from 2007 to 2012 57

Table 4-1. Regulatory Framework of Surface Water Management in the McAleer Creek Basin 62

Table 5-1. Summary of Issues, Opportunities and Projects 70

Table 6-1. Criteria and Scoring for Project Prioritization 79
Table 6-2. List of Prioritized Projects and Costs 80
Table 6-3. Summary of Highest Ranked Capital Projects 82

List of Figures

Figure ES-1 McAleer Creek Basin Vicinity Map 2
Figure ES-2 Schematic Cross Section of McAleer Creek Basin in Shoreline 4
Figure ES-3 McAleer Creek Proposed High Priority Capital Project Locations. 8
Figure 1-1 McAleer Creek Basin Vicinity Map 10
Figure 3-1 McAleer Creek Basin Zoning 15
Figure 3-2 McAleer Creek Basin Age of Development (not included in this draft) 16
Figure 3-3 McAleer Creek Basin LiDAR Imagery 21
Figure 3-4 McAleer Creek Basin Surficial Geology 22
Figure 3-5 McAleer Creek Basin Open Channel and Piped Drainage 26
Figure 3-6 Preliminary 100-year Floodplain Map for McAleer Creek 28
Figure 3-7 McAleer Creek Basin Area Treated by Stormwater Facilities 35
Figure 3-8 Condition Assessment Ratings Greater than 5 in McAleer Creek Basin 36
Figure 3-9 Types of Service Calls Received in McAleer Basin by Year 38
Figure 3-10 Number of Service Calls Received in McAleer Basin by Month (between 2002 and 2014) 38
Figure 3-11 McAleer Basin Service Calls 39
Figure 3-12 McAleer Creek Basin Wetlands 50
Figure 3-13 McAleer Creek Basin Streams 51
Figure 3-14 Dissolved Oxygen (DO) Concentrations in McAleer Creek (mg/L) 52
Figure 3-15 Temperature Data collected in McAleer Creek (degrees Celsius) 53
Figure 3-16 Turbidity measured in McAleer Creek (nephelometric turbidity units or NTUs) 53
Figure 3-17 pH measured in McAleer Creek 54
Figure 3-18 McAleer Creek Basin Water Quality Monitoring Locations 58
Figure 5-1 Schematic Cross Section of McAleer Creek Basin in Shoreline 65
Figure 5-2 McAleer Creek Basin CIP Locations 67

Appendices

Appendix A: McAleer Creek Surface Water Basin Plan (Shoreline, WA) Modeling Memorandum
Appendix B: City of Shoreline McAleer Creek Basin Plan Condition Assessment Summary
Appendix C: Service Calls – Flooding Calls for McAleer Creek Basin
Appendix D: Water Quality Monitoring Data – Sites CB-1 and MC-1 McAleer Creek
Appendix E: McAleer Creek and Lyon Creek Basin Plan Public Meeting Summary
Appendix F: McAleer Creek Basin Proposed Project Summary Sheets

List of Acronyms/Terms

CF	Capital Facilities
CIP	Capital Improvement Project
City	City of Shoreline
CCTV	Closed-circuit Television
CMP	Corrugated Metal Pipe
CPP	Corrugated Plastic Pipe
CWA	Clean Water Act
DO	Dissolved Oxygen
Ecology	Washington State Department of Ecology
ESA	Endangered Species Act
FEMA	Federal Emergency Management Agency
GIS	Geographic Information System
GMA	Growth Management Act
HEC-RAS	Hydraulic Engineering Center River Analysis System
HSPF	Hydrologic Simulation Program-Fortran
MPR	Maintenance Pipe Rating
MPRI	Maintenance Pipe Rating Index
N/A	Not Applicable
NASSCO	National Association of Sewer Service Companies
NE	Natural Environment
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NTU	Nephelometric Turbidity Units
OPR	Overall Pipe Rating
OPRI	Overall Pipe Rating Index
ROW	Right of Way
SEPA	State Environmental Policy Act
SPR	Structural Pipe Rating

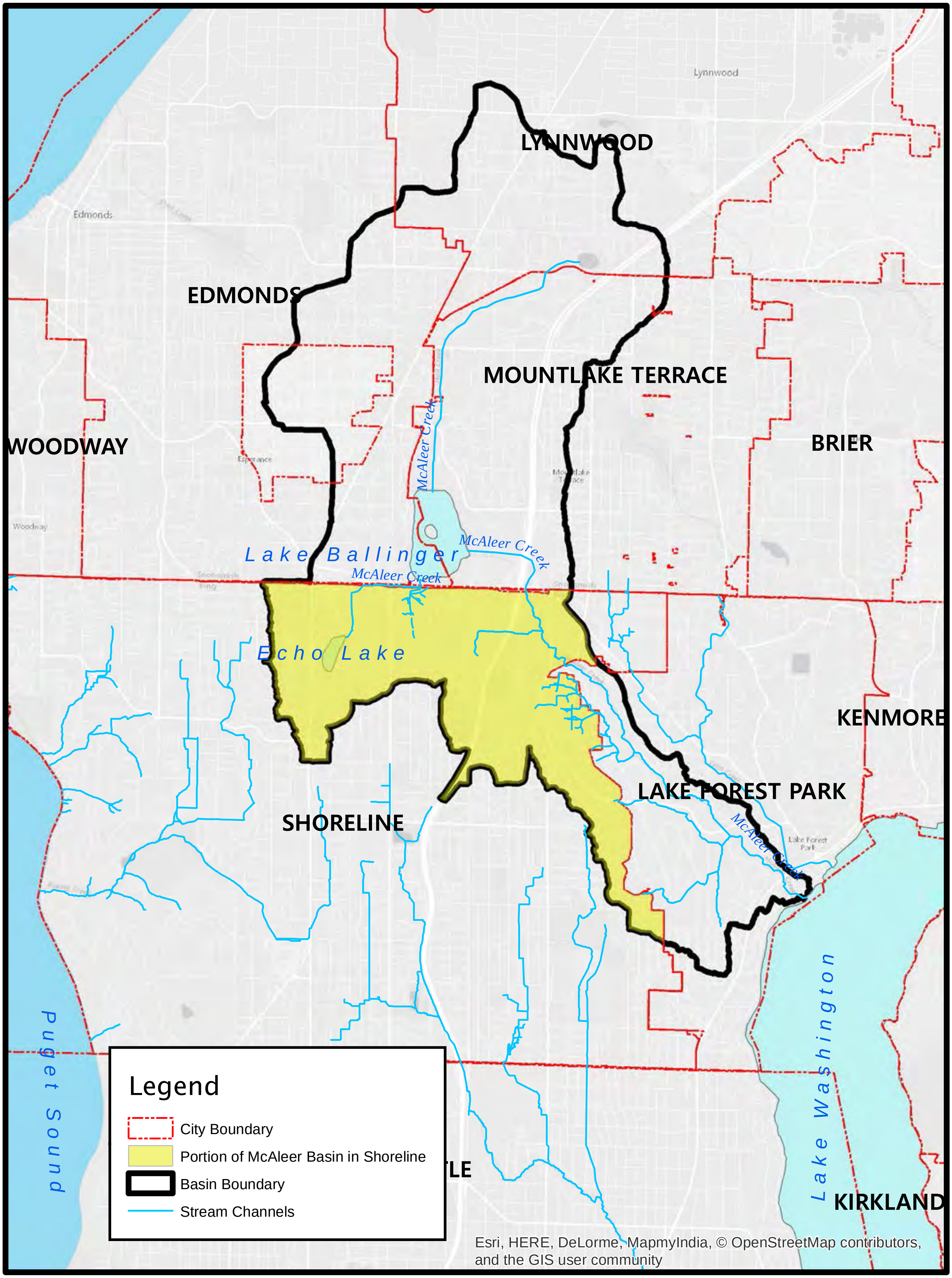
SPRI	Structural Pipe Rating Index
USACE	US Army Corps of Engineers
USFWS	US Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WQC	Water Quality Criteria
WQI	Water Quality Index
WSDOT	Washington State Department of Transportation

Executive Summary

The City of Shoreline (City) contains approximately two square miles of the eight square mile McAleer Creek basin (Figure ES-1). The McAleer Creek drainage starts in Lynnwood at Hall Lake and flows through the cities of Edmonds and Mountlake Terrace prior to entering Lake Ballinger immediately north of Shoreline. The part of the basin within the City is mostly upland areas with small tributary streams that drain toward the main stem of McAleer Creek on the east side of Interstate 5.

The purpose of this basin plan is to provide a comprehensive representation of the natural and built infrastructure in the Shoreline portion of the basin so that the City can direct its stormwater management resources toward correcting existing issues and minimizing potential future problems. The City's specific goals and objectives include completion of the following:

1. A condition assessment video of all stormwater pipes 12 inches or greater in diameter to evaluate maintenance, repair, and replacement needs in the basin.
2. A prioritized list of structural and programmatic strategies, including a repair and replacement schedule to solve surface water and infrastructure problems in the basin (e.g., water quality, flooding, and habitat).



Prepared by E. Nelson 7/29/2015

AltaTerra Consulting LLC

Figure ES-1. McAleer Creek Basin Vicinity Map

To develop this basin plan, the Consultant team (including Osborn Consulting Inc., Altaterra Consulting LLC, and The Watershed Company):

- Used existing information and documents for historical context and reference
- Field-verified conditions in both the natural landscape and piped infrastructure
- Evaluated level of service conditions for bridges and culverts at different flow recurrence intervals to predict potential flooding
- Worked with the City and public to develop workable management strategies and feasible projects for managing stormwater in the McAleer Creek basin

The specific natural and built characteristics of the McAleer Creek basin, along with associated issues and potential solutions, are shown in Figure ES-2.

The primary stormwater-related issues in the McAleer Creek Basin include:

- Over 24 percent of stormwater pipes are in poor to failing condition and require immediate attention.
- Persistent problem drainage areas at:
    - 6th Avenue NE and 200th Ave NE west of Interstate 5
    - East of 15th Avenue NE, between NE 185th Street and NE 195th Street
- Groundwater seepage (associated with some of the drainage areas above)

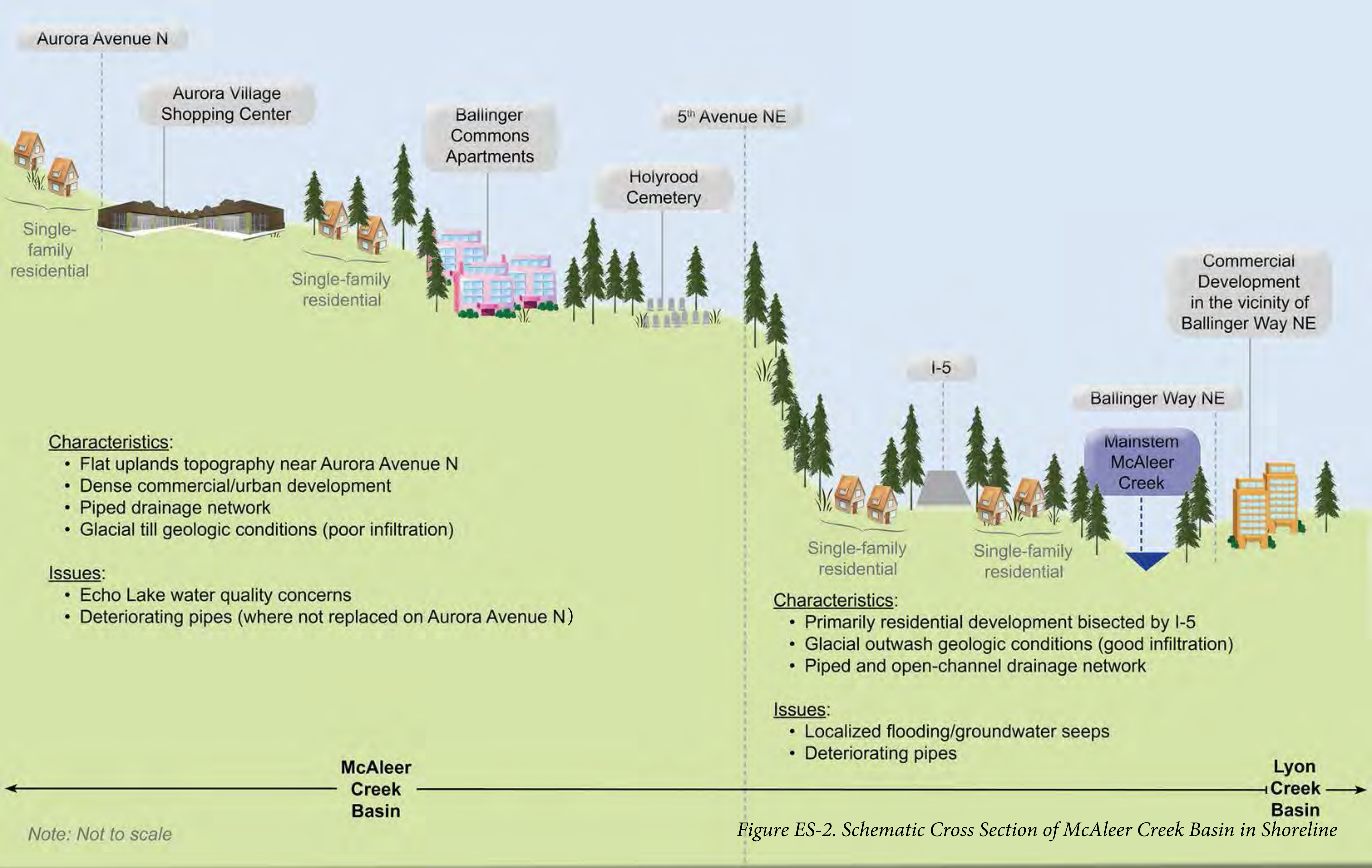


Figure ES-2. Schematic Cross Section of McAleer Creek Basin in Shoreline

The McAleer Creek basin consists of development that largely occurred in the 1950s and 1960s, prior to modern stormwater management techniques being employed in order to reduce water quality and flow control problems. Additionally, the drainage system consists of a mix of conveyance system types consisting of ditches, culverts and pipes that have been installed as needed. Some areas of the basin still lack a more formal drainage system.

Under current stormwater regulations, as redevelopment occurs stormwater management practices will be implemented where none currently exist. Most of the projects recommended in this basin plan are specific to drainage or infrastructure repair or replacement based on the results of the condition assessment or known problems. The full list of recommended strategies is provided in Section 5. Several criteria (Table ES-1) were used to prioritize the capital projects within the context of just the McAleer Creek basin. These projects will be prioritized with regard to the City's entire stormwater management program and may rank lower with respect to other City-wide issues.

Table ES-1 Prioritization Criteria used to Rank Capital Projects

Criteria	Rank Scores		
	High (5 points)	Medium (3 points)	Low (1 point)
Likelihood of success	Proved in other cases	Mixed results	Unproven
Number of issues addressed (water quality, habitat, erosion, flooding)*	Three	Two	One
Protects infrastructure and public safety	Both	One or the other	None
On public property	In ROW or existing easement	Requires easement on other public property	Private property

* If project is a flood reduction project, an additional 5 points are applied to overall score for a total possible 10 points for this criteria.

The combined scores of individual criteria were ranked according to the following total points:

- Low priority (10 points or fewer)
- Medium priority (11 to 15 points)
- High priority (16 points or higher)

Fourteen capital projects are recommended to be included in the City's capital improvement program for a cost ranging between $11.2 million and $12.2 million. Of the fourteen projects, eleven were ranked high according to the criteria shown in Table ES-1 for a cost ranging between $8.8 million and $9.8 million. Costs for three capital projects (MC-CIP-10, MC-CIP-12 and MC-CIP-13) were not calculated, however the estimated range of costs for these projects is between $500,000 and $1,500,000. Table ES-2 lists the highest ranked capital projects, scores and estimated costs. Project locations are shown in Figure ES-3.

Table ES-2 Summary of Highest Ranked Recommended Capital Projects in McAleer Creek Basin

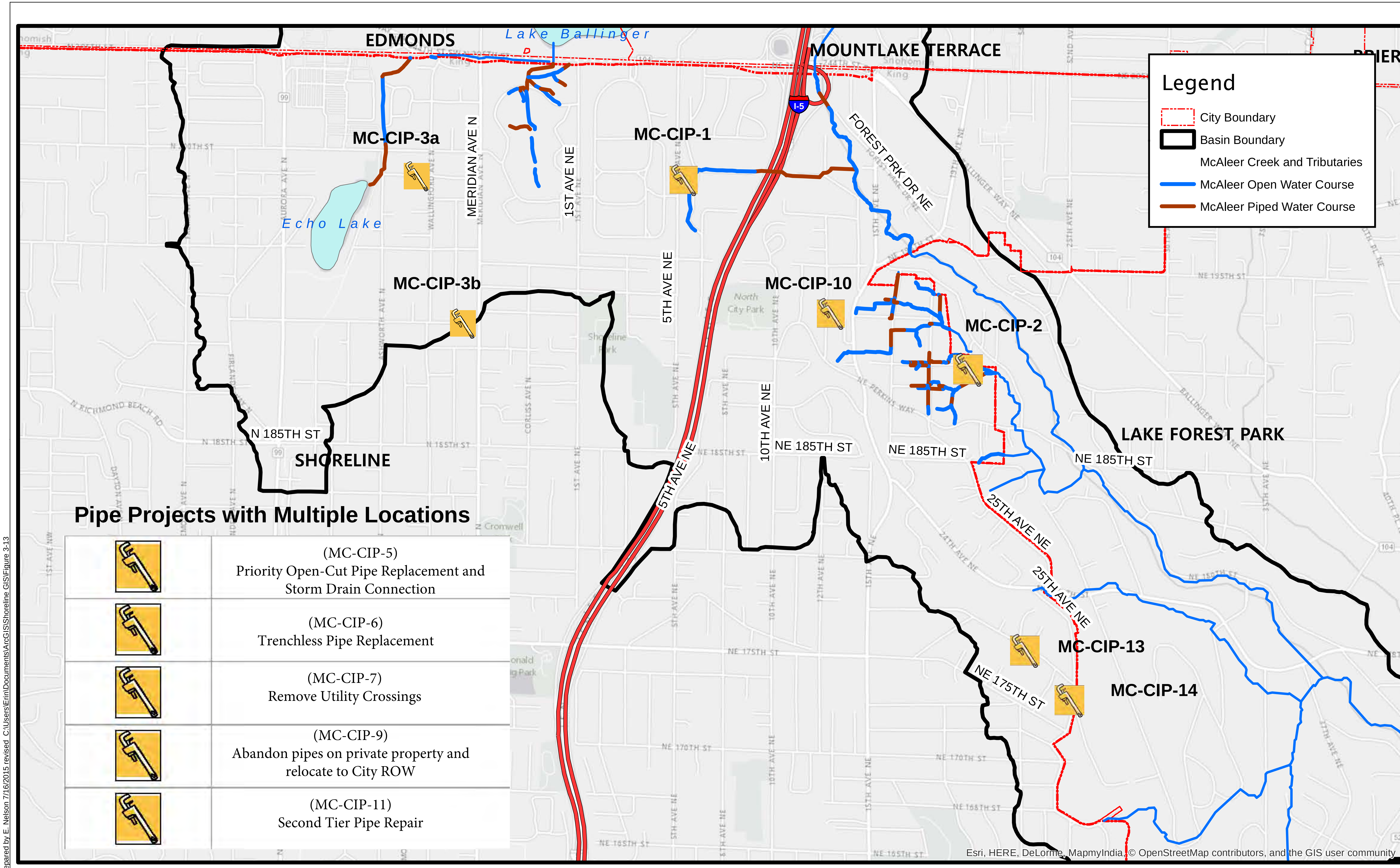
Issue	Project Name	Type	Priority and Score	Cost
Flooding, Drainage and Infrastructure	(MC-CIP-1) 6th Avenue NE and NE 200th Street Flood Reduction		HIGH (21)	$340,100
	(MC-CIP-2) NE 190th Street Flood Reduction		HIGH (19)	$709,500
	(MC-CIP-12) 25th Avenue NE Ditch Improvements		HIGH (18)	Not estimated
	(MC-CIP-13) NE 177th Street Drainage Improvements		HIGH (18)	Not estimated
	(MC-CIP-10) NE 192nd Street Ditch Improvements		HIGH (16)	Not estimated
	(MC-CIP-5) Priority Open-Cut Pipe Replacement and Storm Drain Connection		HIGH (16)	$1,112,200
	(MC-CIP-6) Trenchless Pipe Replacement		HIGH (16)	$401,600
	(MC-CIP-7) Remove Utility Crossings		HIGH (16)	$13,260
	(MC-CIP-11) Second Tier Pipe Repair		HIGH (16)	$5,151,500
Greenworks Projects and Retrofit	(MC-CIP-3a) Greenworks Bioretention at N 199th Street and Wallingford Avenue North		HIGH (17)	$396,800
	(MC-CIP-3b) Greenworks Bioretention at N. 192nd Street and Burke Avenue North		HIGH (17)	$241,600

Several programmatic projects are also recommended to address issues identified in the McAleer Creek basin. These include:

- A groundwater study to evaluate shallow groundwater and seepage issues that impact drainage (MC-Pol-1)
- A stormwater study specific to the upcoming needs of the NE 185th Street Subarea Rezone and Transit-oriented development (MC-Pol-2)
- An evaluation of lateral stormwater pipe connections and how they should be managed (MC-Pol-3)
- An evaluation of potential easement acquisitions (MC-Pol-4)

- An evaluation of existing stream designations and determination as to whether some should be modified (MC-Pol-5)
- An evaluation of water quality conditions and potential water quality improvements for Echo Lake (MC-Pol-6)
- An evaluation of drainage conditions on the City's eastern boundary, including recommendations for improvements (MC-Pol-7)

The estimated cost of the programmatic projects is $200,000.



AltaTerra Consulting LLC

0 550 1,100 2,200 Feet

N

Figure ES-3. McAleer Creek Proposed High Priority Capital Project Locations

1. Introduction

The City of Shoreline (City) contains a portion of the McAleer Creek basin in the northeastern part of the city (Figure 1-1). The part of the basin within the City is mostly upland areas with small tributary streams that originate in Shoreline draining the upland areas and entering the McAleer drainage on the east side of Interstate 5.

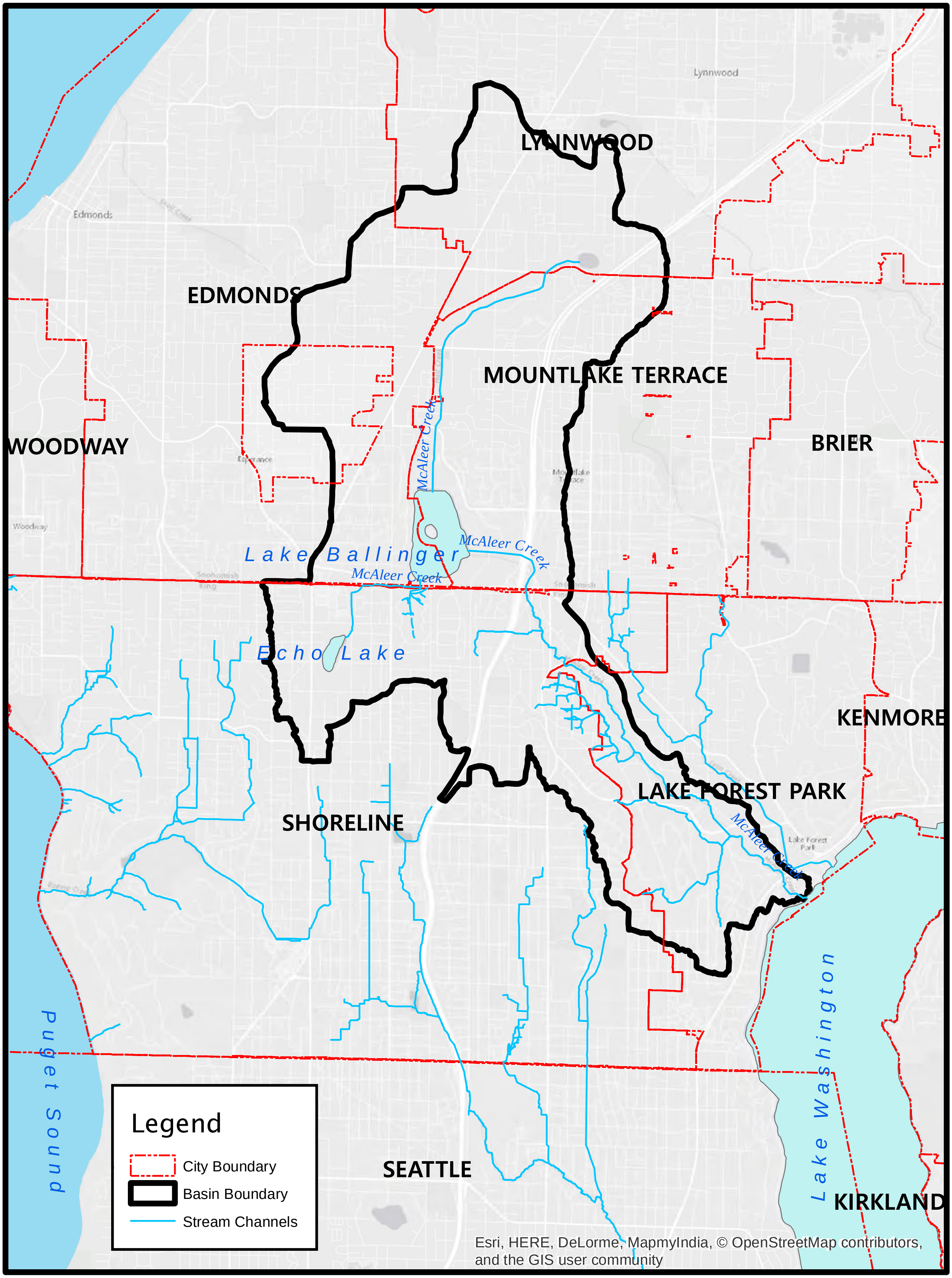
The McAleer Creek drainage starts at Hall Lake in Lynnwood, flowing through the cities of Edmonds and Mountlake Terrace to Lake Ballinger, located immediately north of Shoreline. McAleer Creek outlets from Lake Ballinger in Mountlake Terrace, flowing east, crossing Interstate 5, then enters the City of Shoreline proceeding southeast roughly parallel to NE Ballinger Way (Figure 1-1). The length of the main stem of McAleer Creek within the City is approximately 3,350 feet, including 550 feet within the Washington State Department of Transportation (WSDOT) right of way (ROW).

After crossing NE 196th Street, McAleer Creek enters Lake Forest Park and continues in a southeasterly direction through a forested ravine of single-family residences, roughly parallel to NE Perkins Way for most of its route, before reaching the Lake Forest Park Town Center, crossing NE Bothell Way/State Route 522 and the Burke-Gilman Trail and finally joining Lake Washington near 16826 Shore Drive NE in a lakeside residential neighborhood.

The purpose of this basin plan is to provide a comprehensive representation of the natural and built infrastructure in the Shoreline portion of the basin so that the City can direct its stormwater management resources toward correcting existing issues and minimizing potential future problems. Stormwater management solutions recommended in this basin plan will then be prioritized among city-wide issues. The City's specific goals and objectives include completion of the following:

1. A condition assessment video of all stormwater pipes 12 inches or greater in diameter to evaluate maintenance, repair, and replacement needs in the basin.
2. A prioritized list of structural and programmatic strategies, including a repair and replacement schedule to solve surface water and infrastructure problems in the basin (e.g., water quality, flooding, and habitat).

Through the development of this basin plan, the project team (Altaterra Consulting LLC, Osborn Consulting Inc., and The Watershed Company) used existing information and documents for historical context and reference, verified field conditions in both the natural landscape and piped infrastructure, and worked with the City and public to develop workable management strategies and feasible projects for managing stormwater in the McAleer Creek basin.



N

0 2,050 4,100 8,200 Feet

Figure 1-1. McAleer Creek Basin Vicinity Map

AltaTerra Consulting LLC

Prepared by E. Nelson 7/13/2015 revised

2. Previous Studies

The City of Shoreline and neighboring jurisdictions have conducted numerous studies and collected a plethora of data in the McAleer Creek basin. These studies and data were evaluated by the project team prior to analysis of issues in and potential solutions for the basin. The reference documents reviewed, including sources, data, and relevance to the McAleer Creek basin, are listed in Table 2-1. Specific findings are discussed in the sections that follow.

Table 2-1. Summary of Data Sources and Relevance to McAleer Creek Basin Plan

Reference	Author(s)	Date	Relevance to McAleer Creek Basin Plan
Geographic Information System (GIS) Coverages	City of Shoreline/King County	Various dates	GIS coverages were used in many of the analyses described in Section 3.
Service Requests	City of Shoreline	2000-2013	Stormwater-related calls; information is summarized in Section 3 and Appendix C.
Washington Interactive Geologic Map Documents	Washington State Department of Natural Resources Various Authors	Various dates	Site-specific geologic information is summarized in Section 3.
City of Shoreline Stream and Wetland Inventory and Assessment: Appendices	Tetra Tech/KCM Inc. (2004)	2004	Relevant information is presented in Section 3.
City of Shoreline Comprehensive Plan	City of Shoreline (2012)	2004	Relevant information is presented in Section 4.
City of Shoreline Surface Water Master Plan Update	SAIC (2011)	2011	Relevant recommended projects are discussed in Section 5.
Echo Lake Water Quality: Water Quality Monitoring Results for Water Year 2013	King County (2013)	2013	Relevant information is presented in Section 3.
City of Shoreline 2011-2017 Parks, Recreation and Open Space (PROS) Plan	City of Shoreline (2011a)	2011	There are several City parks located in McAleer Creek basin including Echo Lake Park (2.4 acres), North City Park (4.0 acres), a portion of Shoreline Park (4.7 acres), Rotary Park (0.3 acres) and trail properties such as the Interurban trail, and North Crosstown Connector Trail (1.8 acres).
City of Shoreline 2011 Transportation Master Plan	City of Shoreline (2011b)	2011	Recommended improvements include several new signed bicycle routes and sharrow lanes and pedestrian improvements where sidewalks are lacking on one or both sides of the street throughout the basin.

3. Basin Characteristics

The McAleer Creek basin is approximately eight square miles in size. However, the City of Shoreline portion, which contains a portion of McAleer Creek downstream of Lake Ballinger as well as multiple small tributary streams to McAleer Creek, is two square miles (1,377 acres), making up 26 percent of the basin area (as shown in Figure 1-1). The characteristics of the Shoreline portion of the McAleer Creek basin are described in this section, with context of the larger basin characteristics provided where necessary and relevant to the existing conditions and issues within Shoreline.

Shoreline has jurisdiction over 26% of the McAleer Creek Basin. Neighboring jurisdictions are Edmonds, Mountlake Terrace, and Lynnwood (upstream) and Lake Forest Park (downstream).

The McAleer Creek basin within the City of Shoreline spans portions of seven neighborhoods:

- Ballinger: East of Interstate 5 and north of NE 195th Street; 132 acre area containing the entire length of the City's McAleer Creek main stem and tributary areas.
- North City: East of Interstate 5 and south of NE 195th Street; 411 acre drainage including east-facing ravine slopes and upland areas, as well as numerous streams and wetlands tributary to Whisper Creek within the area east of 15th Avenue NE and north of NE Perkins Way.
- Echo Lake: Between Interstate 5 and Aurora Ave N, north of N 185th Street; 613 acre area including Echo Lake and areas draining to Lake Ballinger and the West Tributary.
- Hillwood: West side of Aurora Avenue N to Fremont Ave N; 146 acre headwater area draining to Echo Lake and Lake Ballinger.
- Richmond Highlands/Meridian Park: Small area (13 acres) of dense commercial development on the south side of N 185th Street on both the west side (Richmond Highlands) and east side (Meridian Park) of Aurora Avenue North; drains to Echo Lake.
- Briarcrest: Small area (29 acres) in the southeastern-most part of the City, east of 25th Avenue NE; headwater area with little formal drainage infrastructure.

3.1 Built Landscape

The type and location of the built environment influences how surface and stormwater runoff is conveyed across the landscape. This starts with how land is zoned by the City and what is allowed to be built according to that zoning. Table 3-1 summarizes statistics for current zoning within the City's portion of McAleer Creek basin.

Table 3-1. Zoning Statistics (as of 9/30/2015) within McAleer Creek Basin in Shoreline

Zoning Classification	Area of Basin within Zoning Class (Acres)	Percentage of Basin within Zoning Class	Percentage of Parcels within Zoning Class Currently Underdeveloped	Area of Underdeveloped* Parcels (Acres)
R6	773.7	56%	13%**	105
City or WSDOT Right of Way (ROW)	329.2	24%	49%	162
MB (Mixed Business)	71.1	7%	0%	0
MUR-70 (Mixed Use Residential, 70 feet high)	65.7	5%	Not calculated	Not calculated
R24	28.5	2%	0%	0
R48	19.3	1%	20%	3.9
Town Center	21.3	1%	Not calculated***	Not calculated***
R12	17.2	1%	28%	4.8
MUR-35 (Mixed Use Residential, 35 feet high)	11.8	<1%	Not calculated	Not calculated
CZ (Contract Zone)	9.4	<1%	0%	0
R18	7.3	<1%	40%	2.9
NB (Neighborhood Business)	4.9	<1%	0%	0
CB (Community Business)	11.0	<1%	0%	0
R4	3.1	<1%	0%	0
R8	3.5	<1%	68%	2.4
Total	*1,377*	*100%*	*N/A*	*281*

*"Underdeveloped" parcels were estimated based on a GIS analysis of parcel area relative to zoning area and current occupancy (single home, duplex, apartment, etc.). For instance, a parcel was assumed to be "underdeveloped" if the zoning class was R6, but the property size was 4 times as large as the minimum R6 property size (7,200 SF) with only one home on the parcel. Underdeveloped right-of-way was assumed to be pervious areas within the City right-of-way.

**Includes parcels that were rezoned to MUR-35 and MUR-70 in March 2015.

***Town Center parcels may be redeveloped from their current uses and are not necessarily "underdeveloped" at this time.

While land use could be considered as predominantly single-family residential (~57%), there are significant areas of dense commercial and multifamily development along the Aurora corridor near Echo Lake, along Ballinger Way and 15th Avenue NE east of Interstate 5, and in the northern portion of the North City business district (Figure 3-1).

Section 3.1.3 addresses potential future development, specifically within the pending Sound Transit Light Rail NE 185th Street Station Subarea and rail corridor.

The remaining areas of the basin not within the NE 185th Street Station Subarea can be generally considered to be built out according to current zoning. However, some parcels could be further developed under current zoning with corresponding increases in impervious area. Other potential sources of increased impervious area within the basin due to future development within current zoning could occur with the construction of accessory dwelling units (ADUs), remodeling to increase an existing building's footprint, entirely redeveloping a property, or other miscellaneous increases in impervious areas such as driveways, parking areas, decks, patios, walkways, outbuildings, etc.

Stormwater impacts from any significantly increase in impervious area would generally be mitigated by development regulations. The City of Shoreline has adopted Ecology surface water regulations for development (see Table 4-1). Current regulations require engineered flow control facilities for any development with new or replaced impervious area of 5,000 square feet or larger, and non-engineered on-site dispersion techniques for any development with new or replaced impervious area of 2,000 square feet or larger.

3.1.1 Age of Development

The McAleer Creek basin within Shoreline was largely built out by 1980, and most of the homes were constructed much earlier in the 1950s and 1960s (Figure 3-2). Infill development has been occurring in Shoreline over the past decade with new homes being constructed in older neighborhoods where large lots can be subdivided to accommodate new housing. To the north of Shoreline, the cities of Edmonds, Lynnwood, and Mountlake Terrace were also constructed in the same timeframe; as a result there are few stormwater management facilities to control flow or provide water quality treatment in the basin.

Why does the age of development matter?

Current stormwater practices were not in place when a large part of the McAleer Creek basin was constructed (including upstream in Lynnwood, Edmonds, and Mountlake Terrace,) resulting in few stormwater treatment facilities in the basin.

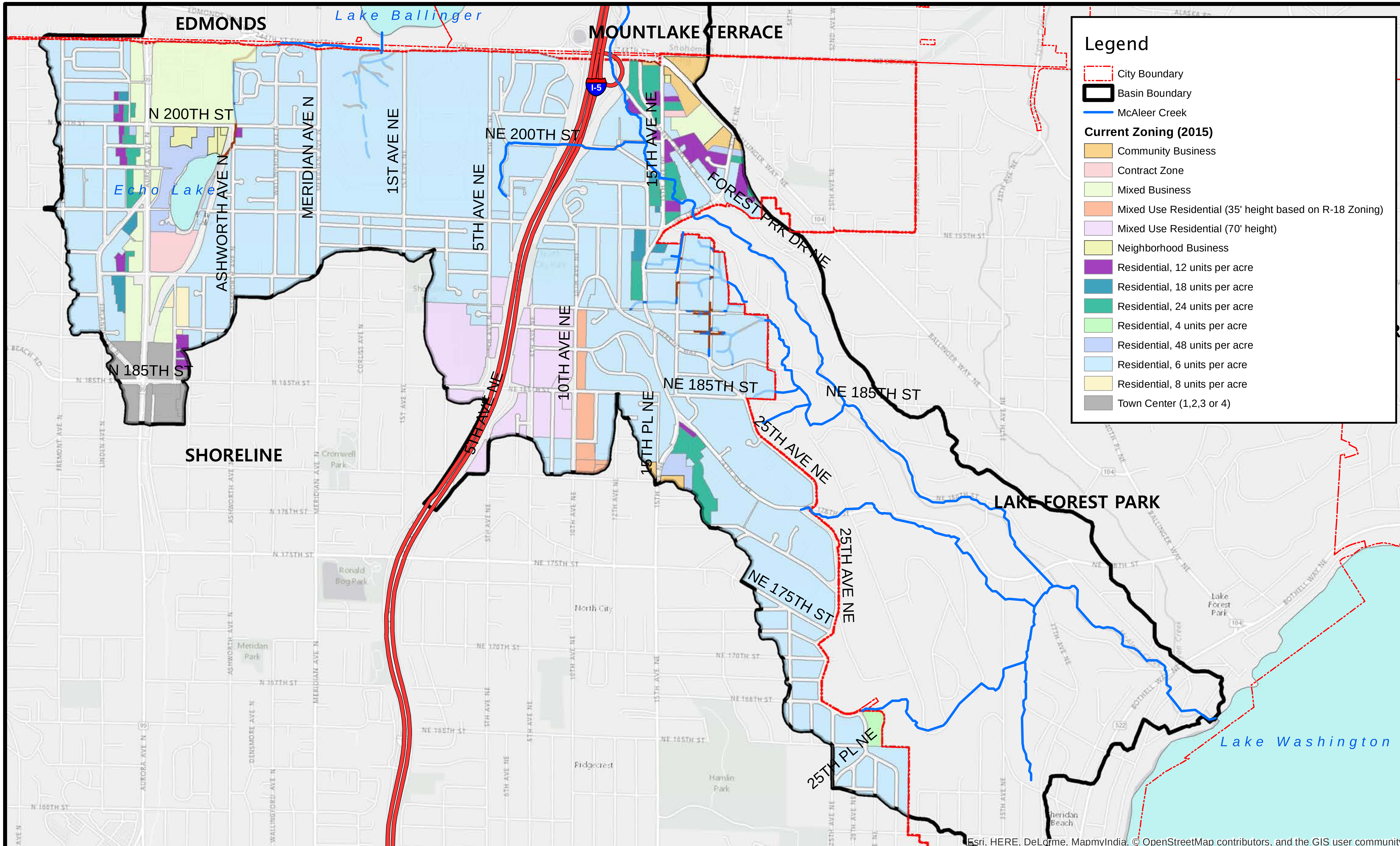
Under the Aurora Corridor Project, the City has been constructing transportation improvements and associated amenities along the full length Aurora Avenue North within the City. Improvements along the southernmost portion of Aurora Ave N within the McAleer Creek Basin from N 185th Street to N 192nd Street were completed in 2012. The remaining portion of work along Aurora from N 185th Street to N 205th Street – entirely within the McAleer Creek Basin -- is currently ongoing and expected to be complete by the end of 2015. The Aurora corridor improvements include new stormwater infrastructure and water quality treatment facilities.

Generally owing to age of development, there are relatively few private stormwater management facilities within the basin. Those that do exist likely provide little large-scale benefit in terms of flow control.

The portion of McAleer basin that is within Shoreline is approximately 40 percent impervious. Buildings, driveways, parking lots, and sidewalks make up 70 percent of the impervious surface coverage; the remaining 30 percent is road surfaces. The City's McAleer basin is crossed by two major multi-lane major north-south transportation corridors in Aurora Avenue North and Interstate 5, plus portions of numerous arterials including NE 205th Street, NE Ballinger Way, Meridian Avenue North, NE 185th Street, and 15th Avenue NE. Because these busy roadways must accommodate more traffic, they generally have several lanes, wider shoulders in some cases, and greater impervious surface than smaller local roads.

There are relatively few large undeveloped or lightly developed properties in the Shoreline portion of McAleer Creek Basin. The largest tracts of land that have some open space features are both just south of NE 205th Street between Meridian Ave N and 5th Avenue NE: the Holyrood Cemetery (75 acres), and the neighboring Ballinger Commons Apartments that were developed in a clustered format, leaving forested areas open space (73 acres). Smaller tracts of undeveloped or lightly developed lands can be found within North City Park, Shoreline Park, and Echo Lake Park; within Shoreline School District properties at Echo Lake School, the Shoreline Center, the North City School site, and the Cedarbrook School site; within the WSDOT ROW; within the Seattle City Light regional utility corridor; and within some continuous areas that are composed of portions of multiple private parcels.

Of the abovementioned underdeveloped or lightly developed properties, the following are adjacent to or within the 185th Street Station Subarea further discussed in Section 3.1.3: Shoreline Center, Shoreline Park, North City school site, North City Park, WSDOT ROW, and Seattle City Light regional utility corridor.



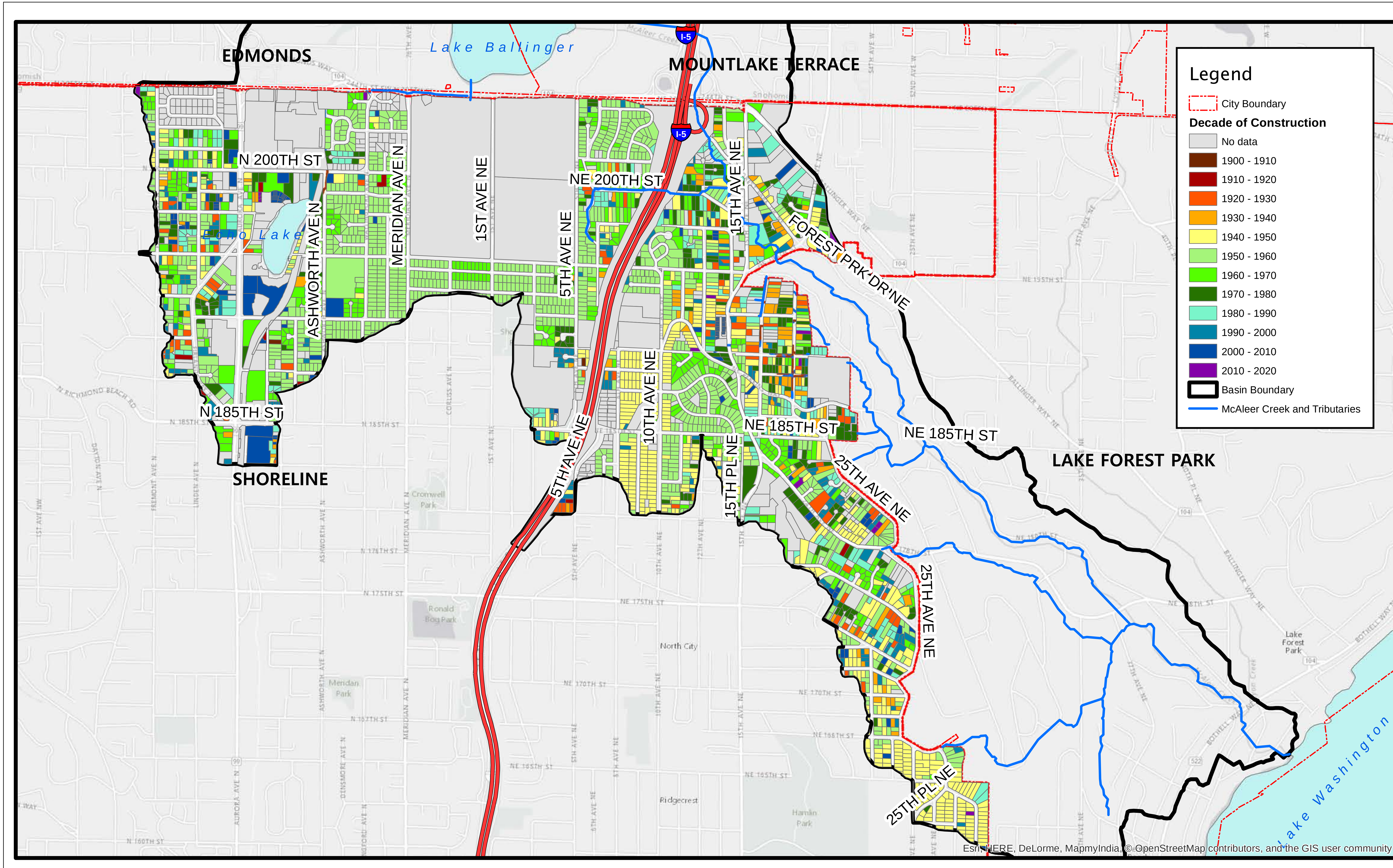
Prepared by E. Nelson 7/13/2015 revised C:\Users\Erin\Documents\ArcGIS\Shoreline GIS\Figure 3-1

AltaTerra Consulting LLC

0 650 1,300 2,600 Feet

N

Figure 3-1. McAleer Creek Basin Zoning



AltaTerra Consulting LLC

Figure 3-2. McAleer Creek Age of Housing Stock

3.1.2 Park Properties

Park properties can help provide surface and stormwater management functions through the (1) preservation of trees, vegetation, and wetlands that filter, transpire, and store water; (2) vegetated open spaces that allow for infiltration; and (3) public areas that provide opportunities for City-sponsored education and outreach events. The City parks in the McAleer basin are listed in Table 3-2.

Table 3-2. List of Parks in the McAleer Creek Basin in Shoreline

City Park	Location	Neighborhood	Size (Acres)
Echo Lake Park	1521 N 200th Street (N 199th Street and Ashworth Avenue N)	Echo Lake	2.4
Interurban Trail	East of Echo Lake and Aurora Avenue N	Echo Lake	Part of corridor
North City Park	19201 10th Avenue NE (NE 192nd Street and 10th Avenue NE)	North City	4.0
North Crosstown Connector Trail	NE 195th Street between 1st Avenue NE and Meridian Avenue NE	Echo Lake	1.8
Rotary Park	NE 185th Street and 10th Avenue NE	North City	0.3
Shoreline Park*	NE 192th Street and 1st Avenue NE	Echo Lake	4.7 (mostly within McAleer basin)

*Note: The City owns only a 4.7-acre parcel at the northern end of Shoreline Park. The southern half of Shoreline Park is owned by the Shoreline School District, including a portion of the park within the same parcel as the larger Shoreline Center site to the south. The combined Shoreline Center/Park site is approximately 39 acres (including the 4.7 acres of City-owned Park) and contains facilities administered by both the City and the Shoreline School District. City facilities include the Spartan Recreation Center and the Shoreline Pool; School District facilities include the district's administrative offices and Shoreline Stadium. The western side of this site drains to the Thornton Creek Basin; the eastern side (including the Shoreline Park soccer fields, Spartan Center, and Shoreline Stadium) drains to the McAleer Creek Basin.

3.1.3 Potential Future Development

In 2008, the region's voters approved the Sound Transit 2 (ST2) ballot measure, which included authorization to extend Link light rail service north of Seattle from Northgate to Lynnwood. Within the City of Shoreline, new light rail from the Lynnwood Link Extension will run along the east side of Interstate 5, with stations constructed at NE 145th Street and NE 185th Street. Approximately 7,200 feet of the new light rail corridor as well as the NE 185th Street Station and associated parking garage will be located within the City's McAleer Creek Basin. Sound Transit is currently preparing the Final Environmental Impact Statement (FEIS) for the Lynnwood Link Extension project. The design and permitting phase of this project is expected to start in 2015 and conclude in 2018, with construction completed and service to begin by 2023.

Surface water-related impacts related to the Lynnwood Link Extension project within the City's portion of McAleer Creek Basin are generally expected to be limited to the loss of some mature trees along the east side of the WSDOT ROW and a net increase in impervious area for the new light rail corridor, station, and garage. The Lynnwood Link Extension Draft Environmental Impact Statement (DEIS) Section 4.8.2 addresses expected long-term impacts from stormwater as follows:

Stormwater from all project-related impervious surfaces would receive appropriate flow control and treatment where required. The light rail alternatives would be designed to meet standards of the applicable jurisdictions, which must comply with the Washington State Department of Ecology (Ecology) Stormwater Management Manual for Western Washington. Based on the analysis for water resources (Section 4.9, Water Resources), none of the light rail alternatives would degrade water quality compared to existing conditions. It is possible, however, that discharges from detention facilities could result in increased water velocities and durations in receiving waters, potentially reducing the availability of forage and displacing juvenile salmonids from cover.

The City of Shoreline is facilitating a separate 185th Street Station Subarea planning process in order to accommodate and manage potential future increases in density of development in around station. This effort included studying re-zoning alternatives for the subarea, which generally consists of parcels within a half mile radius of the station plus additional areas extending west along NE 185th Street to Aurora and southeast to NE 175th Street and the North City business district, and excluding most parcels east of 11th Avenue NE.

A large portion of the subarea (approximately 180 acres) is within the West Tributary sub-basin of the McAleer Creek Basin. Additionally, four acres at the northeast corner of Aurora Ave N and N 185th Street is within the Echo Lake sub-basin. East of Interstate 5 in the immediate vicinity of the future station many of the existing drainage systems are notably informal or unconnected. Stormwater infrastructure in this area along NE 185th Street and 10th Avenue NE drains to a closed depression served by Pump Station 26 (identified as "MC03" in the December 2014 185th Street Station Subarea Planned Action Final Environmental Impact Statement (FEIS)).

Section 3.5 of the 185th Street Station Subarea FEIS evaluates potential utility (including stormwater) impacts for four re-zoning alternatives. For Alternative 4, the Preferred Alternative, the FEIS presents the following information:

- Section 3.5.2b estimates an overall 37% maximum increase in <u>unmitigated</u> runoff peak flow within the subarea for 25-year storm event. This prediction uses simplistic assumptions of a maximum build-out condition. The rational method (typically conservative/overestimating) was used to calculate peak flows.
- Section 3.5.3b (like the Lynnwood Link DEIS excerpt above) notes that redevelopment in the subarea will be done under the stormwater regulations provided by Ecology and subject to flow control and water quality requirements. However, the FEIS does not attempt to quantify the peak flow-mitigating effects of these regulations.
- Section 3.5.3c predicts that by 2035, 185th Street station subarea redevelopment will require upgrading Pump Station 26 (MC03) and installing or replacing approximately 12,000 linear feet of stormwater conveyance (pipes, ditches, and/or bioretention swales) within the McAleer Creek Basin.

The McAleer Creek Basin long-term surface water impacts related to the 185th Street Station Subarea redevelopment are difficult to assess on a detailed level due to a number of unpredictable factors, such as the specific locations, scale, sequence, and timeframe of redevelopment; future evolution of stormwater regulations; and feasibility of future regional stormwater facilities and/or broad usage of small-scale bioretention and infiltration facilities.

Generally in the long-term future one would generally expect widespread redevelopment-driven improvements to stormwater infrastructure within the subarea. The net result of the combination of increases in impervious surface and upgrades to stormwater infrastructure could generally be expected to result in improved stormwater quality and higher levels of service for subarea drainage system, although there may be increased in peak flows at downstream locations under some conditions. It would be a worthwhile effort for the City to further investigate long-term surface water-related planning needs and potential impacts of future redevelopment within the subarea.

On March 16, 2015, the City adopted updated zoning for NE 185th Street Station Subarea (Figure 3-1). The adopted zoning is a modified version of the Preferred Alternative (number four) presented in the FEIS. Major differences between FEIS Preferred Alternative 4 and the final adopted zoning include:

- Adopted re-zoning is divided into three phases: Phase 1 (implemented immediately) generally includes the core area within a quarter-mile radius of the station as well as corridors along N 185th St and southeast to the North City business district. Phases 2 and 3, to be implemented in 2021 and 2033, respectively, add areas north and south of the Phase 1 core area.
- Adopted zoning excludes the North City School site from rezoning.
- Adopted zoning for core areas are rezoned to MUR-70. In the preferred alternative, these areas were shown as MUR-85, which would have allowed structures up to 85 feet in height.

3.2 Topography

Approximate elevations within the McAleer Creek main stem range from a high point of 460 feet above mean sea level in Lynnwood to a low point of 30 at the mouth of the creek at the northern end of Lake Washington within the City of Lake Forest Park. The relatively short length of the McAleer Creek main stem within the City of Shoreline ranges in elevation from 268 feet where the creek enters the City (within the southeast cloverleaf of the Interstate 5-NE 205th Street interchange) to 226 feet, just north of NE 196th Street where the creek exits the City.

Elevations within the overall City tributary basin areas vary from a maximum of 506 feet near Fremont Avenue N and N 195th Street on the western boundary of the basin to a minimum of 224 feet within Whisper Creek at the northeast corner of the Cedarbrook school property.

Topographic contours of the area shows the steep slopes above McAleer Creek on the east side of the City and the smaller tributary channels and ravines that enter the main stem from the west upland areas (Figure 3-3).

3.3 Geology and Geomorphology

Surface and subsurface geologic conditions influence topography, erosional processes, and surface and ground water flow both regionally and locally at the basin scale. The modern-day Puget Sound landscape is the result of continental glaciation of the Cordilleran Ice Sheet, with the maximum extent of the last glacial episode (known as the Vashon Stade of the Fraser Glaciation) occurring nearly 14,000 years ago (Thorson, 1980). Most of the surficial geologic deposits in the Puget Sound region are associated with the Vashon Stade. The glacial deposits mapped in the McAleer Creek basin are described below.

Geologic information available in the vicinity of the McAleer Creek basin was reviewed in preparation of this basin plan and geomorphic conditions were qualitatively evaluated during field reconnaissance of the basin's stream channels.

3.3.1 Geology

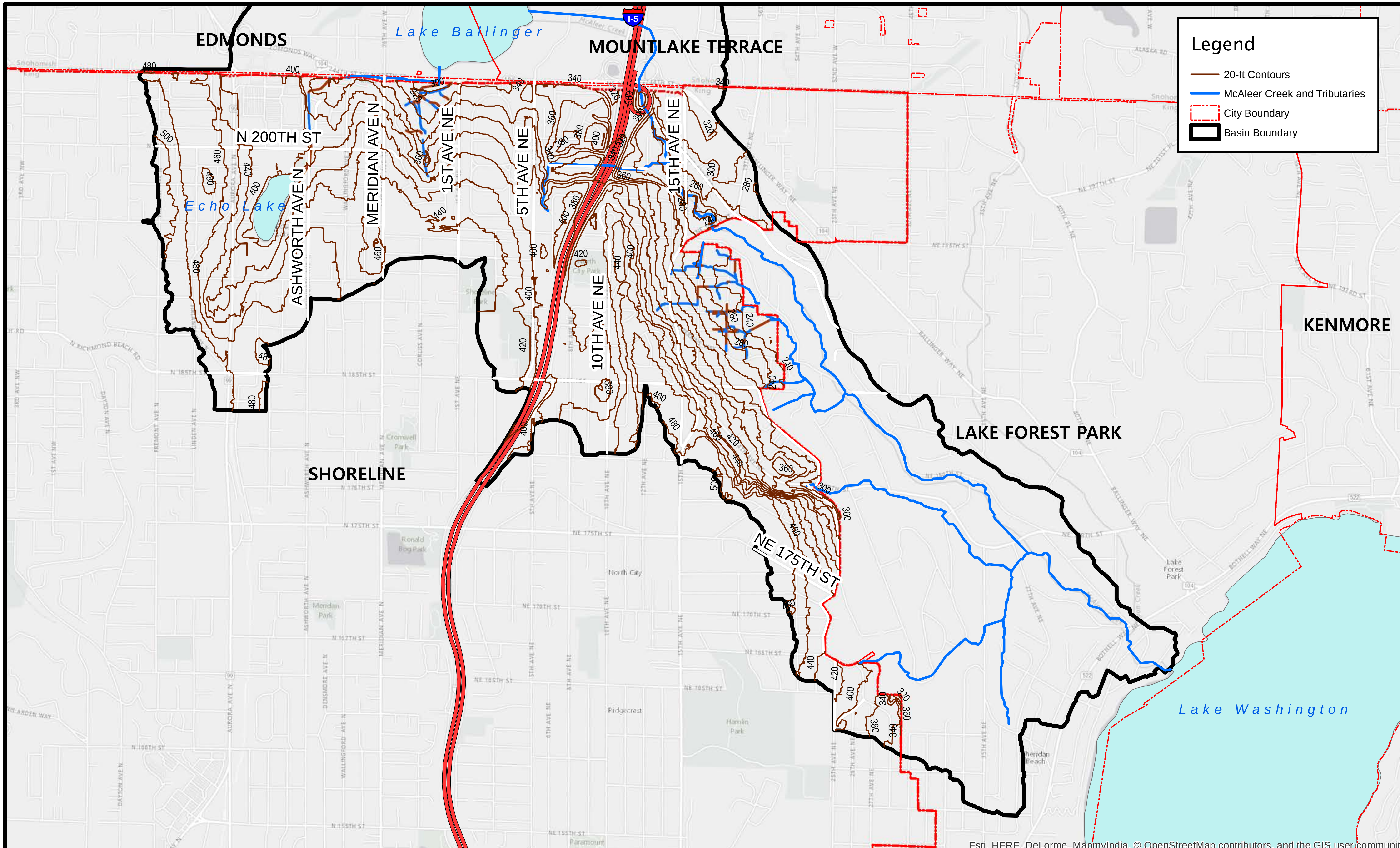
The surficial geologic conditions in the Shoreline portion of the McAleer Creek basin consist primarily of Quaternary-age glacial till deposits in the higher elevations near Echo Lake and Quaternary-age Advance Outwash deposits in the ravines adjacent to and east of Interstate 5, with a narrow ribbon of recessional outwash and younger alluvium around the McAleer Creek main channel. The advance outwash deposits are typically underlain by Quaternary-age Transitional Beds (Figure 3-4) as mapped by J. P. Minard (United States Geological Survey 1983). North of Shoreline, surficial deposits include glacial till and recessional outwash deposits on top of the till, including in the vicinity of Lake Ballinger.

What is the impact of geology on surface water runoff?

Geologic conditions affect how much water runs off the landscape naturally, how much is infiltrated, and how easily streams and hill slopes are eroded. The geologic conditions in the eastern part of Shoreline's portion of the McAleer Creek basin are generally good for surface water infiltration. However, the infiltrative geologic unit is not very thick where it crops out in the basin and sits on top of geologic material that does not infiltrate well. This can cause seepage when the ground becomes saturated.

Available boring log and test pit data were reviewed on the Washington Interactive Geologic Map (https://fortress.wa.gov/dnr/geology/ accessed on January 3, 2015) in the vicinity of McAleer Creek to obtain a better understanding of subsurface geologic conditions and how the geologic conditions influence surface and groundwater flow in the basin.

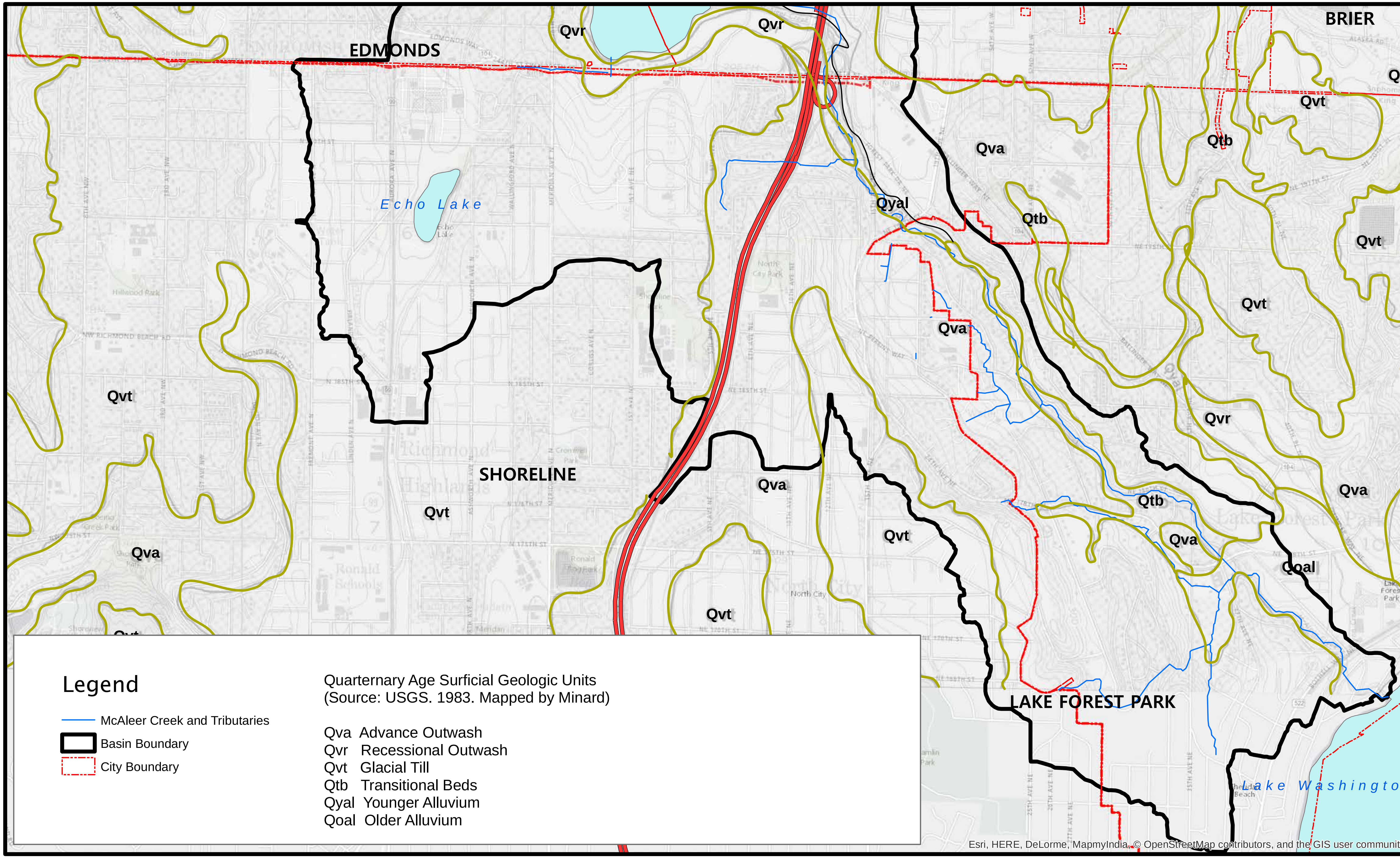
Borings and test pits generally confirm the overall basin surficial conditions described above.



Prepared by E. Nelson 7/13/2015 revised C:\Users\Erin\Documents\ArcGIS\Shoreline GIS\Figure 3-3

AltaTerra Consulting LLC

Figure 3-3. McAleer Creek Basin Topography



Prepared by E. Nelson 7/14/2015 revised C:\Users\Erin\Documents\ArcGIS\Shoreline GIS\Figure 3-4

AltaTerra Consulting LLC

0 650 1,300 2,600 Feet

N

Figure 3-4. McAleer Creek Surficial Geology

3.3.2 Geomorphology

During field reconnaissance in July 2014, most of the open channel sections of McAleer Creek between NE 196th Street and the WSDOT ROW were walked and qualitatively evaluated.

The main channel of McAleer Creek within the City of Shoreline flows northwest to southeast from NE 205th Street to NE 196th Street. At the bottom of the embankment on the north side of NE 196th Street, an in-stream flow control structure (consisting of a small concrete dam with slide gate) creates what is known as the McAleer Creek Regional Detention Pond. The structure is designed to store water up to 4.6 acre-feet of water upstream of NE 196th Street in McAleer Creek and its floodplain.

3.3.2.1 Main stem McAleer Creek NE 196th Street to 15th Avenue NE (downstream to upstream)

For approximately 500 feet upstream of NE 196th Street, the channel consists of shallow pools and riffles with small gravel and sand substrate. Channel widths range from 12 to about 20 feet in this area, with an area of bank erosion on the right bank or south side of the channel (this erosion is to be addressed in 2015 by the City's Goheen Revetment Repair project). Further upstream towards 15th Avenue NE, McAleer Creek flows through a large apartment complex (Forest Creek Apartments). The stream channel has a much different character in this area: width is as narrow as six feet in places, with depth ranges from four to five feet. Clay (Quarternary age transitional beds) was observed in the streambed at this location. A tributary channel originating from a private detention pond (PD-22) at 1512 NE 196th Street joins McAleer Creek downstream of the apartment complexes from the right bank (this channel had significant flow on the day of the field visit). Log weirs providing channel grade control were observed in the reach immediately downstream of 15th Avenue NE.

3.3.2.2 Main stem McAleer Creek 15th Avenue NE to Confluence with West Tributary McAleer Creek (downstream to upstream)

Upstream of 15th Avenue NE to approximately the confluence with the West Tributary, McAleer Creek flows through a large wetland area (Wetland M6 as described in Section 3.8), with plentiful gravel and woody debris. The channel has room to migrate through the wide open floodplain in this reach.

3.3.2.3 Main stem McAleer Creek Confluence with West Tributary to Forest Park Drive NE (downstream to upstream)

Upstream of the West Tributary, McAleer Creek is characterized by rock-armored banks bordered by manicured backyards that abut the stream channel on both sides. This open reach ends at a large culvert (70 inch diameter) crossing Forest Park Drive NE.

McAleer Creek exits Lake Ballinger within the City of Montlake Terrace approximately 3,600 feet upstream of this location. From the lake, the creek crosses Nile Temple Golf Course (1,600 feet) and traverses the Interstate 5 right-of-way owned by WSDOT (2,000 feet). Approximately 550 feet of the creek within the WSDOT ROW south of NE 205th Street are also within the City of Shoreline, including about 200 feet of open channel. This portion of McAleer Creek was not included in the July 2014 field reconnaissance.

3.3.2.4 West Tributary McAleer Creek

The west tributary of McAleer Creek is piped entirely from NE 200th Street to its confluence with the main stem of McAleer Creek. Upstream of Interstate 5, it is contained in a series of ditches or half-pipes and there is no natural stream flow in any part of the system.

3.3.2.5 Echo Lake Creek

Echo Lake Creek is piped from its outlet from Echo Lake to an outfall into an asphalt-lined ditch on the eastern edge of privately owned commercial property in the Aurora Village Shopping Center. It enters a piped system again prior to crossing NE 205th Street and outfalling to Lake Ballinger. The ditch segment on the east side of Aurora Village was filled with trash and other debris and overgrown with vegetation at the time of the field reconnaissance; adjacent areas appear to have been used by homeless individuals as an illegal encampment.

3.3.2.6 Whisper Creek and Tributaries

Whisper Creek and multiple other tributary channels to McAleer Creek can be found within the area east of 15th Avenue NE, north of NE 185th Street, and south of NE 195th Street. This collection of channels consists of various roadside ditches, artificial channels, and natural channels that collect flow from wetlands, seeps, and springs from the hill slope to the west. Most of these channels are no wider than two feet.

3.3.2.7 Un-named Tributary Channel to Lake Ballinger

An un-named tributary channel to Lake Ballinger located within the Ballinger Commons Apartment complex south of NE 205th Street and east of Meridian Ave N was not included in the July 2014 field reconnaissance because access from private property owners was not granted.

3.4 Surface Water

Echo Lake and McAleer Creek are the primary surface water features in the basin. Echo Lake does not discharge directly into McAleer Creek, but rather joins McAleer Creek at Lake Ballinger in Mountlake Terrace to the north via an un-named tributary channel that is partially piped.

There are approximately 2.8 miles of open stream channel present in the portion of the basin within Shoreline. The McAleer Creek main stem is open channel for about a half mile within the City; the remaining 2.3 miles of open channel are small tributary streams.

Approximately 1.5 miles of stream channel are mapped as piped; only about 0.1 mile of this is the McAleer Creek main stem. There are several piped portions throughout the basin mainly associated with small tributary streams (Figure 3-5). The main stem of McAleer Creek is not piped for long segments, with the exception of roadway culverts.

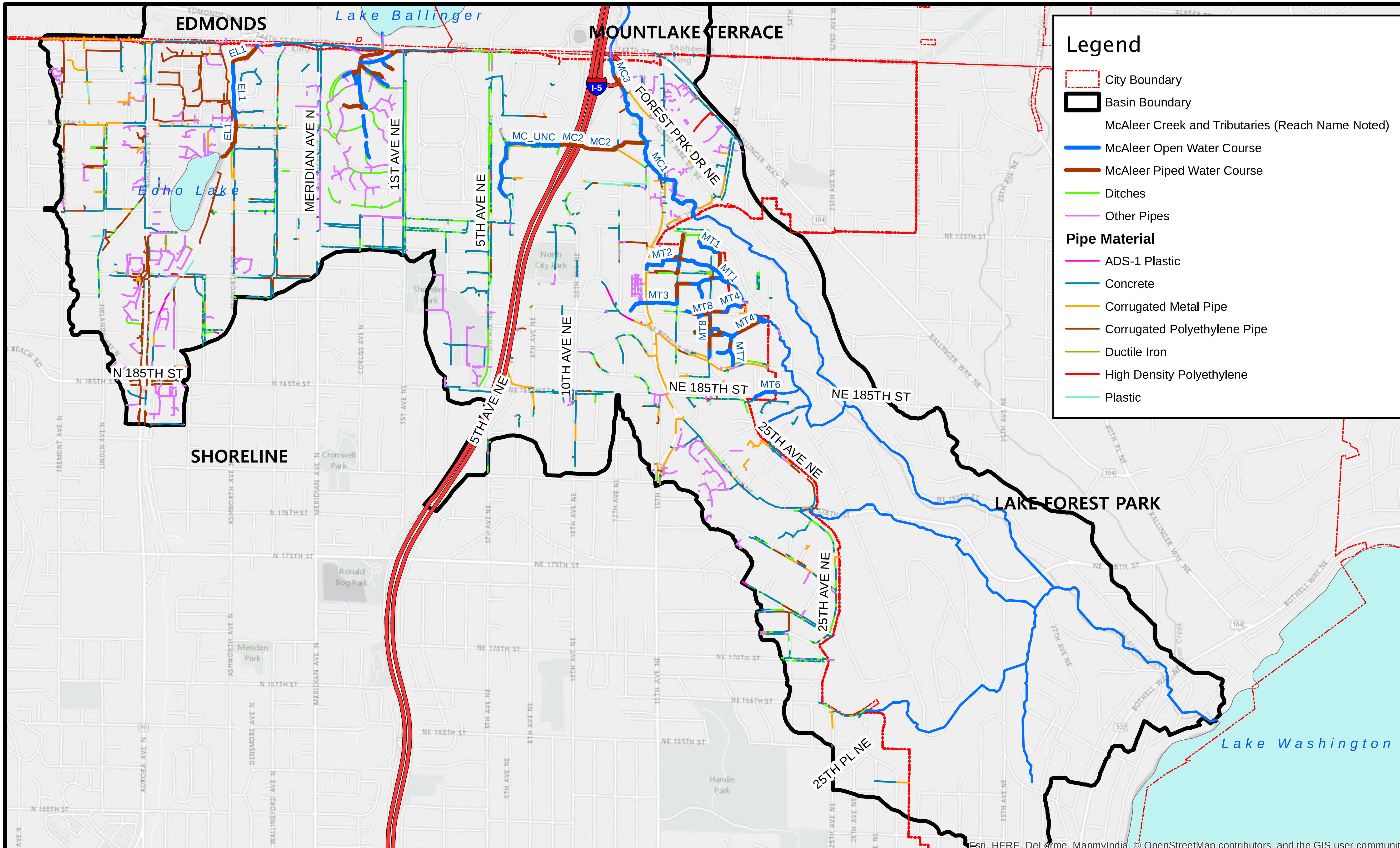
A Hydrologic Simulation Program-Fortran (HSPF) model was developed for the portion of the McAleer Creek Basin that drains directly to McAleer Creek by the City of Lake Forest Park in 2009 (Otak 2009). The HSPF was used to determine 25-year and 100-year flow frequencies for McAleer Creek and import them into a hydraulic model developed for McAleer Creek in this basin plan to identify existing flooded areas and prepare a preliminary 100-year floodplain map for McAleer Creek. The hydraulic model used for the flooding analysis was the United States Army Corps of Engineers Hydraulic Engineering Center River Analysis System (HEC-RAS) Version 4.1.0. The hydrologic and hydraulic modeling memorandum is included in Appendix A.

Flow frequency data from the 2009 HSPF hydrologic model ranged from around 73 cubic feet per second (cfs) for the 2-year flow up to around 240 cfs for the 100-year flow downstream of the control structure at NE 196th Street (Table 3-3). Because the basin is largely built out and new development and redeveloped properties would be required to control stormwater flows according to current stormwater regulations (Section 4), it was assumed that future conditions would not vary much from the 2009 model or existing conditions, and therefore a future conditions scenario was not modeled.

The stormwater collection and conveyance system outside of the McAleer Creek main stem (including smaller tributary streams) was not included in the present surface water modeling effort.

Table 3-3. McAleer Creek Estimated Flow Data

Location	Flow (cfs)*		
	2-year	25-year	100-year
NE 205th Street	73.17	110.60	125.88
Forest Park Drive NE	72.96	110.30	125.57
15th Avenue NE	72.92	110.35	125.69
NE 196th Street	93.14	178.00	240.96



AltaTerra Consulting LLC

0 650 1,300 2,600 Feet

N

Figure 3-5. McAleer Creek Open Channel and Piped Drainage Network

3.4.1 Flooding

The hydraulic analysis conducted for this basin plan indicates that culverts and bridges on the McAleer Creek main stem are not flooded at the 25-year or 100-year flows (Table 3-4).

Table 3-4. HEC-RAS Modeling Results for McAleer Creek Culverts and Bridges within Shoreline

Location	Type of flooding	
	25-year Flow	100-year Flow
Forest Park Drive Culvert	No flooding	No flooding
15th Avenue NE Culvert	No flooding	No flooding
Forest Creek Apartments Bridge	No flooding	No flooding

Figure 3-6 presents the potential floodplain during 25-year and 100-year events based on the HSPF modeling results. This map is for planning purposes only and provides the City a general idea of what areas adjacent to the McAleer Creek channel might be at risk of flooding during a major storm event. The current modeling results approximately confirm the existing Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) map number 53033C0043F (last revised 5/16/1995), which calls out the 100-year flood as contained within the creek channel.

While the HSPF model for the basin did not predict any major flooding along the McAleer Creek main stem, the piped drainage network and smaller tributary streams were not modeled. Based on input from City staff and service requests, there appear to be some areas prone to local flooding issues. The two most problematic areas are:

- Near the intersection of NE 200th Street and 6th Avenue NE; and
- The area east of 15th Avenue NE, north of NE 185th Street, and south of NE 195th Street

Six locations within the basin are on the City's stormwater operations and maintenance "hot-spot" list to check before or during heavy rain events due to recurring drainage issues. The six locations are:

- Echo Lake outlet pipe (within Echo Lake Park at 1521 N 200th Street): check for debris.
- Intersection of 6th Avenue NE and NE 200th Street and half-pipe ditch along 6th Ave NE to south: prone to localized flooding, inspect culvert, check for debris.
- McAleer Creek Regional Detention Pond (NE 196th Street): check control structure for debris
- Half-pipe ditch along 25th Avenue NE from NE 175th Street to NE 178th Street: check for debris.
- Pump Station 26 (10th Avenue NE and NE 185th Street): verify adequate pump function.
- Ditch at 19218 12th Avenue NE: Check for debris/blockage.

The McAleer Creek Regional Detention Pond control structure at NE 196th Street was evaluated to assess potential impacts if the control structure were to be removed. Results of the analysis are included in the Modeling Memorandum (Appendix A, Section IV).

OSBORN CONSULTING INCORPORATED

ET

Prepared by MLP, 12/17/2014

Figure 3-6. Preliminary 100-year Floodplain Map for McAleer Creek

Shoreline, WA

3.4.2 Rainfall

The National Oceanic and Atmospheric Administration (NOAA) has collected weather data for the Seattle area continuously since 1948. Table 3-5 lists the 10 greatest precipitation events within a 24-hour period in Seattle. The gauge for these data is located at Seattle-Tacoma International Airport, approximately 25 miles south of the basin plan area. Weather patterns vary greatly even between short distances, so while these precipitation statistics may not be directly applicable to the McAleer Creek basin area within the City of Shoreline, they do give an idea of regional precipitation history. Of the 10 precipitation events, seven have occurred since 1990, and five have occurred since the City's incorporation in 1995.It should also be noted that occurrences and magnitudes of flooding are not necessarily correlated with the size of the 24-hour precipitation event. Flooding may occur during events that would not appear as a large 24-hour precipitation event, such as short-duration high-intensity rainfalls, multiple-day lower-intensity storms, snowmelt-related events, or due to debris blockages or other capacity restrictions.

Table 3-5. Ten Greatest Precipitation Events in Seattle between 1948 and 2014

Date	Inches of Precipitation in 24 hours
October 2003	5.02
December 2007	3.77
November 1959	3.41
November 2006	3.29
February 1996	3.06
November 1998	3.04
January 1986 (tie)	2.98
February 1951 (tie)	2.98
November 1990	2.95
November 1990	2.93

3.5 Groundwater

Geologic conditions within Shoreline in the area east of 15th Avenue NE, north of NE 185th Street, and south of NE 195th Street result in shallow groundwater and seepage because water does not readily infiltrate into clay and silty soils that are likely present beneath sandy soils (see Figure 3-4).

3.6 Stormwater Infrastructure

The City and private property owners maintain a series of pipes, ditches, and connecting structures (i.e., catch basins and manholes) that convey and route stormwater through the basin away from houses, road surfaces, and parking lots (Figure 3-5), as well as stormwater treatment facilities designed to provide water quality improvement and reduce high flows. This stormwater infrastructure is connected to the natural channel network, including McAleer Creek and other tributary channels. The condition of City-owned pipes in the McAleer Creek basin was assessed through video inspection using closed-circuit television (CCTV) technology. Table 3-6 summarizes the conveyances that are present in the basin.

Table 3-6. Summary of Conveyance Types, Materials and Lengths

Conveyance Type	Material	Owner		Total Approximate Linear Feet
		Private	City of Shoreline or Unknown	
Open Channel	N/A	Not specified		***14,884***
Ditch	N/A	Not specified		***37,717***
Pipe	ADS-1	333	1091	***1,424***
	Aluminum	0	107	***107***
	Corrugated metal pipe (CMP)	2,241	22,772	***25,013***
	Concrete	1,123	73,218	***74,341***
	Corrugated plastic pipe (CPP)	2,282	27,517	***29,799***
	Ductile Iron (DI) or high density polyethylene (HDPE)	11	942	***953***
	Plastic	0	3,211	***3,211***
	Not specified	32,242	22,620	***54,862***
	Total Conveyance Length	***38,232***	***151,478***	***242,311***

3.6.1 Stormwater Treatment Facilities

The McAleer Creek basin within Shoreline has a number of stormwater treatment facilities catalogued in the City's GIS database, including stormwater ponds, detention vaults and tanks, and low-impact development features (LID), including bioretention and infiltration facilities. For this basin planning effort, detailed information for individual facilities was not reviewed. Tables 3-7 and 3-8 list the facilities and locations of stormwater ponds and vaults in the McAleer Creek basin and Figure 3-7 shows the area treated by these facilities. Detention tanks and infiltration pipes, which are typically smaller and more numerous facilities throughout the basin, are not listed here.

Table 3-7. Stormwater Ponds

Facility ID	Address	Neighborhood	Approximate Size (square feet)
PD-10 (Pump Plant 26)	18331 10th Avenue NE	North City	7,523
PD-17	19223 Densmore Avenue N	Echo Lake	4,807
PD-20 (Forest Creek Condos)	19814 15th Avenue NE	Ballinger	660
PD-21 (Park Place Condos)	19814 15th Avenue NE	Ballinger	1,234
PD-22	1512 NE 196th Street	Ballinger	2,842
PD-28 (Ballinger Commons Condos)	2405 N 202nd Place	Echo Lake	16,483

Facility ID	Address	Neighborhood	Approximate Size (square feet)
PD-29 (Ballinger Commons Condos)	2405 N 202nd Place	Echo Lake	21, 943
PD-30 (Ballinger Commons Condos)	2405 N 202nd Place	Echo Lake	3,525
PD-31 (Ballinger Commons Condos)	2405 N 202nd Place	Echo Lake	16,809
PD-32 (Ballinger Commons Condos)	2405 N 202nd Place	Echo Lake	8,003
PD-42	17910 23rd Ct NE	North City	6,583
PD-43	18121 24th Avenue NE	North City	1,275
PD-44	18117 24th Avenue NE	North City	2,033
PD-45	20028 15th Avenue NE	North City	1,039
PD-50	1614 N 203rd Place	Echo Lake	905
PD-51	N 203rd Place	Echo Lake	1,350

Table 3-8. Stormwater Vaults

Facility ID	Address	Neighborhood
VT-3	1601 N 201st Street	Echo Lake
VT-4	2420 N 202nd Place	Echo Lake
VT-8	919 NE 185th Street	North City
VT-20	1130 N 185th Street	Echo Lake
VT-21	926 N 199th Street	Hillwood
VT-32	19250 Aurora Avenue N	Echo Lake
VT-33	19250 Aurora Avenue N	Echo Lake
VT-41	20128 Whitman Avenue N	Hillwood
VT-46	18420 Aurora Avenue N	Meridian Park
VT-47	18827 Midvale Avenue N	Echo Lake
VT-50	20010 Aurora Avenue N	Echo Lake
VT-55	1022 N 192nd Street	Hillwood
VT-56	18843 Midvale Avenue N	Echo Lake
VT-59	19921 Sunnyside Drive N	Echo Lake
VT-60	20155 Bagley Drive N	Echo Lake
VT-62	1849 N 203rd Street	Echo Lake
VT-63	20040 15th Avenue NE	Ballinger
VT-71	1160 N 192nd Street	Echo Lake

Facility ID	Address	Neighborhood
VT-76	20068 15th Avenue NE	Ballinger
VT-78	1607 N 202nd Place	Echo Lake
VT-84	18843 Midvale Avenue N	Echo Lake
VT-102	19937 Aurora Avenue N	Hillwood
VT-108	20105 Sunnyside Drive N	Echo Lake
VT-111	N 202nd Place and Bagley Drive N	Echo Lake
VT-121	1225 N 200th Street	Echo Lake
VT-122	1130 N 185th Street	Echo Lake
VT-141	1601 N 201st Street	Echo Lake

Low impact development (LID) features can be found at following locations:

- Bioretention facilities
  - East side of Ashworth Avenue N from N 190th Street to N 192nd Street
  - Selected locations along Aurora Avenue North corridor
- Bioinfiltration facilities
  - 17 facilities totaling 0.4 acres throughout the basin, many on private property
- Filterra® tree boxes along the Aurora Avenue N corridor
- Permeable pavements, typically small areas only including:
  - East side of Ashworth Avenue N from N 190th Street to N 192nd Street (pervious concrete for some sidewalk and parking pullouts)
  - Sidewalk on north side of N 185th Street east of Aurora Avenue N (permeable pavers)
  - Pedestrian trail throughout Echo Lake Park (porous asphalt)
  - 1176 N 198th Street

3.6.2 Condition Assessment

The condition assessment included inspection of all pipes with a diameter of 12 inches or more in the McAleer Creek basin within the City (ROW) boundaries, with the exception of new pipes recently installed in the Aurora corridor. Everson Econo-Vac (Everson) was the vendor selected to inspect the pipes using CCTV and rate the pipes. Everson began the CCTV inspections in May 2014 and completed the final inspections in November 2014. The CCTV inspection videos and reports were processed and organized and the City's GIS database was updated with the inspection results. Pipes between 25 and 50-feet in length were not inspected using CCTV and the NASSCO rating system, rather through a visual inspection called "candling." Everson shone a flashlight down the length of the culvert and noted any deficiencies which were visible. These pipes were assigned ratings based on the notes provided. A memorandum documenting the condition assessment procedures and results is provided in Appendix B.

> *How is the condition assessment data used?*
>
> *The City uses the condition assessment results in its asset management program for which it schedules repair, replacement, and maintenance of City assets including stormwater pipes. Pipes that are identified as needing repair or replacement are prioritized and scheduled for that work. Recommended projects to repair pipes are included in Section 5.*

The CCTV inspection included a qualitative inspection rating following the industry standard National Association of Sewer Service Companies (NASSCO) system of rating. The rating system includes three categories: structural, maintenance, and overall pipe conditions. The Structural Pipe Rating (SPR), Maintenance Pipe Rating (MPR), and Overall Pipe Rating (OPR) are based on the sum of the defects (ranging from a score of 0 to 5 per defect) found in each pipe segment in each category, resulting in scores of 0 and above. The rating criteria per individual defect are shown in Table 3-9.

The pipes were also compared using rating indices. The Structural Pipe Rating Index (SPRI), Maintenance Pipe Rating Index (MPRI), and Overall Pipe Rating Index (OPRI) represent the average of the individual defect scores for all of the defects found in a particular pipe segment, resulting in scores on a 0 to 5 scale.

Table 3-9. NASSCO Rating Criteria per defect

NASSCO Score	Description	Estimated Time to Failure
0	EXCELLENT: no defects	Unlikely in the foreseeable future
1	EXCELLENT: minor defects	Unlikely in the foreseeable future
2	GOOD: defects that have not begun to deteriorate	20 years or more
3	FAIR: moderate defects that will continue to deteriorate	10 to 20 years
4	POOR: severe defects that will become grade 5 defects within the foreseeable future	5 to 10 years
5	IMMEDIATE ATTENTION: defects requiring immediate attention	Has failed or will likely fail within the next 5 years

Table 3-10 summarizes the number of pipes and structure inspected by Everson, and Table 3-11 lists the number of pipes within each rating category. Fifty-seven pipes were candled resulting in 1,749 linear feet of pipe that were assessed in this manner, rather than CCTV.

Many of the pipes in the McAleer Creek basin are in poor structural condition, with 25 percent having an SPR rating of five or greater. While some of these SPR scores may simply indicate multiple minor defects, many of the scores indicate serious structural flaws and will require repair in the near future. Specific pipes and recommendations for the type of immediate action needed is summarized in Section 5.

Additionally, many of the pipes in the McAleer Creek basin are in poor maintenance condition, with 37 percent scoring five or greater for MPR. While some of these MPR scores may be indicative of multiple minor maintenance issues, many will require maintenance in the near future (typically needing intensive cleaning efforts). Many of the pipes with high MPR ratings were unable to be completely inspected or may have structural defects not visible (for instance obscured by sediment, debris, or standing water). It should be expected that additional structural defects will likely be observed in high-MPR pipes once they have been cleaned to a level that will allow complete inspection.

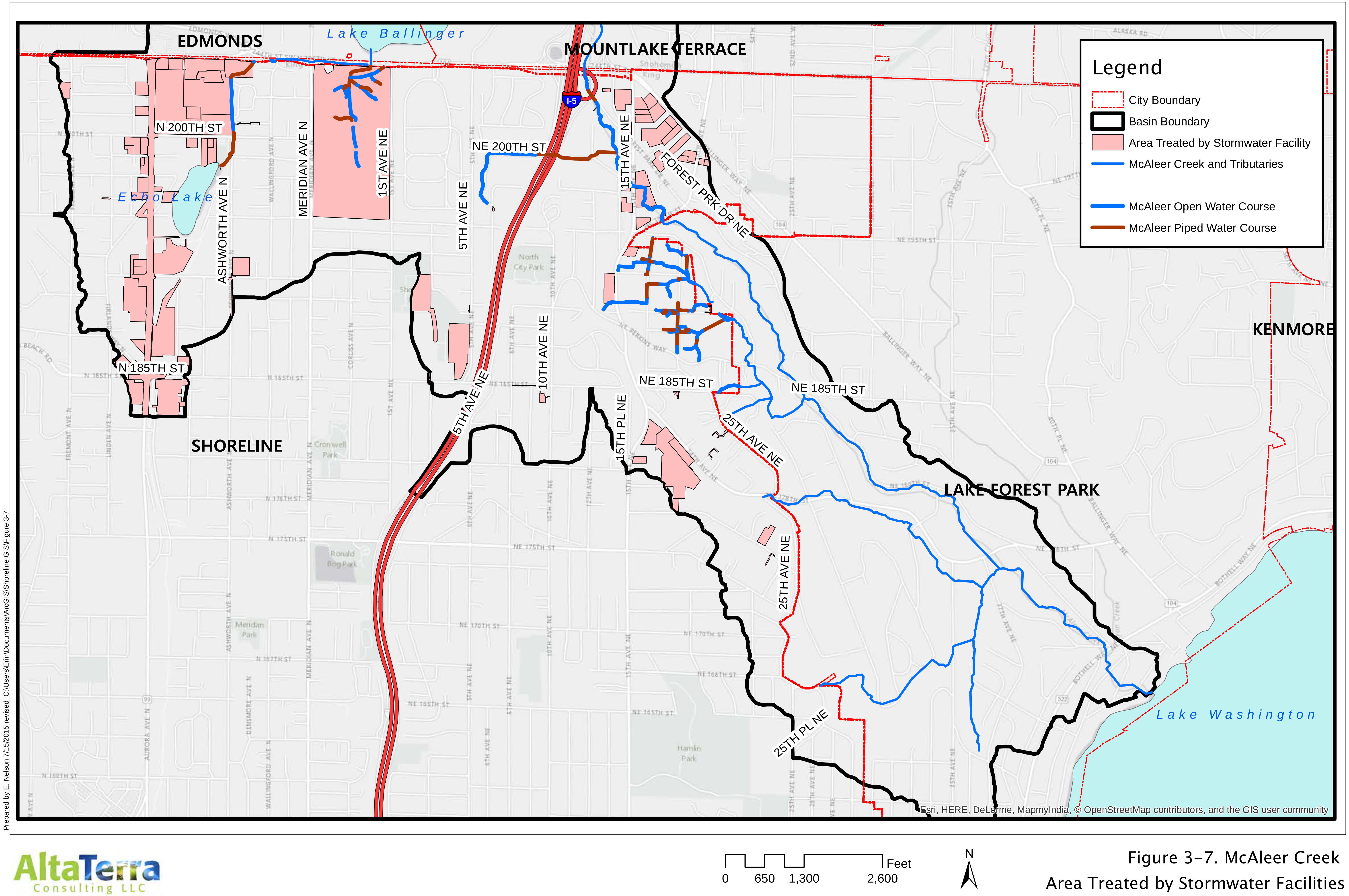
Figure 3-8 shows all the pipes in the Shoreline portion of McAleer Creek basin with pipes scoring a 5 or higher in SPR and MPR highlighted.

Table 3-10. Summary of Pipes and Structures Inspected by CCTV in McAleer Creek Basin

Number of Pipes	Number of Structures	Length of Inspected Pipes (linear feet)	% of Total Pipes Inspected in Basin
1,221	2,267	93,401	~50

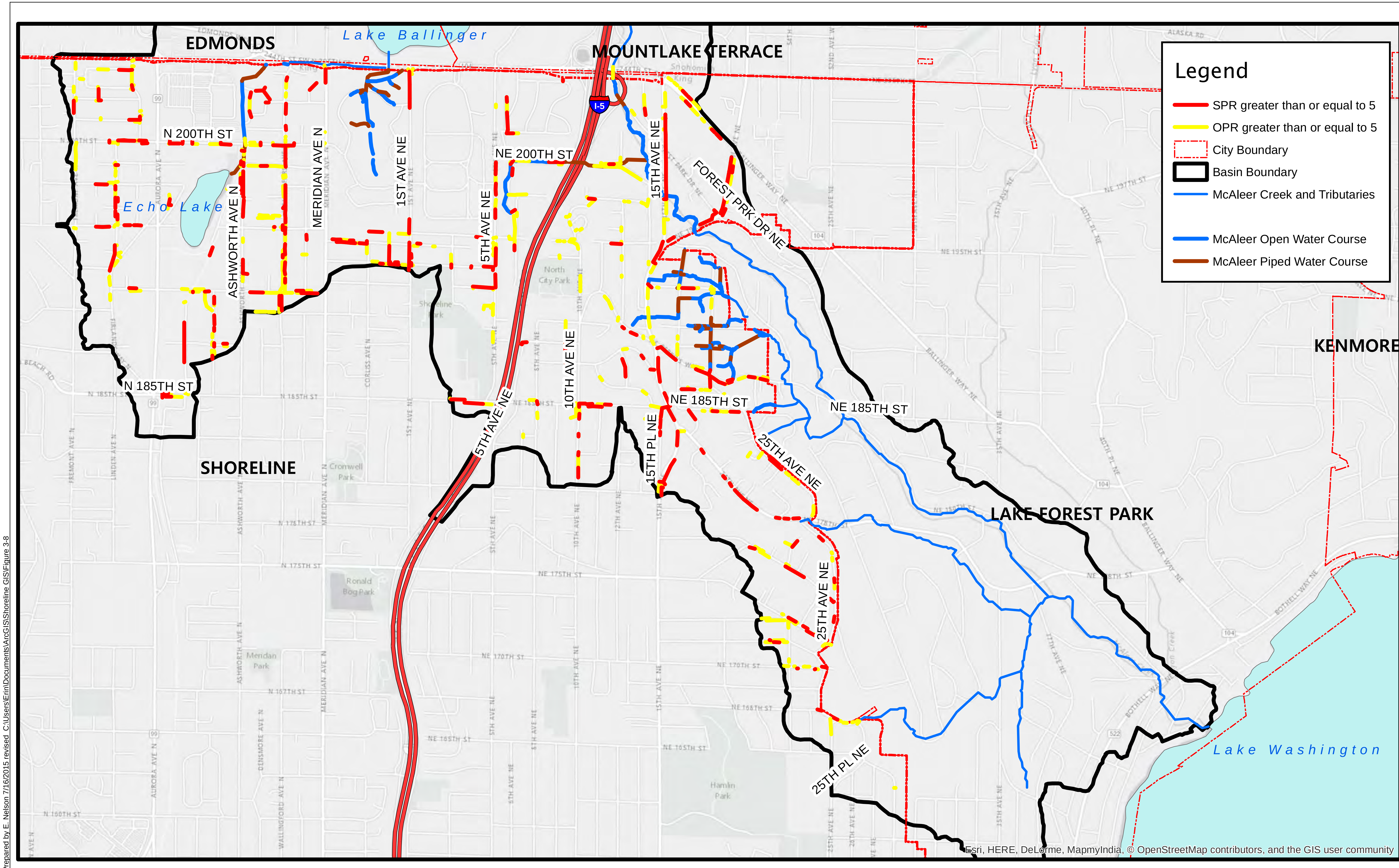
Table 3-11. Pipe Condition Summary

Rating Type	Number of Pipes within Each Category Rating					
	Rating = 0	Rating = 1	Rating = 2	Rating = 3	Rating = 4	Rating = 5
SPR	804	34	71	29	39	301
MPR	520	29	121	66	90	452
OPR	331	29	104	56	83	675
SPRI	804	57	157	122	50	88
MPRI	520	71	396	140	37	114
OPRI	331	83	453	199	68	144



AltaTerra Consulting LLC

Figure 3-7. McAleer Creek Area Treated by Stormwater Facilities



AltaTerra Consulting LLC

Note:
SPR = Structural Pipe Rating (NASSCO system)
OPR = Overall Pipe Rating (NASSCO system)

Figure 3-8. McAleer Creek Pipe Condition Assessment Ratings Greater than 5

3.7 Infrastructure Service Requests

City service requests received between 2002 and 2014 were reviewed to identify problematic areas in the basin and potential causes. Three sources of City GIS data were reviewed: flood calls, drainage requests, and other related requests.

How are infrastructure service requests used in the basin plan?

Evaluation of the type, location, and frequency of service requests in conjunction with other data (e.g., condition assessment information, hydraulic modeling, and field assessment) is valuable to provide validation of issues (in the case of flooding events and timing) and identify whether the issues are isolated or broader in nature (for instance, is an entire neighborhood affected by the same thing, such as high groundwater, or is it just one home?).

Over 250 service requests were received from residents in the McAleer Creek basin during the reporting period. Of these calls, the total number of unique flooding-related service requests was 75, of which 29 requests (38%) were received on 4 days: August 9, 2004 (11 calls); August 23, 2004 (8 calls); December 3 and 4, 2007 (3 calls); and November 19, 2012 (7 calls).

A large proportion of the calls were associated with a two locations in the basin—the area east of 15th Avenue NE, north of NE 185th Street, and south of NE 195th Street and also the area around the intersection of 6th Avenue NE and NE 200th Street on the west side of Interstate 5.

Figure 3-9 shows the types of service calls received and the years in which they were received. Many were associated with drainage and flooding problems related to a precipitation event apparently occurring late in the day on Friday, August 6, 2004 that resulted in localized flooding in these neighborhoods and resulting service requests on Monday, August 9, 2004 (also occurring within the City's neighboring Lyon Creek Basin as well) from overtopped conveyance systems. Additionally, another August 2004 event (resulting in calls on August 23) was responsible for many of the service requests. Precipitation across the region on August 6 and 7, 2004 and later in the month on between August 21 and 23, 2004 was variable. However, data accessed from regional rain gauges available in the National Climatic Data Center's (now National Oceanic and Atmospheric Administration [NOAA] National Center for Environmental Information) indicated around 1 inch of rain fell between August 6 and August 7 in Everett (0.86"), Magnuson Park Sand Point in Seattle (0.7"), SeaTac International Airport (0.87") and Boeing Field in Seattle (1.07"). This same data showed nearly 1 to 2 inches of rain fell between August 21 and 23 in Monroe (2.09"), Everett (1.2"), Boeing Field in Seattle (0.98"), SeaTac International Airport (0.74") and Magnuson Park Sand Point in Seattle (1.76").

Peak groundwater seepage within the eastern portion of the City's McAleer basin occurs during the summer months, so the combination of high groundwater flows and the basin's geologic characteristics may have created a pre-existing condition that led to the storm drain capacity being easily overwhelmed by a high-intensity, short duration summer storm. Figure 3-10 shows the distribution of service calls by month. Note that a majority of the 39 August calls originated in 2004.

Figure 3-11 plan view map of type and location of calls. Appendix C includes tables of infrastructure service requests received from the McAleer Creek basin.

Figure 3-9. Types of Service Calls Received in McAleer Creek Basin by Year

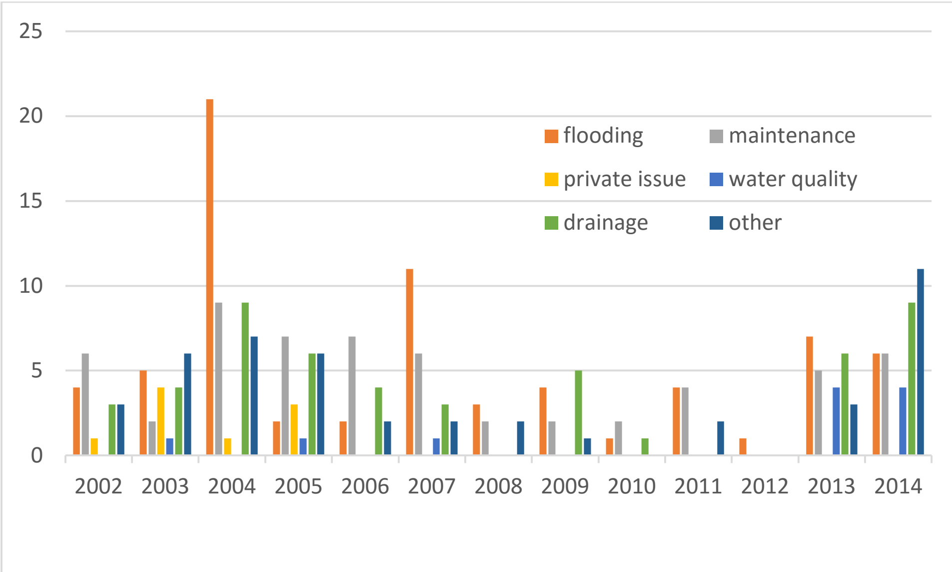
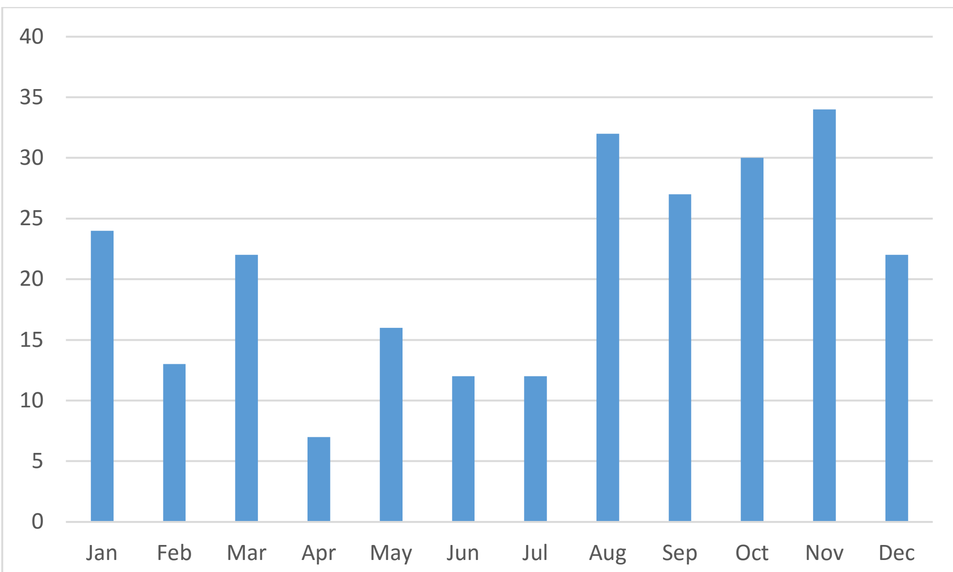
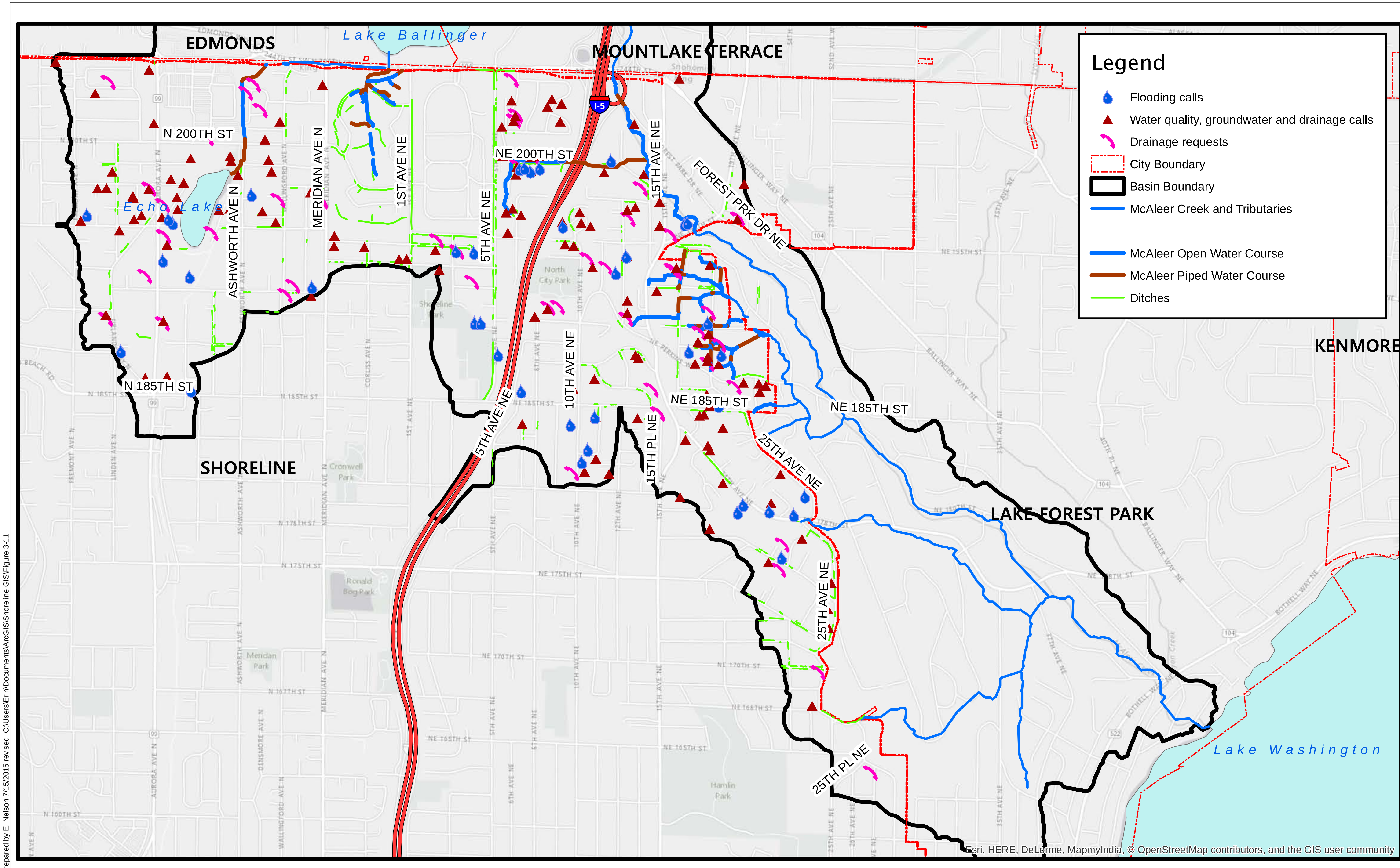


Figure 3-10. Number of Service Calls Received in McAleer Creek Basin by Month (between 2002 and 2014)





AltaTerra Consulting LLC

Figure 3-11. McAleer Creek Service Call Locations (2002 through 2014)

3.8 Biological Conditions

Biological conditions, including a qualitative assessment of wetlands and stream conditions in the McAleer Creek basin, were evaluated during stream walks in July 2014.

3.8.1 Wetlands

An inventory-level analysis of wetlands basin-wide within the City of Shoreline was conducted for this basin plan. Of these McAleer Creek basin wetlands, only two were previously identified in the 2004 basin characterization report (Tetra Tech/KCM): Echo Lake (Wetland "WL-S") and McAleer Creek Reach 1 (M6: Wetland "WL-U"). During fieldwork, wetland areas were sketched onto aerial maps and then transferred to a GIS layer. Wetland presence and approximate boundaries were based on observable field conditions from private properties where entry permission was granted or from public roads and rights of way. Preliminary ratings were given for each wetland based on the current Shoreline wetland classification system outlined in Chapter 20.80 of the Shoreline Municipal Code. No formal delineations were conducted; all information generated regarding wetlands is suitable for landscape- or region-level planning, but is not a substitute for formal wetland delineations. Specific development proposals should rely on this information only as a guide. On projects where wetlands are present, formal delineations of wetland boundaries and determinations of wetland classifications are necessary to support individual clearing, grading, and building applications.

City GIS data show two wetland polygons over the ponds adjacent to NE 205th Street at the Ballinger Commons Apartments. Aerial photographs from multiple different years show visible ponding in the wooded area in the center of the apartment complex, for a total of five separate ponds of relatively significant size and apparent permanence. Permission to access these ponded features was denied by management. However, it can be assumed that these ponds would likely be regulated as wetlands as records indicate that they were built prior to 1990.

Notable features include a large slope and riverine wetland along the McAleer Creek main stem just upstream of 15th Avenue NE and a complicated network of slope wetlands supported by groundwater seeps associated with small tributaries to Whisper Creek along the northwestern edge of the North City neighborhood.

3.8.1.1 Echo Lake

Echo Lake is a small open-water feature that is ringed by semi-continuous, relatively narrow wetlands along the shoreline. Several of these features have been identified in prior permit applications as City of Shoreline Type 2 wetlands. The largest is a scrub-shrub-dominated area found at the south end of the lake that was recently restored through the implementation of a mitigation planting plan. A small cove and adjacent pond that likely have wetland characteristics are found at the southwest corner of the lake. These areas appear to be managed for aesthetics and recreation by the adjoining lakefront apartment complex. Except for scattered areas of floating-leaf aquatic vegetation, most of the lake is unvegetated open water that is deeper than 6 feet. Since these open-water areas generally do not support "a prevalence of vegetation typically adapted for life in saturate soil conditions" (US Army Corps of Engineers [Corps] May 2010), they are excluded from the definition of jurisdictional wetland although they are still subject to federal Clean Water Act and State Hydraulic Code regulation.

3.8.1.2 Whisper Creek/Cedarbrook Creek area Wetlands

Ten wetlands were noted in the Whisper Creek/Cedarbrook Creek area although additional features may be present but not viewable from the public road system. This area is characterized by numerous groundwater seeps that support wetlands and small tributary drainages or streams. Many roadside ditches carry year-round or steady, seasonal flow. The historic land use of this area may have successfully drained groundwater; however, lack of drainage maintenance, increasing housing density and lack of tree cover may be contributing to increasing water levels. All ten are preliminarily classified as Type III wetlands. Shoreline Municipal Code (SMC 20.80.320) describes Type III wetlands as "those wetlands that are equal to or less than one acre in size and that have one or two wetland classes and are not rated as Type IV wetlands, or wetlands less than one-half acre in size having either three wetlands classes or a forested wetland class or subclass."

Wetland locations are shown in Figure 3-12. Of the ten identified wetlands in the Whisper Creek/Cedarbrook Creek area, four were previously unmapped in the city GIS data (W1 – W4). Wetlands W5 – W10 are located on or directly adjacent to the former Cedarbrook Elementary school, which opened in 1954, closed in 1971, and is currently leased by private organizations. All five wetlands are mapped in the city GIS data. Cedarbrook Creek and several seeps emerge from the north-facing hillside. The creek has been piped across the northern half of the property. Given the landscape position including remaining wetlands, topography and presence of seeps along the hill slopes it is apparent most of the playfield was a former wetland area associated with Cedarbrook and Whisper creeks.

Table 3-12 lists the wetlands, approximate sizes, preliminary classifications, and descriptions of wetlands in the Whisper Creek/Cedarbrook Creek area.

Table 3-12. Whisper Creek/Cedarbrook Creek Area Wetlands

Wetland	Location	Preliminary Rating*	Size (acres)	Description
W1	16th Avenue NE and NE 195th Street	3	<0.5	This is a slope-type wetland supported by groundwater emerging at the soil surface as a hillside seep. About half the wetland is within the jurisdiction of Lake Forest Park, just outside the Shoreline city limits. This wetland is dominated by emergent vegetation with some smaller trees and shrubs. Soil saturation appears to be more prolonged as evidenced by declining tree health, particularly amongst young western red cedars.
W2	Under Seattle City Light transmission line adjacent to 16th Avenue NE	3	<1 acre	This is a moderately-sized slope wetland dominated by shrubs and emergent plants. Much of this wetland is beneath the Seattle City Light transmission lines and is regularly maintained by trimming vegetation to safe heights.
W3	Northwest corner of intersection of 16th Avenue NE and NE 192nd Street	3	<0.5 acre	This wetland is a small remnant of W2 that was separated during the construction of 16th Avenue NE. Another seep-supported wetland, this feature is dominated by shrubs and small trees
W4	Northwest corner of intersection of 18th Avenue NE and NE 192nd Street	3	<0.5 acre	This is a small slope wetland that consists of mowed sedges in the roadside ditch and lawn areas along the margin of 18th Avenue NE.

Wetland	Location	Preliminary Rating*	Size (acres)	Description
W5	Northwest corner of Cedarbrook School field.	3	<0.5 acre	This is a small, depressional wetland. The shape and location of the feature was refined slightly during this study. This feature is located on the west side of the school playfield and is dominated by emergent species and woody vines (Himalayan blackberry).
W6	West side of Cedarbrook School building	3	<0.5 acre	This is a slope wetland behind several residences along NE Perkins Way and on the west side of Cedarbrook School building. This wetland appears to have a forested vegetation class. Cedarbrook Creek flows through W6.
W7	Southwest edge of Cedarbrook School field.	3	<0.5 acre	This is a narrow, forested wetland fringe along the banks of Cedarbrook Creek. The northern end of the wetland stops at the inlet culvert carrying the flow from Cedarbrook Creek to Whisper Creek.
W8	North end of Cedarbrook School field in riparian area adjacent to Whisper Creek	3	<0.5	This is a riparian wetland along the banks of Whisper Creek. It is likely a remnant of the wetland that existed in the playfield prior to the development of the school in the mid-1950's. W8 is dominated by shrubs and deciduous trees.
W9	East side of Cedarbrook School lower parking lot	3	<0.5 acre	This is a swale-shaped wetland adjacent to the school's lower parking lot. Except for a small patch of reed canarygrass, the entire wetland and most of the buffer is Himalayan blackberry. W9 has very marginal wetland indicators and indistinct boundaries.
W10	Hill slope adjacent to Cedarbrook School lower parking lot.	3	<0.5 acre	This is a slope wetland associated with the hillside excavation undertaken to construct the lower parking lot. It is likely that no wetland was present prior to excavation revealing a high groundwater table. Water from this wetland sheet-flows across the current asphalt pavement, which is in poor condition from the persistent inundation. The wetland is dominated by deciduous trees, blackberry thickets and a few native shrubs.

* The City Planning Department is reviewing a code revision that will likely modify the classification system to reference the Washington State Wetland Rating System for Western Washington: 2014 Update (Ecology 2014); (Personal communication between Hugh Mortensen, the Watershed Company, and Juniper Nammi, City of Shoreline, 2014).

3.8.1.3 Main stem McAleer Creek Wetlands

Wetlands in the City of Shoreline's portion of the main stem McAleer Creek basin are mainly limited to small, streamside seeps and a few off-channel depressional features. Six wetlands were noted along or near the main stem of McAleer Creek. Of these six, five were previously unmapped in the city GIS data (M1-M5). M1 – M5 are preliminarily classified as Type III wetlands. At 0.9-acres, the GIS-mapped polygon of M6 is very close to the 1-acre size threshold for a Type II wetland. Also, since much of the wetland is on private property, other parameters that might qualify it for a Type II classification could not be verified. Development proposals affecting this wetland should delineate and field investigate to determine the exact size and classification.

Table 3-13 lists the wetlands, approximate sizes, preliminary classifications, and descriptions in the main stem McAleer creek area and Echo Lake.

Table 3-13. Main stem McAleer Creek Wetlands and Echo Lake

Wetland	Location	Preliminary Rating*	Size (acres)	Description
M1	NE 200th Street near NE Ballinger Place	3	<0.5	This is a small depressional wetland west of McAleer Creek and behind several residences along NE Ballinger Place. This wetland contains shrub and forested vegetation classes including several large western red cedar trees.
M2	Downstream of 15th Avenue NE on McAleer Creek	3	<0.5 acre	This is a small slope wetland on the left bank of McAleer Creek just downstream of the 15th Avenue NE culvert. The vegetation is dominated by shrubs with a few trees along the upland margin.
M3	East of 15th Avenue NE, north of the intersection with NE 196th Street	3	<0.5 acre	This is a very small wetland along a tributary to McAleer Creek entering about midway between the NE 196th Street and 15th Avenue NE crossings. This wetland area is dominated by emergent species (grasses).
M4	Behind condominium complex on left bank of McAleer Creek (north side of stream channel)	3	<0.5 acre	This is a slope wetland draining directly towards McAleer Creek. Recent wetland delineation flags were noted during the field work. The wetland is dominated by a forested vegetation class. English ivy and holly are mixed with native understory species.
M5	Left bank of McAleer Creek (north side) just upstream of NE 196th Street	3	<0.5 acre	This is a very steep sloped-wetland dominated by shrubs, and a few large western red cedar trees. Obligate wetland plants such as skunk cabbage and water parsley were noted within the wetland boundary.
M6 (WL-U)	On McAleer Creek upstream of 15th Avenue NE	3	0.9 acre	This is a large wetland located along both sides of McAleer Creek, immediately west of the 15th Avenue NE crossing. It contains attributes of both riverine and slope wetlands. Vegetation includes forested, shrub and emergent classes. The foundation and debris from a former residence is found within the wetland

Wetland	Location	Preliminary Rating*	Size (acres)	Description
				boundary and presents an opportunity for wetland enhancement
Echo Lake	Between SR 99 and the Interurban Trail	2	10-acre Lake	Open water with small fringe wetlands on the edges of the lake. The largest is scrub-shrub dominated on the south edge of the lake.

*The City Planning Department is reviewing a code revision that will likely modify the classification system to reference the Washington State Wetland Rating System for Western Washington: 2014 Update (Ecology 2014); (Personal communication between Hugh Mortensen, the Watershed Company, and Juniper Nammi, City of Shoreline, 2014).

3.8.2 Stream and Aquatic Habitat Conditions

Stream and aquatic habitat conditions were qualitatively assessed during stream walks conducted in July 2014. In addition to evaluating conditions, the City requested that stream conditions be evaluated relative to their current City designation to determine whether any current designations should be modified to reflect actual conditions. Table 3-14 summarizes stream reaches and conditions observed. The stream channels are shown in Figure 3-13. Stream conditions were similar to conditions reported in the City of Shoreline Stream and Wetland Inventory and Assessment conducted by Tetra Tech/KCM in 2004 (Tetra Tech/KCM 2004). Stream segments were classified as City of Shoreline designation Type II or Type III. Type II streams according to Shoreline Municipal Code (SMC 20.80.470) are those streams that are not Type I streams and are either perennial or intermittent and have one of the following characteristics:

1. Salmonid fish use; or
2. Demonstrated salmonid habitat value as determined by a qualified professional.

Type III streams are those streams which are not Type I or Type II streams, which have perennial (year-round) or intermittent flow, which have a channel width of two feet or more taken at the ordinary high water mark, and which are not used by salmonid fish.

A Water Type Conversion Table is provided below (Table 3-15) for cross-referencing with the stream classification system(s) used by the Washington Department of Natural Resources (DNR). To complicate matters, DNR defines a “permanent” water typing system under WAC 222-16-30 and an interim water typing system under WAC 222-16-31. Type 1 streams or “waters” are Shorelines of the state in each case. However, as can be seen, there is not a direct or 1:1 correspondence between the three stream classification systems in all cases. The state distinguishes between Type 4 (or Np) and 5 (or Ns) waters based on whether they are seasonal or perennial, while the City of Shoreline distinguishes between Type III and IV streams based on their channel width.

Table 3-14. Summary of McAleer Creek Conditions

Location	City of Shoreline Designation*	Description
McAleer Creek Main stem upstream of NE 196th Street to Interstate 5 Interchange (MC1)	"Type II" in open channel segment, "piped stream segment" under and along 25th Avenue NE	This entire reach is an open-channel segment with varying degrees of riparian vegetation, wetlands (Photos 1 through 3), and pool and riffle habitat. Salmonid use by coho salmon, cutthroat trout, and possibly additional salmonid fish is well documented. The stream passes through two major culverts in this segment---15th Avenue NE and Forest Park Drive (Photo 4).
West Tributary (MC2)	"piped stream segment" and "Type IV"	This stream is piped between Interstate 5 and the confluence with the main stem McAleer Creek. Un-piped sections upstream of Interstate 5 are presumptively classified as Type IV stream segments based on a lack of salmonid fish use (seasonal flow upstream of migration barriers), and a channel width less than 2 feet. However, portions of this segment are subject to possible re-classification on a case by case basis. During field reconnaissance in this segment, channels appeared to be primarily non-stream, roadside stormwater drainage ditches with connecting piped sections. No remnant natural stream channels were noted during the fieldwork. This is due to development either totally altering the entire system or the possibility that there were no historic stream channels in this reach and all contemporary drainage is generated entirely from post-development stormwater runoff.
McAleer Creek 15th Avenue NE Tributary (NEW)	"Type III"	A piped stormwater outfall discharges along the east side of 15th Avenue NE about midway between the intersection with NE 196th Street and McAleer Creek crossing. Flow originating from this outfall flows through a channel approximately 150 feet in length through an area vegetated with shrubs, groundcover, and young deciduous trees to join McAleer Creek. Though most of the flow through this channel originates as stormwater, it may also carry perennial seepage. Active fish use more than a short distance upstream of the mouth is not anticipated due to low or absent flows between storm events and low habitat value and diversity. The channel width ranged from 2 to 5 feet, so this tributary is presumptively classified as Type III, subject to confirmation of lack of fish use or habitat.
Whisper Creek and Tributaries (MT1 thru MT8)	Collectively grouped as "Type II"	There are many segments of small tributary drainages in the Whisper Creek area configured in artificial channels, roadside ditches, half-pipes and full-pipes (Photos 5 and 6). Each is tentatively classified as Type II, based on presumptions of having salmonid fish use or habitat and having channel widths or two feet or more. However, each is subject to possible reclassification as a Type III stream, Type IV stream, or even a non-stream (storm drainage) on an individual basis. A Type III classification is warranted if a lack of salmonid fish use and habitat is adequately demonstrated. For example, documenting that a stream is entirely seasonal upstream of a natural migration barrier is sufficient to reach a conclusion that fish do not and cannot use the stream on a sustained basis. A Type IV classification can be assigned if, in addition to lacking salmonid fish use and habitat, the channel is less than 2 feet in width at the ordinary high water mark.

Location	City of Shoreline Designation*	Description
Echo Lake Tributary (ET1)	"piped stream segment" and "Type III"	Echo Lake Creek between the outlet of Echo Lake and North 200th Street, and between North 203rd Street and North 205th Street is piped. Between North 200th and North 203rd Streets, the stream channel is a straight, asphalt-lined ditch that is seasonal and is otherwise judged to have no value as salmonid habitat (Photo 7). However, the reach does drain from Echo Lake which is known to contain planted rainbow trout and conceivably, individual trout could occasionally enter the piped outfall and be temporarily present in the highly degraded open channel section of the creek.
Echo Lake source tributary (ET2)	Not classified	The main source of flow to Echo Lake is entirely piped, except for a very small section that appears to have been recently daylighted in connection with the YMCA improvements on the southwest side of the lake. No other channels, natural or otherwise, could be found upstream of Aurora Avenue North.

* Stream reach designations are based on Shoreline Municipal Code 20.80.460. Type III streams are subject to confirmation of lack of fish use or habitat and a channel width of two feet or more.

Table 3-15. Water Type Conversion Table

DNR Permanent Water Typing (WAC 222-16-030)	DNR Interim Water Typing (WAC 222-16-031)	City of Shoreline Rating
Type "S"	Type 1 Water	Type I Stream
Type "F"	Type 2 and 3 Water	Type II Stream
Type "Np"	Type 4 Water	Type III or IV Stream
Type "Ns"	Type 5 Water	Type III or IV Stream

Photo 1. McAleer Creek Main stem upstream of NE 196th Street

Photo 2. Main stem McAleer Creek through Wetland M-6(WL-U)

Photo 3.Main stem McAleer Creek in armored segment downstream of Forest Park Drive NE

Photo 4. Forest Park Drive NE Culvert

Photo 5. Example roadside drainage channel in Whisper Creek area

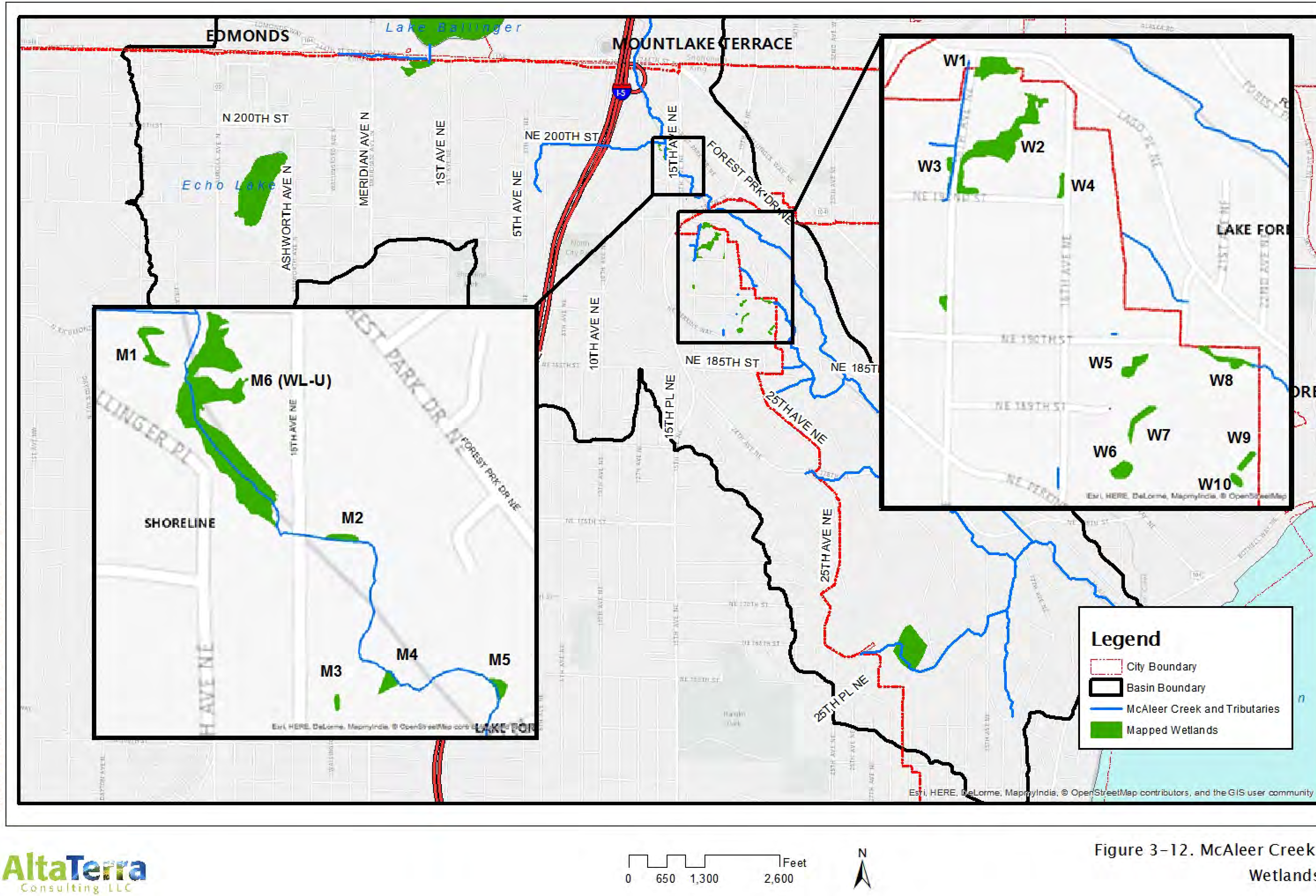
Photo 6. Example half-pipe drainage in Whisper Creek area

Photo 7. Echo Lake Creek Tributary Channel

3.8.3 Fish Use and Barriers

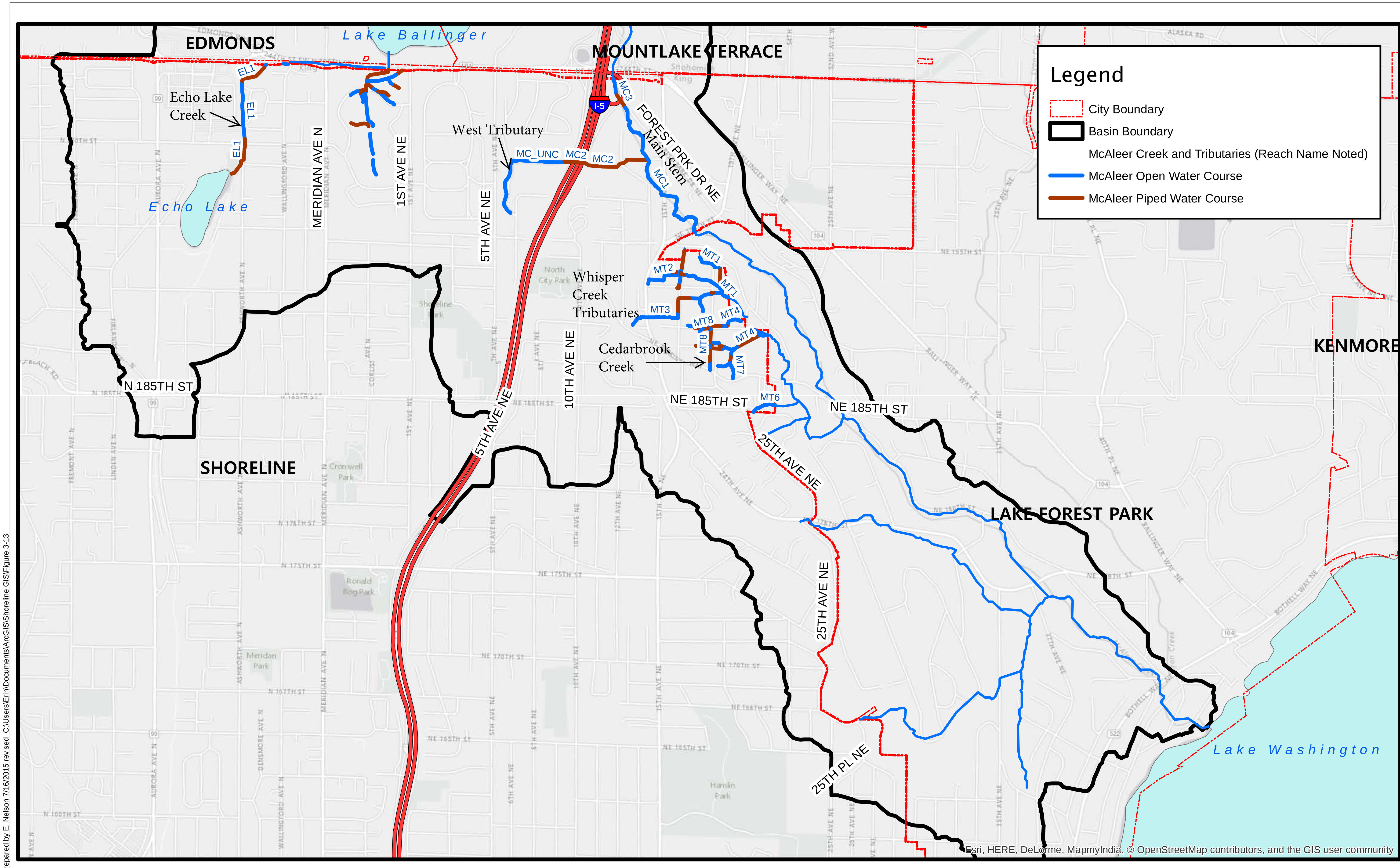
McAleer Creek within the City of Shoreline is documented as being used by several species of salmonid fish, including cutthroat and steelhead trout, and Coho and Chinook salmon. Of these, use by cutthroat and Coho would be the most common and pervasive, with use by Chinook or steelhead being more sporadic and/or seasonal. Chinook and steelhead are listed as threatened under the Endangered Species Act. These species' use of the stream is reported by King County's *Known Freshwater Distribution of Cutthroat Trout for WRIA 8*, as well as WDFW's Priority Habitats and Species (PHS) data and their SalmonScape website. None of the culvert crossings along the main stem of McAleer Creek within the City are documented by the WDFW *SalmonScape* website as full migration barriers, although the culvert at Forest Park Drive is identified as a partial barrier. While the culvert at NE 196th Street is identified as an "unknown" fish barrier, it should be noted that the control structure on the north side of NE 196th Street and the box culvert extending downstream under the roadway include a series of baffle structures which function collectively as a relatively low-gradient fish ladder. Additionally, *SalmonScape* documents three partial-barrier culverts along the McAleer main stem downstream of the City boundary.

Fish migration barriers and fish use along McAleer Creek tributaries within the City were not specifically inventoried or documented. However, some tributary fish use can be expected, most notably possible use by cutthroat trout along Whisper Creek tributaries. These may be documented on a case by case basis for project-specific use in determining stream classification. Most of Whisper Creek itself is outside the City limits and is expected to be used, at least, by cutthroat trout.



AltaTerra Consulting LLC

Figure 3-12. McAleer Creek Wetlands



AltaTerra Consulting LLC

0 650 1,300 2,600 Feet

N

Figure 3-13. McAleer Creek Streams

3.8.4 Water Quality

The City has been monitoring stream water quality parameters within the McAleer Creek basin at two locations: the main stem at NE 196th Street (water quality sampling location MC-1) and in the Whisper Creek tributary (location CB-1). Monitoring has been ongoing since 2001 to establish baseline water quality conditions and evaluate trends. Additionally, the City has been conducting water quality monitoring at Echo Lake since around 2005 in conjunction with King County's monitoring that occurs as part of their small lakes program.

Figures 3-15 through 3-18 show graphs of dissolved oxygen, temperature, pH, and turbidity data collected at the stream locations. Since 2007, additional parameters including nutrients (total phosphorus and total nitrogen), total suspended solids, and fecal coliform bacteria samples have also been collected and analyzed. WAC 173-201A-200 establishes water quality criteria for fresh surface waters of the state. Table 3-16 shows summary of these criteria and a qualitative comparison of measured water quality parameters for McAleer Creek with the City of Shoreline. These criteria are also shown on the graphs below for comparison. Additional water quality data is provided in Appendix D.

Figure 3-14. Dissolved Oxygen (DO) concentrations in McAleer Creek basin (mg/L)

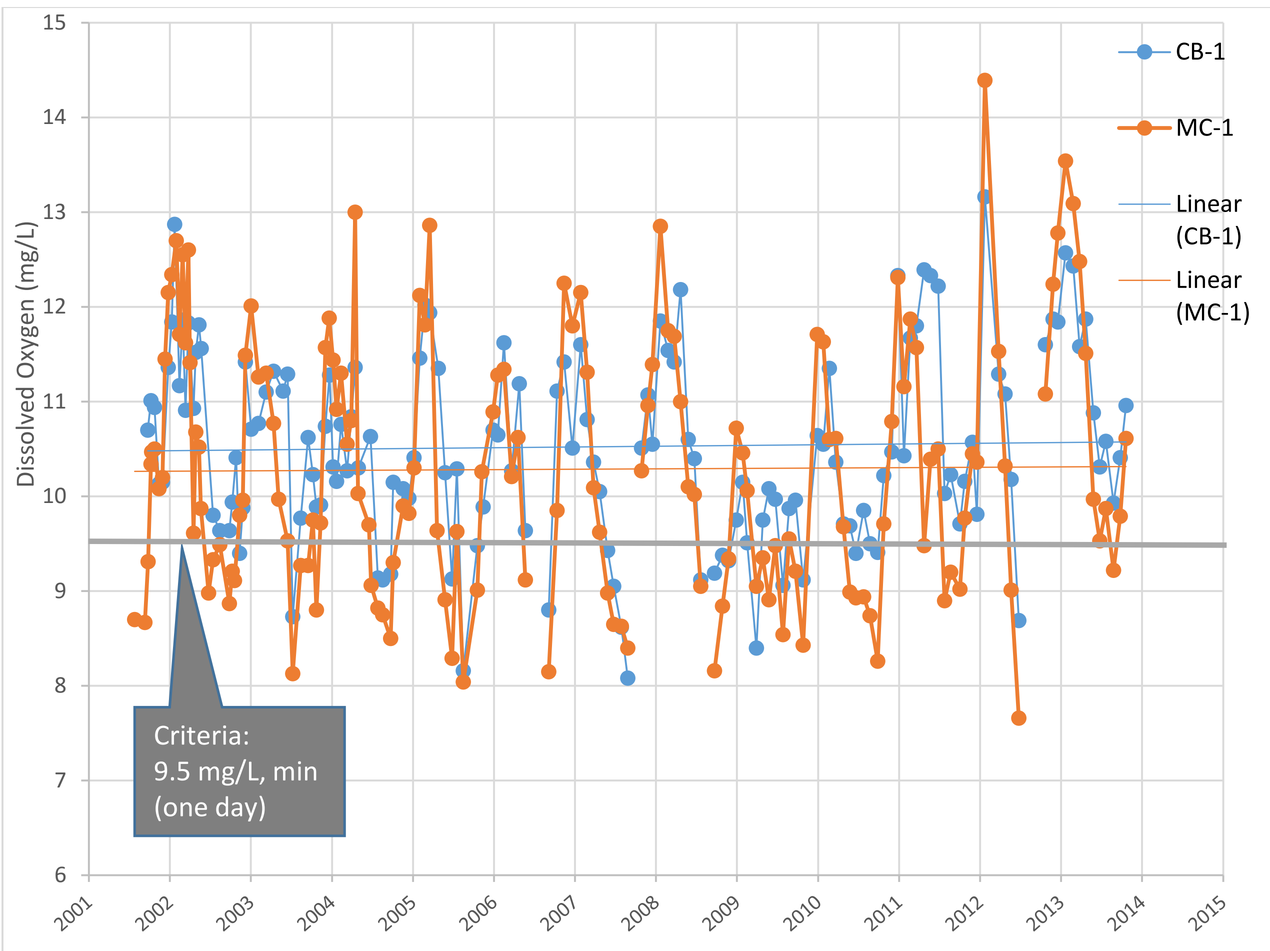


Figure 3-15. Temperature Data Collected in McAleer Creek basin (degrees Celsius)

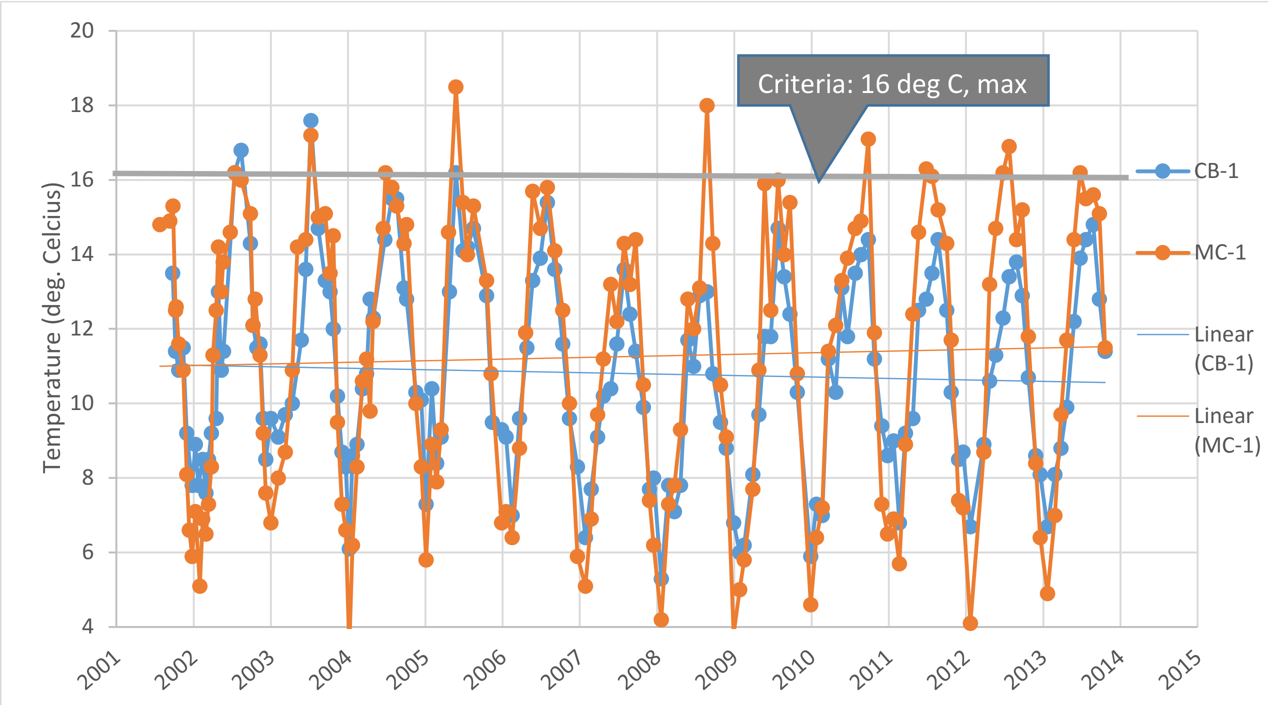


Figure 3-16. Turbidity Measured in McAleer Creek (nephelometric turbidity units or NTUs)

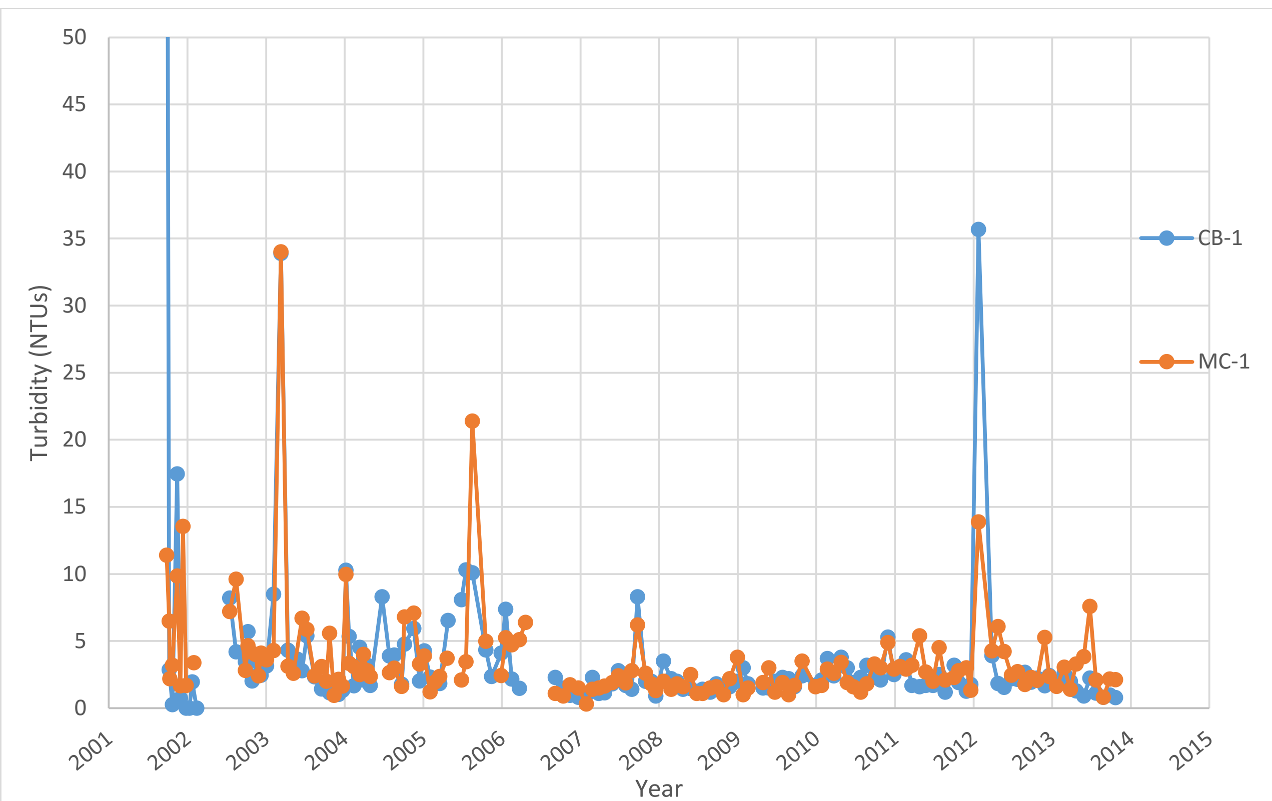


Figure 3-17. pH Measured in McAleer Creek.

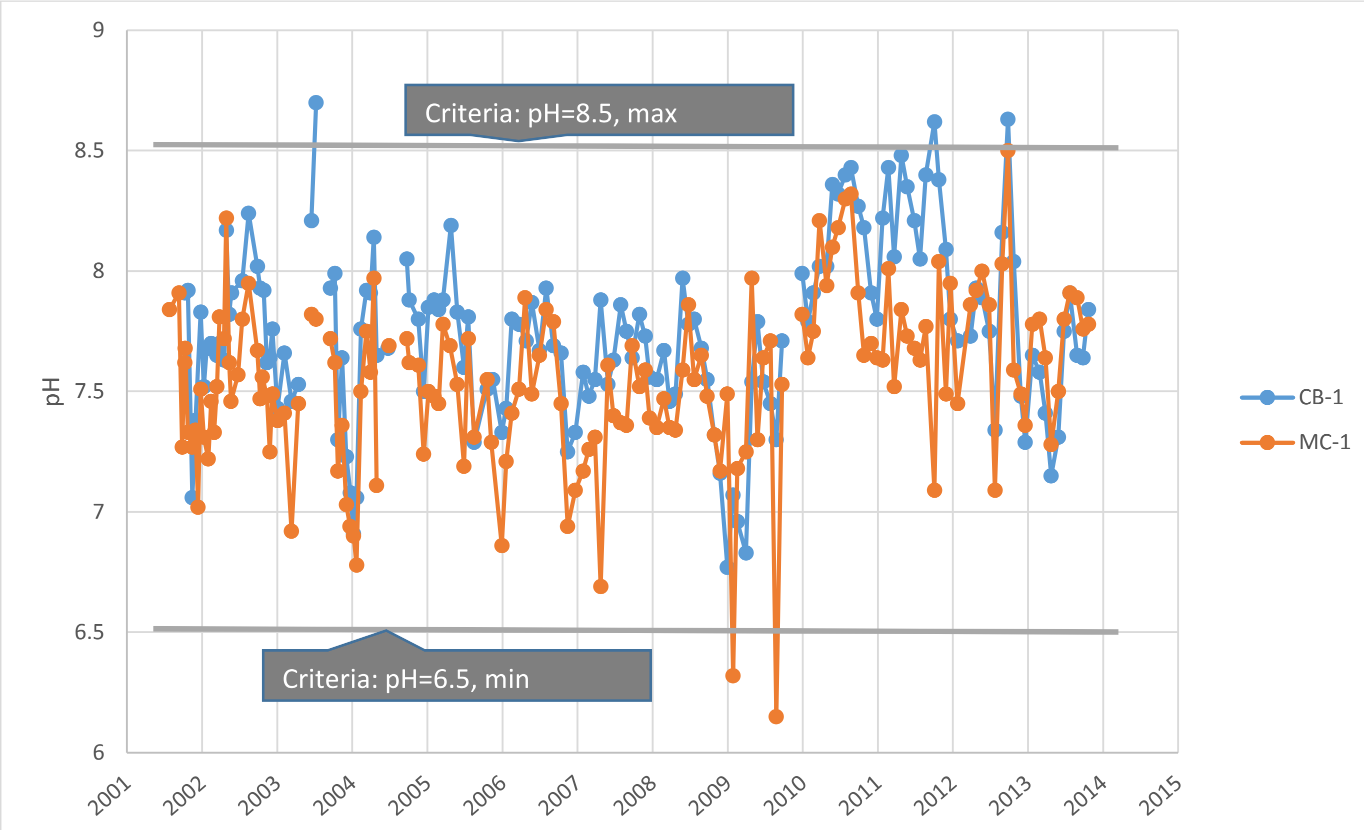


Figure 3-18 shows the McAleer Creek basin water quality monitoring locations and data collected. The water quality monitoring data do show some differences between the two locations (CB-1 and MC-1) that could be a result of the type of flow upstream. MC-1 is located in the mainsteam of McAleer creek and is primarily fed by open water bodies upstream. CB-1 is located on Whisper Creek, which is one of many tributaries that originate as hillslope seeps and is likely more influenced by groundwater. The range of variability between minimum and maximum temperature is much more narrow (up to 2 degrees C) at the Whisper Creek monitoring location, likely due to the effect of groundwater inputs that provide more stable temperatures less effected by solar radiation and freezing temperatures.

CB-1 23 days didn't meet DO criterion, 51 days for MC-1.

Table 3-16. Summary of Water Quality Criteria and Data in McAleer Creek Basin

Parameter	Criteria	Qualitative Observation	
		MC-1	CB-1
DO	Lowest 1-Day Minimum = 9.5 mg/L	DO typically falls below this criterion in the second half of each year. Trendlines are flat. Average DO slightly higher at CB-1.	
Temperature	7-day average of daily maximum temperatures (7-DADMax) = 16 degrees C	Temperature typically exceeds this criterion 1 month/year (in summer). Trendline rising slightly (worsening). Actual 7-DADMax not taken.	No measured exceedances since 2005. Trendline falling slightly (improving). Actual 7-DADMax not taken.

Parameter	Criteria	Qualitative Observation	
		MC-1	CB-1
Turbidity	Shall not exceed 5 NTU over background	Since 2006, background increased from <2 NTU to approximately 3 NTU from 2010-2012, decreasing again to around 2 NTU by 2014. Criterion has been exceeded in only a few instances. Prior to 2006, turbidity was more variable and often higher.	
pH	Within range of 6.5 to 8.5	Criteria not met in two instances, each time pH below 6.5.	Criteria not met in three instances, each time pH above 8.5.

In order to use the Water Quality Index (WQI) for small Puget Sound lowland streams, developed by the Department of Ecology, the City uses additional parameters to assess relative stream health. This Index evaluates several water quality parameters and gives a single rating of “high,” “moderate,” or “low” water quality concern. Stations with a score of 80 and above meet expectations for water quality and are of “low concern;” stations with a score between 40 and 80 indicate “moderate concern;” and stations with a score below 40 are of “high concern.”

WQI scores have been completed for MC-1 and CB-1 from 2007-2012. Generally, both sites have scores indicating “moderate concern” for water quality. Results are in Table 3-17 (full tables can be found in Appendix D).

Table 3-17. Summary of Water Quality Indices from 2007 to 2012

Monitoring Location	Year	WQI	Rating
MC-1	2007	68	Moderate concern
	2008	63	Moderate concern
	2009	56	Moderate concern
	2010	60	Moderate concern
	2011	64	Moderate concern
	2012	74	Moderate concern
CB-1	2007	68	Moderate concern
	2008	66	Moderate concern
	2009	52	Moderate concern
	2010	60	Moderate concern
	2011	64	Moderate concern
	2012	66	Moderate concern

McAleer Creek within the City of Shoreline is not listed on Ecology's 303(d) 2012 list for impairment; however, downstream of Shoreline in Lake Forest Park a reach of McAleer Creek extending nearly a mile from the creek mouth at Lake Washington is listed on the 2012 303(d) list for impairment for the following parameters:

- DO
- Bacteria
- Ammonia-Nitrogen
- pH

3.8.4.1 Echo Lake Monitoring

Water quality concerns were brought up during the public outreach meetings regarding water quality in Echo Lake in particular (see Section 4). Concerned residents have expressed additional Echo Lake concerns to City staff including the following:

- Silt in the lake
- More lily pads
- Lack of maintenance
- Development at the south end of the lake
- Swimming beach has converted from sand to black muck
- Overflow from Aurora Avenue North causes flooding during large storms between Echo Cove Condominiums and the YMCA along the boardwalk

The Echo Lake Neighborhood Association discusses the health of Echo Lake on their website (http://www.echolakeneighborhood.org/water-and-wetlands.html). Below is an excerpt:

> *What is Eutrophication?*
>
> *Eutrophication is the process in which lakes have an input of too many nutrients (such as phosphorus and nitrogen) that contributes to excessive plant growth (such as algae, including toxic varieties) and leads to an oxygen deprived environment that is detrimental to the health of aquatic organisms and results in poor water quality.*

"The lake has almost always been within appropriate ranges, remaining substantially health, with abundant wildlife and clear pure water. One exception came when the area had a major issue with geese which had stopped migrating because of the availability of food. That year, the increasing fowl populations raised the levels of feces borne contaminants. Since the waterfowl population was reduced and discouraged, the lake has consistently been at normal levels.

Property owners in the lake basin should be mindful of their contribution to the health of the lake. It is essential that no unwanted chemicals or debris enter into the surface waters or the lake itself. Pesticides are certainly harmful, as might be expected. But the water quality is also endangered by plant and lawn food because of the nitrogen levels. Soap of any kind, whether environmentally friendly or not, is harmful to the lake waters. Residents are encouraged to wash their cars at professional locations. People who must wash their cars at home are requested to put the cars on the lawn when washing them, so the soapy water will be filtered through the ground before it reaches the lake. And everyone must use natural, biodegradable and nontoxic products for cleaning and yard care.

The primary problem is one of phosphorus. It is caused by fertilizers, pesticides, and pet waste. Car washes and feeding animals outside also contribute to the problem. At the edge of the lake,

> the shore line, it is good to have thick vegetation to catch such debris before it can enter the water.
>
> New projects around the lake, such as the Gateway development, the buildings at 192nd and Aurora, the rain garden at the Park-and-Ride, and the Sky Nursery project, have contributed to the good health of the lake. Water from these sites is now filtered before it enters the lake."
>
> *--Echo Lake Neighborhood Association Website- July 2015*

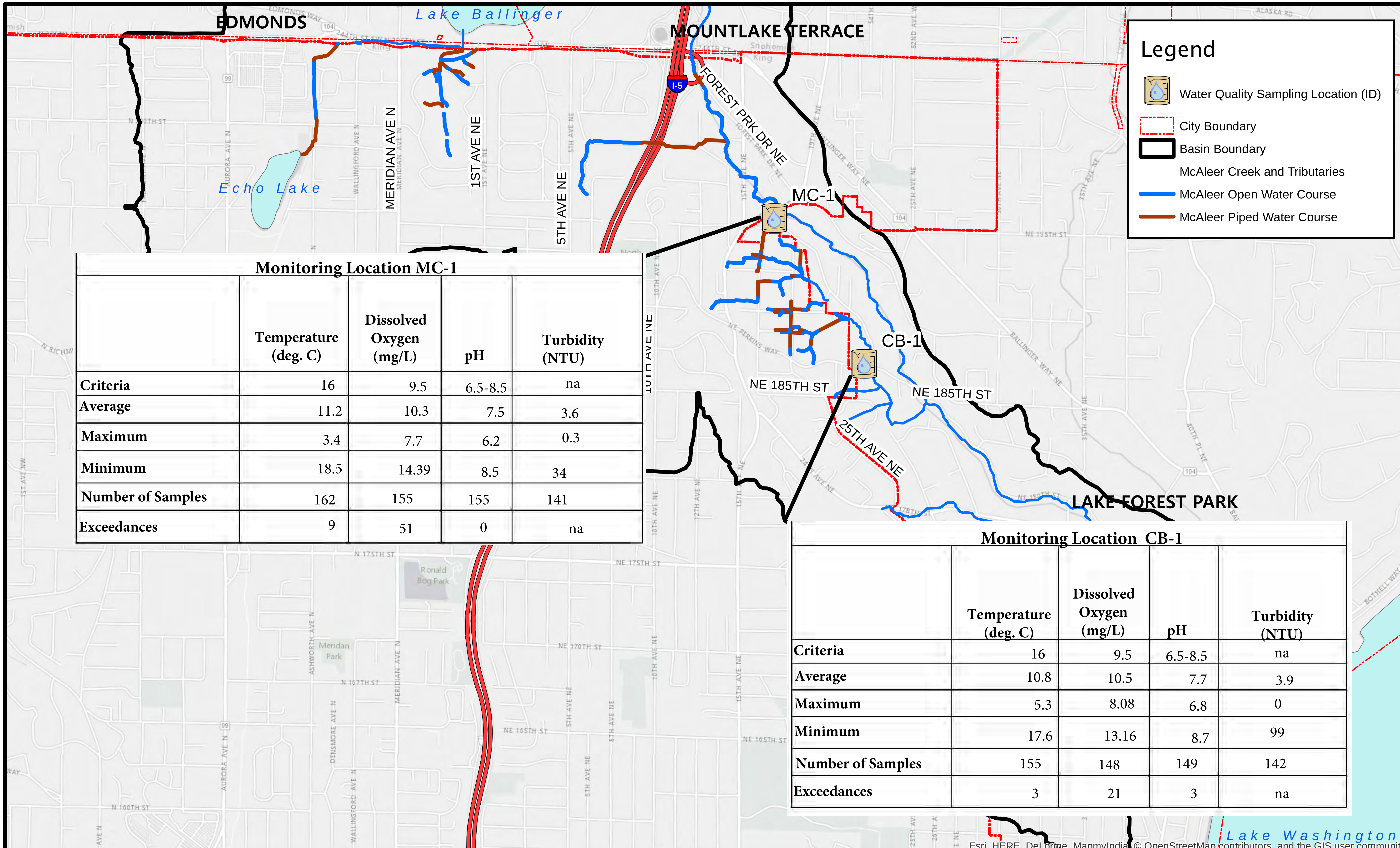
During the summer months, King County monitors the water quality at the Echo Lake swimming beach for fecal coliform bacteria. If bacteria counts are too high, the County takes appropriate measures to close the beach for swimming and other contact uses that could be detrimental to human health.

Echo Lake is on Ecology's 2012 303(d) list as Category 1 for meeting tested standards for clean waters for phosphorus and Category 2 water of concern for bacteria. Placement in Category 1 does not necessarily mean that a water body is free of all pollutants, but that the water body met standards for the pollutant (in this case, phosphorus) for which it was tested. Category 2 are waters where there is some evidence of a water quality problem, but not enough to require production of a water quality improvement project (including total maximum daily load [TMDL]. Ecology lists several reasons that a water body might be placed in this category, including pollution levels that are not quite high enough to violate the water quality standards, or if there are not enough violations to categorize it as impaired according to Ecology's listing policy. Echo Lake is not on Ecology's 303(d) list for any other water quality parameters.

Since 2001, the City of Shoreline with partner volunteers has also participated in King County's Lake and Stream monitoring program to monitor water quality conditions in Echo Lake. Samples are collected between May and October and include water temperature, Secchi depth (a measure of water clarity) and a suite of water chemistry parameters. The primary water quality concern is the growth of algae and trend toward eutrophication, particularly toxic varieties that are harmful to humans, pets and wildlife if ingested. The parameters measured allow for predictions of potential algal growth and trends for future algal growth. Additionally, the City has been collecting additional water quality parameters since about 2005 including dissolved oxygen, specific conductivity, pH, turbidity, and ortho-Phosphorus.

The 2013 monitoring report indicated that Echo Lake has remained relatively stable, but that there might be a slight trend toward eutrophication. Only low levels of toxicity were reported in algae samples taken in the summer of 2012 (King County 2013), despite conditions being favorable for nuisance toxic blooms.

As the area around Echo Lake is redeveloped new water quality treatment is implemented. For example, stormwater treatment technologies added as part of the recent Aurora Avenue Improvements Project include rain gardens, Filterra™ tree boxes, and detention facilities. The effectiveness of these water quality treatment facilities will be monitored as part of Ecology's Regional Stormwater Monitoring Program Effectiveness Study.



Monitoring Location MC-1

	Temperature (deg. C)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)
Criteria	16	9.5	6.5-8.5	na
Average	11.2	10.3	7.5	3.6
Maximum	3.4	7.7	6.2	0.3
Minimum	18.5	14.39	8.5	34
Number of Samples	162	155	155	141
Exceedances	9	51	0	na

Monitoring Location CB-1

	Temperature (deg. C)	Dissolved Oxygen (mg/L)	pH	Turbidity (NTU)
Criteria	16	9.5	6.5-8.5	na
Average	10.8	10.5	7.7	3.9
Maximum	5.3	8.08	6.8	0
Minimum	17.6	13.16	8.7	99
Number of Samples	155	148	149	142
Exceedances	3	21	3	na

Prepared by E. Nelson 7/16/2015 revised C:\Users\Erin\Documents\ArcGIS\Shoreline GIS\Figure 3-14

AltaTerra Consulting LLC

Figure 3-18. McAleer Creek Water Quality Monitoring Locations

4. Community and Regulatory Framework

4.1 Community Stakeholders

The McAleer Creek basin within the City of Shoreline spans large portions of four neighborhoods (Ballinger, North City, Echo Lake, and Hillwood) and smaller areas within three others (Briarcrest, Richmond Highlands, and Meridian Park).The larger basin is spread between neighboring cities Edmonds and Mountlake Terrace (to the north) and Lake Forest Park (to the south and east). The City of Shoreline neighborhoods have active neighborhood associations that add their voices and concerns to community and environmental concerns. The Echo Lake Neighborhood Association takes an active role in the stewardship of Echo Lake Park and is especially concerned about water quality conditions in Echo Lake.

4.2 Public meetings and outreach

Two joint public open houses were held to provide information about the Lyon Creek and McAleer Basin Plans to the public and solicit input on specific issues or concerns in these two basins. The first open house was held at Shoreline City Hall on May 13, 2014. A brief PowerPoint presentation was given to provide an overview of the basin planning projects, and project boards were posted for attendees to note problem areas or other concerns. Additionally, a brief electronic survey was conducted of attendees. The results of the meeting are provided in Appendix E. The McAleer Creek basin concerns and suggestions noted at the May 13, 2014 meeting included:

- Need to improve Echo Lake Creek channel,
- Echo Lake water quality,
- Request for more rain gardens, and
- Suggestion to daylight Cedarbrook Creek through Cedarbrook School property.

The second open house was held in Bruggers Bog Park on September 17, 2014. Display boards showing basin problems and proposed projects were shown to attendees to provide comments. There were no specific concerns received related to the McAleer Creek basin.

4.3 Regulatory Framework

The City governs land use, stormwater, and the use of natural resources through codes and ordinances that are specific to the City or dictated by overarching state and federal regulations. These regulations, along with the goals outlined in the City's Comprehensive Plan (City of Shoreline 2012), were considered in the development of solutions to address stormwater management issues in the McAleer Creek basin. Table 4-1 summarizes existing federal, state, and local regulations related to stormwater runoff and natural resources and the relevance of these regulations to the McAleer Creek basin. A thorough review and description of relevant codes and their relationship to the City can be found in the City's Surface Water Master Plan Update (SAIC 2011).

Table 4-1. Regulatory Framework of Surface Water Management in the McAleer Creek Basin

Law	Implementing Entity	Regulatory Programs	Intent and Specifics	Relevance to McAleer Creek Basin
Clean Water Act (CWA)	Ecology	National Pollutant Discharge Elimination System (NPDES) Phase II Municipal Separate Storm Sewer System Permit	Eliminate discharge of pollutants into the nation's water and achieve water quality levels that are protective of beneficial uses.	The City is a NPDES Phase II permittee and must comply with conditions of the permit. The permit is in its second cycle and many new conditions are being implemented according to the schedule outlined in the permit.
	Ecology	Surface Water Quality Standards	Protect and regulate the quality of surface water in Washington State by: 1) sustaining designated uses, 2) meeting numeric WQC, and 3) implementing anti-degradation policies.	McAleer Creek in Shoreline is not listed on the state's 303(d) list for non-compliance with water quality standards.
	Ecology and US Army Corps of Engineers (USACE)	Sections 401 and 404	Requires a permit for activities classified by the USACE as dredging or discharge of fill material to Waters of the United States.	McAleer Creek and associated wetlands and Puget Sound are considered Waters of the United States.
Tribal Agreements and Related Case Law	Muckleshoot Tribe	N/A	Protect fish populations in traditional fishing grounds of Native American tribes.	The Muckleshoot Tribe is party to SEPA review of development proposals within the McAleer Creek basin.
Endangered Species Act (ESA)	US Fish and Wildlife Service (USFWS) and National Oceanic and Atmospheric Administration (NOAA) Fisheries in consultation with lead federal agencies	N/A	Prevent further decline of listed terrestrial and aquatic species.	There are no documented endangered species within the McAleer Creek basin; however, McAleer Creek discharges to Lake Washington, which does have endangered aquatic species, including Chinook salmon.

Law	Implementing Entity	Regulatory Programs	Intent and Specifics	Relevance to McAleer Creek Basin
State Environmental Policy Act (SEPA)	City conducts review and issues SEPA determinations on proposed projects within its jurisdiction	N/A	Identify and require mitigation of the environmental impacts of proposals and programs.	SEPA is used to address impacts from projects in the McAleer Creek basin that are not covered in other City code requirements.
Shoreline Management Act	City (Shoreline Master Program)	N/A	Protect use and functions (e.g., economic, ecological, aesthetic) of shoreline areas.	McAleer Creek discharges to Lake Washington, which is subject to the Shoreline Management Act within the City of Lake Forest Park (not a City of Shoreline issue).
Washington State Hydraulic Code	WDFW	N/A	Set requirements for placement of culverts and other hydraulic devices that may affect fish use.	Projects within the ordinary high water mark of streams must obtain a Hydraulic Project Approval permit from WDFW. Culverts must be fish passable where fish are present.
Growth Management Act (GMA)	City	City Comprehensive Plan	Regulate land use to meet growth targets while providing necessary services and protecting sensitive environmental resources.	N/A
Water Quality Protection Act	Ecology	Puget Sound Partnership	Provide an integrated stormwater management program to protect and restore Puget Sound.	N/A
Chapter 13.10 Surface Water Utility	City	Drainage standards for new development and redevelopment	Promote public health, safety, and welfare by providing design, construction, and maintenance criteria for permanent and temporary surface water drainage facilities for development and redevelopment activities.	The City has adopted the most recent version of the Stormwater Management Manual for Western Washington (Ecology 2012). Shoreline's 2012 Engineering Design Manual provides stormwater design standards.
Chapter 13.12 Floodplain Management	City	Development Code.	Regulate activities, uses and development in regulatory floodplains.	Portions of McAleer Creek are within the 100-year FEMA floodplain.

Law	Implementing Entity	Regulatory Programs	Intent and Specifics	Relevance to McAleer Creek Basin
Chapter 20.80 Critical Areas	City	Development Code	Establish supplemental standards for the protection of critical areas in compliance with GMA and the City's Comprehensive Plan, including the protection of surface and ground water quality.	Projects proposed within critical areas must adhere to requirements in Chapter 20.80.

4.4 City of Shoreline Comprehensive Plan and the McAleer Creek Basin

The following statement is an excerpt from the City's Vision 2029 Statement included in its Comprehensive Plan:

> *Shoreline is a regional and national leader for living sustainably. Everywhere you look there are examples of sustainable, low-impact, climate-friendly practices come to life – cutting edge energy-efficient homes and businesses, vegetated roofs, rain gardens, bioswales along neighborhood streets, green buildings, solar-powered utilities, rainwater harvesting systems, and local food production to name only a few. Shoreline is deeply committed to caring for its seashore, protecting and restoring its streams to bring back the salmon, and to making sure its children can enjoy the wonder of nature in their own neighborhoods.*

Several elements of this vision statement relate directly to stormwater management and Shoreline's strong connection to environmental values. Projects and strategies presented in the McAleer Creek Basin Plan are recommended in the context of the City's overall vision as well as the following Comprehensive Plan goals:

Goal NE VI: Manage the stormwater system through the preservation of natural systems and structural solutions in order to:

- Protect water quality;
- Provide public safety and services;
- Preserve and enhance fish and wildlife habitat and critical areas;
- Maintain a hydrologic balance; and
- Prevent property damage from flooding and erosion.

Goal NE VII: Continue to require that natural and on-site solutions, such as infiltration and rain gardens, be proven infeasible before considering engineered solutions, such as detention.

Goal NE VIII: Preserve, protect, and where feasible, restore wetlands, shorelines, and streams for wildlife, appropriate human use, and the maintenance of hydrological and ecological processes.

Goal NE IX: Use education and outreach to increase understanding, stewardship, and protection of the natural environment.

Goal CF V: Facilitate, support, and/or provide citywide utility services that are:

- Consistent, reliable, and equitable;
- Technologically innovative, environmentally sensitive, and energy efficient;
- Sited with consideration for location and aesthetic; and
- Financially sustainable.

5. Summary of Basin Issues and Recommended Strategies

Of the multiple jurisdictions within the larger McAleer Creek basin, the City of Shoreline occupies approximately one quarter of the total basin area (26 percent), primarily in the uplands to the west of the main channel. Over half of Shoreline's portion of the McAleer Creek basin drains to Lake Ballinger. Most of the remaining part of the basin drains eastward to McAleer Creek by means of small tributaries originating on hill slopes to the west and southwest of the creek. Only a small part of the City drains directly to the McAleer Creek main stem, which is limited enough and oriented in such a way so that there are no major flooding issues. However, downstream in Lake Forest Park more frequent flooding has occurred leading to ongoing implementation of flood reduction efforts, including the McAleer Creek Regional Detention Facility mentioned in Section 3.

A cross section schematic in Figure 5-1 depicts general land use and topographic characteristics across the basin from west to east and lists general issues identified in this basin plan. With respect to stormwater management, the following beneficial characteristics and deficiencies are noted:

Beneficial characteristics:

- New water quality facilities in the Aurora Avenue North corridor, including low impact development BMPs.
- Strong neighborhood support for pollution control, low impact development, and improved water quality.
- No major persistent drainage issues within many basin areas, including along the McAleer Creek main stem within the City.

Deficiencies:

- Over 24 percent of stormwater pipes are in poor to failing condition and require immediate attention.
- Persistent problem drainage areas at:
    - 6th Avenue NE and 200th Ave NE west of Interstate 5
    - East of 15th Avenue NE, between NE 185th Street and NE 195th Street
- Groundwater seepage (associated with some of the problem drainage areas above)

Whereas much of the McAleer Creek basin is built out, the coming Sound Transit North Link Light Rail Corridor and 185th Street Station and associated 185th Street Station Subarea rezone will significantly affect future stormwater infrastructure and management in the portions of the City's McAleer basin centered on the Interstate 5 corridor. A programmatic strategy for assessing the Surface Water Utility future needs due to projected redevelopment within the 185th Street Station Subarea is recommended below.

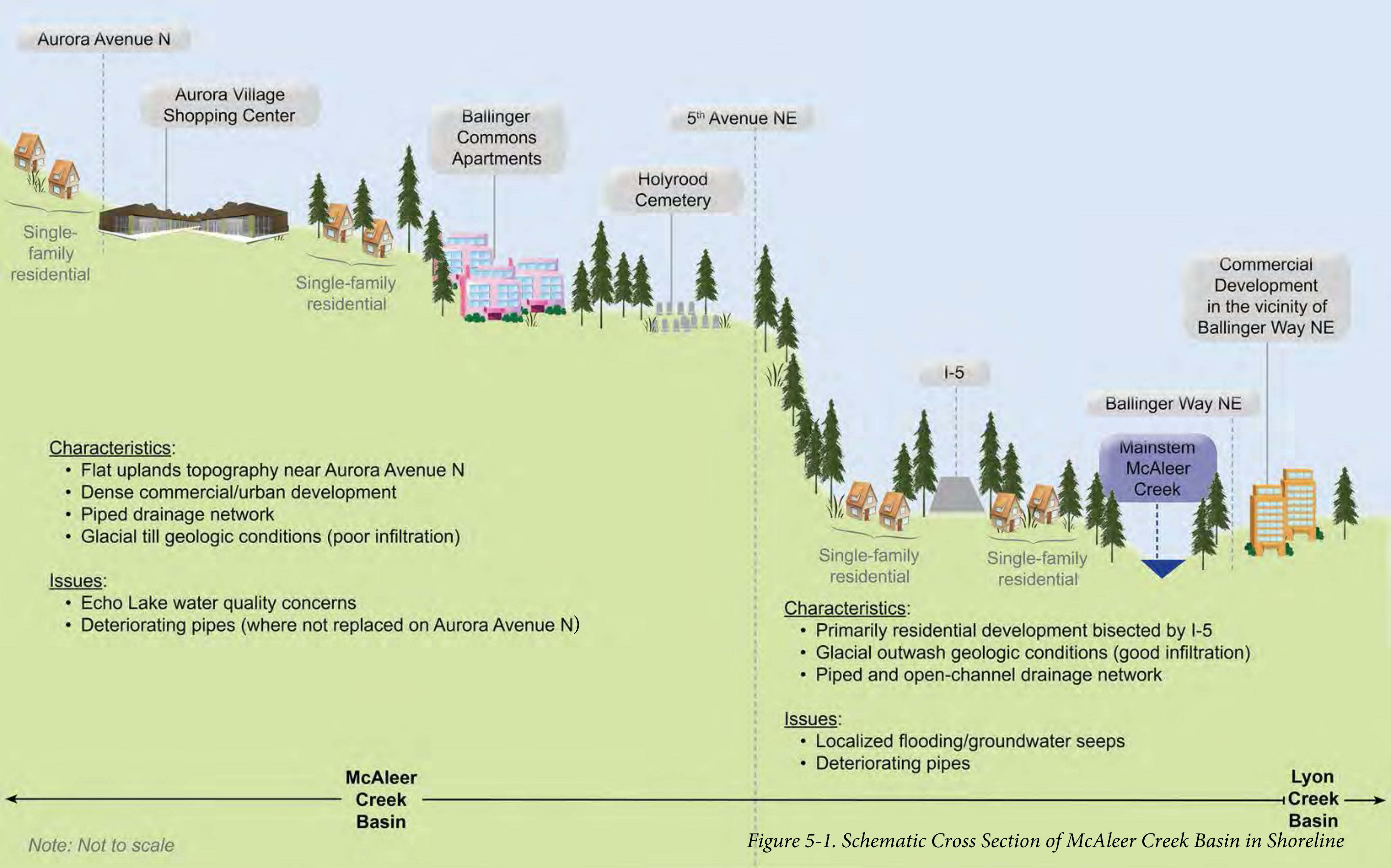


Figure 5-1. Schematic Cross Section of McAleer Creek Basin in Shoreline

5.1 Recommended Strategies

The recommended strategies discussed in this section include capital projects, programmatic and policy-oriented changes, and educational programs to affect social change for improved stormwater management functions. The projects are discussed according to the type of issue addressed by the recommendation (e.g., water quality improvement, flood reduction, infrastructure maintenance and repair, habitat improvement, etc.). Most recommendations to solve particular issues have secondary benefits and those are described as well. Table 5-1 and Figure 5-2 list the recommended stormwater management strategies. Individual recommendations are also discussed below, including projects that were previously recommended in the 2011 Surface Water Master Plan Update (SAIC 2011) or other City documents.

5.1.1 Previous Recommendations Carried Forward

The 2011 Surface Water Master Plan (SAIC 2011) identified selected flooding and water quality issues within the McAleer Creek basin. These include:

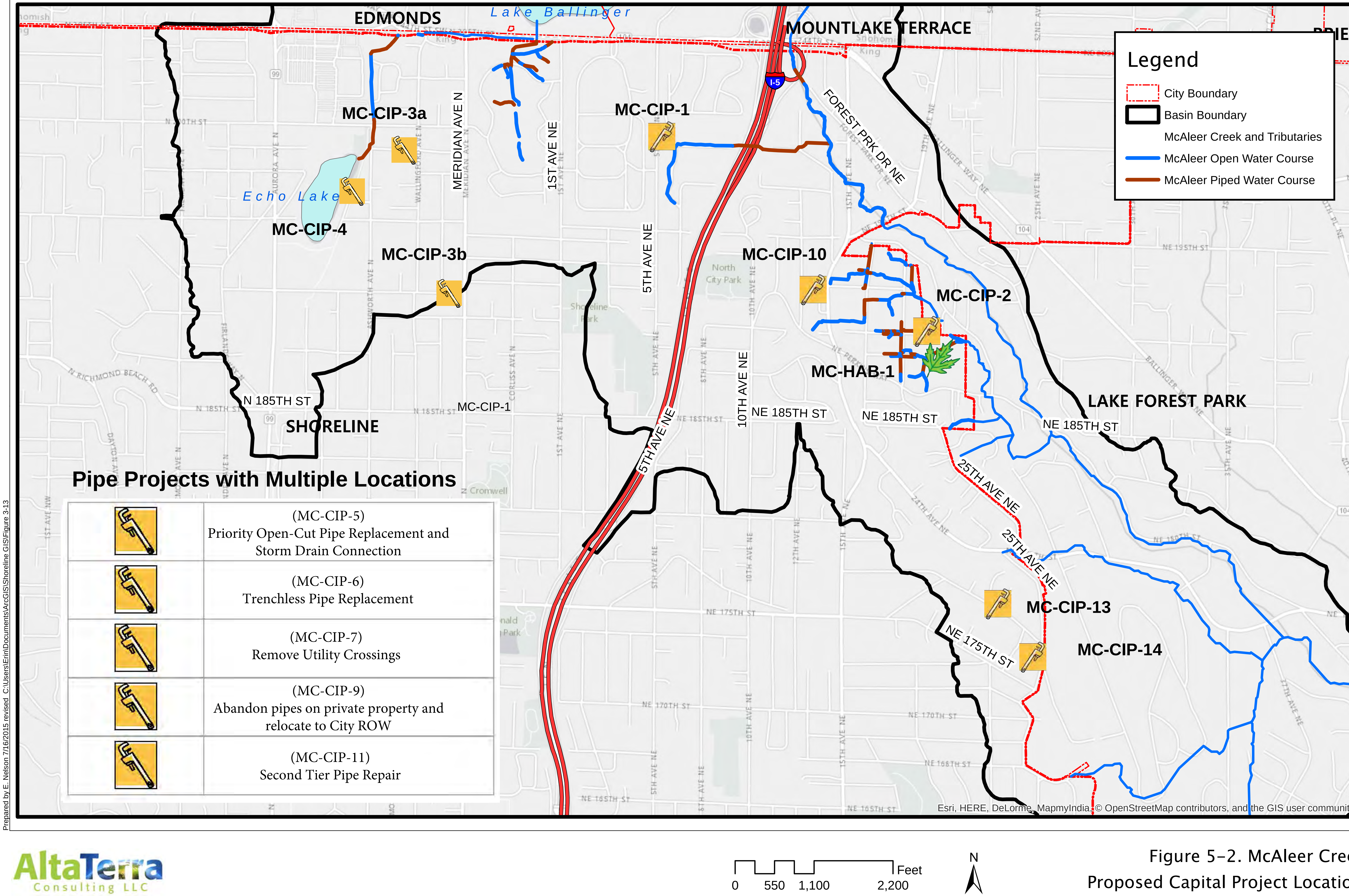
- MC-F1: Flooding of three homes east of 15th Avenue NE (vicinity of NE 190th Street east of 18th Ave NE)
- MC-F2: High groundwater generally east of 16th Avenue NE to the City limits
- H-1: Advance ROW Acquisition (H-1) – this was a City-wide initiative.

Two aquatic habitat problems were identified in the 2011 SWMP for further analysis and possible development as projects:

- MC-AQ1 (15th Avenue NE culvert replacement) was evaluated and is not being recommended as a project because the culvert does not appear to be a fish passage barrier based on recent observations during the stream walk for this Basin Plan. Additionally, the culvert does not contribute to flooding and is not recommended for replacement.
- MC-AQ2 (remove invasive vegetation within the McAleer Creek riparian buffer) is recommended as a general programmatic solution to be carried out through education and outreach since most of the riparian area adjacent to McAleer Creek and associated tributaries is in private ownership.

Water quality problems identified in the 2011 SWMP included MC-WQ1 (low dissolved oxygen on McAleer Creek during summer months) and MC-WQ2 (high concentrations of total phosphorus, high temperatures and low dissolved oxygen in Echo Lake). General recommended solutions identified in the 2011 SWMP for both issues included improvement to soils and ground vegetation in buffers, education and outreach to reduce fertilizer use, and improved stormwater infiltration and bioinfiltration.

Additionally, the McAleer Creek Goheen Property Revetment Repair Project is under construction in 2015 and includes bank stabilization improvements along the south side McAleer Creek main stem approximately 300 feet upstream of the NE 196th Street control structure. This project is being constructed as a condition of the City's drainage easement associated with the McAleer creek dam structure at 196th Street.



Prepared by E. Nelson 7/16/2015 revised C:\Users\Erin\Documents\ArcGIS\Shoreline GIS\Figure 3-13

AltaTerra Consulting LLC

Figure 5-2. McAleer Creek Proposed Capital Project Locations

Table 5-1. Summary of Issues, Opportunities and Projects

Issue/Opportunity	How was it Identified?	Specifics	Projects			
			Capital Projects		Planning Projects	Operations Projects
			Capital	Habitat	Policies, Studies, and Coordination	Maintenance
Flooding/Recurring Drainage Issues	Service requests, City staff	Residences located at the intersection of NE 200th Street and 6th Avenue NE have experienced flooding on numerous occasions over the past 10 years;	(MC-CIP-1) 6th Avenue NE and NE 200th Street Flood Reduction Project(s)	N/A	N/A	N/A
		On-going flooding, drainage, erosion and groundwater issues in vicinity of 15th Avenue NE and NE Perkins Way	(MC-CIP-10) NE 192nd Pl Ditch Improvements	N/A	(MC-Pol-1) Groundwater Study	N/A
		2011 SWMP Problem #MC-F1: Flooding of three homes on the north side of NE 190th Street east of 18th Ave NE	(MC-CIP-2) NE 190th St Flood Reduction Project	N/A	N/A	N/A
Failing or Insufficient Infrastructure	City staff	Aging stormwater systems with recurring drainage issues	(MC-CIP-12) 25th Ave NE Ditch Improvements	N/A	N/A	N/A
		Lack of public stormwater infrastructure with proper downstream connections	(MC-CIP-13) NE 177th Street Drainage Improvements	N/A	(MC-Pol-2) 185th Street Station Subarea Stormwater Study	N/A
					(MC-Pol-7) Eastern Boundary Drainage Systems Study	
Habitat Improvements	City staff, Citizen comments	Remove Cedarbrook Creek from an existing pipe under the current school field property.	N/A	(MC-Hab-1) Daylight Cedarbrook Creek	N/A	N/A

Issue/Opportunity	How was it Identified?	Specifics	Projects			
			Capital Projects		Planning Projects	Operations Projects
			Capital	Habitat	Policies, Studies, and Coordination	Maintenance
Water quality improvements	City staff	Potential programmatic measures to protect and improve Echo Lake water quality	(MC-CIP-4) Echo Lake Bio filtration Swale	N/A	(MC-Pol-6) Evaluate potential approaches to improve Echo Lake WQ	N/A
		Greenworks projects: Design and construct LID facilities in City ROW to improve water quality and solve existing drainage problems in the project vicinity.	(MC-CIP-3a) North 199th Street at Wallingford Avenue NE	N/A	N/A	N/A
			(MC-CIP-3b) NE 192nd Street and Burke Avenue N.	N/A	N/A	N/A
Failing or Insufficient Infrastructure	CCTV inspection	Up to 50 percent of the pipes in the McAleer Creek basin were determined to have structural and/or maintenance deficiencies during the condition assessment.	(MC-CIP-5) Stormwater Pipe Repair and Replacement	N/A	(MC-Pol-3) Evaluate lateral stormwater connections	(MC-Main-1) Pipe maintenance modifications
			(MC-CIP-6) Trenchless Pipe Repair	N/A	N/A	(MC-CIP-8) Pipes to be replaced by City Crews
			(MC-CIP-7) Remove utility crossings	N/A	N/A	N/A
			(MC-CIP-11) Second Tier Pipe Repair	N/A	N/A	N/A

Issue/Opportunity	How was it Identified?	Specifics	Projects			
			Capital Projects		Planning Projects	Operations Projects
			Capital	Habitat	**Policies, Studies, and Coordination**	Maintenance
City pipes crossing private property	GIS mapping, City staff	Pipes crossing private property with no easement makes maintenance difficult for the City	(MC-CIP-9) Abandon pipes and relocate to City ROW	N/A	(MC-Pol-4) Easement acquisition	N/A
					(MC-CIP-9a) Evaluate pipes on private property for possible future relocation to City ROW	N/A
Stream Designations	City staff, field observation	It appears that some stream designations in the McAleer Creek basin may be inaccurate based on field observations.	N/A	N/A	(MC-Pol-5) Review stream designations	N/A

5.1.2 Capital Projects

Capital projects are those that involve construction or replacement of a stormwater asset. Typically these projects require engineered drawings and bid documents, however, some are fairly simple and can be constructed by City crews.

The recommended capital projects in this Plan address:

- **Flood reduction;**

  Chronic flooding occurs at the intersection of 6th Avenue NE and NE 200th Street, the location of numerous flood-related complaints between 2002 and 2014. Hydraulic modeling indicates that pipes are not adequately sized to convey the 25-year storm event. Project MC-CIP-1 provides a phased approach to address the flooding in this area.

- **Water quality or habitat improvements;**

  The City's Greenworks program seeks opportunities to install low impact development stormwater management BMPs in City ROW to improve minor drainage issues and enhance storm water quality. Two Greenworks projects previously identified in the McAleer Creek basin were developed into recommended projects for this plan (CIP-3a and CIP-3b); an additional low impact development water quality improvement opportunity was identified adjacent to Echo Lake (CIP-4).

  Preservation and protection of habitat are themes throughout the City's Comprehensive Plan (City of Shoreline 2012) and are also key factors in a functioning surface water system for both flood reduction and water quality. However, there are relatively few opportunities in this basin for the City to significantly improve habitat. One such opportunity is the daylighting of Cedarbrook Creek at the Cedarbrook School property, currently owned by the Shoreline School District. If this property does become a Shoreline Park at some future point in time, it would be a great opportunity for an environmental learning center and restoration of the surrounding wetlands, and stream corridor.

- **Stormwater pipes with structural deficiencies or improper connections;**

  Several hundred linear feet of pipe were identified as having poor structural or maintenance rating scores during the condition assessment. Additionally, other types of problems were identified during the condition assessment, including utility crossings that cut through stormwater pipe and improper storm drain connections. For the purpose of recommending projects to improve stormwater conveyance infrastructure, similar projects have been grouped together as one. The benefit of this approach is that several small repairs or replacement projects could be completed under one contract with the same equipment. The pipe repair and replacement projects, including the priority open-cut pipe replacement and storm drain connections (MC-CIP-5), trenchless pipe repair (MC-CIP-6), and second tier pipe repair (MC-CIP-11) projects will be implemented through the City's Stormwater Pipe Repair and Replacement Program.

- **Stormwater drainage improvements.**

  In addition to pipe issues identified through the CCTV inspections, ditch improvements were also identified as a need by City staff in many locations. Two projects address ditch improvements (MC-CIP-10 and MC-CIP-12) and another project addresses lack of public infrastructure (MC-CIP-13).

The 2011 Surface Water Master Plan Update (SAIC 2011) recommended a city-wide initiative to advance easement acquisition for stormwater pipes that are currently crossing private properties. A review of pipes that cross private properties was made for this basin plan and one specific project was identified where the pipes could be relocated at three different locations to City ROW. That project is specifically called out as a capital project (MC-CIP-9), and another programmatic project is recommended to pursue additional easements for pipes located on private properties with no easements in place.

These projects were identified through pipe condition assessment, field work, previous studies and City staff input. Project summary sheets and planning-level costs are provided in Appendix F and described below.

5.1.2.1 6th Avenue NE and NE 200th Street Flood Reduction Project(s) (MC-CIP-1)

This project was identified by City staff as a conveyance and system configuration issue that contributes to flooding. This project involves replacing and upsizing some of the existing infrastructure that is undersized, replacing structures and adding a birdcage to keep debris out of the pipes and prevent future blockages.

5.1.2.2 NE 190th Street Flood Reduction Project (MC-CIP-2)

This project addresses the flooding issue identified as Mc-F1 in the 2011 SWMP and involves re-routing an unnamed Whisper Creek tributary from a flood-prone private property channel on the north side of NE 190th Street to a new open channel along the south side of NE 190th Street and the northern edge of the Cedarbrook School property. The new channel would offer water quality benefits as well as habitat enhancements. The concept for this project was initially developed by SvR Consulting; cost estimates based upon the conceptual design were prepared for this basin plan. A project summary sheet is provided in Appendix F.

5.1.2.3 Greenworks: Bioretention at North 199th Street and Wallingford Avenue N. (MC-CIP-3a)

This project involves constructing three bioretention swales on the south side of North 199th Street at the intersection of Wallingford Avenue NE. This project was identified through the Greenworks program. A project summary sheet is provided in Appendix F.

5.1.2.4 Greenworks: Bioretention at NE 192nd Street and Burke Avenue N. (MC-CIP-3b)

This project involves constructing three bioretention swales on the south side of North 192nd Street at the intersection with Burke Avenue NE. This project was identified through the Greenworks program. A project summary sheet is provided in Appendix F.

5.1.2.5 Echo Lake/ Stormwater Retrofit Interurban Trail. (MC-CIP-4)

This project involves constructing a biofiltration swale between Stone Avenue North and the Interurban Trail. A project summary sheet is provided in Appendix F.

5.1.2.6 Priority Open-cut Pipe Replacement and Storm Drain Connection (MC-CIP-5)

Approximately 800 linear feet of pipe is recommended for priority replacement by open-cut trenching methods due to poor structural pipe ratings and significant defects. Most of these pipe segments were rated very poorly and require immediate attention within the next few years, either because of their location or the type of failure. Lateral or side storm connections improperly connected to the storm mainline is a common issue throughout the basin. Several of the connections were made with different pipe material and/or have not been grouted in, resulting in a severe structural deficiency of the storm mainline. Generally, the recommended solution for pipes in this category is to install a structure, such as a catch basin or manhole, and properly connect the incoming and outgoing pipes to the new structure. Improper storm drain structures associated with these pipes were also identified and are recommended for repair at the time that the pipes are replaced.

Appendix F lists the specific problems, proposed solutions, and locations of the pipes and drainage structures recommended for replacement in the project summary sheets along with a planning level cost estimate.

5.1.2.7 Trenchless Pipe Repair (MC-CIP-6)

There are over 1,100 linear feet of pipe recommended for trenchless pipe repair. Trenchless solutions include slip-lining, cured-in-place pipe, pipe bursting, pipe reaming, and others. A project summary sheet in Appendix F lists the specific pipes, locations, pipe ratings, and cost of this recommended capital project.

5.1.2.8 Remove Utility Crossings (MC-CIP-7)

Structural deficiencies sometimes result from other utilities crossing or coming close to storm drain pipes and damaging them. It is recommended that the City identify the likely utility owners and coordinate relocation of the utility crossing and repair of stormwater pipes that have been affected. It is assumed that the utility companies that have crossed the storm drain pipes will pay for the repairs and that the City will not be financially responsible for the work; however, there is a cost associated with staff coordination time that is assumed in the project summary sheet in Appendix F.

5.1.2.9 Abandon Pipes and Relocate to ROW (MC-CIP-9)

This project involves reconfiguring existing stormwater pipes and structures at three different locations within the City's right-of-way. The project summary sheet, pipe locations, and planning level cost estimate are provided in Appendix F.

5.1.2.10 NE 192nd Street Ditch Improvements (MC-CIP-10)

This project addresses a ditch with on-going erosion problems on the south side of NE 192nd Street. The ditch has a large contributing area and a history of sedimentation and scour. Previously-installed energy dissipation features subsequently filled in with sediment. The City recently excavated the ditch to restore the previous configuration; however, a long-term solution is needed to prevent future scour and erosion in the ditch due to high flow velocities on the steep slope. This project is to design an engineered, robust solution that can convey the high flows and velocities without damage to the ditch.

5.1.2.11 Second Tier Pipe Repair (MC-CIP-11)

Pipes that did not fall into one of the priority repair categories, yet have received a poor SPR were included in this category. Structural deficiencies in this category include pipes that have fractures, holes, or minor deformities. It is recommended that the City place these pipes on a "to be repaired" list to ensure the pipe does not fail before the next assessment period. Nearly 6,000 linear feet of pipe fall into this category.

5.1.2.12 25th Avenue NE Ditch Improvements (MC-CIP-12)

The 25th Avenue NE half-pipe ditch and culvert system has been an on-going maintenance concern for Shoreline for many years, and is currently on the City's "hot-spot" list to be checked before, during and after heavy rain events. The existing system is failing, and is in need of repair. However, other issues may also need to be addressed in a comprehensive manner at the same time, including problems associated with slope and road stability and drainage conveyed to this location. This project involves evaluating the problem and developing a comprehensive solution to repair the ditch and culvert system and minimize future drainage issues.

5.1.2.13 NE 177th Street Drainage Improvements (MC-CIP-13)

Private properties have been affected by flooding due to a lack of public infrastructure along the north side of NE 177th Street in the vicinity of 21st Place NE and 22nd Place NE. This project involves developing options for connecting existing infrastructure within the public right-of-way to reduce impacts and provide proper downstream connections.

5.1.2.14 Daylight Cedarbrook Creek (MC-Hab-1)

This project was recommended by citizens at the public meetings for this plan. It involves daylighting the portion of Cedarbrook Creek that is currently in a pipe beneath the Cedarbrook School property. A cost estimate or conceptual design was not prepared for this project, however, a project summary sheet is provided in Appendix F.

5.1.3 Planning Projects

The planning projects recommended below address basin-wide or site specific surface and stormwater issues that require further evaluation before a capital project or operational strategy can be recommended, or involve development of a new policy or management strategy. These include shallow groundwater and associated impacts, zoning changes and transit-oriented new development in the NE 185th Street corridor, stormwater connections outside of City ROW including potential easement acquisition, Echo Lake water quality, re-visiting current stream designations, and evaluation of drainage system needs on the City's eastern boundary.

Water quality monitoring has been conducted by the City in McAleer Creek downstream of NE 196th Street and in Whisper Creek for many years. Water quality conditions monitored at these locations appear stable, trending neither up nor down. Additionally, Echo Lake has been monitored as part of King County's Lake Monitoring program since 2001. The City is making progress in the treatment of stormwater runoff prior to discharging to Echo Lake, as Aurora Avenue and private businesses have implemented projects in the last several years. As this area continues to redevelopment, water quality treatment will improve and hopefully a commensurate trend in improving lake water quality will follow. In the meantime, an evaluation of other programmatic efforts that can be implemented to improve water quality in Echo Lake is warranted (MC-Pol-8).

In addition to the specific water quality recommendations for this basin listed above (MC-CIP-3a, MC-CIP-3b, and MC_CIP-4) a general recommendation for the basin is to continue city-wide water quality-related education and outreach programs including “chemical-free gardening,” “natural yard care,” “scoop the poop,” and ways to safely wash cars without impacting surface water. These education and outreach activities are conducted both passively through information posted on the City’s website and actively through special events for Earth Day, school programs, and other events.

5.1.3.1 Groundwater Study (MC-Pol-1)

Flooding and other drainage issues due to or exacerbated by shallow groundwater are present within the McAleer Creek basin, particularly within the area east of 15th Avenue NE and between NE 185th Street and NE 195th Street. Groundwater seepage and springs are common and the source of many of the stream channels in this area. While this area is particularly notable for shallow groundwater, there are other locations within the McAleer Creek basin and City-wide that may experience similar conditions. A city-wide groundwater study would further evaluate existing drainage issues due to shallow groundwater, including those identified in the McAleer Creek basin, and recommend alternative surface water management approaches in these areas, including the appropriate use of infiltrative stormwater management techniques such as low impact development options, and open- or closed-conveyance systems in these areas.

5.1.3.2 NE 185th Street Station Subarea Stormwater Study (MC-Pol-2)

Sound Transit’s North Link Light Rail line will run through the City of Shoreline along the east side of Interstate 5, including a station at NE 185th Street. The City has adopted a major rezone to allow for higher density redevelopment for the NE 185th Street Station Subarea typically extending to a half-mile radius from the station, of which large portions drain to the McAleer Creek basin. This project is to analyze existing condition of the public stormwater system in this area and recommend future upgrades needed to accommodate anticipated growth. This study could be combined with the Groundwater Study recommended in Mc-Pol-1 as a single, dual-purpose study with some overlapping interests, or the studies could be done separately. Either way, the 185TH Street Subarea should be evaluated for groundwater conditions and any related potential stormwater management impacts.

5.1.3.3 Evaluate Lateral Stormwater Connections (MC-Pol-3)

In addition to the improper storm drain connection that are being recommended to be repaired as part of open-cut pipe replacements, an additional 72 lateral improper stormwater connections were identified during the CCTV inspections. In most cases, the improper connections have resulted in damage to the City’s stormwater pipe, and there is no record of the connection other than the video recording and report done for this assessment. This project is to evaluate how to handle these connections, including inventory, repair and maintenance, and responsibility. A project summary sheet is in Appendix F.

5.1.3.4 Evaluate Easement Acquisition (MC-Pol-4)

This programmatic project involves staff time to review and research options for acquiring drainage easements for storm drainage pipes currently located on private property. A project summary sheet is provided in Appendix F.

5.1.3.5 Evaluation of Stream Designations (MC-Pol-5)

There are some questionable channels that are designated as streams in the McAleer Creek basin. Some of these are likely just stormwater runoff and do not qualify as streams according to the City's designation. This project involves reviewing the list of streams field verified during reconnaissance for this basin plan and evaluate potential revisions to designations that more accurately reflect actual conditions and might be appropriate for reclassification following discussions with City staff and the Planning department. A project summary sheet is provided in Appendix F.

5.1.3.6 Echo Lake Water Quality Improvement Study (MC-Pol-6)

Given the unique status of Echo Lake as the City's only natural lake, ongoing water quality concerns and monitoring, as well as importance to residents and organizations such as the Echo Lake Neighborhood Association, it could be worthwhile for the City to undertake a study which (1) assesses of Echo Lake's current health and trending conditions, especially with regard water quality; (2) analyzes likely sources of water quality issues; and (3) makes specific recommendations to stabilize and improve the lake's water quality. Examples of potential recommendations may include:

- Higher priority given to Greenworks candidate sites within the Echo Lake watershed.
- Incentives to encourage additional WQ enhancements within the Echo Lake watershed.
- Other programmatic efforts to reduce influent nutrient loading for nitrogen and phosphorus.

5.1.3.7 Eastern Boundary Drainage Systems Study (MC-Pol-7)

Much of the City of Shoreline's eastern boundary with Lake Forest Park runs roughly along the western edge of the McAleer Creek ravine. Accordingly, there are numerous City drainage systems of various sizes and conditions which flow eastward towards McAleer Creek across this boundary. Many of these eastward drainage connections were originally informal or under-designed, or have since become overwhelmed, failed, or fallen into disrepair. It could be valuable for the City to undertake a study which: (1) Locates and assesses all such exiting storm drain systems ; (2) identifies currently problematic or potentially problematic situations; (3) recommends potential solutions – including drainage system improvements and/or coordination efforts with Lake Forest Park and private property owners.

5.1.3.8 Abandon Pipes and Relocate to ROW - Planning (MC-CIP-9a)

This project involves evaluating additional pipes for potential future relocation. The locations of the pipes and a summary of their condition are provided in the project summary sheet in Appendix F, however a planning level cost estimate has not been prepared.

5.1.4 Operational Projects

Projects in the operational category are maintenance-oriented, but non-routine. Only one project is identified in this basin and it includes extra maintenance for several pipes that were found to be in need of extra cleaning.

5.1.4.1 Maintenance Modifications (MC-Main-1)

The pipes identified as having a poor maintenance rating or that were not accessible by CCTV because of excessive sedimentation or root buildup were determined to need additional maintenance. Approximately 7,200 linear feet of pipe is on the maintenance modification list, requiring additional cleaning. Appendix F includes the project summary sheet with specific pipes, locations, ratings, and estimated cost.

5.1.4.2 Operational Pipe Replacement and Repair by City Crews (MC-CIP-8)

Some of the pipe repairs identified during the infrastructure condition assessment are relatively minor and can be completed by City operations and maintenance crews. Eleven such pipes were identified; however, a cost estimate was not prepared for the work.

6. Project Prioritization and Costs

The projects recommended in Section 5 represent a variety of strategies to address on-going issues in the McAleer Creek basin. Most of the projects are specific to drainage or infrastructure repair or replacement based on the results of the condition assessment or known problems. Several criteria were used to prioritize the projects within the context of just the McAleer Creek basin. These projects will be prioritized with regard to the City's entire stormwater management program and may rank lower with respect to other City-wide issues. Only the capital projects were prioritized for this effort.

6.1 Criteria

Table 6-1 lists the criteria for project prioritization and shows the conditions under which each criterion's score will rank as high, medium, or low.

Table 6-1. Criteria and Scoring for Project Prioritization

Criteria	Rank Scores		
	High (5 points)	Medium (3 points)	Low (1 point)
Likelihood of success	Proved in other cases	Mixed results	Unproven
Number of issues addressed (water quality, habitat, erosion, flooding)*	Three	Two	One
Protects infrastructure and public safety	Both	One or the other	None
On public property	In ROW or existing easement	Requires easement on other public property	Private property

* If project is a flood reduction project, an additional 5 points are applied to overall score for a total possible 10 points for this criteria.

The combined scores of individual criteria were ranked according to the following total points:

- Low priority (10 points or fewer)
- Medium priority (11 to 15 points)
- High priority (16 points or higher)

6.2 Matrix of Projects

Table 6-2 lists the recommended capital projects according to issue addressed and prioritization criteria. Preliminary project cost is shown, but was not factored into the prioritization. Using the criteria described above, all of the projects ranked within a few points of one another in the high and medium category.

Table 6-2. List of Prioritized Projects and Costs

Issue	Project Name	Type	Cost	Prioritization Criteria: Likelihood of Success	Prioritization Criteria: Number of Issues Addressed	Prioritization Criteria: Protects Infrastructure and Public Safety	Prioritization Criteria: On Public Property	Total Score and Priority
Flooding, Drainage and Infrastructure	(MC-CIP-1) 6th Avenue NE and NE 200th Street Flood Reduction		$340,100	High (5)	Low (6)	High (5)	High (5)	HIGH (21)
	(MC-CIP-2) NE 190th Street Flood Reduction		$709,500	Medium (3)	High (10)	High (5)	Low (1)	HIGH (19)
	(MC-CIP-12) 25th Avenue NE Ditch Improvements		Not estimated	Medium (3)	High (5)	High (5)	High (5)	HIGH (18)
	(MC-CIP-13) NE 177th Street Drainage Improvements		Not estimated	High (5)	Medium (3)	High (5)	High (5)	HIGH (18)
	(MC-CIP-10) NE 192nd Street Ditch Improvements		Not estimated	Medium (3)	Medium (3)	High (5)	High (5)	HIGH (16)
	(MC-CIP-5) Priority Open-Cut Pipe Replacement and Storm Drain Connection		$1,112,200	High (5)	Medium (3)	High (5)	High (5)	HIGH (18)
	(MC-CIP-6) Trenchless Pipe Replacement		$401,600	High (5)	Medium (3)	High (6)	High (5)	HIGH (18)
	(MC-CIP-7) Remove Utility Crossings		$13,260	High (5)	Low (1)	High (5)	High (5)	HIGH (16)
	(MC-CIP-11) Second Tier Pipe Repair		$5,151,500	High (5)	Medium (3)	Medium (3)	High (5)	HIGH (16)

Issue	Project Name	Type	Cost	Prioritization Criteria				Total Score and Priority
				Likelihood of Success	Number of Issues Addressed	Protects Infrastructure and Public Safety	On Public Property	
Habitat	(MC-HAB-1) Daylight Cedarbrook Creek		Not estimated	High (5)	Low (1)	Low (1)	High (5)	MEDIUM (12)
Pipes on private property	(MC-CIP-9) Abandon pipes on private property and relocate to City ROW		$1,716,400	High (5)	Low (1)	Low (1)	High (5)	MEDIUM (12)
Greenworks Projects and Retrofit	(MC-CIP-3a) Greenworks Bioretention at N 199th Street and Wallingford Avenue North		$396,800	Medium (3)	Medium (8)	Low (1)	High (5)	HIGH (17)
	(MC-CIP-3b) Greenworks Bioretention at N. 192nd Street and Burke Avenue North		$241,600	Medium (3)	Medium (8)	Low (1)	High (5)	HIGH (17)
	(MC-CIP-4) Echo Lake Biofiltration Swale		$610,000	Medium (3)	Low (1)	Low (1)	High (5)	LOW (10)

.

6.3 Project Cost Summary

The total cost of the recommended capital projects for which costs were estimated in the McAleer Creek basin is estimated to be $10,646,960. The estimated cost of programmatic recommendations is an additional $200,000, and approximately $146,000 is needed for additional maintenance on pipes that were too dirty to be assessed during the condition assessment. There are three projects that are high priority for which costs were not estimated. The range of estimated costs for these three projects are between $500,000 and $1,500,000 in capital costs.

A summary of the highest ranked capital projects is shown in Table 6.3. The total cost for these projects, not including those for which a cost was not estimated (MC-CIP-10, MC-CIP-12, and MC-CIP-13) is $8,320,560.

Table 6-3. Summary of Highest Ranked Capital Projects

Issue	Project Name	Type	Priority and Score	Cost
Flooding, Drainage and Infrastructure	(MC-CIP-1) 6th Avenue NE and NE 200th Street Flood Reduction		HIGH (21)	$340,100
	(MC-CIP-2) NE 190th Street Flood Reduction		HIGH (19)	$709,500
	(MC-CIP-12) 25th Avenue NE Ditch Improvements		HIGH (18)	Not estimated
	(MC-CIP-13) NE 177th Street Drainage Improvements		HIGH (18)	Not estimated
	(MC-CIP-10) NE 192nd Street Ditch Improvements		HIGH (16)	Not estimated
	(MC-CIP-5) Priority Open-Cut Pipe Replacement and Storm Drain Connection		HIGH (16)	$1,112,200
	(MC-CIP-6) Trenchless Pipe Replacement		HIGH (16)	$401,600
	(MC-CIP-7) Remove Utility Crossings		HIGH (16)	$13,260
	(MC-CIP-11) Second Tier Pipe Repair		HIGH (16)	$5,151,500
Greenworks Projects and Retrofit	(MC-CIP-3a) Greenworks Bioretention at N 199th Street and Wallingford Avenue North		HIGH (17)	$396,800

Issue	Project Name	Type	Priority and Score	Cost
	(MC-CIP-3b) Greenworks Bioretention at N. 192nd Street and Burke Avenue North		HIGH (17)	$241,600

The primary medium ranked capital project with an associated cost estimate is project MC-CIP-9 which involves abandoning city-owned stormwater pipes on private properties and relocating them to City ROW. The cost for this project is $1.7 million dollars.

7. Partnerships/Grant Opportunities

Funding stormwater management programs in addition to other City functions has been a challenge in recent years. Increasingly, many communities are looking to partnerships and grant funding to relieve some of the financial strain. For some of the projects recommended in this plan, there are opportunities to partner with other community and educational organizations for implementation, as well as to pursue grant opportunities from a myriad of organizations. Two projects have community interest, MC-Hab-1 (Daylighting Cedarbrook Creek) and MC-Pol-6 (Echo Lake Water Quality Improvement Study). To the extent that neighborhood groups can be enlisted in support of these projects either as volunteers or community liaisons will be helpful as solutions are identified and implemented.

Several projects have low impact development stormwater retrofit components, which are attractive to projects for grant funding as funding agencies such as Ecology look to municipalities to implement modern stormwater management techniques. The following projects would likely be eligible for stormwater funding (such as the Stormwater Pre-construction grants) that has been typically available through the Washington State Department of Ecology:

- MC-CIP-3a (Greenworks Bioretention at N. 199th St. and Wallingford Avenue N)
- MC-CIP-3b (Greenworks Bioretention at N. 192nd St. and Burke Avenue N.)
- MC-CIP-4 (Echo Lake Biofiltration Swale)

8. References

City of Shoreline. 2011a. *2011-2017 Parks, Recreation and Open Space Plan*. Adopted July 2011.

City of Shoreline. 2011b. *Transportation Master Plan*.

City of Shoreline. 2012. *Comprehensive Plan*. Adopted December 2012.

Hammond, Collier & Wade Livingstone Associates. 1999. *McAleer and Lyon Creeks Drainage Basin Study for the City of Lake Forest Park*. June 1999.

Otak. 2009. *Flood Reduction Planning Study, Lyon Creek and McAleer Drainage Basins*. December 2009.

SAIC. 2011. *City of Shoreline Surface Water Master Plan Update*. December 2011.

Tetra Tech/KCM. 2004. *City of Shoreline Stream and Wetland Inventory Assessment Appendices*. May 2004.

United States Army Corps of Engineers. 2010. *Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Western Mountains, Valleys, and Coast Region Version 2.0.* May 2010.

United States Geological Survey. 1983. *Geologic Map of the Edmonds East and Part of the Edmonds West Quadrangles, Washington*. Miscellaneous Field Studies Map MF-1541. 1983.

Washington State Department of Ecology. 2012. *Water Quality and 303(d) List*. http://www.ecy.wa.gov/programs/Wq/303d/index.html.

Washington State Department of Ecology. 2014. *Washington State Wetland Rating System for Western Washington: 2014 Update*. October 2014.

McAleer Creek Basin Plan

Appendix A:
McAleer Creek Surface Water Basin Plan (Shoreline, WA)
Modeling Memorandum

MCALEER CREEK SURFACE WATER BASIN PLAN

[SHORELINE, WA]

MODELING MEMORANDUM

City of Shoreline

17500 Midvale Avenue North

Shoreline, Washington 98133

Prepared by

OSBORN CONSULTING INCORPORATED

1800 112th Avenue Northeast, Suite 220E

Bellevue, Washington 98004

425.451.4009

July 2015

TABLE OF CONTENTS

SECTION I INTRODUCTION AND BACKGROUND 1
Background 1
SECTION II HYDROLOGIC MODEL (HSPF) 3
Model Selection 3
Modeling Methods 3
Results – Flow Frequency Analysis 4
SECTION III HYDRAULIC MODEL (HEC-RAS) 5
Model Selection 5
Modeling Methods 5
FEMA Floodplain Mapping 9
SECTION IV ALTERNATIVES ANALYSIS 11

LIST OF APPENDICES

APPENDIX A-1: HSPF Flow Frequency Analysis
APPENDIX A-2: Field Observations
APPENDIX A-3: McAleer Creek FIRMs
APPENDIX A-4: Modeling Files
APPENDIX A-5: Calculations

LIST OF TABLES

TABLE 1: McAleer Creek Flow Frequency Results
TABLE 2: HEC-RAS Flow Data – McAleer Creek
TABLE 3: HEC-RAS Results – McAleer Creek
TABLE 4: NE 196th St. WSEL Assessment

LIST OF FIGURES

FIGURE 1: Vicinity Map
FIGURE 2: McAleer Creek Plan View
FIGURE 3: 25 and 100-Yr Profile
FIGURE 4: McAleer Creek Floodplain Map

SECTION I
INTRODUCTION AND BACKGROUND

This memorandum presents the methods and results of the Hydrologic and Hydraulic Modeling completed as part of the development of the McAleer Creek Basin Plan for the City of Shoreline. The Hydrologic and Hydraulic Modeling was conducted by Osborn Consulting Inc. (OCI) under contract to the City of Shoreline (City). The specific project objectives for the McAleer Creek Basin Plan are:

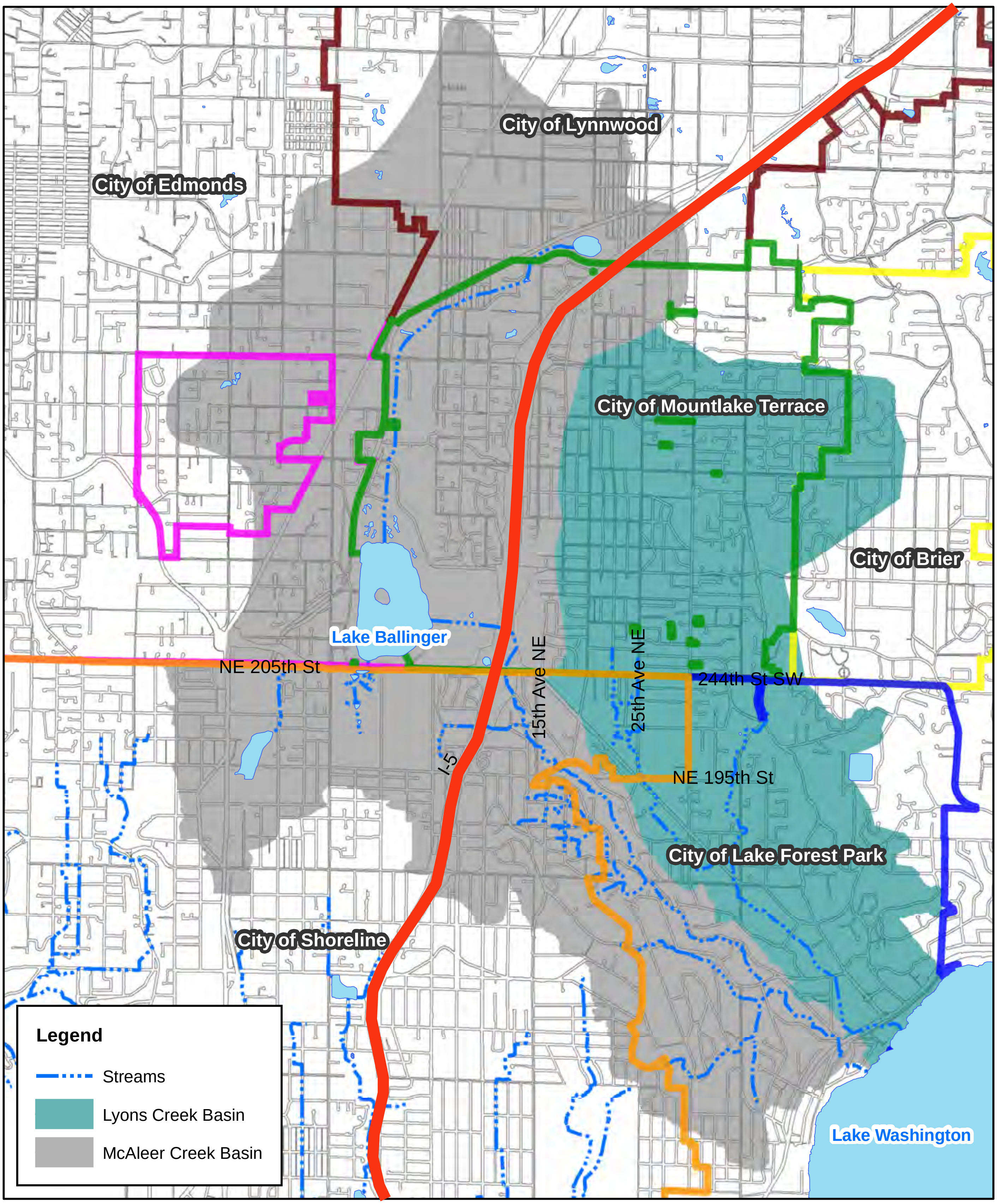
- Update floodplain mapping,
- Identification and evaluation of management actions to surface water and infrastructure problems (flooding, erosion, water quality),
- Evaluation of stormwater treatment strategies for future development and redevelopment (regional facilities, alternative standards, etc.), and
- Develop a prioritized list of proposed Capital Improvement Projects (CIPs).

Background

Multiple jurisdictions share responsibility and interest in addressing long-term watershed planning and conservation efforts in the McAleer Creek watershed. The McAleer Creek watershed is approximately 8.1 square miles. McAleer Creek general flows from the west side of I-5, in a southeast direction towards Lake Washington. Over two thirds of the watershed (5.5 square miles) flows through Lake Ballinger, located in the City of Mountlake Terrace, which is regulated by an outlet structure. The remaining 2.6 square miles are located between the Lake Ballinger outlet and Lake Washington (see **Figure 1**).

The focus area of this study (referred to as the McAleer Creek subbasin in this memorandum) is the portion of the McAleer Creek watershed downstream of Lake Ballinger and within the City of Shoreline. McAleer Creek flows from north to south through the McAleer Creek subbasin from NE 205th Street (aka 244th St. SW), on the east side of I-5, until it crosses into Lake Forest Park at NE 196th Street east of 15th Ave NE. Noteworthy infrastructure within the subbasin includes two culverts, one bridge, and one regional detention facility.

Photo 1: McAleer Creek bridge at Forest Creek Apartments



N

0 1,750 3,500 7,000 Feet

0 875 1,750 Meters

Figure 1: Vicinity Map

Shoreline, WA

DRAFT

OSBORN CONSULTING INCORPORATED

Prepared by MLP,12/15/2014

SECTION II
HYDROLOGIC MODEL (HSPF)

This section documents the Hydrologic Simulation Program Fortran (HSPF) hydrologic modeling methods and results.

Model Selection

An existing McAleer Creek HSPF model, developed by others, was used for the McAleer Creek hydrology. The McAleer Creek HSPF model was developed and calibrated by Hammond Collier Wade Livingstone in 1999 for the City of Lake Forest Park to simulate a future “built-out” condition. Otak updated the model in 2009 by extending the precipitation through 2007 and incorporating updated Lake Ballinger modeling completed by Clear Creek Solutions in 2008. The updated Lake Ballinger modeling focused on the area tributary to Lake Ballinger and the stage-volume-discharge relationship of the Lake and weir outlet. The output from the Lake Ballinger model is used as an input to the McAleer Creek HSPF model. HSPF is a Federal Emergency Management Agency (FEMA) nationally accepted continuous simulation hydrologic model.

Modeling Methods

No changes were made to the McAleer Creek HSPF model developed by others. OCI reran the model and performed a flow frequency analysis (FFA) at one location along McAleer Creek to verify consistent results with those published in *Flood Reduction Planning Study, Lyon Creek and McAleer Creek Drainage Basins*, Otak, 2009. OCI’s FFA results matched the 2009 published results at NE 196th Street (HSPF RCHRES 785). The 2009 published results were focused on McAleer Creek in Lake Forest Park so did not publish results for reaches within the City of Shoreline.

Existing Condition

The McAleer Creek HSPF model developed and calibrated in 1999 to simulate the future “built-out” condition and updated in 2009, was used to simulate the existing condition flow for McAleer Creek.

Land Use

No land use changes were made to the HSPF model. Subbasin MC5 accounts for the roughly 697 acres contributing to McAleer Creek between the Lake Ballinger outlet and NE 196th St. The HSPF model assumes McAleer Creek subbasin MC5 has an Effective Impervious Area (EIA) of 14.4% impervious.

Hydrologic modeling is based on EIA which is the total impervious area (TIA) reduced by a “percent connected” factor that accounts for fact that the entire basin is not 100% connected (i.e. roof downspouts may discharge to splash pads and/or open ditches are much less connected than curb and gutter). Review of Shoreline GIS and found the portion of the McAleer Creek basin that is within Shoreline is approximately 40% impervious. However, subbasin MC5 includes the Nile Shrine Golf Course (approximately 93 acres) which greatly reduces the amount of TIA within subbasin MC5. The hydrologic modeling protocols developed for the Snohomish County Drainage Needs Reports 2002, were referenced, which allow for TIA to be reduced by up to 60% in older medium density residential neighborhoods without curb and gutter. Therefore, no land use changes were made to the HSPF model.

The tributary area to Lake Ballinger was modeled separately, by others, and also was not modified as part of this study.

Calibration

The McAleer Creek HSPF model was previously calibrated by others. No additional calibration was performed as part of this study.

Future Condition

A future condition model was not developed as part of this study. City of Shoreline zoning allows for impervious surface coverages greater than the 14.4% simulated in the HSPF model; however; current development standards include stormwater requirements that will limit the amount of increase runoff associated with new development.

Results – Flow Frequency Analysis

HSPF flow data was analyzed at five RCHRES locations in the McAleer Creek subbasin (see **Table 1** and **Appendix A-1**). A RCHRES is a location where HSPF uses a stage-storage-discharge relationship to simulate how flow is routed through the basin. The output from the Lake Ballinger model generates the flow that is routed through RCHRES locations: 804, 802, 800, and 790. Subbasin MC5 contributes additional runoff at RCHRES 785.

Table 1: McAleer Creek Flow Frequency Results					
Flow	**RCHRES**	**Location**	**2-yr (cfs)**	**25-yr (cfs)**	**100-yr (cfs)**
↓	804	SW 244th St.	73.17	110.60	125.88
	802	Eastbound SW 244th St. Onramp to I-5	73.18	110.61	125.90
	800	Forest Park Dr. NE	72.96	110.30	125.57
	790	15th Ave NE	72.92	110.35	125.69
	785	NE 196th St.	93.14	178.00	240.96

Flow results at two RCHRES locations were used as input in the HEC-RAS model (see **Table 2**). RCHRES 790 flows were input at the upper limit of the model and flow through 15th Ave NE. RCHRES 785 flows were input at 15th Ave NE and flow through the downstream model limit at NE 196th St.

Table 2: HEC-RAS Flow Data – McAleer Creek					
Flow	**River Station**	**Location**	**25-yr (cfs)**	**100-yr (cfs)**	**Source**
↓	3164.23	NE 205th St. / SW 244th St. (City limits)	110.35	125.7	RCHRES 790
	906.88	15TH Ave NE	178	240.96	RCHRES 785

The HEC-RAS River Station locations are shown on **Figure 2** located in Section III. Results of the HEC-RAS modeling are also presented in Section III.

SECTION III
HYDRAULIC MODEL (HEC-RAS)

This section documents the HEC-RAS hydraulic modeling methods and results. The HEC-RAS model was used to run 25-year and 100-year design flows from the McAleer Creek HSPF model for the purpose of identifying flooding problems and mapping the 100-year floodplain.

Model Selection

McAleer Creek was modeled using US Army Corps of Engineers Hydrologic Engineering Centers River Analysis System (HEC-RAS) Version 4.1.0. HEC-RAS performs one-dimensional steady and unsteady flow river hydraulics calculations (steady was used for this project). HEC-RAS is a Federal Emergency Management Agency (FEMA) nationally accepted hydraulic model. Use of a FEMA approved model is important because it allows the City to pursue a Zone A 100-year Flood Hazard designation. HEC-RAS is a publically available model that could easily be updated and used by City staff as infrastructure is replaced or upgraded throughout the basin.

When this project was scoped, it was assumed that an existing McAleer Creek XPSWMM model developed by others for the City of Lake Forest Park would be used. However, review of that model found it does not extend upstream into the City of Shoreline, so a new HEC-RAS model was developed. The City of Shoreline provided the proposed model for the Goheen Revetment project (located upstream of NE 196th St.) and that model was incorporated into the new HEC-RAS model. Construction of Goheen Revetment project is scheduled to begin June, 2015.

Modeling Methods

This section documents the data and the assumptions that were used to develop the McAleer Creek HEC-RAS model.

Existing Condition

The new McAleer Creek HEC-RAS geometry was developed using City of Shoreline GIS data for the stream alignment and cutting channel cross sections in CAD using contours generated from 2001 LiDAR data. The LiDAR sections were updated with low flow channels based on field observations. Culvert information was obtained from field observations as well, including culvert inverts. The road surfaces defining the over topping elevation of the culverts were cut from LiDAR. The 2012 LiDAR data became available after the model development was underway so sections were not re-cut using the more recent data. Contour lines from both data sets (2001 and 2012) were compared in GIS and no significant differences between the two were identified.

The City provided Goheen Revetment project model was incorporated as the lower portion of the model (River Stations 0 through 380). No edits were made to the City provided model.

Field observations, site photos, and engineering judgment were used to estimate various characteristics defining McAleer Creek as summarized below:

- Cross section locations were determined based on observed bends in the stream alignment and at changes in cross section shape.
- Manning's n values are 0.045 for the channel, and range from 0.05 to 0.12 for the overbanks based on observed vegetation.
- Ineffective areas model the active flow area due to contraction and expansion of the channel at each culvert in accordance with HEC-RAS guidelines.
- The downstream boundary condition is the rating curve simulating the flow control structure at the NE 196th Street flow control facility. The rating curve was provided as part of the Goheen Revetment model.

The resulting model simulates 3,165 linear feet of McAleer Creek, including two culvert crossings and a bridge crossing, in the City of Shoreline. See **Figure 2** for the plan view showing river stations and culvert crossings. The HEC-RAS flow data is presented in **Table 2** located in the previous section. See **Appendix A-2** for field notes and site photos.

Results

The HEC-RAS model indicates the McAleer Creek culverts and bridge provide adequate conveyance capacity for the 100-year flow frequency. The HEC-RAS results at the bridge and culvert locations are presented in **Table 3**. The McAleer Creek 25-year and 100-year water surface profile is provided as **Figure 3**.

Table 3: HEC-RAS Results – McAleer Creek

Flow	River Station	Location	25-yr Flooding	100-yr Flooding
↓	2538.88	Forest Park Dr. Culvert	No Flooding	No Flooding
	955.88	15th Ave NE Culvert	No Flooding	No Flooding
	590.88	Forest Cr Apts. Bridge	No Flooding	No Flooding

The HEC-RAS analysis found no flooding of right of way or private property within the study area through the 100-year flow. The floodplain map overlaid with 2012 aerial photo indicates is provided as **Figure 4**.

OSBORN CONSULTING INCORPORATED

N

Legend

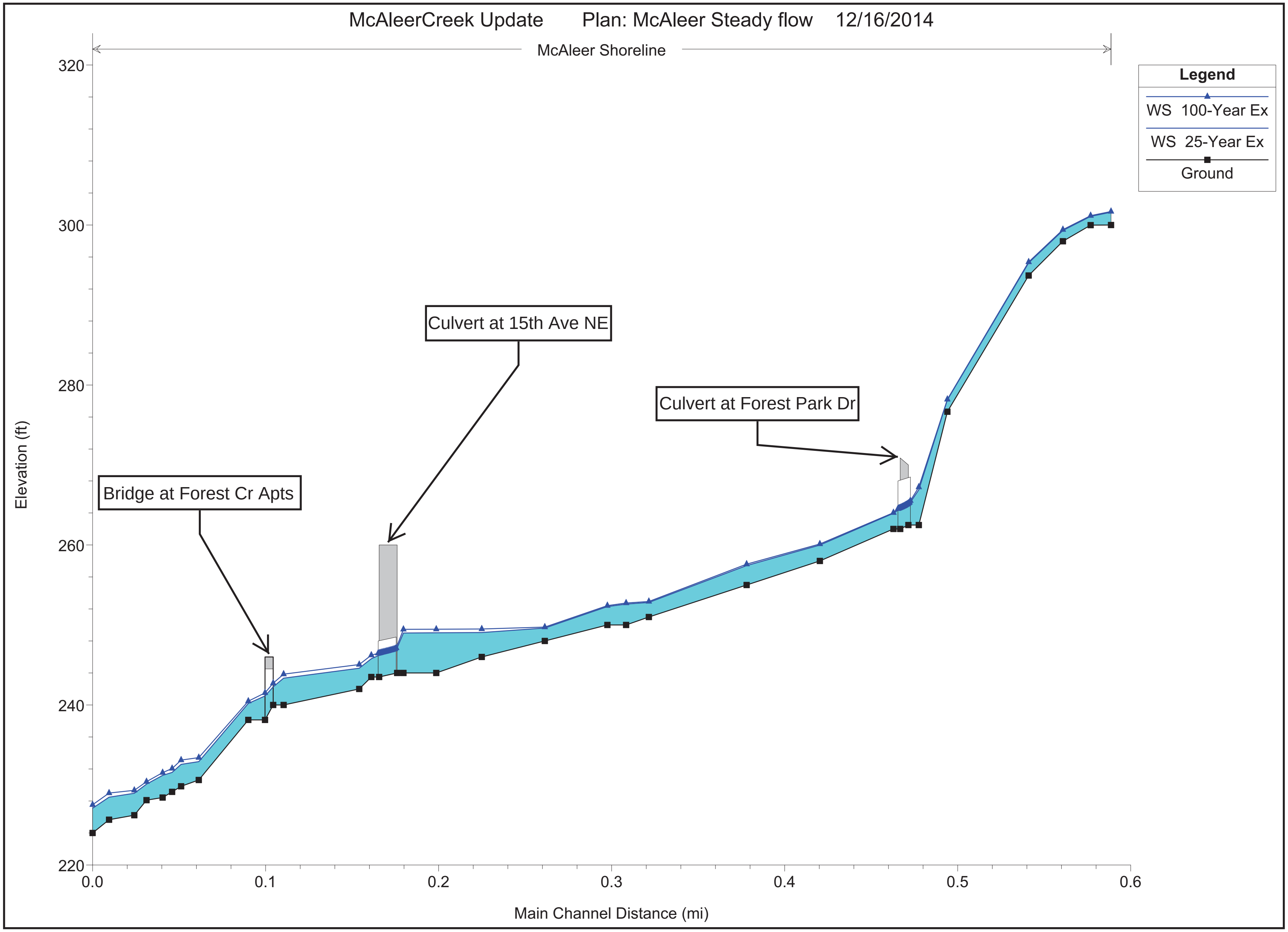
- Bank Station
- Cross Section
- McAleer Creek
- Culvert
- City Limit

Figure 2: McAleer Creek Plan View

Shoreline, WA

DRAFT

Prepared by MLP, 12/12/2014



OSBORN CONSULTING INCORPORATED

Figure 3: 25 and 100- Yr Profile

McAleer Creek Basin

Shoreline, WA

FEMA Floodplain Mapping

The results of the HEC-RAS mapping confirm what is shown on the current Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM) mapping for McAleer Creek within the City of Shoreline. FIRM map number 53033C0043F (last revised 5/16/1995) shows the McAleer Creek 100-year flow contained within the channel (see **Appendix A-3**).

The limits of the FIRM mapping within the City of Shoreline study area are from the City boundary at NE 196th St to just upstream of 15th Ave NE. Notation on the map indicates McAleer Creek, upstream of 15th Ave NE is shown on adjacent panel 0040; however, review of the panel found that it does not include the area between 15th Ave NE and Interstate 5.

Figure 4: Preliminary 100-year Floodplain Map depicts the approximate 100-year McAleer Creek Floodplain as simulated by HEC-RAS. The approximate 100-year floodplain is based on a simulation of 100-year flows presented in **Table 2**, above. Since the HEC-RAS model did not identify existing flooding problems, updating the FIRM with a McAleer Creek Zone A boundary is not recommended at this time. The benefit of having a Zone A boundary is that it would limit encroachment by future development in the floodplain. However, since the area is already built out the risk of encroachment is low and not likely worth the cost of establishing a Zone A boundary.

OSBORN CONSULTING INCORPORATED

Prepared by MLP, 12/17/2014

N

0 200 400 Feet

0 200 Meters

Figure 4: McAleer Flooding Map

Shoreline, WA

DRAFT

SECTION IV
ALTERNATIVES ANALYSIS

This section documents the alternatives analysis performed in support of the CIP project identification and conceptual design. Model files are included as **Appendix A-4**.

NE 196th Street Flow Control Assessment

An existing stormwater detention facility provides approximately 3 acre-feet of detention upstream of the NE 196th Street road prism. The outlet structure is comprised of a slide gate and overflow weir that discharge to a culvert under NE 196th Street. The City reports spending approximately $4,000 per year to the maintain the structure and that the structure is a potential barrier to fish.

The City requested assessment of the NE 196th Street flow control structure to assess the impacts if the facility's control structure was removed.

Since the HEC-RAS model is being run in steady state, the current modeling is unable to quantify the amount of storage provided by the detention facility. Therefore, in order to assess the flow control function of the NE 196th Street flow control structure water surface elevations were compared with and without the flow control structure in place for a range of flows. The resulting changes in water surface elevation (WSEL) are provided in **Table 4**. Removing the control structure drops WSELs upstream of NE 196th Street by approximately 6-feet for the 10-year through the 100-year flow. This indicates that removing the structure could have a significant impact on downstream flows.

Photo 2: Flow control facility at NE 196th St.

Table 4: NE 196th St. WSEL Assessment

		Water Surface Elevation[1] (ft)		
Return Period (year)	**Flow (cfs)**	**With Flow Control**	**Without Flow Control**	**Delta**
2	93.14	230.10	227.66	2.44
10	46.85	234.17	228.17	6.00
25	178.00	234.50	228.47	6.03
50	207.64	234.73	228.72	6.01
100	240.96	234.96	229.00	5.96

1. Water surface elevations taken at HEC-RAS River Station 50.

Removal of the NE 196th Street flow control structure is not recommended. The structure provides flow control for McAleer Creek; primarily up to approximately the 10-year flow (with the structure in overflow

APPENDIX A-1

HSPF FLOW FREQUENCY ANALYSIS

McAleer Creek HSPF

HSPF Flow Frequency Results

Engineer: lcr Run Date: 8/26/2014 Source: McalOCI.uci

Existing Condition Flows (1:00 Hr.)

	Reach		Flow Frequency Results (CFS)				
	Data Set #	Description	2-yr	10-yr	25-yr	50-yr	100-yr
Upstream	804	SW 244th St.	73.17	99.22	110.60	118.48	125.88
	802	EB ramp to I-5	73.18	99.23	110.61	118.50	125.90
	800	Forest Park Dr.	72.96	98.94	110.30	118.18	125.57
	790	15th Ave NE	72.92	98.95	110.35	118.26	125.69
Downstream	785	NE 196th	93.14	143.85	178.00	207.64	240.96

Comparison to Otak Published results (2009): Looks Good.						
Data Set #	Description	2-yr	10-yr	25-yr	50-yr	100-yr
7785	NE 196th	93.1	143.9	178.0	207.6	241.0

FREQUENCY ANALYSIS: McAleer Creek

8/26/2014 existing 1:00 Hr 1785

return(yr)	*p*	*zp*	*K*	*log(Q)*	***Q***
1.25	0.200	-0.839	-0.842	1.89	**77.03**
1.58	0.367	-0.337	-0.475	1.93	**85.59**
2	0.500	0.000	-0.180	1.97	**93.14**
2.33	0.571	0.177	-0.009	1.99	**97.82**
5	0.800	0.839	0.734	2.08	**121.12**
10	0.900	1.281	1.333	2.16	**143.85**
25	0.960	1.757	2.075	2.25	**178.00**
50	0.980	2.064	2.612	2.32	**207.64**
100	0.990	2.337	3.130	2.38	**240.96**

EV I

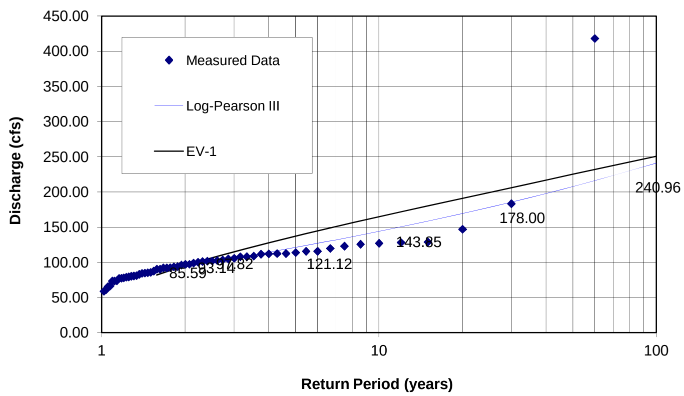
K	*Q*
-0.82	64.75
-0.45	82.11
-0.16	95.61
0.00	103.39
0.72	137.15
1.30	164.64
2.04	199.39
2.59	225.16
3.14	250.74

*Bulletin 17B recommends averaging calculated skew with regional skew estimate

Regional skew coefficient (of logarithms) = 0.02 from Bulletin 17B Map

average	103.3	1.99
std.dev.	47.0	0.12
skew	5.39	2.22
		1.12 regional skew or calculated

year	*flow, cfs*	*log(flow)*	*rank*	*P=m/(N+1)*	*T=1/P*
1949	65.71	1.82	57	0.950	1.05
1950	101.94	2.01	24	0.400	2.50
1951	73.95	1.87	53	0.883	1.13
1952	80.31	1.90	47	0.783	1.28
1953	79.02	1.90	49	0.817	1.22
1954	90.40	1.96	38	0.633	1.58
1955	128.32	2.11	5	0.083	12.00
1956	108.94	2.04	17	0.283	3.53
1957	119.76	2.08	9	0.150	6.67
1958	101.84	2.01	25	0.417	2.40
1959	93.77	1.97	33	0.550	1.82
1960	100.22	2.00	27	0.450	2.22
1961	112.55	2.05	13	0.217	4.62
1962	97.39	1.99	29	0.483	2.07
1963	102.64	2.01	23	0.383	2.61
1964	81.15	1.91	45	0.750	1.33
1965	92.49	1.97	34	0.567	1.76
1966	66.54	1.82	56	0.933	1.07
1967	99.10	2.00	28	0.467	2.14
1968	107.98	2.03	19	0.317	3.16
1969	111.70	2.05	16	0.267	3.75
1970	78.03	1.89	50	0.833	1.20
1971	97.30	1.99	30	0.500	2.00
1972	125.81	2.10	7	0.117	8.57
1973	84.81	1.93	42	0.700	1.43
1974	92.11	1.96	36	0.600	1.67
1975	77.29	1.89	52	0.867	1.15
1976	85.93	1.93	40	0.667	1.50
1977	73.66	1.87	54	0.900	1.11
1978	83.04	1.92	44	0.733	1.36
1979	115.71	2.06	10	0.167	6.00
1980	73.57	1.87	55	0.917	1.09
1981	79.37	1.90	48	0.800	1.25
1982	113.90	2.06	12	0.200	5.00
1983	90.48	1.96	37	0.617	1.62
1984	103.49	2.01	22	0.367	2.73
1985	112.43	2.05	14	0.233	4.29
1986	183.40	2.26	2	0.033	30.00
1987	127.20	2.10	6	0.100	10.00
1988	87.69	1.94	39	0.650	1.54
1989	85.36	1.93	41	0.683	1.46
1990	96.25	1.98	31	0.517	1.94
1991	94.08	1.97	32	0.533	1.88
1992	105.91	2.02	20	0.333	3.00
1993	108.11	2.03	18	0.300	3.33
1994	92.18	1.96	35	0.583	1.71
1995	128.86	2.11	4	0.067	15.00
1996	146.98	2.17	3	0.050	20.00
1997	418.12	2.62	1	0.017	60.00
1998	80.73	1.91	46	0.767	1.30
1999	104.85	2.02	21	0.350	2.86
2000	101.21	2.01	26	0.433	2.31
2001	59.01	1.77	59	0.983	1.02
2002	84.51	1.93	43	0.717	1.40
2003	77.51	1.89	51	0.850	1.18
2004	115.69	2.06	11	0.183	5.45
2005	60.99	1.79	58	0.967	1.03
2006	123.08	2.09	8	0.133	7.50
2007	112.24	2.05	15	0.250	4.00



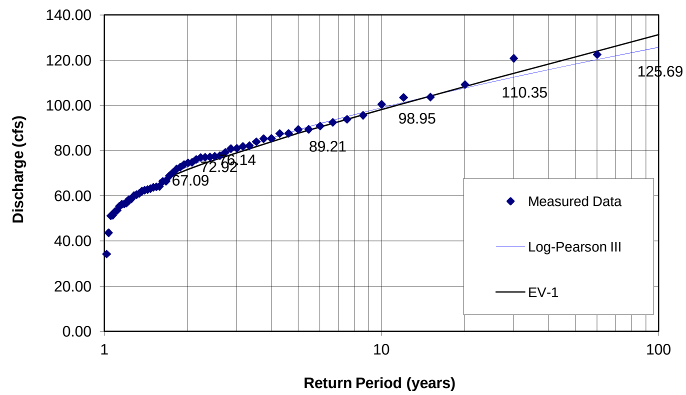
FREQUENCY ANALYSIS: McAleer Creek
8/26/2014 existing 1:00 Hr 1790

return(yr)	p	zp	K	log(Q)	Q		EV I K	EV I Q
1.25	0.200	-0.839	-0.832	1.77	**59.17**		-0.82	60
1.58	0.367	-0.337	-0.319	1.83	**67.09**		-0.45	67
2	0.500	0.000	0.021	1.86	**72.92**		-0.16	72
2.33	0.571	0.177	0.198	1.88	**76.14**		0.00	75
5	0.800	0.839	0.844	1.95	**89.21**		0.72	88
10	0.900	1.281	1.267	2.00	**98.95**		1.30	98
25	0.960	1.757	1.712	2.04	**110.35**		2.04	112
50	0.980	2.064	1.995	2.07	**118.26**		2.59	121
100	0.990	2.337	2.243	2.10	**125.69**		3.14	131

*Bulletin 17B recommends averaging calculated skew with regional skew estimate
Regional skew coefficient (of logarithms) = 0.02 from Bulletin 17B Map

average	74.7	1.86
std.dev.	18.0	0.11
skew	0.50	-0.27
		-0.13 regional skew or calculated

year	flow, cfs	log(flow)	rank	P=m/(N+1)	T=1/P
1949	56.48	1.75	51	0.850	1.18
1950	74.64	1.87	30	0.500	2.00
1951	58.49	1.77	49	0.817	1.22
1952	55.43	1.74	53	0.883	1.13
1953	51.51	1.71	56	0.933	1.07
1954	77.06	1.89	27	0.450	2.22
1955	85.32	1.93	16	0.267	3.75
1956	89.48	1.95	11	0.183	5.45
1957	89.40	1.95	12	0.200	5.00
1958	64.24	1.81	38	0.633	1.58
1959	74.86	1.87	29	0.483	2.07
1960	80.93	1.91	21	0.350	2.86
1961	77.13	1.89	26	0.433	2.31
1962	64.02	1.81	39	0.650	1.54
1963	61.13	1.79	45	0.750	1.33
1964	58.71	1.77	48	0.800	1.25
1965	77.84	1.89	23	0.383	2.61
1966	51.25	1.71	57	0.950	1.05
1967	70.29	1.85	34	0.567	1.76
1968	84.00	1.92	17	0.283	3.53
1969	60.14	1.78	47	0.783	1.28
1970	62.82	1.80	42	0.700	1.43
1971	85.43	1.93	15	0.250	4.00
1972	76.19	1.88	28	0.467	2.14
1973	66.43	1.82	37	0.617	1.62
1974	68.95	1.84	35	0.583	1.71
1975	60.55	1.78	46	0.767	1.30
1976	73.95	1.87	31	0.517	1.94
1977	53.06	1.72	55	0.917	1.09
1978	56.83	1.75	50	0.833	1.20
1979	72.69	1.86	32	0.533	1.88
1980	56.35	1.75	52	0.867	1.15
1981	62.11	1.79	44	0.733	1.36
1982	93.90	1.97	8	0.133	7.50
1983	63.24	1.80	41	0.683	1.46
1984	87.66	1.94	13	0.217	4.62
1985	82.22	1.91	18	0.300	3.33
1986	120.85	2.08	2	0.033	30.00
1987	103.75	2.02	4	0.067	15.00
1988	77.54	1.89	24	0.400	2.50
1989	43.69	1.64	58	0.967	1.03
1990	81.88	1.91	19	0.317	3.16
1991	77.23	1.89	25	0.417	2.40
1992	92.55	1.97	9	0.150	6.67
1993	62.55	1.80	43	0.717	1.40
1994	79.32	1.90	22	0.367	2.73
1995	109.30	2.04	3	0.050	20.00
1996	100.53	2.00	6	0.100	10.00
1997	122.54	2.09	1	0.017	60.00
1998	66.55	1.82	36	0.600	1.67
1999	87.60	1.94	14	0.233	4.29
2000	90.93	1.96	10	0.167	6.00
2001	34.31	1.54	59	0.983	1.02
2002	71.91	1.86	33	0.550	1.82
2003	63.83	1.81	40	0.667	1.50
2004	103.55	2.02	5	0.083	12.00
2005	53.61	1.73	54	0.900	1.11
2006	95.65	1.98	7	0.117	8.57
2007	81.11	1.91	20	0.333	3.00



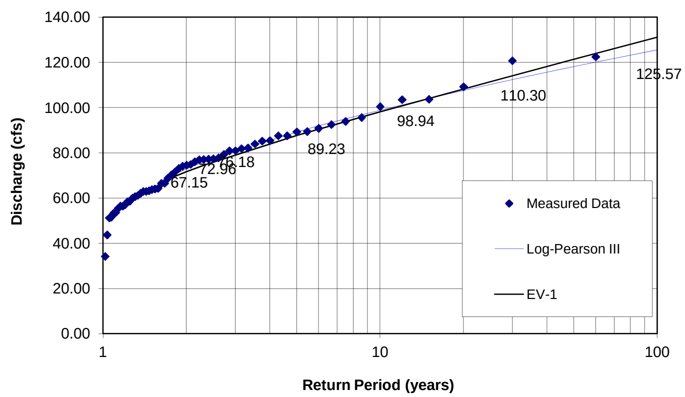
FREQUENCY ANALYSIS: McAleer Creek
8/26/2014 existing 1:00 Hr 1800

return(yr)	*p*	*zp*	*K*	*log(Q)*	***Q***		***EV I*** *K*	*Q*
1.25	0.200	-0.839	-0.831	1.77	**59.22**		-0.82	60
1.58	0.367	-0.337	-0.318	1.83	**67.15**		-0.45	67
2	0.500	0.000	0.022	1.86	**72.96**		-0.16	72
2.33	0.571	0.177	0.198	1.88	**76.18**		0.00	75
5	0.800	0.839	0.844	1.95	**89.23**		0.72	88
10	0.900	1.281	1.267	2.00	**98.94**		1.30	98
25	0.960	1.757	1.711	2.04	**110.30**		2.04	112
50	0.980	2.064	1.993	2.07	**118.18**		2.59	121
100	0.990	2.337	2.241	2.10	**125.57**		3.14	131

*Bulletin 17B recommends averaging calculated skew with regional skew estimate
Regional skew coefficient (of logarithms) = 0.02 from Bulletin 17B Map

average	74.7	1.86
std.dev.	18.0	0.11
skew	0.50	-0.28
		-0.13 regional skew or calculated

year	*flow, cfs*	*log(flow)*	*rank*	*P=m/(N+1)*	*T=1/P*
1949	56.51	1.75	51	0.850	1.18
1950	74.60	1.87	30	0.500	2.00
1951	58.50	1.77	49	0.817	1.22
1952	55.45	1.74	53	0.883	1.13
1953	51.61	1.71	56	0.933	1.07
1954	77.03	1.89	27	0.450	2.22
1955	85.27	1.93	16	0.267	3.75
1956	89.48	1.95	11	0.183	5.45
1957	89.35	1.95	12	0.200	5.00
1958	64.31	1.81	38	0.633	1.58
1959	74.94	1.87	29	0.483	2.07
1960	80.93	1.91	21	0.350	2.86
1961	77.16	1.89	26	0.433	2.31
1962	64.06	1.81	39	0.650	1.54
1963	61.21	1.79	45	0.750	1.33
1964	58.71	1.77	48	0.800	1.25
1965	77.83	1.89	23	0.383	2.61
1966	51.27	1.71	57	0.950	1.05
1967	70.28	1.85	34	0.567	1.76
1968	83.98	1.92	17	0.283	3.53
1969	60.08	1.78	47	0.783	1.28
1970	62.93	1.80	43	0.717	1.40
1971	85.46	1.93	15	0.250	4.00
1972	76.09	1.88	28	0.467	2.14
1973	66.57	1.82	36	0.600	1.67
1974	68.87	1.84	35	0.583	1.71
1975	60.65	1.78	46	0.767	1.30
1976	74.13	1.87	31	0.517	1.94
1977	53.29	1.73	55	0.917	1.09
1978	57.08	1.76	50	0.833	1.20
1979	73.17	1.86	32	0.533	1.88
1980	56.45	1.75	52	0.867	1.15
1981	62.14	1.79	44	0.733	1.36
1982	93.94	1.97	8	0.133	7.50
1983	63.27	1.80	41	0.683	1.46
1984	87.60	1.94	14	0.233	4.29
1985	82.18	1.91	18	0.300	3.33
1986	120.79	2.08	2	0.033	30.00
1987	103.78	2.02	4	0.067	15.00
1988	77.46	1.89	24	0.400	2.50
1989	43.77	1.64	58	0.967	1.03
1990	81.91	1.91	19	0.317	3.16
1991	77.26	1.89	25	0.417	2.40
1992	92.58	1.97	9	0.150	6.67
1993	63.02	1.80	42	0.700	1.43
1994	79.34	1.90	22	0.367	2.73
1995	109.31	2.04	3	0.050	20.00
1996	100.50	2.00	6	0.100	10.00
1997	122.51	2.09	1	0.017	60.00
1998	66.54	1.82	37	0.617	1.62
1999	87.63	1.94	13	0.217	4.62
2000	90.90	1.96	10	0.167	6.00
2001	34.24	1.53	59	0.983	1.02
2002	71.68	1.86	33	0.550	1.82
2003	63.82	1.80	40	0.667	1.50
2004	103.55	2.02	5	0.083	12.00
2005	53.65	1.73	54	0.900	1.11
2006	95.71	1.98	7	0.117	8.57
2007	81.01	1.91	20	0.333	3.00



FREQUENCY ANALYSIS: McAleer Creek

8/26/2014 existing 1:00 Hr 1802

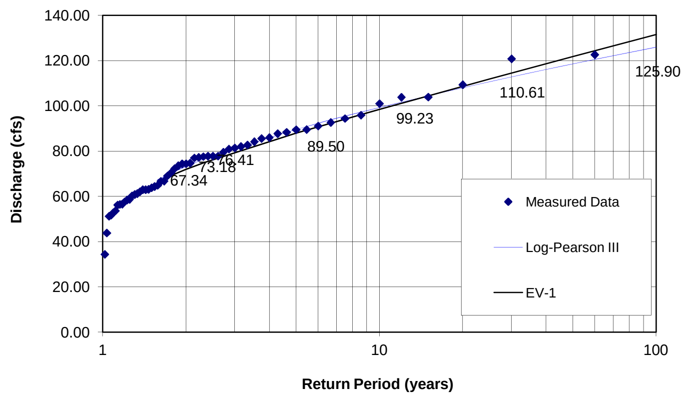
return(yr)	*p*	*zp*	*K*	*log(Q)*	***Q***	***EV I*** *K*	*Q*
1.25	0.200	-0.839	-0.831	1.77	**59.38**	-0.82	60
1.58	0.367	-0.337	-0.318	1.83	**67.34**	-0.45	67
2	0.500	0.000	0.022	1.86	**73.18**	-0.16	72
2.33	0.571	0.177	0.198	1.88	**76.41**	0.00	75
5	0.800	0.839	0.844	1.95	**89.50**	0.72	88
10	0.900	1.281	1.266	2.00	**99.23**	1.30	98
25	0.960	1.757	1.710	2.04	**110.61**	2.04	112
50	0.980	2.064	1.991	2.07	**118.50**	2.59	122
100	0.990	2.337	2.239	2.10	**125.90**	3.14	132

*Bulletin 17B recommends averaging calculated skew with regional skew estimate

Regional skew coefficient (of logarithms) = 0.02 from Bulletin 17B Map

average	74.9	1.86
std.dev.	18.0	0.11
skew	0.48	-0.28
		-0.13 regional skew or calculated

year	*flow, cfs*	*log(flow)*	*rank*	*P=m/(N+1)*	*T=1/P*
1949	56.49	1.75	52	0.867	1.15
1950	74.48	1.87	30	0.500	2.00
1951	58.46	1.77	49	0.817	1.22
1952	56.23	1.75	53	0.883	1.13
1953	51.72	1.71	56	0.933	1.07
1954	77.05	1.89	28	0.467	2.14
1955	86.00	1.93	15	0.250	4.00
1956	89.49	1.95	12	0.200	5.00
1957	89.55	1.95	11	0.183	5.45
1958	64.39	1.81	39	0.650	1.54
1959	74.76	1.87	29	0.483	2.07
1960	80.95	1.91	21	0.350	2.86
1961	77.85	1.89	23	0.383	2.61
1962	64.88	1.81	38	0.633	1.58
1963	61.27	1.79	45	0.750	1.33
1964	58.71	1.77	48	0.800	1.25
1965	77.82	1.89	24	0.400	2.50
1966	51.27	1.71	57	0.950	1.05
1967	70.45	1.85	34	0.567	1.76
1968	84.20	1.93	17	0.283	3.53
1969	60.27	1.78	47	0.783	1.28
1970	63.00	1.80	42	0.700	1.43
1971	85.59	1.93	16	0.267	3.75
1972	77.78	1.89	25	0.417	2.40
1973	66.76	1.82	36	0.600	1.67
1974	69.12	1.84	35	0.583	1.71
1975	60.85	1.78	46	0.767	1.30
1976	74.38	1.87	31	0.517	1.94
1977	52.80	1.72	55	0.917	1.09
1978	57.68	1.76	50	0.833	1.20
1979	73.60	1.87	32	0.533	1.88
1980	56.58	1.75	51	0.850	1.18
1981	62.10	1.79	44	0.733	1.36
1982	94.45	1.98	8	0.133	7.50
1983	63.14	1.80	41	0.683	1.46
1984	88.36	1.95	13	0.217	4.62
1985	82.73	1.92	18	0.300	3.33
1986	120.81	2.08	2	0.033	30.00
1987	103.91	2.02	4	0.067	15.00
1988	77.61	1.89	26	0.433	2.31
1989	43.85	1.64	58	0.967	1.03
1990	82.06	1.91	19	0.317	3.16
1991	77.29	1.89	27	0.450	2.22
1992	92.70	1.97	9	0.150	6.67
1993	62.99	1.80	43	0.717	1.40
1994	79.54	1.90	22	0.367	2.73
1995	109.39	2.04	3	0.050	20.00
1996	100.99	2.00	6	0.100	10.00
1997	122.63	2.09	1	0.017	60.00
1998	66.69	1.82	37	0.617	1.62
1999	87.76	1.94	14	0.233	4.29
2000	91.10	1.96	10	0.167	6.00
2001	34.41	1.54	59	0.983	1.02
2002	72.31	1.86	33	0.550	1.82
2003	63.84	1.81	40	0.667	1.50
2004	103.82	2.02	5	0.083	12.00
2005	53.67	1.73	54	0.900	1.11
2006	95.89	1.98	7	0.117	8.57
2007	81.44	1.91	20	0.333	3.00



FREQUENCY ANALYSIS: McAleer Creek

8/26/2014 existing 1:00 Hr 1804

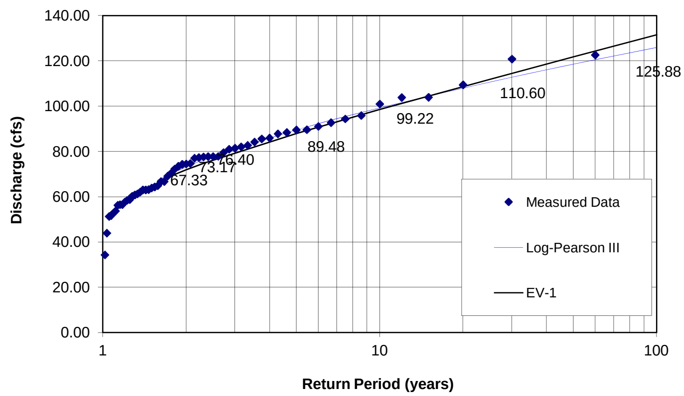
return(yr)	*p*	*zp*	*K*	*log(Q)*	***Q***		*EV I* *K*	*Q*
1.25	0.200	-0.839	-0.831	1.77	**59.38**		-0.82	60
1.58	0.367	-0.337	-0.318	1.83	**67.33**		-0.45	67
2	0.500	0.000	0.022	1.86	**73.17**		-0.16	72
2.33	0.571	0.177	0.198	1.88	**76.40**		0.00	75
5	0.800	0.839	0.844	1.95	**89.48**		0.72	88
10	0.900	1.281	1.266	2.00	**99.22**		1.30	98
25	0.960	1.757	1.710	2.04	**110.60**		2.04	112
50	0.980	2.064	1.991	2.07	**118.48**		2.59	122
100	0.990	2.337	2.239	2.10	**125.88**		3.14	132

*Bulletin 17B recommends averaging calculated skew with regional skew estimate

Regional skew coefficient (of logarithms) = 0.02 from Bulletin 17B Map

average	74.9	1.86
std.dev.	18.0	0.11
skew	0.48	-0.28
		-0.13 regional skew or calculated

year	*flow, cfs*	*log(flow)*	*rank*	*P=m/(N+1)*	*T=1/P*
1949	56.49	1.75	52	0.867	1.15
1950	74.47	1.87	30	0.500	2.00
1951	58.45	1.77	49	0.817	1.22
1952	56.28	1.75	53	0.883	1.13
1953	51.73	1.71	56	0.933	1.07
1954	77.04	1.89	28	0.467	2.14
1955	85.95	1.93	15	0.250	4.00
1956	89.49	1.95	12	0.200	5.00
1957	89.59	1.95	11	0.183	5.45
1958	64.37	1.81	39	0.650	1.54
1959	74.72	1.87	29	0.483	2.07
1960	80.96	1.91	21	0.350	2.86
1961	77.77	1.89	24	0.400	2.50
1962	64.87	1.81	38	0.633	1.58
1963	61.29	1.79	45	0.750	1.33
1964	58.75	1.77	48	0.800	1.25
1965	77.83	1.89	23	0.383	2.61
1966	51.27	1.71	57	0.950	1.05
1967	70.45	1.85	34	0.567	1.76
1968	84.20	1.93	17	0.283	3.53
1969	60.25	1.78	47	0.783	1.28
1970	63.00	1.80	42	0.700	1.43
1971	85.58	1.93	16	0.267	3.75
1972	77.71	1.89	25	0.417	2.40
1973	66.75	1.82	36	0.600	1.67
1974	69.15	1.84	35	0.583	1.71
1975	60.83	1.78	46	0.767	1.30
1976	74.32	1.87	31	0.517	1.94
1977	52.77	1.72	55	0.917	1.09
1978	57.65	1.76	50	0.833	1.20
1979	73.47	1.87	32	0.533	1.88
1980	56.56	1.75	51	0.850	1.18
1981	62.09	1.79	44	0.733	1.36
1982	94.39	1.97	8	0.133	7.50
1983	63.14	1.80	41	0.683	1.46
1984	88.37	1.95	13	0.217	4.62
1985	82.70	1.92	18	0.300	3.33
1986	120.81	2.08	2	0.033	30.00
1987	103.90	2.02	4	0.067	15.00
1988	77.59	1.89	26	0.433	2.31
1989	43.95	1.64	58	0.967	1.03
1990	82.08	1.91	19	0.317	3.16
1991	77.29	1.89	27	0.450	2.22
1992	92.71	1.97	9	0.150	6.67
1993	63.00	1.80	43	0.717	1.40
1994	79.53	1.90	22	0.367	2.73
1995	109.40	2.04	3	0.050	20.00
1996	100.97	2.00	6	0.100	10.00
1997	122.59	2.09	1	0.017	60.00
1998	66.71	1.82	37	0.617	1.62
1999	87.78	1.94	14	0.233	4.29
2000	91.08	1.96	10	0.167	6.00
2001	34.36	1.54	59	0.983	1.02
2002	72.29	1.86	33	0.550	1.82
2003	63.86	1.81	40	0.667	1.50
2004	103.84	2.02	5	0.083	12.00
2005	53.68	1.73	54	0.900	1.11
2006	95.89	1.98	7	0.117	8.57
2007	81.44	1.91	20	0.333	3.00



McAleer and Lyon Creeks Drainage Basin Study
for the City of Lake Forest Park
June 1999

Prepared by: Hammond, Collier & Wade-Livingstone Assoc. Inc.
and Aqua Terra Consultants

APPENDIX B

EXISTING CULVERT INVENTORY

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/24/98

Apparent Responsibility Code:

L.F.P. = Lake Forest Park	BRIER = Brier
WSDOT = Wash. State Dept. of Transportation	KING CO. = King County
PRIVATE = culverts on private property	M.L.T. = Mountlake Terrace

*** Denotes capacity at road overtopping.**

				EXISTING CULVERT CONFIGURATION							EXISTING CULVERT CONFIGURATION						
Culvert #	Location	Subbasin	Apparent Responsibility	# of Culv's	Culv. Type	Span (ft)	Rise (ft)	Invert Elev.	Outlet Elev.	Length (ft)	Slope (ft/ft)	Slope (ft/ft)	Manning	*Capacity (cfs)	* Total Capacity (cfs)	Inlet Type	Overtop Elev.
L5	BEACH DRIVE NE	TOWNE CENTER	L.F.P.	1	CAA	9	3.88	20	19.1	16.03	0.0561	0.0562	0.035	301	301	CONVENTIONA	29.0
L10	BOTHELL WAY NE (150' W of NE Ballinger Way)	TOWNE CENTER	L.F.P./WSDOT	1	RCB	5	4	24.87	24.56	110	0.0028	0.0028	0.012	307	307	CONVENTIONA	30.2
L20	TOWNE CENTER ENTRANCE FROM BOTHELL WAY	TOWNE CENTER	PRIVATE in L.F.P.	1	CAA	7	3.67	25	24.9	73	0.0014	0.0014	0.035	108		CONVENTIONA	30.0
L20	TOWNE CENTER ENTRANCE FROM BOTHELL WAY	TOWNE CENTER	PRIVATE in L.F.P.	2	CSP	2.5	2.5	26.34	26.33	73	0.0001	26.33	0.031	18	126	CONVENTIONA	30.0
L30	TOWNE CENTER (NEAR SKIPPERS)	TOWNE CENTER	PRIVATE in L.F.P.	1	RCB	6	3	28.2	28	75	0.0027	0.0027	0.012	84		CONVENTIONA	31.5
L30	TOWNE CENTER (NEAR SKIPPERS)	TOWNE CENTER	PRIVATE in L.F.P.	2	CSP	2.5	2.5	27.6	27.5	150	0.0007	1	0.031	16	100	CONVENTIONA	31.5
L40	TOWNE CENTER (NEAR CLEANERS)	TOWNE CENTER	PRIVATE in L.F.P.	1	RCB	6	3	28.2	28	150	0.0013	0.0027	0.012	94		CONVENTIONA	31.5
L40	TOWNE CENTER (NEAR CLEANERS)	TOWNE CENTER	PRIVATE in L.F.P.	2	CSP	2.5	2.5	28.2	28	75	0.0027	1	0.031	17	111	CONVENTIONA	31.5
L60	NE 178TH ST (W of 44th Ave NE)	LYON 2	L.F.P.	1	CMPA	6.08	4.58	60	59.9	60	0.0017	0.0017	0.028	258	258	CONVENTIONA	70.0
L70	40TH AVE NE (W of NE Ballinger Way)	LYON 3	L.F.P.	1	CAA	8	4.17	96	95.1	40.01	0.0225	0.0225	0.035	208	208	CONVENTIONA	103.5
L80	35TH AVE NE (S of NE Ballinger Way)	LYON 3	L.F.P.	1	CMPA	7.25	5.25	120	119.7	46	0.0065	0.0065	0.028	266	266	CONVENTIONA	128.0
L90	NE 185TH ST (W of 35th Ave NE)	LYON 3	L.F.P.	1	RCPA	3.02	1.88	125	124.9	32	0.0031	0.0031	0.012	114	114	CONVENTIONA	131.5
L100	NE BALLINGER WAY (E of 35th Ave NE)	LYON 3	PRIVATE in L.F.P./WSDOT	1	RCB	5	3	130	129	150	0.0067	0.0067	0.012	177	177	CONVENTIONA	138.0
L110	35TH AVE NE (S of NE 190th St)	LYON 4	L.F.P.	1	RCB	7	5	150	149.7	40	0.0075	0.0075	0.012	97	97	CONVENTIONA	154.0
L120	35TH AVE NE (N of NE 190th St)	LYON 4	L.F.P.	1	RCB	5	3	155	154.2	33.01	0.0242	0.0242	0.012	176	176	CONVENTIONA	161.0
L130	165' W of 35TH AVE NE (450' S of NE 195th St)	LYON 4	PRIVATE in L.F.P.	1	CAA	10	3.46	161	160.65	27	0.0130	0.013	0.035	196	196	CONVENTIONA	168.0
L140	150' W of 35TH AVE NE (300' S of NE 195th St)	LYON 4	PRIVATE in L.F.P.	1	RCB	2.5	3.5	175	174.65	25	0.0140	0.014	0.012	90		CONVENTIONA	182.0
L140	150' W of 35TH AVE NE (300' S of NE 195th St)	LYON 4	PRIVATE in L.F.P.	2	RCB	5.8	2.5	175.5	175.15	25	0.0140	1	0.012	154	244	CONVENTIONA	182.0
L150	150' W of 35TH AVE NE (150' S of NE 195th St)	LYON 4	PRIVATE in L.F.P.	1	RCB	4.5	3.2	176	175.6	15.01	0.0266	0.0267	0.012	95	95	CONVENTIONA	180.2
L155	NE 195TH ST (150' W of 35th Ave NE)	LYON 5	L.F.P.	1	CSP	4	4	180	179.7	51	0.0059	0.0059	0.031	201	201	CONVENTIONA	187.0
L160	35TH AVE NE (525' S of 40th Place NE)	LYON 5	L.F.P.	1	RCP	4	4	218	217.9	41	0.0024	0.0024	0.012	146	146	CONVENTIONA	225.0
L161	W of 32ND AVE NE (near NE 198th Place)	32ND TRIB	L.F.P.	1	CSP	2.5	2.5	218	216.5	80.01	0.0187	0.0188	0.031	36	36	CONVENTIONA	224.0
L163	NE 200TH ST (E of 32nd Ave NE)	32ND TRIB	L.F.P.	1	CSP	2.5	2.5	240	239.2	50.01	0.0160	0.016	0.031	41	41	CONVENTIONA	246.5
L164	W of 32ND AVE NE (75' N of NE 200th St)	32ND TRIB	PRIVATE in L.F.P.	1	CSP	1.5	1.5	248	243	250.05	0.0200	0.02	0.031	7	7	CONVENTIONA	251.0
L165	W of 32ND AVE NE (150' N of NE 200th St)	32ND TRIB	PRIVATE in L.F.P.	1	RCP	1.5	1.5	250	248.5	70.02	0.0214	0.0214	0.012	22	22	CONVENTIONA	252.5
L166	W of 32ND AVE NE (250' N of NE 200th St)	32ND TRIB	PRIVATE in L.F.P.	1	CSP	1	1	254	252	105.02	0.0190	0.019	0.031	2	2	CONVENTIONA	256.0
L167	N 204TH ST (W of 33rd Ave NE)	32ND TRIB	L.F.P.	1	CSP	3	3	265	263.8	60.01	0.0200	0.02	0.031	52	52	CONVENTIONA	270.5
L168	W of 243RD PLACE SW	32ND TRIB	M.L.T./PRIVATE in M.L.T.	1	RCP	1.5	1.5	280	275	250.05	0.0200	0.02	0.012	13	13	CONVENTIONA	283.0
L170	E of 35TH AVE NE	LYON 5	PRIVATE in L.F.P.	1	CSP	1	1	219	218.3	18.01	0.0389	0.0389	0.031	7		CONVENTIONA	224.0
L170	E of 35TH AVE NE	LYON 5	PRIVATE in L.F.P.	2	CMPA	4.08	2.75	220	219.3	18.01	0.0389	0.0389	0.024	60	67	CONVENTIONA	224.0
L180	35TH AVE NE (375' S of 40th Place NE)	LYON 5	L.F.P.	1	CSP	4	4	221	219.7	45.02	0.0289	0.0289	0.031	127	127	CONVENTIONA	229.0
L190	35TH AVE NE (150' S of 40th Place NE)	LYON 5	L.F.P.	1	RCP	2.5	2.5	240	238.9	43.01	0.0256	0.0256	0.012	71	71	CONVENTIONA	250.0
L200	40TH PLACE NE (75' W of 35th Ave NE)	LYON 6	L.F.P.	1	RCP	3	3	245	244.3	31.01	0.0226	0.0226	0.012	94		CONVENTIONA	254.0
L200	150' N of 40TH PLACE NE	LYON 6	PRIVATE in L.F.P.	2	RCP	2	2	245	244.3	31.01	0.0226	0.0226	0.012	49	143	CONVENTIONA	254.0
L210	37TH AVE NE (300' N of 40th Place NE)	LYON 6	PRIVATE in L.F.P.	1	CSP	2.5	2.5	250	249.5	18.01	0.0278	0.0278	0.031	73	73	CONVENTIONA	254.5
L220	37TH AVE NE (450' N of 40th Place NE)	LYON 6	L.F.P.	1	CMPA	4.75	3.17	251	250.9	42	0.0024	0.0024	0.024	138	138	CONVENTIONA	260.0
L230	E of 37TH AVE NE	LYON 6	L.F.P.	1	RCP	2	2	255	254.6	50	0.0080	0.008	0.012	68	68	CONVENTIONA	261.0
L240	37TH AVE NE (580' N of 40th Place NE)	LYON 6	PRIVATE in L.F.P.	1	CSP	4	4	258	257.9	21	0.0048	0.0048	0.031	93	93	CONVENTIONA	264.0
L250	SW 244TH ST (W of 37th Ave NE / Cedar Way S)	LYON 6	L.F.P.	1	CSP	4	4	260	258.5	38.03	0.0394	0.0395	0.031	75	75	CONVENTIONA	266.0
L255	150' W of NE BALLINGER WAY (S of NE 184th St)	LYON 6	L.F.P./BRIER	1	RCB	5.5	4	262	261.9	62	0.0016	0.0016	0.012	207	207	CONVENTIONA	269.0
L260	50' W of NE BALLINGER WAY (S of NE 184th St)	SCHOOLHOUSE CREE	PRIVATE in L.F.P.	1	RCP	1	1	95	94.5	30	0.0167	0.0167	0.012	6	6	CONVENTIONA	98.0
L280	150' E of NE 184TH ST	SCHOOLHOUSE CREE	PRIVATE in L.F.P.	1	CMPA	2.92	2	140	138.8	21.03	0.0571	0.0571	0.025	44	44	CONVENTIONA	146.0
L290	NE BALLINGER WAY (450' N of 35th Ave NE)	LOWER BRUGGERS	L.F.P./WSDOT	1	RCPA	3.02	1.88	138	137.2	69	0.0116	0.0116	0.012	62	62	CONVENTIONA	145.5
L300	75' W of NE BALLINGER WAY (N of 35th Ave NE)	LOWER BRUGGERS	PRIVATE in L.F.P.	1	CMPA	3.5	2.42	145	144.9	22	0.0045	0.0045	0.025	54	54	CONVENTIONA	150.0
L310	150' W of NE BALLINGER WAY (N of 35th Ave NE)	LOWER BRUGGERS	PRIVATE in L.F.P.	1	CMPA	3.5	2.42	150	149.6	40	0.0100	0.01	0.025	42	42	CONVENTIONA	154.0
L320	S of 30TH AVE NE	LOWER BRUGGERS	L.F.P.	1	CSP	4	4	181	180.8	21	0.0095	0.0095	0.031	138	138	CONVENTIONA	190.0
L330	FOREST PARK DRIVE NE (75' W of 30th Ave NE)	LOWER BRUGGERS	L.F.P.	1	RCP	3	3	190	189.5	52	0.0096	0.0096	0.012	112	112	CONVENTIONA	200.0
L331	NE BALLINGER WAY (225' S of NE 195th St)	LOWER BRUGGERS	L.F.P./WSDOT	1	CSP	2.5	2.5	200	199	60.01	0.0167	0.0167	0.031	33	33	CONVENTIONA	206.0
L332	NE 195TH ST (100' E of NE Ballinger Way)	UPPER BRUGGERS	L.F.P./KING CO.	1	CSP	2.5	2.5	210	209.7	50	0.0060	0.006	0.031	33	33	CONVENTIONA	216.0
L333	25TH AVE NE (300' N of NE Ballinger Way)	UPPER BRUGGERS	KING CO.	1	CSP	2	2	215	210	500.02	0.0100	0.01	0.031	11		CONVENTIONA	218.5
L333	26th AVE NE (300' N of NE Ballinger Way)	UPPER BRUGGERS	KING CO.	2	CSP	2	2	215.5	210	500.03	0.0110	0.011	0.031	11	22	CONVENTIONA	218.5
L340	100' W of NE BALLINGER WAY (S of NE 184th St)	SCHOOLHOUSE CREE	PRIVATE in L.F.P.	1	CSP	2	2	100	99	15.03	0.0665	0.0667	0.045	15	15	CONVENTIONA	102.5
L350	NE BALLINGER WAY (150' S of NE 184th St)	SCHOOLHOUSE CREE	L.F.P./WSDOT	1	CSP	2.5	2.5	110	108.3	54.03	0.0315	0.0315	0.031	33	33	CONVENTIONA	114.0
L360	NE 184TH ST	SCHOOLHOUSE CREE	L.F.P.	1	CSP	3	3	150	148.35	19.07	0.0865	0.0868	0.031	34	34	CONVENTIONA	153.1
L370	175' W of NE BALLINGER WAY	SCHOOLHOUSE CREE	PRIVATE in L.F.P.	1	RCPA	1.83	1.13	88	87.9	15	0.0067	0.0067	0.012	14	14	CONVENTIONA	91.0

Ballinger Creek RCHRES locations used by OCI for flow frequency analysis. 332, 333, and 390

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/24/98

Apparent Responsibility Code:
L.F.P. = Lake Forest Park — BRIER = Brier
WSDOT = Wash. State Dept. of Transportation — KING CO. = King County
PRIVATE = culverts on private property — M.L.T. = Mountlake Terrace

*** Denotes capacity at road overtopping.**

McAleer Creek RCHRES locations used by OCI for flow frequency analysis.

				EXISTING CULVERT CONFIGURATION						EXISTING CULVERT CONFIGURATION							
Culvert #	Location	Subbasin	Apparent Responsibility	# of Culv's	Culv. Type	Span (ft)	Rise (ft)	Invert Elev.	Outlet Elev.	Length (ft)	Slope (ft/ft)	Slope (ft/ft)	Manning	*Capacity (cfs)	* Total Capacity (cfs)	Inlet Type	Overtop Elev.
L390	225' W of 25TH AVE NE	UPPER BRUGGERS	PRIVATE in KING CO.	1	CSP	2.5	2.5	225	223.7	20.04	0.0649	0.065	0.031	30	30	CONVENTIONA	228.5
L400	CEDAR WAY S (N of SW 244th St)	LYON 6	M.L.T.	1	RCB	5.5	4	265	264.5	65	0.0077	0.0077	0.012	216	216	CONVENTIONA	272.0
L410	50' W of CEDAR WAY S (175' N of SW 244th St)	LYON 6	PRIVATE in M.L.T.	1	CMPA	11.83	7.58	272	271.9	19	0.0053	0.0053	0.027	518	518	CONVENTIONA	281.0
L415	CEDAR WAY S DETENTION POND OUTLET	CEDAR POND	M.L.T.	1										20	20		
L420	CEDAR WAY S (300' S of 237th St SW)	TERRACE	M.L.T.	1	CSP	4	4	298	297.9	120	0.0008	0.0008	0.031	130	130	CONVENTIONA	310.0
L430	475' E of CEDAR WAY S (150' N of 236th St SW)	BRIER	PRIVATE in M.L.T.	1	CMPA	7.92	5.58	332	331.6	70	0.0057	0.0057	0.028	301	301	CONVENTIONA	340.0
L450	525' E of CEDAR WAY S (300' N of 236th St SW)	BRIER	PRIVATE in M.L.T.	1	CMPA	9.75	6.58	335	334.8	40	0.0050	0.005	0.028	760	760	CONVENTIONA	350.0
L460	600' E of CEDAR WAY S (750' N of 236th St SW)	BRIER	PRIVATE in M.L.T.	1	CMPA	9.75	6.58	338	336.3	42.03	0.0404	0.0405	0.028	576	576	CONVENTIONA	348.0
L470	600' S of intersection of 228TH ST SW & 40th Place W	BRIER	PRIVATE in BRIER	1	CSP	4.4	4.4	340	339.3	125	0.0056	0.0056	0.031	114	114	CONVENTIONA	348.0
L480	475' S of intersection of 228TH ST SW & 40th Place W	BRIER	PRIVATE in BRIER	1	CSP	4.5	4.5	345	344.9	13	0.0077	0.0077	0.024	103	103	CONVENTIONA	352.0
L490	237TH ST SW (W of Cedar Way S)	TERRACE	M.L.T.	1	CSP	3	3	300	299.7	60	0.0050	0.005	0.031	113	113	CONVENTIONA	320.0
L500	S of 236TH ST SW	TERRACE	PRIVATE in M.L.T.	1	CSP	4	4	345	342.5	21.15	0.1182	0.119	0.031	96	96	CONVENTIONA	350.5
L510	236TH ST SW	TERRACE	M.L.T.	1	RCPA	3.65	2.22	349	348.6	42	0.0095	0.0095	0.012	78	78	CONVENTIONA	358.0
L512	N of 236TH ST SW	TERRACE	PRIVATE in M.L.T.	1	CSP	4	4	352	350	120.02	0.0167	0.0167	0.031	110	110	CONVENTIONA	360.0
L515	233RD ST SW	TERRACE	M.L.T.	1	CSP	3	3	356	354	150.01	0.0133	0.0133	0.031	87	87	CONVENTIONA	376.0
L520	300' E of CEDAR WAY S (50' S of 237th St SW)	BRIER	PRIVATE in M.L.T.	1	CMPA	7.25	5.25	290	289.6	88	0.0045	0.0045	0.028	442	442	CONVENTIONA	304.0
L530	350' E of CEDAR WAY S (300' N of 237th St SW)	BRIER	M.L.T.	1	CMPA	7.92	5.58	310	308.5	144.01	0.0104	0.0104	0.028	469	469	CONVENTIONA	325.0
L540	48TH AVE W (300' N of 233rd St SW)	TERRACE	M.L.T.	1	RCP	3.75	3.75	359	358.9	42	0.0024	0.0024	0.012	179	179	CONVENTIONA	370.0
L550	250' W of 48TH AVE W	TERRACE	M.L.T.	1	CSP	3.75	3.75	360	359.9	21	0.0048	0.0048	0.031	85	85	CONVENTIONA	366.0
L560	600' W of 48TH AVE W	TERRACE	M.L.T.	1	CSP	2	2	365	363.8	16.04	0.0748	0.075	0.031	59	59	CONVENTIONA	371.0
M570	SHORE DRIVE NE (S of NE 170th St)	McALEER S.	L.F.P.	1		16	5	13.5	13.2	30	0.0100	0.01	0.012	401	401		20.5
M580	45TH AVE NE (S of Beach Drive NE)	McALEER S.	L.F.P.	1	RCB	15	4	15	14.6	30	0.0133	0.0133	0.012	416	416	CONVENTIONA	20.0
M585	BEACH DRIVE NE (W of 45th Ave NE)	McALEER S.	L.F.P.	1	RCB	15	4	17	16.97	30	0.0010	0.001	0.012	302	302	CONVENTIONA	23.0
M590	BOTHELL WAY NE (S of Bothell Way NE)	McALEER S.	L.F.P.	1	RCB	39	7	20	19.99	8	0.0013	0.0013	0.045	540	540	CONVENTIONA	28.0
M600	BOTHELL WAY NE	McALEER S.	L.F.P./WSDOT	1	RCB	14	6	22	21.1	85	0.0106	0.0106	0.012	874	874	CONVENTIONA	31.0
M610	BOTHELL WAY NE (at Hamlin Rd NE)	McALEER S.	L.F.P./WSDOT	1	RCB	16	4	22.5	22.2	21	0.0143	0.0143	0.012	702	702	CONVENTIONA	31.0
M620	37TH AVE NE (125' S of NE 178th St)	HILLSIDE	L.F.P.	1	RCPA	3.65	2.22	70	69.9	65	0.0015	0.0015	0.012	67	67	CONVENTIONA	76.0
M630	35TH AVE NE (175' S of NE 178th St)	HILLSIDE	L.F.P.	1	CSP	2.5	2.5	75	74.6	50	0.0080	0.008	0.031	32	32	CONVENTIONA	80.0
M640	35TH AVE NE (150' S of NE 178th St)	HILLSIDE	L.F.P./PRIVATE in L.F.P.	1	CSP	2	2	74	73.6	30	0.0133	0.0133	0.031	23	23	CONVENTIONA	79.0
M650	NE 178TH ST (S of 178th & W of 35th Ave NE)	HILLSIDE	PRIVATE in L.F.P.	1	RCP	2	2	95	93.75	14.06	0.0889	0.0893	0.012	26	26	CONVENTIONA	99.0
M660	NE 178TH ST (S of 178th & W of 35th Ave NE)	HILLSIDE	PRIVATE in L.F.P.	1	RCP	1.5	1.5	100	97.5	15.21	0.1644	0.1667	0.012	18	18	CONVENTIONA	105.0
M670	33RD AVE NE (S of NE 178th St)	HILLSIDE	L.F.P.	1	RCP	2	2	125	124.9	50	0.0020	0.002	0.012	46	46	CONVENTIONA	135.0
M680	NE 178TH ST (W of 37th Ave NE)	McALEER 2	L.F.P.	1	CMPA	7.25	5.25	65	63.6	60.02	0.0233	0.0233	0.028	327	327	CONVENTIONA	78.0
M690	33RD AVE NE (S of NE 18th St)	McALEER 3	L.F.P.	1	CMPA	5.92	3.92	82.52	81.64	40.01	0.0220	0.022	0.024	133	133	CONVENTIONA	87.9
M700	NE 165TH ST (N of 36th Ave NE)	BROOKSIDE	PRIVATE in L.F.P.	1	CSP	2	2	106	105.2	42.01	0.0190	0.019	0.031	19	19	CONVENTIONA	110.0
M710	NE 178TH ST (W of 29th Ave NE)	HILLSIDE	PRIVATE in L.F.P.	1	CSP	2	2	180	179	60.01	0.0167	0.0167	0.031	20	20	CONVENTIONA	185.0
M720	NE 178TH ST (W of 29th Ave NE)	HILLSIDE	PRIVATE in L.F.P.	1	CSP	2	2	200	196.3	67.1	0.0551	0.0552	0.031	24	24	CONVENTIONA	204.5
M730	NE 178TH ST (W of 29th Ave NE)	HILLSIDE	PRIVATE in L.F.P.	1	CSP	2	2	210	207.2	21.19	0.1321	0.1333	0.031	25	25	CONVENTIONA	214.5
M740	28TH AVE NE (NE 177th Place)	HILLSIDE	L.F.P.	1	CSP	1.5	1.5	255	251.9	41.12	0.0754	0.0756	0.031	8	8	CONVENTIONA	260.0
M750	28TH AVE NE (150' N of NE Meadows Place)	HILLSIDE	L.F.P.	1	RCP	1	1	260	256.6	41.14	0.0826	0.0829	0.012	7	7	CONVENTIONA	264.0
M760	28TH AVE NE (225' N of NE Meadows Place)	HILLSIDE	L.F.P.	1	RCP	1	1	260	258.3	36.04	0.0472	0.0472	0.012	7	7	CONVENTIONA	264.0
M770	28TH AVE NE (440' N of NE Meadows Place)	HILLSIDE	L.F.P.	1	RCP	1	1	260	258.1	32.06	0.0593	0.0594	0.012	7	7	CONVENTIONA	264.0
M780	NE PERKINS WAY	McALEER 3	L.F.P./KING CO.	1	RCPA	3.65	2.22	170	169.6	53	0.0075	0.0075	0.012	172	172	CONVENTIONA	179.0
M785	NE 196TH ST	McALEER 5	KING CO.	1	RCB	2.33	4	220	219.99	1	0.0100	0.01	0.012	122	122	CONVENTIONA	230.0
M790	15TH AVE NE	McALEER 5	KING CO.	1	RCB	4	4	240.5	240	51	0.0098	0.0098	0.012	265	265	CONVENTIONA	255.0
M800	FOREST PARK DRIVE NE (W of 14th Ave NE)	McALEER 5	KING CO.	1	CSP	6	6	254	253.8	50	0.0040	0.004	0.031	407	407	CONVENTIONA	269.0
M802	Eastbound SW 244TH ST ONRAMP TO Northbound I-	McALEER 5	KING CO.	1	CSP	5.5	5.5	257	254.7	300.01	0.0077	0.0077	0.031	288	288	CONVENTIONA	277.0
M804	SW 244TH ST	McALEER 5	KING CO./M.L.T.	1	RCB	6	4	261	258.6	320.01	0.0075	0.0075	0.012	476	476	CONVENTIONA	281.0
M806	Northbound I-5 OFFRAMP TO Northbound I-5 ONRAM	McALEER 5	WSDOT	1	CSP	5.5	5.5	265	263	270.01	0.0074	0.0074	0.031	287	287	CONVENTIONA	285.0
M808	I-5	McALEER 5	WSDOT	1	CSP	5	5	272.72	269	470.01	0.0079	0.0079	0.024	255	255	CONVENTIONA	295.0
M810	NILE TEMPLE GOLF COURSE (East)	McALEER 5	M.L.T./PRIVATE in M.L.T.	1	CSP	5	5	272.66	272.6	21	0.0029	0.0029	0.031	141	141	CONVENTIONA	279.5
M820	NILE TEMPLE GOLF COURSE	McALEER 5	M.L.T./PRIVATE in M.L.T.	1	CSP	5	5	274.21	274.15	23	0.0026	0.0026	0.031	101	101	CONVENTIONA	281.0
M830	NILE TEMPLE GOLF COURSE (West)	McALEER 5	M.L.T./PRIVATE in M.L.T.	1	CSP	5	5	275.02	274.81	44	0.0048	0.0048	0.031	168	168	CONVENTIONA	284.5
													TOTAL CULVERTS:		101		

APPENDIX C

CURRENT CONDITIONS MODELING RESULTS

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/18/98

NOTE: "Def." = deficiency (difference between existing culvert capacity and food frequency flow)

		CURRENT CONDITIONS FLOOD FREQUENCIES																	
Culvert #	Location	2 YR FLOOD	2 Yr Flood Flow Def.	% of Cap.	5 YR FLOOD	5 Yr Flood Flow Def.	% of Cap.	10 YR FLOOD	10 Yr Flood Flow Def.	% of Cap.	25 YR FLOOD	25 Yr Flood Flow Def.	% of Cap.	50 YR FLOOD	50 Yr Flood Flow Def.	% of Cap.	100 YR FLOOD	100 Yr Flood Flow Def.	% of Cap.
L5	BEACH DRIVE NE	104.7	196.3	287%	150.7	150.3	200%	182.0	119.0	165%	222.2	78.8	135%	252.6	48.4	119%	283.3	17.7	106%
L10	BOTHELL WAY NE (150' W of NE Ballinger Way)	104.6	202.4	293%	150.6	156.4	204%	181.9	125.1	169%	222.2	84.8	138%	252.7	54.3	121%	283.5	23.5	108%
L20	TOWNE CENTER ENTRANCE FROM BOTHELL WAY																		
L20	TOWNE CENTER ENTRANCE FROM BOTHELL WAY	104.6	21.4	120%	150.6	(24.6)	84%	181.9	(55.9)	69%	222.2	(96.2)	57%	252.7	(126.7)	50%	283.6	(157.6)	44%
L30	TOWNE CENTER (NEAR SKIPPERS)																		
L30	TOWNE CENTER (NEAR SKIPPERS)	104.6	(4.6)	96%	150.7	(50.7)	66%	182.0	(82.0)	55%	222.3	(122.3)	45%	252.8	(152.8)	40%	283.6	(183.6)	35%
L40	TOWNE CENTER (NEAR CLEANERS)																		
L40	TOWNE CENTER (NEAR CLEANERS)	104.6	6.4	106%	150.7	(39.7)	74%	182.1	(71.1)	61%	222.4	(111.4)	50%	252.9	(141.9)	44%	283.7	(172.7)	39%
L60	NE 178TH ST (W of 44th Ave NE)	102.5	155.5	252%	148.5	109.5	174%	179.7	78.3	144%	219.9	38.1	117%	250.3	7.7	103%	280.9	(22.9)	92%
L70	40TH AVE NE (W of NE Ballinger Way)	99.6	108.4	209%	144.0	64.0	144%	174.5	33.5	119%	213.9	(5.9)	97%	243.9	(35.9)	85%	274.3	(66.3)	76%
L80	35TH AVE NE (S of NE Ballinger Way)	94.1	171.9	283%	137.1	128.9	194%	166.7	99.3	160%	205.2	60.8	130%	234.6	31.4	113%	264.6	1.4	101%
L90	NE 185TH ST (W of 35th Ave NE)	94.2	19.8	121%	137.3	(23.3)	83%	167.0	(53.0)	68%	205.8	(91.8)	55%	235.5	(121.5)	48%	265.7	(151.7)	43%
L100	NE BALLINGER WAY (E of 35th Ave NE)	94.1	82.9	188%	137.2	39.8	129%	166.9	10.1	106%	205.5	(28.5)	86%	235.1	(58.1)	75%	265.2	(88.2)	67%
L110	35TH AVE NE (S of NE 190th St)	66.7	30.3	145%	99.2	(2.2)	98%	120.7	(23.7)	80%	147.7	(50.7)	66%	167.5	(70.5)	58%	187.0	(90.0)	52%
L120	35TH AVE NE (N of NE 190th St)	64.2	111.8	274%	95.9	80.1	184%	116.9	59.1	151%	142.9	33.1	123%	161.8	14.2	109%	180.4	(4.4)	98%
L130	165' W of 35TH AVE NE (450' S of NE 195th St)	64.2	131.8	305%	96.0	100.0	204%	116.9	79.1	168%	143.0	53.0	137%	162.1	33.9	121%	180.8	15.2	108%
L140	150' W of 35TH AVE NE (300' S of NE 195th St)																		
L140	150' W of 35TH AVE NE (300' S of NE 195th St)	64.2	179.8	380%	96.0	148.0	254%	117.0	127.0	209%	143.1	100.9	171%	162.2	81.8	150%	180.9	63.1	135%
L150	150' W of 35TH AVE NE (150' S of NE 195th St)	64.2	30.8	148%	96.0	(1.0)	99%	117.0	(22.0)	81%	143.1	(48.1)	66%	162.2	(67.2)	59%	181.0	(86.0)	52%
L155	NE 195TH ST (150' W of 35th Ave NE)	64.2	136.8	313%	96.0	105.0	209%	117.0	84.0	172%	143.1	57.9	140%	162.2	38.8	124%	180.9	20.1	111%
L160	35TH AVE NE (525' S of 40th Place NE)	53.6	92.4	272%	81.9	64.1	178%	100.2	45.8	146%	122.4	23.6	119%	138.3	7.7	106%	153.5	(7.5)	95%
L161	W of 32ND AVE NE (near NE 198th Place)	14.2	21.8	254%	19.3	16.7	187%	22.7	13.3	159%	27.1	8.9	133%	30.4	5.6	118%	33.7	2.3	107%
L163	NE 200TH ST (E of 32nd Ave NE)	14.8	26.2	277%	21.1	19.9	194%	25.6	15.4	160%	31.8	9.2	129%	36.7	4.3	112%	41.9	(0.9)	98%
L164	W of 32ND AVE NE (75' N of NE 200th St)	14.9	(7.9)	47%	21.3	(14.3)	33%	26.0	(19.0)	27%	32.4	(25.4)	22%	37.5	(30.5)	19%	42.8	(35.8)	16%
L165	W of 32ND AVE NE (150' N of NE 200th St)	15.0	7.0	147%	21.5	0.5	102%	26.2	(4.2)	84%	32.6	(10.6)	67%	37.8	(15.8)	58%	43.4	(21.4)	51%
L166	W of 32ND AVE NE (250' N of NE 200th St)	15.1	(13.1)	13%	21.5	(19.5)	9%	26.2	(24.2)	8%	32.6	(30.6)	6%	37.9	(35.9)	5%	43.4	(41.4)	5%
L167	N 204TH ST (W of 33rd Ave NE)	16.9	35.1	308%	24.2	27.8	215%	29.4	22.6	177%	36.5	15.5	142%	42.2	9.8	123%	48.1	3.9	108%
L168	W of 243RD PLACE SW	18.6	(5.6)	70%	26.9	(13.9)	48%	33.2	(20.2)	39%	41.8	(28.8)	31%	48.9	(35.9)	27%	56.5	(43.5)	23%
L170	E of 35TH AVE NE																		
L170	E of 35TH AVE NE	53.6	13.4	125%	82.0	(15.0)	82%	100.3	(33.3)	67%	122.6	(55.6)	55%	138.6	(71.6)	48%	153.9	(86.9)	44%
L180	35TH AVE NE (375' S of 40th Place NE)	53.6	73.4	237%	82.0	45.0	155%	100.4	26.6	126%	122.7	4.3	104%	138.6	(11.6)	92%	154.0	(27.0)	82%
L190	35TH AVE NE (150' S of 40th Place NE)	53.9	17.1	132%	83.1	(12.1)	85%	102.3	(31.3)	69%	126.1	(55.1)	56%	143.2	(72.2)	50%	159.9	(88.9)	44%
L200	40TH PLACE NE (75' W of 35th Ave NE)																		
L200	150' N of 40TH PLACE NE	57.4	85.6	249%	87.9	55.1	163%	107.5	35.5	133%	131.1	11.9	109%	147.9	(4.9)	97%	163.9	(20.9)	87%
L210	37TH AVE NE (300' N of 40th Place NE)	53.0	20.0	138%	82.3	(9.3)	89%	101.1	(28.1)	72%	123.7	(50.7)	59%	139.6	(66.6)	52%	154.8	(81.8)	47%
L220	37TH AVE NE (450' N of 40th Place NE)	53.2	84.8	259%	82.4	55.6	167%	101.1	36.9	136%	123.5	14.5	112%	139.2	(1.2)	99%	154.1	(16.1)	90%
L230	E of 37TH AVE NE	53.2	14.8	128%	82.7	(14.7)	82%	101.6	(33.6)	67%	124.4	(56.4)	55%	140.4	(72.4)	48%	155.6	(87.6)	44%
L240	37TH AVE NE (580' N of 40th Place NE)	53.3	39.7	174%	82.9	10.1	112%	101.8	(8.8)	91%	124.6	(31.6)	75%	140.6	(47.6)	66%	155.8	(62.8)	60%
L250	SW 244TH ST (W of 37th Ave NE / Cedar Way S)	53.4	21.6	140%	83.0	(8.0)	90%	102.0	(27.0)	74%	124.8	(49.8)	60%	140.9	(65.9)	53%	156.1	(81.1)	48%
L255	150' W of NE BALLINGER WAY (S of NE 184th St)	53.4	153.6	388%	83.3	123.7	248%	102.5	104.5	202%	125.6	81.4	165%	141.9	65.1	146%	157.4	49.6	132%
L260	50' W of NE BALLINGER WAY (S of NE 184th St)	6.5	(0.5)	92%	9.9	(3.9)	61%	12.2	(6.2)	49%	15.3	(9.3)	39%	17.7	(11.7)	34%	20.2	(14.2)	30%
L280	150' E of NE 184TH ST	7.1	36.9	620%	10.8	33.2	407%	13.4	30.6	328%	17.1	26.9	257%	19.9	24.1	221%	22.9	21.1	192%
L290	NE BALLINGER WAY (450' N of 35th Ave NE)	36.6	25.4	169%	47.9	14.1	129%	55.1	6.9	113%	63.9	(1.9)	97%	70.3	(8.3)	88%	76.6	(14.6)	81%
L300	75' W of NE BALLINGER WAY (N of 35th Ave NE)	37.9	16.1	142%	51.0	3.0	106%	59.8	(5.8)	90%	71.0	(17.0)	76%	79.5	(25.5)	68%	88.1	(34.1)	61%
L310	150' W of NE BALLINGER WAY (N of 35th Ave NE)	37.9	4.1	111%	50.9	(8.9)	83%	59.7	(17.7)	70%	70.9	(28.9)	59%	79.3	(37.3)	53%	87.9	(45.9)	48%
L320	S of 30TH AVE NE	38.6	99.4	358%	51.7	86.3	267%	60.3	77.7	229%	71.1	66.9	194%	79.2	58.8	174%	87.2	50.8	158%
L330	FOREST PARK DRIVE NE (75' W of 30th Ave NE)	38.7	73.3	289%	51.9	60.1	216%	60.5	51.5	185%	71.2	40.8	157%	79.1	32.9	142%	87.0	25.0	129%
L331	NE BALLINGER WAY (225' S of NE 195th St)	38.0	(5.0)	87%	54.2	(21.2)	61%	66.1	(33.1)	50%	82.6	(49.6)	40%	95.9	(62.9)	34%	110.1	(77.1)	30%

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/18/98

NOTE: "Def." = deficiency (difference between existing culvert capacity and food frequency flow)

Culvert #	Location	2 YR FLOOD	2 Yr Flood Flow Def.	% of Cap.	5 YR FLOOD	5 Yr Flood Flow Def.	% of Cap.	10 YR FLOOD	10 Yr Flood Flow Def.	% of Cap.	25 YR FLOOD	25 Yr Flood Flow Def.	% of Cap.	50 YR FLOOD	50 Yr Flood Flow Def.	% of Cap.	100 YR FLOOD	100 Yr Flood Flow Def.	% of Cap.
		CURRENT CONDITIONS FLOOD FREQUENCIES																	
L332	NE 195TH ST (100' E of NE Ballinger Way)	38.8	(5.8)	85%	55.5	(22.5)	59%	67.9	(34.9)	49%	85.1	(52.1)	39%	99.1	(66.1)	33%	114.2	(81.2)	29%
L333	25TH AVE NE (300' N of NE Ballinger Way)																		
L333	26th AVE NE (300' N of NE Ballinger Way)	40.1	(18.1)	55%	56.9	(34.9)	39%	69.5	(47.5)	32%	87.0	(65.0)	25%	101.3	(79.3)	22%	116.7	(94.7)	19%
L340	100' W of NE BALLINGER WAY (S of NE 184th St)	6.7	8.3	224%	10.1	4.9	149%	12.5	2.5	120%	15.8	(0.8)	95%	18.3	(3.3)	82%	21.0	(6.0)	71%
L350	NE BALLINGER WAY (150' S of NE 184th St)	6.7	26.3	493%	10.2	22.8	324%	12.7	20.3	260%	16.0	17.0	206%	18.7	14.3	176%	21.4	11.6	154%
L360	NE 184TH ST	7.0	27.0	486%	10.7	23.3	318%	13.3	20.7	256%	16.9	17.1	201%	19.8	14.2	172%	22.7	11.3	150%
L370	175' W of NE BALLINGER WAY	6.2	7.8	226%	9.3	4.7	151%	11.5	2.5	122%	14.3	(0.3)	98%	16.5	(2.5)	85%	18.7	(4.7)	75%
L390	225' W of 25TH AVE NE	40.7	(10.7)	74%	57.7	(27.7)	52%	70.4	(40.4)	43%	88.0	(58.0)	34%	102.4	(72.4)	29%	117.9	(87.9)	25%
L400	CEDAR WAY S (N of SW 244th St)	53.4	162.6	404%	83.2	132.8	260%	102.4	113.6	211%	125.6	90.4	172%	141.9	74.1	152%	157.4	58.6	137%
L410	50' W of CEDAR WAY S (175' N of SW 244th St)	53.4	464.6	970%	83.3	434.7	622%	102.5	415.5	505%	125.7	392.3	412%	142.0	376.0	365%	157.5	360.5	329%
L415	CEDAR WAY S DETENTION POND OUTLET	53.8	(33.8)	37%	84.3	(64.3)	24%	104.1	(84.1)	19%	127.9	(107.9)	16%	144.9	(124.9)	14%	161.0	(141.0)	12%
L420	CEDAR WAY S (300' S of 237th St SW)	31.9	98.1	408%	42.5	87.5	306%	49.0	81.0	265%	56.6	73.4	230%	61.9	68.1	210%	66.9	63.1	194%
L430	475' E of CEDAR WAY S (150' N of 236th St SW)	33.9	267.1	888%	48.2	252.8	624%	57.9	243.1	520%	70.4	230.6	428%	80.0	221.0	376%	89.7	211.3	336%
L450	525' E of CEDAR WAY S (300' N of 236th St SW)	34.1	725.9	2229%	48.4	711.6	1570%	58.1	701.9	1308%	70.7	689.3	1075%	80.2	679.8	948%	89.9	670.1	845%
L460	600' E of CEDAR WAY S (750' N of 236th St SW)	34.3	541.7	1679%	48.5	527.5	1188%	58.3	517.7	988%	70.9	505.1	812%	80.5	495.5	716%	90.3	485.7	638%
L470	600' S of intersection of 228TH ST SW & 40th Place W	34.5	79.5	330%	48.9	65.1	233%	58.8	55.2	194%	71.7	42.3	159%	81.6	32.4	140%	91.7	22.3	124%
L480	475' S of intersection of 228TH ST SW & 40th Place W	35.2	67.8	293%	49.8	53.2	207%	60.1	42.9	171%	73.8	29.2	140%	84.4	18.6	122%	95.4	7.6	108%
L490	237TH ST SW (W of Cedar Way S)	32.1	80.9	352%	42.6	70.4	265%	49.1	63.9	230%	56.7	56.3	199%	62.0	51.0	182%	67.0	46.0	169%
L500	S of 236TH ST SW	36.6	59.4	262%	48.8	47.2	197%	56.2	39.8	171%	64.9	31.1	148%	71.0	25.0	135%	76.8	19.2	125%
L510	236TH ST SW	36.6	41.4	213%	48.8	29.2	160%	56.2	21.8	139%	64.9	13.1	120%	70.9	7.1	110%	76.6	1.4	102%
L512	N of 236TH ST SW	38.1	71.9	289%	50.8	59.2	217%	58.5	51.5	188%	67.7	42.3	162%	74.2	35.8	148%	80.3	29.7	137%
L515	233RD ST SW	38.1	48.9	228%	50.7	36.3	172%	58.4	28.6	149%	67.6	19.4	129%	74.0	13.0	118%	80.1	6.9	109%
L520	300' E of CEDAR WAY S (50' S of 237th St SW)	33.7	408.3	1312%	47.7	394.3	927%	57.2	384.8	773%	69.5	372.5	636%	78.9	363.1	560%	88.4	353.6	500%
L530	350' E of CEDAR WAY S (300' N of 237th St SW)	33.8	435.2	1388%	47.9	421.1	979%	57.5	411.5	816%	70.0	399.0	670%	79.4	389.6	591%	89.1	379.9	526%
L540	48TH AVE W (300' N of 233rd St SW)	41.6	137.4	430%	59.1	119.9	303%	71.3	107.7	251%	87.3	91.7	205%	99.6	79.4	180%	112.3	66.7	159%
L550	250' W of 48TH AVE W	43.0	42.0	198%	61.6	23.4	138%	75.3	9.7	113%	94.2	(9.2)	90%	109.5	(24.5)	78%	125.8	(40.8)	68%
L560	600' W of 48TH AVE W	45.9	13.1	129%	66.0	(7.0)	89%	81.2	(22.2)	73%	102.8	(43.8)	57%	120.6	(61.6)	49%	140.1	(81.1)	42%
M570	SHORE DRIVE NE (S of NE 170th St)	113.2	287.8	354%	146.0	255.0	275%	167.5	233.5	239%	194.8	206.2	206%	215.2	185.8	186%	235.6	165.4	170%
M580	45TH AVE NE (S of Beach Drive NE)	111.4	304.6	373%	143.7	272.3	289%	165.0	251.0	252%	191.7	224.3	217%	211.7	204.3	197%	231.7	184.3	180%
M585	BEACH DRIVE NE (W of 45th Ave NE)	111.3	190.7	271%	143.7	158.3	210%	164.9	137.1	183%	191.8	110.2	157%	211.8	90.2	143%	231.9	70.1	130%
M590	BOTHELL WAY NE (S of Bothell Way NE)	111.4	428.6	485%	143.7	396.3	376%	165.0	375.0	327%	191.8	348.2	282%	211.8	328.2	255%	231.8	308.2	233%
M600	BOTHELL WAY NE	111.4	762.6	785%	143.7	730.3	608%	165.0	709.0	530%	191.8	682.2	456%	211.8	662.2	413%	231.8	642.2	377%
M610	BOTHELL WAY NE (at Hamlin Rd NE)	111.3	590.7	631%	143.7	558.3	489%	165.0	537.0	425%	191.8	510.2	366%	211.8	490.2	331%	231.8	470.2	303%
M620	37TH AVE NE (125' S of NE 178th St)	16.0	51.0	419%	21.5	45.5	312%	25.1	41.9	267%	29.6	37.4	226%	33.0	34.0	203%	36.3	30.7	185%
M630	35TH AVE NE (175' S of NE 178th St)	5.5	26.5	582%	7.5	24.5	427%	8.8	23.2	364%	10.6	21.4	302%	11.9	20.1	269%	13.3	18.7	241%
M640	35TH AVE NE (150' S of NE 178th St)	5.5	17.5	418%	7.5	15.5	307%	8.8	14.2	261%	10.6	12.4	217%	11.9	11.1	193%	13.2	9.8	174%
M650	NE 178TH ST (S of 178th & W of 35th Ave NE)	5.6	20.4	464%	7.6	18.4	342%	8.9	17.1	292%	10.6	15.4	245%	11.9	14.1	218%	13.2	12.8	197%
M660	NE 178TH ST (S of 178th & W of 35th Ave NE)	5.7	12.3	316%	7.6	10.4	237%	9.0	9.0	200%	10.7	7.3	168%	11.9	6.1	151%	13.2	4.8	136%
M670	33RD AVE NE (S of NE 178th St)	6.1	39.9	754%	8.4	37.6	548%	9.9	36.1	465%	12.0	34.0	383%	13.5	32.5	341%	15.1	30.9	305%
M680	NE 178TH ST (W of 37th Ave NE)	98.7	228.3	331%	127.5	199.5	256%	146.5	180.5	223%	170.5	156.5	192%	188.3	138.7	174%	206.3	120.7	159%
M690	33RD AVE NE (S of NE 18th St)	98.4	34.6	135%	127.1	5.9	105%	146.1	(13.1)	91%	169.9	(36.9)	78%	187.7	(54.7)	71%	205.5	(72.5)	65%
M700	NE 165TH ST (N of 36th Ave NE)	11.5	7.5	165%	15.2	3.8	125%	17.7	1.3	107%	21.0	(2.0)	90%	23.5	(4.5)	81%	26.0	(7.0)	73%
M710	NE 178TH ST (W of 29th Ave NE)	6.6	13.4	303%	9.1	10.9	220%	10.9	9.1	183%	13.3	6.7	150%	15.2	4.8	132%	17.2	2.8	116%
M720	NE 178TH ST (W of 29th Ave NE)	6.7	17.3	358%	9.2	14.8	261%	11.1	12.9	216%	13.7	10.3	175%	15.7	8.3	153%	18.0	6.0	133%
M730	NE 178TH ST (W of 29th Ave NE)	6.8	18.2	368%	9.3	15.7	269%	11.2	13.8	223%	13.9	11.1	180%	16.0	9.0	156%	18.3	6.7	137%
M740	28TH AVE NE (NE 177th Place)	6.8	1.2	118%	9.3	(1.3)	86%	11.2	(3.2)	71%	13.9	(5.9)	58%	16.0	(8.0)	50%	18.3	(10.3)	44%
M750	28TH AVE NE (150' N of NE Meadows Place)	6.8	0.2	103%	9.3	(2.3)	75%	11.2	(4.2)	63%	13.9	(6.9)	50%	16.0	(9.0)	44%	18.3	(11.3)	38%
M760	28TH AVE NE (225' N of NE Meadows Place)	6.8	0.2	103%	9.3	(2.3)	75%	11.2	(4.2)	63%	13.9	(6.9)	50%	16.0	(9.0)	44%	18.3	(11.3)	38%
M770	28TH AVE NE (440' N of NE Meadows Place)	6.8	0.2	103%	9.3	(2.3)	75%	11.2	(4.2)	63%	13.9	(6.9)	50%	16.0	(9.0)	44%	18.3	(11.3)	38%

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/18/98

NOTE: "Def." = deficiency (difference between existing culvert capacity and food frequency flow)

Culvert #	Location	CURRENT CONDITIONS FLOOD FREQUENCIES																	
		2 YR FLOOD	2 Yr Flood Flow Def.	% of Cap.	5 YR FLOOD	5 Yr Flood Flow Def.	% of Cap.	10 YR FLOOD	10 Yr Flood Flow Def.	% of Cap.	25 YR FLOOD	25 Yr Flood Flow Def.	% of Cap.	50 YR FLOOD	50 Yr Flood Flow Def.	% of Cap.	100 YR FLOOD	100 Yr Flood Flow Def.	% of Cap.
M780	NE PERKINS WAY	97.6	74.4	176%	127.0	45.0	135%	145.3	26.7	118%	167.5	4.5	103%	183.3	(11.3)	94%	198.7	(26.7)	87%
M785	NE 196TH ST	94.6	27.4	129%	126.2	(4.2)	97%	146.7	(24.7)	83%	172.1	(50.1)	71%	190.8	(68.8)	64%	209.3	(87.3)	58%
M790	15TH AVE NE	69.0	196.0	384%	90.0	175.0	294%	103.3	161.7	257%	119.5	145.5	222%	131.2	133.8	202%	142.7	122.3	186%
M800	FOREST PARK DRIVE NE (W of 14th Ave NE)	63.9	343.1	637%	85.0	322.0	479%	98.4	308.6	414%	114.8	292.2	355%	126.7	280.3	321%	138.2	268.8	295%
M802	Eastbound SW 244TH ST ONRAMP TO Northbound I-5	64.0	224.0	450%	85.1	202.9	338%	98.5	189.5	292%	114.8	173.2	251%	126.7	161.3	227%	138.3	149.7	208%
M804	SW 244TH ST	64.0	412.0	744%	85.1	390.9	559%	98.5	377.5	483%	114.8	361.2	415%	126.7	349.3	376%	138.3	337.7	344%
M806	Northbound I-5 OFFRAMP TO Northbound I-5 ONRAMP	64.0	223.0	448%	85.1	201.9	337%	98.5	188.5	291%	114.8	172.2	250%	126.7	160.3	227%	138.3	148.7	208%
M808	I-5	63.9	191.1	399%	85.1	169.9	300%	98.5	156.5	259%	114.8	140.2	222%	126.7	128.3	201%	138.3	116.7	184%
M810	NILE TEMPLE GOLF COURSE (East)	63.9	77.1	221%	85.1	55.9	166%	98.5	42.5	143%	114.8	26.2	123%	126.7	14.3	111%	138.3	2.7	102%
M820	NILE TEMPLE GOLF COURSE	63.9	37.1	158%	85.1	15.9	119%	98.5	2.5	103%	114.8	(13.8)	88%	126.7	(25.7)	80%	138.3	(37.3)	73%
M830	NILE TEMPLE GOLF COURSE (West)	63.9	104.1	263%	85.1	82.9	197%	98.5	69.5	171%	114.8	53.2	146%	126.7	41.3	133%	138.3	29.7	121%
		# Culv's < 2 YR FLOOD			# Culv's < 5 YR FLOOD			# Culv's < 10 YR FLOOD			# Culv's < 25 YR FLOOD			# Culv's < 50 YR FLOOD			# Culv's < 100 YR FLOOD		
			10			27			31			39			43			47	

APPENDIX E

FUTURE CONDITIONS WITH HYPOTHETICALLY UPSIZED CULVERTS (MAX. FLOW) MODELING RESULTS

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/18/98

NOTE: "Def." = deficiency (difference between existing culvert capacity and food frequency flow)

Culvert #	Location	FUTURE LAND USE & HYPOTHETICALLY UPSIZED CULVERTS FLOOD FREQUENCIES (MAXIMUM POSSIBLE FLOWS)																	
		2 YR FLOOD (cfs)	2 Yr Flood Flow Def.	% of Cap.	5 YR FLOOD (cfs)	5 Yr Flood Flow Def.	% of Cap.	10 YR FLOOD (cfs)	10 Yr Flood Flow Def.	% of Cap.	25 YR FLOOD (cfs)	25 Yr Flood Flow Def.	% of Cap.	50 YR FLOOD (cfs)	50 Yr Flood Flow Def.	% of Cap.	100 YR FLOOD (cfs)	100 Yr Flood Flow Def.	% of Cap.
L5	BEACH DRIVE NE	130.4	170.6	231%	181.9	119.1	165%	216.8	84.2	139%	261.8	39.2	115%	295.8	5.2	102%	330.4	(29.4)	91%
L10	BOTHELL WAY NE (150' W of NE Ballinger Way)	130.3	176.7	236%	181.7	125.3	169%	216.4	90.6	142%	261.2	45.8	118%	295.0	12.0	104%	329.4	(22.4)	93%
L20	TOWNE CENTER ENTRANCE FROM BOTHELL WAY																		
L20	TOWNE CENTER ENTRANCE FROM BOTHELL WAY	130.3	(4.3)	97%	181.6	(55.6)	69%	216.4	(90.4)	58%	261.2	(135.2)	48%	295.1	(169.1)	43%	329.5	(203.5)	38%
L30	TOWNE CENTER (NEAR SKIPPERS)																		
L30	TOWNE CENTER (NEAR SKIPPERS)	130.3	(30.3)	77%	181.6	(81.6)	55%	216.4	(116.4)	46%	261.1	(161.1)	38%	295.0	(195.0)	34%	329.4	(229.4)	30%
L40	TOWNE CENTER (NEAR CLEANERS)																		
L40	TOWNE CENTER (NEAR CLEANERS)	130.3	(19.3)	85%	181.6	(70.6)	61%	216.4	(105.4)	51%	261.1	(150.1)	43%	295.0	(184.0)	38%	329.4	(218.4)	34%
L60	NE 178TH ST (W of 44th Ave NE)	126.0	132.0	205%	177.0	81.0	146%	211.6	46.4	122%	256.3	1.7	101%	290.2	(32.2)	89%	324.6	(66.6)	79%
L70	40TH AVE NE (W of NE Ballinger Way)	122.3	85.7	170%	171.8	36.2	121%	205.5	2.5	101%	248.9	(40.9)	84%	281.9	(73.9)	74%	315.4	(107.4)	66%
L80	35TH AVE NE (S of NE Ballinger Way)	113.5	152.5	234%	160.7	105.3	166%	193.3	72.7	138%	235.9	30.1	113%	268.5	(2.5)	99%	302.0	(36.0)	88%
L90	NE 185TH ST (W of 35th Ave NE)	113.6	0.4	100%	161.0	(47.0)	71%	193.7	(79.7)	59%	236.4	(122.4)	48%	269.2	(155.2)	42%	302.7	(188.7)	38%
L100	NE BALLINGER WAY (E of 35th Ave NE)	113.7	63.3	156%	161.1	15.9	110%	193.9	(16.9)	91%	236.5	(59.5)	75%	269.2	(92.2)	66%	302.7	(125.7)	58%
L110	35TH AVE NE (S of NE 190th St)	73.2	23.8	133%	110.3	(13.3)	88%	134.8	(37.8)	72%	165.5	(68.5)	59%	187.9	(90.9)	52%	209.9	(112.9)	46%
L120	35TH AVE NE (N of NE 190th St)	70.6	105.4	249%	106.4	69.6	165%	129.8	46.2	136%	158.6	17.4	111%	179.4	(3.4)	98%	199.7	(23.7)	88%
L130	165' W of 35TH AVE NE (450' S of NE 195th St)	70.6	125.4	278%	106.5	89.5	184%	130.0	66.0	151%	159.0	37.0	123%	179.9	16.1	109%	200.3	(4.3)	98%
L140	150' W of 35TH AVE NE (300' S of NE 195th St)																		
L140	150' W of 35TH AVE NE (300' S of NE 195th St)	70.5	173.5	346%	106.4	137.6	229%	129.9	114.1	188%	158.8	85.2	154%	179.8	64.2	136%	200.1	43.9	122%
L150	150' W of 35TH AVE NE (150' S of NE 195th St)	70.5	24.5	135%	106.4	(11.4)	89%	129.9	(34.9)	73%	158.8	(63.8)	60%	179.7	(84.7)	53%	200.0	(105.0)	48%
L155	NE 195TH ST (150' W of 35th Ave NE)	70.5	130.5	285%	106.4	94.6	189%	129.9	71.1	155%	158.9	42.1	126%	179.8	21.2	112%	200.1	0.9	100%
L160	35TH AVE NE (525' S of 40th Place NE)	58.6	87.4	249%	89.3	56.7	163%	108.7	37.3	134%	131.8	14.2	111%	147.9	(1.9)	99%	163.1	(17.1)	90%
L161	W of 32ND AVE NE (near NE 198th Place)	15.2	20.8	237%	20.6	15.4	175%	24.1	11.9	149%	28.6	7.4	126%	31.9	4.1	113%	35.1	0.9	103%
L163	NE 200TH ST (E of 32nd Ave NE)	16.1	24.9	255%	23.0	18.0	178%	27.8	13.2	147%	34.4	6.6	119%	39.5	1.5	104%	44.8	(3.8)	92%
L164	W of 32ND AVE NE (75' N of NE 200th St)	16.4	(9.4)	43%	23.3	(16.3)	30%	28.3	(21.3)	25%	35.0	(28.0)	20%	40.2	(33.2)	17%	45.7	(38.7)	15%
L165	W of 32ND AVE NE (150' N of NE 200th St)	16.5	5.5	133%	23.5	(1.5)	94%	28.6	(6.6)	77%	35.3	(13.3)	62%	40.6	(18.6)	54%	46.2	(24.2)	48%
L166	W of 32ND AVE NE (250' N of NE 200th St)	16.6	(14.6)	12%	23.6	(21.6)	8%	28.7	(26.7)	7%	35.5	(33.5)	6%	40.8	(38.8)	5%	46.4	(44.4)	4%
L167	N 204TH ST (W of 33rd Ave NE)	16.8	35.2	310%	24.1	27.9	216%	29.4	22.6	177%	36.5	15.5	142%	42.2	9.8	123%	48.2	3.8	108%
L168	W of 243RD PLACE SW	18.6	(5.6)	70%	26.9	(13.9)	48%	33.1	(20.1)	39%	41.7	(28.7)	31%	48.8	(35.8)	27%	56.5	(43.5)	23%
L170	E of 35TH AVE NE																		
L170	E of 35TH AVE NE	58.5	8.5	115%	89.3	(22.3)	75%	108.7	(41.7)	62%	131.8	(64.8)	51%	147.9	(80.9)	45%	163.1	(96.1)	41%
L180	35TH AVE NE (375' S of 40th Place NE)	58.5	68.5	217%	89.2	37.8	142%	108.7	18.3	117%	131.8	(4.8)	96%	147.9	(20.9)	86%	163.1	(36.1)	78%
L190	35TH AVE NE (150' S of 40th Place NE)	58.5	12.5	121%	89.1	(18.1)	80%	108.4	(37.4)	65%	131.5	(60.5)	54%	147.5	(76.5)	48%	162.7	(91.7)	44%
L200	40TH PLACE NE (75' W of 35th Ave NE)																		
L200	150' N of 40TH PLACE NE	60.6	82.4	236%	92.5	50.5	155%	112.7	30.3	127%	136.9	6.1	104%	153.8	(10.8)	93%	169.9	(26.9)	84%
L210	37TH AVE NE (300' N of 40th Place NE)	55.0	18.0	133%	85.2	(12.2)	86%	104.3	(31.3)	70%	127.0	(54.0)	57%	142.8	(69.8)	51%	157.6	(84.6)	46%
L220	37TH AVE NE (450' N of 40th Place NE)	54.9	83.1	251%	85.1	52.9	162%	104.3	33.7	132%	127.2	10.8	108%	143.1	(5.1)	96%	158.2	(20.2)	87%
L230	E of 37TH AVE NE	54.9	13.1	124%	85.2	(17.2)	80%	104.5	(36.5)	65%	127.5	(59.5)	53%	143.5	(75.5)	47%	158.6	(90.6)	43%
L240	37TH AVE NE (580' N of 40th Place NE)	55.0	38.0	169%	85.3	7.7	109%	104.6	(11.6)	89%	127.6	(34.6)	73%	143.7	(50.7)	65%	158.8	(65.8)	59%
L250	SW 244TH ST (W of 37th Ave NE / Cedar Way S)	55.0	20.0	136%	85.4	(10.4)	88%	104.7	(29.7)	72%	127.7	(52.7)	59%	143.8	(68.8)	52%	158.9	(83.9)	47%
L255	150' W of NE BALLINGER WAY (S of NE 184th St)	55.0	152.0	376%	85.4	121.6	242%	104.8	102.2	198%	127.9	79.1	162%	144.0	63.0	144%	159.2	47.8	130%
L260	50' W of NE BALLINGER WAY (S of NE 184th St)	6.6	(0.6)	91%	10.0	(4.0)	60%	12.4	(6.4)	48%	15.7	(9.7)	38%	18.3	(12.3)	33%	21.0	(15.0)	29%
L280	150' E of NE 184TH ST	7.1	36.9	620%	10.8	33.2	407%	13.4	30.6	328%	17.1	26.9	257%	19.9	24.1	221%	22.9	21.1	192%
L290	NE BALLINGER WAY (450' N of 35th Ave NE)	52.8	9.2	117%	64.7	(2.7)	96%	71.9	(9.9)	86%	80.3	(18.3)	77%	86.3	(24.3)	72%	92.0	(30.0)	67%
L300	75' W of NE BALLINGER WAY (N of 35th Ave NE)	53.7	0.3	101%	66.1	(12.1)	82%	73.8	(19.8)	73%	83.0	(29.0)	65%	89.6	(35.6)	60%	96.0	(42.0)	56%
L310	150' W of NE BALLINGER WAY (N of 35th Ave NE)	53.7	(11.7)	78%	66.1	(24.1)	64%	73.7	(31.7)	57%	82.9	(40.9)	51%	89.5	(47.5)	47%	95.8	(53.8)	44%
L320	S of 30TH AVE NE	53.8	84.2	257%	66.2	71.8	208%	73.8	64.2	187%	82.9	55.1	166%	89.4	48.6	154%	95.7	42.3	144%
L330	FOREST PARK DRIVE NE (75' W of 30th Ave NE)	54.6	57.4	205%	66.3	45.7	169%	73.4	38.6	153%	81.6	30.4	137%	87.4	24.6	128%	93.0	19.0	120%
L331	NE BALLINGER WAY (225' S of NE 195th St)	65.6	(32.6)	50%	84.5	(51.5)	39%	97.7	(64.7)	34%	115.0	(82.0)	29%	128.6	(95.6)	26%	142.6	(109.6)	23%
L332	NE 195TH ST (100' E of NE Ballinger Way)	66.0	(33.0)	50%	85.2	(52.2)	39%	98.7	(65.7)	33%	116.6	(83.6)	28%	130.6	(97.6)	25%	145.2	(112.2)	23%
L333	25TH AVE NE (300' N of NE Ballinger Way)																		

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/18/98

NOTE: "Def." = deficiency (difference between existing culvert capacity and food frequency flow)

		FUTURE LAND USE & HYPOTHETICALLY UPSIZED CULVERTS FLOOD FREQUENCIES (MAXIMUM POSSIBLE FLOWS)																	
Culvert #	Location	2 YR FLOOD (cfs)	2 Yr Flood Flow Def.	% of Cap.	5 YR FLOOD (cfs)	5 Yr Flood Flow Def.	% of Cap.	10 YR FLOOD (cfs)	10 Yr Flood Flow Def.	% of Cap.	25 YR FLOOD (cfs)	25 Yr Flood Flow Def.	% of Cap.	50 YR FLOOD (cfs)	50 Yr Flood Flow Def.	% of Cap.	100 YR FLOOD (cfs)	100 Yr Flood Flow Def.	% of Cap.
L333	26th AVE NE (300' N of NE Ballinger Way)	66.7	(44.7)	33%	86.4	(64.4)	25%	100.3	(78.3)	22%	119.0	(97.0)	18%	133.7	(111.7)	16%	149.2	(127.2)	15%
L340	100' W of NE BALLINGER WAY (S of NE 184th St)	6.7	8.3	224%	10.1	4.9	149%	12.6	2.4	119%	15.9	(0.9)	94%	18.5	(3.5)	81%	21.2	(6.2)	71%
L350	NE BALLINGER WAY (150' S of NE 184th St)	6.7	26.3	493%	10.2	22.8	324%	12.7	20.3	260%	16.0	17.0	206%	18.7	14.3	176%	21.4	11.6	154%
L360	NE 184TH ST	7.0	27.0	486%	10.7	23.3	318%	13.3	20.7	256%	16.9	17.1	201%	19.8	14.2	172%	22.7	11.3	150%
L370	175' W of NE BALLINGER WAY	6.3	7.7	222%	9.5	4.5	147%	11.9	2.1	118%	15.1	(1.1)	93%	17.6	(3.6)	80%	20.2	(6.2)	69%
L390	225' W of 25TH AVE NE	67.3	(37.3)	45%	87.2	(57.2)	34%	101.4	(71.4)	30%	120.6	(90.6)	25%	135.7	(105.7)	22%	151.7	(121.7)	20%
L400	CEDAR WAY S (N of SW 244th St)	54.9	161.1	393%	85.3	130.7	253%	104.7	111.3	206%	127.7	88.3	169%	143.9	72.1	150%	159.1	56.9	136%
L410	50' W of CEDAR WAY S (175' N of SW 244th St)	55.0	463.0	942%	85.4	432.6	607%	104.8	413.2	494%	127.9	390.1	405%	144.0	374.0	360%	159.2	358.8	325%
L415	CEDAR WAY S DETENTION POND OUTLET	55.4	(35.4)	36%	86.2	(66.2)	23%	105.8	(85.8)	19%	129.3	(109.3)	15%	145.7	(125.7)	14%	161.1	(141.1)	12%
L420	CEDAR WAY S (300' S of 237th St SW)	32.9	97.1	395%	43.7	86.3	297%	50.1	79.9	259%	57.6	72.4	226%	62.7	67.3	207%	67.6	62.4	192%
L430	475' E of CEDAR WAY S (150' N of 236th St SW)	33.9	267.1	888%	48.2	252.8	624%	57.9	243.1	520%	70.4	230.6	428%	80.0	221.0	376%	89.7	211.3	336%
L450	525' E of CEDAR WAY S (300' N of 236th St SW)	34.1	725.9	2229%	48.4	711.6	1570%	58.1	701.9	1308%	70.7	689.3	1075%	80.2	679.8	948%	89.9	670.1	845%
L460	600' E of CEDAR WAY S (750' N of 236th St SW)	34.3	541.7	1679%	48.5	527.5	1188%	58.3	517.7	988%	70.9	505.1	812%	80.5	495.5	716%	90.3	485.7	638%
L470	600' S of intersection of 228TH ST SW & 40th Place W	34.5	79.5	330%	48.9	65.1	233%	58.8	55.2	194%	71.7	42.3	159%	81.6	32.4	140%	91.7	22.3	124%
L480	475' S of intersection of 228TH ST SW & 40th Place W	35.2	67.8	293%	49.8	53.2	207%	60.1	42.9	171%	73.8	29.2	140%	84.4	18.6	122%	95.4	7.6	108%
L490	237TH ST SW (W of Cedar Way S)	33.0	80.0	342%	43.7	69.3	259%	50.1	62.9	226%	57.7	55.3	196%	63.0	50.0	179%	68.0	45.0	166%
L500	S of 236TH ST SW	38.4	57.6	250%	50.8	45.2	189%	58.1	37.9	165%	66.6	29.4	144%	72.4	23.6	133%	77.8	18.2	123%
L510	236TH ST SW	38.4	39.6	203%	50.8	27.2	154%	58.2	19.8	134%	66.7	11.3	117%	72.5	5.5	108%	77.9	0.1	100%
L512	N of 236TH ST SW	40.0	70.0	275%	53.1	56.9	207%	61.1	48.9	180%	70.4	39.6	156%	76.9	33.1	143%	83.0	27.0	133%
L515	233RD ST SW	40.0	47.0	218%	53.0	34.0	164%	60.8	26.2	143%	70.0	17.0	124%	76.3	10.7	114%	82.3	4.7	106%
L520	300' E of CEDAR WAY S (50' S of 237th St SW)	33.7	408.3	1312%	47.7	394.3	927%	57.2	384.8	773%	69.5	372.5	636%	78.9	363.1	560%	88.4	353.6	500%
L530	350' E of CEDAR WAY S (300' N of 237th St SW)	33.8	435.2	1388%	47.9	421.1	979%	57.5	411.5	816%	70.0	399.0	670%	79.4	389.6	591%	89.1	379.9	526%
L540	48TH AVE W (300' N of 233rd St SW)	47.3	131.7	378%	66.8	112.2	268%	80.2	98.8	223%	97.7	81.3	183%	111.1	67.9	161%	124.8	54.2	143%
L550	250' W of 48TH AVE W	51.3	33.7	166%	73.4	11.6	116%	89.2	(4.2)	95%	110.5	(25.5)	77%	127.4	(42.4)	67%	145.2	(60.2)	59%
L560	600' W of 48TH AVE W	54.1	4.9	109%	77.8	(18.8)	76%	95.1	(36.1)	62%	119.0	(60.0)	50%	138.2	(79.2)	43%	158.7	(99.7)	37%
M570	SHORE DRIVE NE (S of NE 170th St)	125.6	275.4	319%	163.5	237.5	245%	188.7	212.3	213%	220.9	180.1	182%	245.1	155.9	164%	269.6	131.4	149%
M580	45TH AVE NE (S of Beach Drive NE)	123.5	292.5	337%	161.1	254.9	258%	186.1	229.9	224%	217.8	198.2	191%	241.7	174.3	172%	265.9	150.1	156%
M585	BEACH DRIVE NE (W of 45th Ave NE)	123.4	178.6	245%	160.9	141.1	188%	185.8	116.2	163%	217.5	84.5	139%	241.4	60.6	125%	265.5	36.5	114%
M590	BOTHELL WAY NE (S of Bothell Way NE)	123.5	416.5	437%	160.8	379.2	336%	185.6	354.4	291%	217.1	322.9	249%	240.8	299.2	224%	264.7	275.3	204%
M600	BOTHELL WAY NE	123.5	750.5	708%	160.8	713.2	544%	185.5	688.5	471%	217.1	656.9	403%	240.8	633.2	363%	264.7	609.3	330%
M610	BOTHELL WAY NE (at Hamlin Rd NE)	123.5	578.5	568%	160.8	541.2	437%	185.5	516.5	378%	217.1	484.9	323%	240.8	461.2	292%	264.7	437.3	265%
M620	37TH AVE NE (125' S of NE 178th St)	16.5	50.5	406%	22.3	44.7	300%	26.2	40.8	256%	31.2	35.8	215%	35.1	31.9	191%	38.9	28.1	172%
M630	35TH AVE NE (175' S of NE 178th St)	5.6	26.4	571%	7.7	24.3	416%	9.0	23.0	356%	10.8	21.2	296%	12.2	19.8	262%	13.5	18.5	237%
M640	35TH AVE NE (150' S of NE 178th St)	5.6	17.4	411%	7.6	15.4	303%	9.0	14.0	256%	10.8	12.2	213%	12.1	10.9	190%	13.5	9.5	170%
M650	NE 178TH ST (S of 178th & W of 35th Ave NE)	5.7	20.3	456%	7.8	18.2	333%	9.1	16.9	286%	10.9	15.1	239%	12.2	13.8	213%	13.5	12.5	193%
M660	NE 178TH ST (S of 178th & W of 35th Ave NE)	5.8	12.2	310%	7.8	10.2	231%	9.2	8.8	196%	10.9	7.1	165%	12.2	5.8	148%	13.5	4.5	133%
M670	33RD AVE NE (S of NE 178th St)	6.3	39.7	730%	8.6	37.4	535%	10.2	35.8	451%	12.2	33.8	377%	13.8	32.2	333%	15.4	30.6	299%
M680	NE 178TH ST (W of 37th Ave NE)	110.0	217.0	297%	142.9	184.1	229%	164.7	162.3	199%	192.2	134.8	170%	212.8	114.2	154%	233.6	93.4	140%
M690	33RD AVE NE (S of NE 18th St)	109.6	23.4	121%	142.4	(9.4)	93%	164.1	(31.1)	81%	191.4	(58.4)	69%	211.9	(78.9)	63%	232.5	(99.5)	57%
M700	NE 165TH ST (N of 36th Ave NE)	12.2	6.8	156%	16.7	2.3	114%	19.8	(0.8)	96%	24.1	(5.1)	79%	27.5	(8.5)	69%	31.0	(12.0)	61%
M710	NE 178TH ST (W of 29th Ave NE)	6.8	13.2	294%	9.3	10.7	215%	11.2	8.8	179%	13.6	6.4	147%	15.6	4.4	128%	17.7	2.3	113%
M720	NE 178TH ST (W of 29th Ave NE)	6.9	17.1	348%	9.5	14.5	253%	11.4	12.6	211%	14.0	10.0	171%	16.1	7.9	149%	18.4	5.6	130%
M730	NE 178TH ST (W of 29th Ave NE)	6.9	18.1	362%	9.6	15.4	260%	11.5	13.5	217%	14.2	10.8	176%	16.4	8.6	152%	18.8	6.2	133%
M740	28TH AVE NE (NE 177th Place)	6.9	1.1	116%	9.6	(1.6)	83%	11.5	(3.5)	70%	14.2	(6.2)	56%	16.4	(8.4)	49%	18.8	(10.8)	43%
M750	28TH AVE NE (150' N of NE Meadows Place)	6.9	0.1	101%	9.6	(2.6)	73%	11.5	(4.5)	61%	14.2	(7.2)	49%	16.4	(9.4)	43%	18.8	(11.8)	37%
M760	28TH AVE NE (225' N of NE Meadows Place)	6.9	0.1	101%	9.6	(2.6)	73%	11.5	(4.5)	61%	14.2	(7.2)	49%	16.4	(9.4)	43%	18.8	(11.8)	37%
M770	28TH AVE NE (440' N of NE Meadows Place)	6.9	0.1	101%	9.6	(2.6)	73%	11.5	(4.5)	61%	14.2	(7.2)	49%	16.4	(9.4)	43%	18.8	(11.8)	37%
M780	NE PERKINS WAY	107.9	64.1	159%	142.0	30.0	121%	163.6	8.4	105%	189.8	(17.8)	91%	208.7	(36.7)	82%	227.2	(55.2)	76%
M785	NE 196TH ST	101.1	20.9	121%	133.7	(11.7)	91%	155.5	(33.5)	78%	183.5	(61.5)	66%	204.7	(82.7)	60%	226.1	(104.1)	54%
M790	15TH AVE NE	76.8	188.2	345%	99.2	165.8	267%	113.0	152.0	235%	129.7	135.3	204%	141.6	123.4	187%	153.1	111.9	173%
M800	FOREST PARK DRIVE NE (W of 14th Ave NE)	71.7	335.3	568%	94.2	312.8	432%	108.2	298.8	376%	125.0	282.0	326%	137.0	270.0	297%	148.6	258.4	274%

McAleer & Lyon Creeks Culvert Inventory

Owner: City of Lake Forest Park
Project: McAleer & Lyon Creeks Drainage Basin Study

Revised: 3/18/98

NOTE: "Def." = deficiency (difference between existing culvert capacity and food frequency flow)

		FUTURE LAND USE & HYPOTHETICALLY UPSIZED CULVERTS FLOOD FREQUENCIES (MAXIMUM POSSIBLE FLOWS)																	
Culvert #	Location	2 YR FLOOD (cfs)	2 Yr Flood Flow Def.	% of Cap.	5 YR FLOOD (cfs)	5 Yr Flood Flow Def.	% of Cap.	10 YR FLOOD (cfs)	10 Yr Flood Flow Def.	% of Cap.	25 YR FLOOD (cfs)	25 Yr Flood Flow Def.	% of Cap.	50 YR FLOOD (cfs)	50 Yr Flood Flow Def.	% of Cap.	100 YR FLOOD (cfs)	100 Yr Flood Flow Def.	% of Cap.
M802	Eastbound SW 244TH ST ONRAMP TO Northbound I-5	71.7	216.3	402%	94.3	193.7	305%	108.3	179.7	266%	125.1	162.9	230%	137.2	150.8	210%	148.8	139.2	194%
M804	SW 244TH ST	71.7	404.3	664%	94.3	381.7	505%	108.3	367.7	440%	125.1	350.9	380%	137.2	338.8	347%	148.8	327.2	320%
M806	Northbound I-5 OFFRAMP TO Northbound I-5 ONRAM	71.7	215.3	400%	94.2	192.8	305%	108.3	178.7	265%	125.1	161.9	229%	137.2	149.8	209%	148.8	138.2	193%
M808	I-5	71.7	183.3	356%	94.3	160.7	270%	108.3	146.7	235%	125.1	129.9	204%	137.2	117.8	186%	148.8	106.2	171%
M810	NILE TEMPLE GOLF COURSE (East)	71.7	69.3	197%	94.3	46.7	150%	108.3	32.7	130%	125.1	15.9	113%	137.2	3.8	103%	148.8	(7.8)	95%
M820	NILE TEMPLE GOLF COURSE	71.7	29.3	141%	94.3	6.7	107%	108.3	(7.3)	93%	125.1	(24.1)	81%	137.2	(36.2)	74%	148.8	(47.8)	68%
M830	NILE TEMPLE GOLF COURSE (West)	71.7	96.3	234%	94.3	73.7	178%	108.3	59.7	155%	125.1	42.9	134%	137.2	30.8	122%	148.9	19.1	113%
		# Culv's < 2 YR FLOOD (cfs)			# Culv's < 5 YR FLOOD (cfs)			# Culv's < 10 YR FLOOD (cfs)			# Culv's < 25 YR FLOOD (cfs)			# Culv's < 50 YR FLOOD (cfs)			# Culv's < 100 YR FLOOD (cfs)		
			13			31			36			41			47			52	

during flows greater than the 10-year). Channel forming flows are the frequently occurring ones (i.e. less than 2-year), therefore loss of flow control could have adverse effects of erosion downstream. The *McAleer and Lyon Creeks Drainage Basin Study, 1999,* by Hammond Collier Wade Livingston identifies some downstream culvert flooding during the 1999 10-year flow and at the Future 5-year flow. Flow control should not be reduced without verifying these previously identified capacity problems have been addressed.

Improved maintenance access and/or improved debris collection and removal practices may be a more effective way to reduce annual maintenance costs without causing adverse effects downstream.

6th Ave NE and NE 200th St. Flood Reduction

The existing collection and conveyance system is overwhelmed at the intersection of 6th Ave NE and NE 200th Street. A half pipe carries flow down the hill (6th Ave NE) and then discharges into a structure that the City has recently upsized to a Type 2. The structure is located where the grade flattens out. The change in gradient combined with the open conveyance system (half pipe) which carries a lot of debris causes the structure to be overwhelmed. The proposed CIP will improve the collection and conveyance along 6th AVE NE.

The Western Washington Hydrology Model 2012 (WWHM) was used to develop design flows for this location. WWHM was used because the HSPF model does not have a subbasin at the project location. The project site is located upstream of Lake Ballinger and the HSPF model uses the output from a calibrated model by others to simulate the flows out of the lake (as opposed to having subbasins and routing through the lake). The resulting 25-year design flow and the Manning's equation were used to assess the downstream conveyance system and found a larger pipe diameter is necessary.

Model files are included as **Appendix A-4**. The calculation cover sheet and resulting CIP Project are included in **Appendix A-5**.

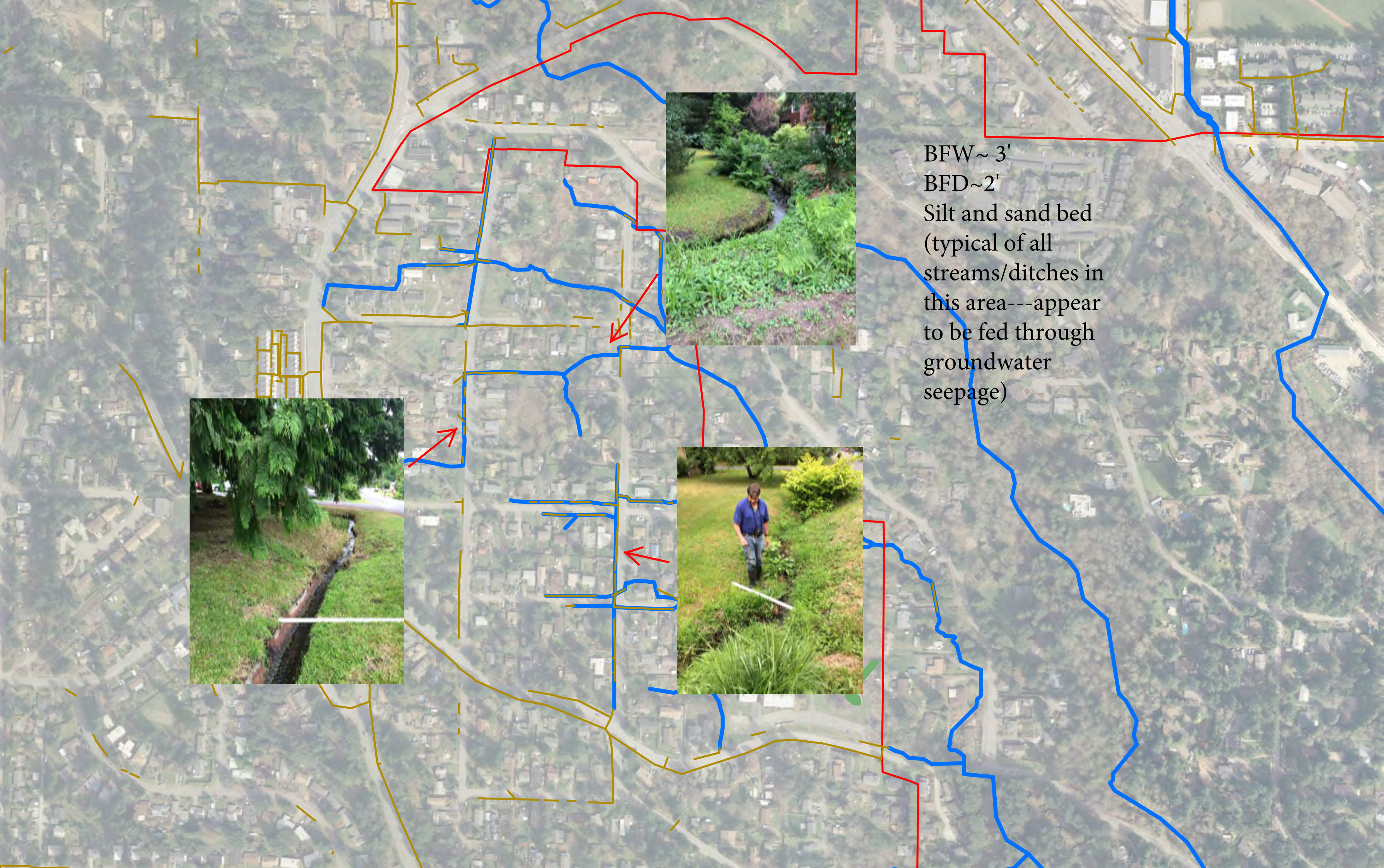
Echo Lake LID Retrofit

Urban development has negatively impacted the water quality of Echo Lake and therefore it has been identified as a high priority for source control projects. WWHM was used to size a biofiltration swale to treat approximately 1 acre of roadway runoff prior to discharge into Echo Lake. Similar to the project described above, WWHM was used because the HSPF model does not have a subbasin at the project location. The biofiltration facility is sized in accordance with 2012 Department of Ecology standards and fits within the existing grass median between Stone Ave and Interurban Trail.

Model files are included as **Appendix A-4**. The calculation cover sheet and resulting project are included in **Appendix A-5**.

APPENDIX A-2

FIELD OBSERVATIONS


BFW~ 3'
BFD~2'
Silt and sand bed
(typical of all
streams/ditches in
this area---appear
to be fed through
groundwater
seepage)

Old beaver dam , logs and debris in reach
Box culvert under 15th 4'Wx4.5'H with windgalls and apron (photo on ds end)
BFW~ 20'
BFD~2'
Sand and gravel (1 - 1.5 in diameter)- typical through reach
BFW~ 20'
BFD~3'
5 Log grade control structures- 2' drops, ~50 ft. spacing
Bed is sand and gravel
LB- bank stabilization and riprap

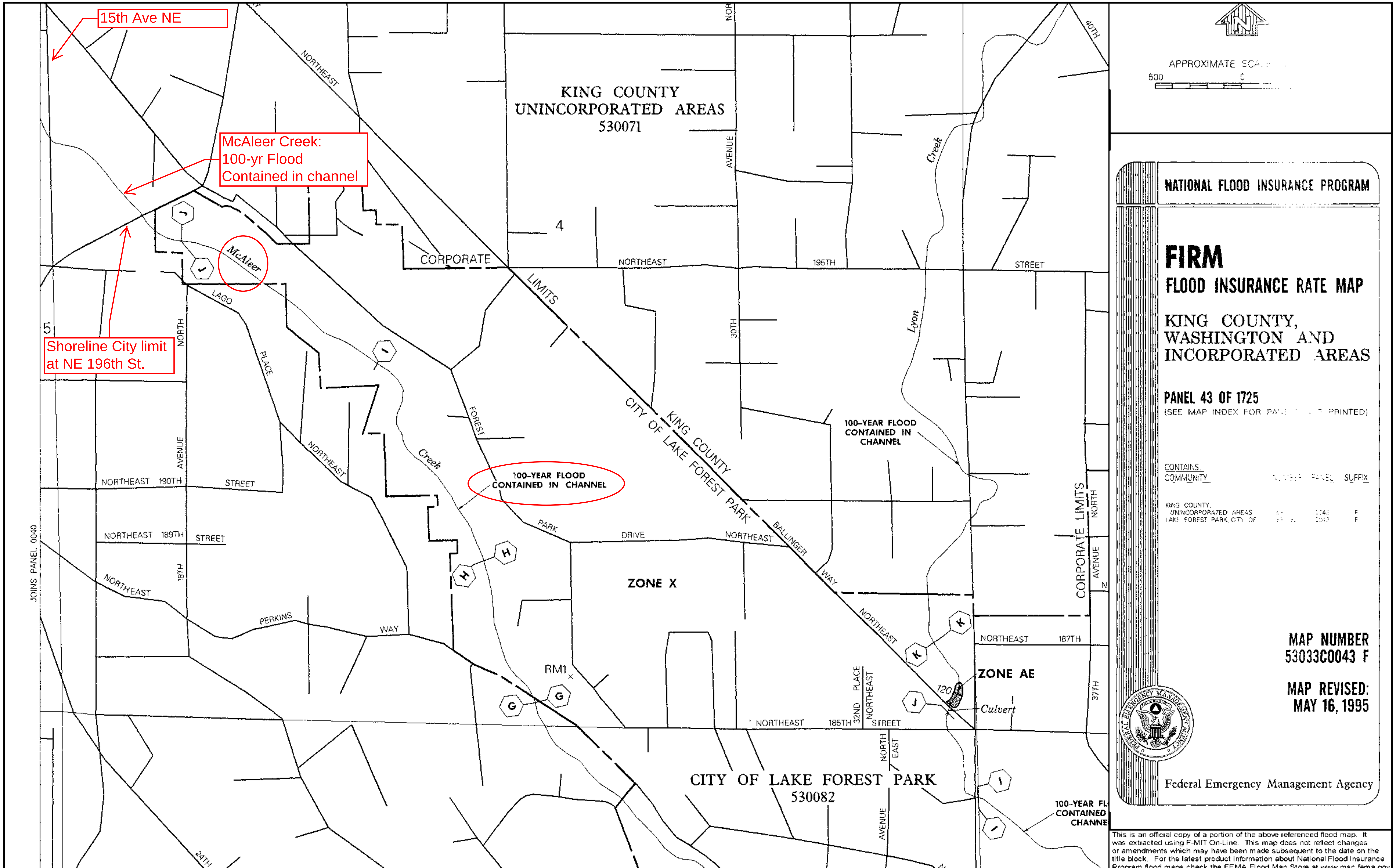

BFW~ 8'
BFD~5'
Large riprap in channel, over clay bed
BFW~ 8'
BFD~5'
Riprap over clay
BFW~20'
BFD~3'
large gravel & cobbles
RB tributary channel-- lots of flow
BFW~2.5'
BFD~ 2'
Seepage
BFW~ 12'
BFD~ 3'
1 -1.5 in dia gravel


BFW~10'
BFD~2.5'
Channel confined by rip-rap on both sides, gravel bed, lawn up to edge, rock weirs every 50- 100 ft through reach (typical)
RB 42" Dia concrete pipe


6' Diam CMP culvert under driveway
No access to this reach

APPENDIX A-3

MCALEER CREEK FIRMS



15th Ave NE
McAleer Creek:
100-yr Flood
Contained in channel
Shoreline City limit
at NE 196th St.
KING COUNTY
UNINCORPORATED AREAS
530071
CORPORATE
LIMITS
NORTHEAST
195TH
STREET
McAleer
Creek
Lyon
Creek
100-YEAR FLOOD
CONTAINED IN
CHANNEL
KING COUNTY
CITY OF LAKE FOREST PARK
ZONE X
ZONE AE
Culvert
RM1
CITY OF LAKE FOREST PARK
530082
JOINS PANEL 0040
NORTHEAST 190TH STREET
NORTHEAST 189TH STREET
NORTHEAST 187TH
NORTHEAST 185TH STREET
PERKINS WAY
BALLINGER WAY
LAGO PLACE
FOREST PARK DRIVE
APPROXIMATE SCALE
500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
KING COUNTY,
WASHINGTON AND
INCORPORATED AREAS
PANEL 43 OF 1725
MAP NUMBER
53033C0043 F
MAP REVISED:
MAY 16, 1995
Federal Emergency Management Agency
This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

47°45'00''
122°22'30''

JOINS PANEL 0330

JOINS PANEL 0327

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

KING COUNTY,
WASHINGTON AND
INCORPORATED AREAS

PANEL 40 OF 1725
(SEE MAP INDEX FOR PANELS NOT PRINTED)

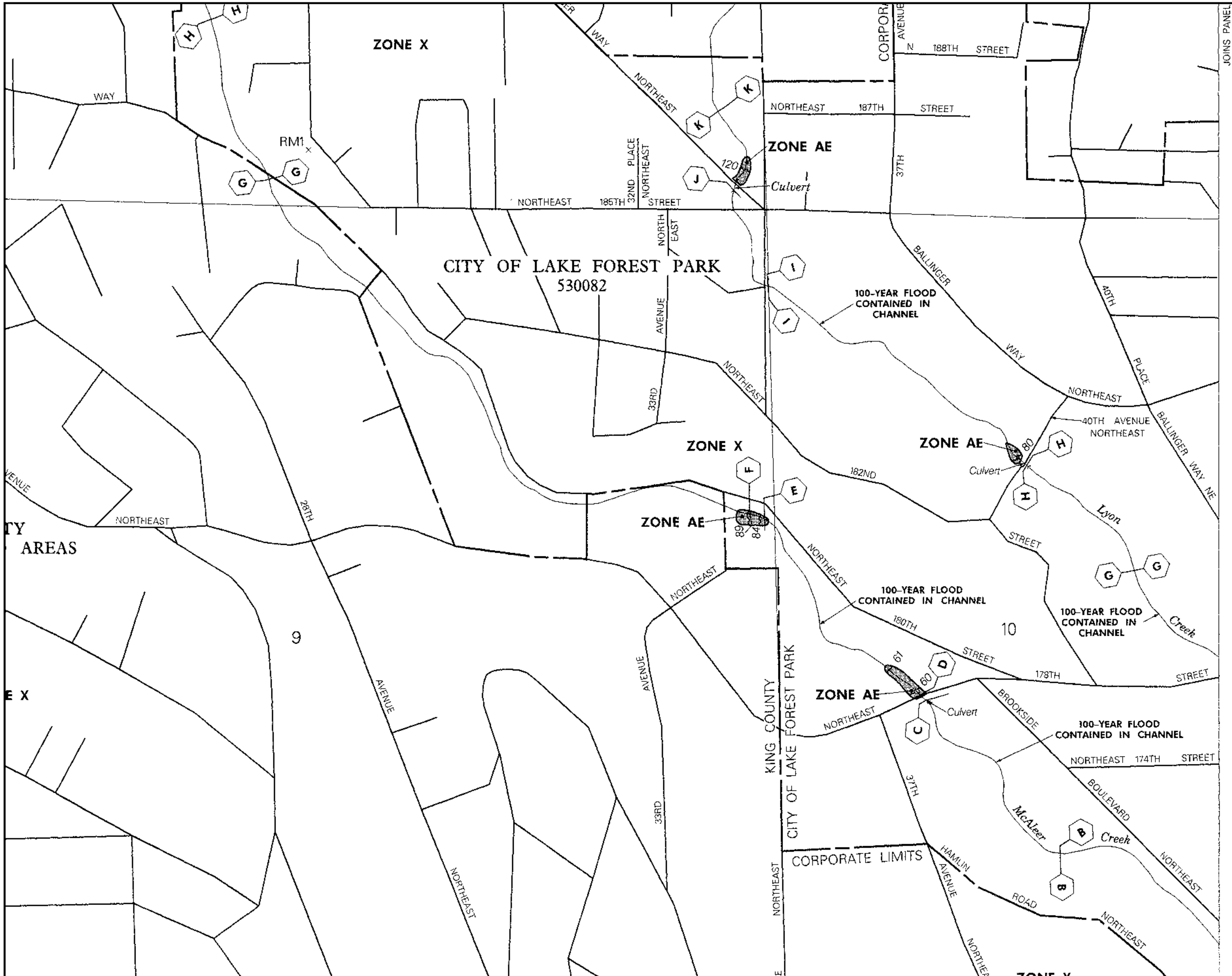
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KING COUNTY, UNINCORPORATED AREAS	530071	0040	F

MAP NUMBER
53033C0040 F

MAP REVISED:
MAY 16, 1995

Federal Emergency Management Agency



APPROXIMATE SCALE

500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

KING COUNTY, WASHINGTON AND INCORPORATED AREAS

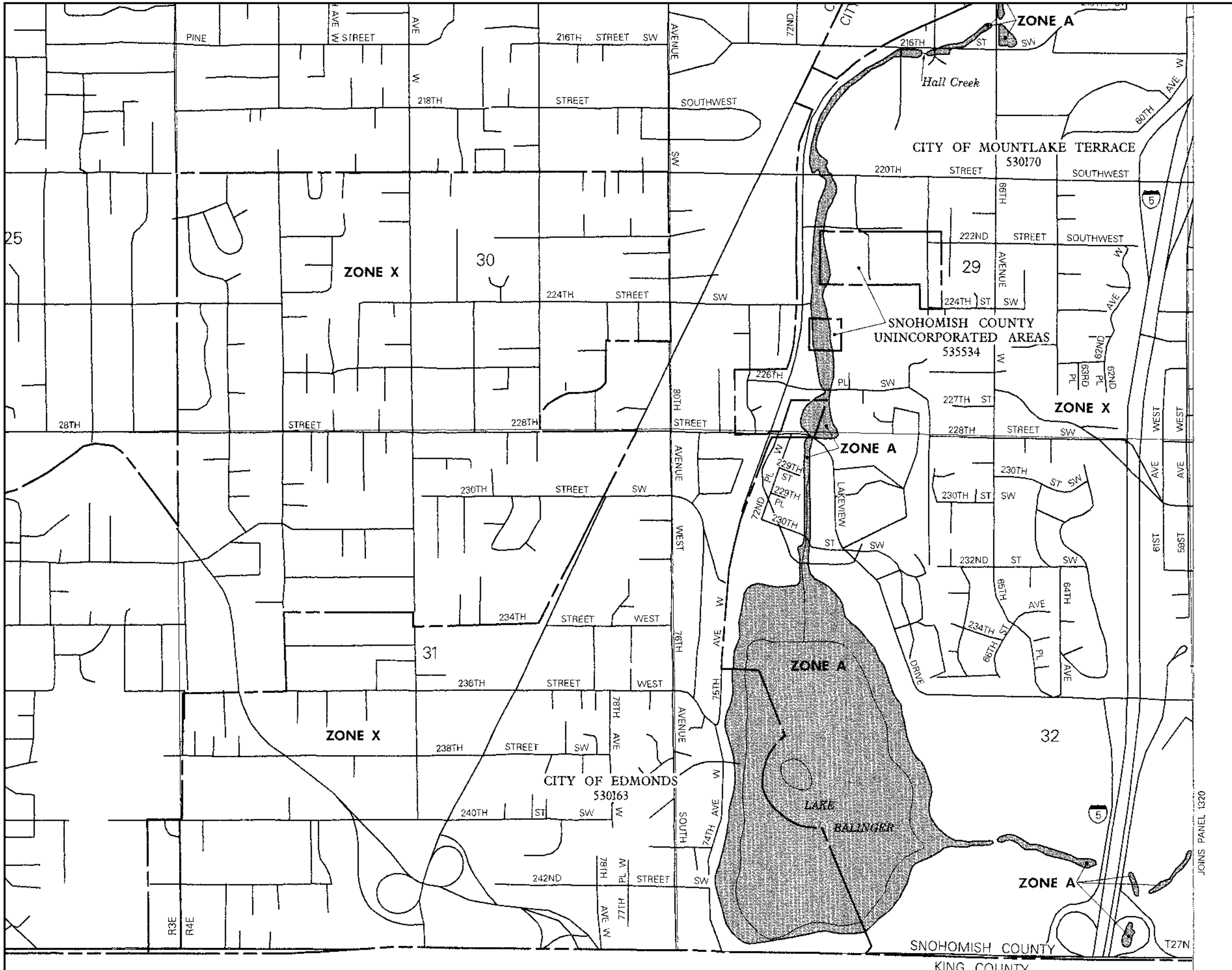
PANEL 43 OF 1725
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS: COMMUNITY	NUMBER	PANEL	SUFFIX
KING COUNTY, UNINCORPORATED AREAS	[illegible]	0043	F
LAKE FOREST PARK, CITY OF	[illegible]	0043	F

MAP NUMBER
53033C0043 F

MAP REVISED:
MAY 16, 1995

Federal Emergency Management Agency



APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SNOHOMISH COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 1315 OF 1575

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EDMONDS, CITY OF	530163	1315	E
LYNNWOOD, CITY OF	530167	1315	E
MOUNTLAKE TERRACE, CITY OF	530170	1315	E
WOODWAY, TOWN OF	530308	1315	E
SNOHOMISH COUNTY, UNINCORPORATED AREAS	535534	1315	E

MAP NUMBER
53061C1315 E

EFFECTIVE DATE:
NOVEMBER 8, 1999

Federal Emergency Management Agency

E

F

122°18'45''
47°48'45''

LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A No base flood elevations determined.

ZONE AE Base flood elevations determined.

ZONE AH Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE A99 To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.

ZONE V Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X Areas determined to be outside 500-year floodplain.

ZONE D Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Identified 1983 | Identified 1990 | Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Flood Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.

~~~~513~~~~ Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

(D)———(D) Cross Section Line

(EL 987) Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.

RM7 × Elevation Reference Mark

• M2 River Mile

97°07'30'', 32°22'30'' Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from

APPROXIMATE SCALE IN FEET

1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM

FLOOD INSURANCE RATE MAP

KING COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 40 OF 1725

(SEE MAP INDEX FOR PANELS NOT PRINTED)

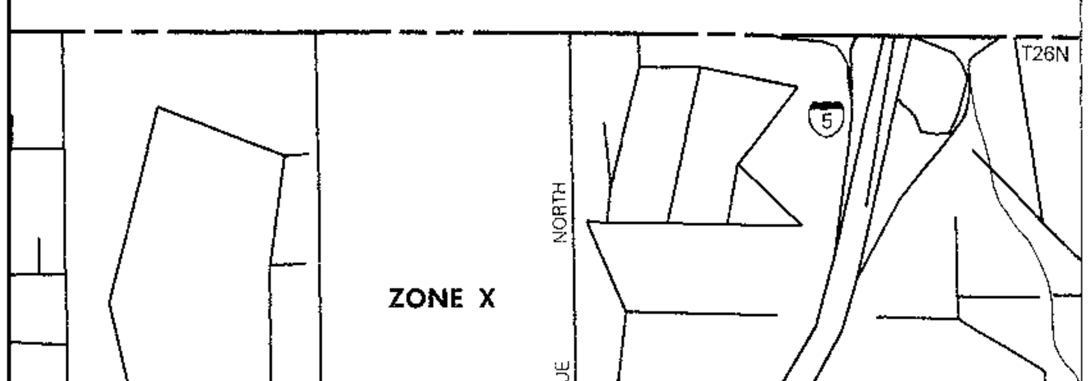
CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KING COUNTY, UNINCORPORATED AREAS	530071	0040	F

MAP NUMBER 53033C0040 F

MAP REVISED: MAY 16, 1995

Federal Emergency Management Agency
~~~~



Identified 1983	Identified 1990	Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

	Flood Boundary
	Floodway Boundary
	Zone D Boundary
	Boundary Dividing Special Flood Hazard Zones, and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Zones.
~~513~~~	Base Flood Elevation Line: Elevation in Feet. See Map Index for Elevation Datum.
(D)——(D)	Cross Section Line
(EL 987)	Base Flood Elevation in Feet Where Uniform Within Zone. See Map Index for Elevation Datum.
RM7 ×	Elevation Reference Mark
• M2	River Mile
97°07′30″, 32°22′30″	Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection.

NOTES

This map is for use in administering the National Flood Insurance Program; it does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size, or all planimetric features outside Special Flood Hazard Areas.

Coastal base flood elevations apply only landward of 0.0 NGVD, and include the effects of wave action; these elevations may also differ significantly from those developed by the National Weather Service for hurricane evacuation planning.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, A99, V, and VE.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Floodway widths are provided in the Flood Insurance Study Report.

This map may incorporate approximate boundaries of Coastal Barrier Resource System Units and /or Otherwise Protected Areas established under the Coastal Barrier improvement Act of 1990 (PL 101-591).

Corporate limits shown are current as of the date of this map. The user should contact appropriate community officials to determine if corporate limits have changed subsequent to the issuance of this map.

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For adjoining map panels and base map source see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:

SEPTEMBER 29,1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:
Revised May 16, 1995 to update map format.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800) 638-6620.

N

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

KING COUNTY, WASHINGTON AND INCORPORATED AREAS

PANEL 40 OF 1725
(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
KING COUNTY, UNINCORPORATED AREAS	530071	0040	F

MAP NUMBER
53033C0040 F

MAP REVISED:
MAY 16, 1995

Federal Emergency Management Agency

APPENDIX A-4

MODELING FILES

The following files are provided to the City via CD.

Title	Description
McalOCI.uci	HSPF input file.
McAleerCreek_final.prj	HEC-RAS project files. Includes geometry and flow files.
6^{th} and 200^{th} Flows.whm	WWHM project files.
6^{th} and 200^{th} Flows_S side of 200th.whm	WWHM project files.
Echo Lake Biofiltration.whm	WWHM project files.

McAleer Creek, HEC-RAS Files		
Project File:	McAleerCreek_final.prj	
Plan Files:	Existing Condtions	This plan represents the exisitng conditions scenario with cross sections from the Goheen Revetment Project. The downstream boundary condition uses the rating curve for the 196th Street detention facility outlet structure.
	no control Structure	This plan uses the same geomtery as the exisitng conditions, however the downstream rating curve boundary condition has been removed to examine the effects on WSELs.

McAleer Creek, WWHM Files		
Project File:	6th and 200th Flows.whm	Basin draining to the west side of 6th Ave NE/north side of NE 200th St.
Project File:	6th and 200th Flows_S side of 200th.whm	Basin draining to the east side of 6th Ave NE/south side of NE 200th St.
Project File:	Echo Lake Biofiltration.whm	Biofiltration swale sizing for biofiltration swale at Stone Ave N.

APPENDIX A-5

CALCULATIONS

CALCULATIONS COVER PAGE

OSBORN CONSULTING INCORPORATED

REVISION 0 (DATE: 7/10/15)

PROJECT: Ballinger and McAleer Basin Plans	**OCI JOB NO.:** 10-130053	**PLAN NO.:**	**PAGE 1 OF 7** Total Pages includes Attachments.
CLIENT: City of Shoreline	**DEPARTMENT/DISCIPLINE:** Public Works	**CALCULATION NO.** 1	
SUBJECT/TITLE:	6th Ave NE and NE 200th St. Flows for Pipe Sizing		

CALCULATION REV. NO.	ORIGINATOR	DISCIPLINE REVIEWER	TECHNICAL PEER REVIEWER (IF REQUIRED)	CONFIRMATION REQUIRED (Y/N) IF YES, INCLUDED ATTACHMENT II
0	MLP	LR		N
1				
2				
3				

CALCULATIONS OBJECTIVE

Determine the required sizing for the pipes at the intersection of 6th Ave NE and NE 200th St., downstream of an existing half pipe ditch. Currently the intersection of 6th Ave NE and NE 200th St. floods due to the amount of flow and debris flowing down the steep slope of 6th Ave NE. The slope flattens out suddenly at NE 200th St. where debris is caught at the driveway culvert and Type 1 Catch Basin, causing stormwater to pond in the roadway.

CALCULATION METHODOLOGY/ LIST OF ASSUMPTIONS

Assumptions:

1. ROW on 6th Ave NE is narrow, and the slopes on either side of the roadway are steep and close to the road. There is little room for any ditch or swale larger than the existing half pipe.
2. No trash rack currently exists at the driveway culvert at the bottom of the slope.
3. All areas were obtained using GIS data, including parcels, topography, and impervious, tree, and shrub cover.
4. Hydrologic Soil Group is C (based on basin MC5 in the HSPF model being 64% till).

Following is the process used to size the pipes:

1. Delineate basins in GIS using topography, parcels, and storm pipes. One basin drains to the west side of the intersection, and other drains to a series of ditches on the east side of 6th Ave NE/south side of NE 200th St.
2. Determine impervious and pervious cover areas for the basin utilizing GIS shapefiles.
3. Create basins in WWHM 2012 using characteristics determined in previous steps.
4. Obtain the 25-year flow (level of service flow) for basin.
5. Size the pipe using the Manning's n equation and the flows obtained from WWHM 2012.

REFERENCES / INPUTS

WWHM: Basin 1

- Basin Area = 47.86 AC
- Roads/Mod Area = 4.69 AC
- Roof Tops/Flat Area = 10.66 AC
- C, Forest, Mod Area = 13.44 AC
- C, Pasture, Mod Area = 6.92 AC
- C, Lawn, Flat Area = 12.15 AC

WWHM: Basin 2

- Basin Area = 7.36 AC
- Roads/Flat Area = 1.47 AC
- Roof Tops/Flat Area = 2.21 AC
- C, Lawn, Flat Area = 1.84 AC
- C, Lawn, Steep Area = 1.84 AC

Manning's: See attached excel sheet for equation solutions (See Appendix D).

CONCLUSIONS

25-Year Flow from WWHM for Basin 1 = 10.1853 CFS

25-Year Flow from WWHM for Basin 2 = 2.4113 CFS

Pipes SP-5112, SP-6874, SP-142, SP-1596, SP-2491, and SP-3377 are undersized for the 25-year storm. All driveway culverts on the south side of NE 200th St are sufficiently sized.

OCI proposes to implement a three phase approach.

1. Phase I calls for installing a trash rack structure at the inlet of the driveway culvert SP-5111 to collect debris before it can clog the pipe system at the intersection of 6th Ave NE and NE 200th St. The existing pipe SP-5112 at CB-6373 will be upsized to a 24-inch pipe. (Red in figure.)
2. Phase II is to install a flow splitter and high flow bypass pipe to connect CB-6373 to the ditches on the east side of 6th Ave NE/south side of NE 200th St. (Green in figure.)
3. Phase III upsizes the remaining undersized pipes on the north side of NE 200th St. (Blue in figure.)

THE CALCULATIONS IS COMPLETED AND READY FOR DISCIPLINE REVIEW

Originator …………………….…………….

Signature/Date

Manning's Equation:

$$Q = \frac{k}{n} * A * Rh^{2/3} * S^{1/2}$$

25-year Q from WWHM = 10.1853 cfs (West side of 6th Ave NE and North side of NE 200th St)

25-year Q from WWHM = 2.4113 cfs (East side of 6th Ave NE and South side of NE 200th St - Basin delineated in GIS; assuming 50% lawn (50% steep and 50% flat), 20% roadway, and 30% roofs)

k = 1.49

n = 0.013 assumed smooth walled pipe

A = (π/4) * d² sf

π/4 = 0.7853982

Rh = d/4 ft

$^1/_4{}^{2/3}$ = 0.3968503

S = See table; refer to schematic for numbering

$$d = \left(\frac{Q * n}{\frac{\pi}{4} * \frac{1}{4}^{2/3} * k * S^{1/2}}\right)^{3/8}$$

Pipe Number	Existing				Required				% Flow Capacity Comparison	Upsize?
	Diam (ft)	Diam (in)	Slope	Flow Capacity (cfs)	Diam (ft)	Diam (in)	Rounded Diam. (in)	Flow Capacity (cfs)		
West side of 6th Ave NE and North side of NE 200th St.										
1 - SP-5111	1.5	18	0.074	28.652	1.02	12.21	15	10.1853	281%	No
2 - SP-5112	1.5	18	0.004	6.661	1.76	21.11	24	10.1853	65%	Yes
3 - SP-140	1.5	18	0.014	12.462	1.39	16.69	18	10.1853	122%	No
4 - SP-968	1.5	18	0.019	14.518	1.31	15.76	18	10.1853	143%	No
5 - SP-15106	1.5	18	0.014	12.462	1.39	16.69	18	10.1853	122%	No
6 - SP-5125	1.5	18	0.043	21.841	1.13	13.52	15	10.1853	214%	No
7 - SP-6874	1	12	0.061	8.823	1.06	12.66	15	10.1853	87%	Yes
8 - SP-142	1	12	0.029	6.084	1.21	14.56	15	10.1853	60%	Yes
9 - SP-1596	1	12	0.026	5.760	1.24	14.86	15	10.1853	57%	Yes
10 - SP-2491	1	12	0.028	5.978	1.22	14.65	15	10.1853	59%	Yes
11 - SP-3377	1	12	0.034	6.587	1.18	14.13	15	10.1853	65%	Yes
12 - SP-9048	1.5	18	0.010	10.533	1.48	17.78	18	10.1853	103%	No
13 - SP-12914 (WSDOT pipe)	2	24	0.020	32.079	1.30	15.61	18	10.1853	315%	No

East side of 6th Ave NE and South side of NE 200th St.										
14 - SP-1808	1	12	0.033	6.490	0.69	8.28	12	2.4113	269%	No
15 - SP-970	1	12	0.074	9.718	0.59	7.12	12	2.4113	403%	No
16 - SP-5959	1	12	0.036	6.778	0.68	8.14	12	2.4113	281%	No
17 - SP-969	1	12	0.030	6.188	0.70	8.43	12	2.4113	257%	No
18 - SP-5126	1	12	0.022	5.299	0.74	8.93	12	2.4113	220%	No
19 - SP-5127	1	12	0.023	5.418	0.74	8.86	12	2.4113	225%	No
20 - SP-141	1	12	0.320	20.209	0.45	5.41	12	2.4113	838%	No
21 - SP-6875	1	12	0.015	4.375	0.80	9.60	12	2.4113	181%	No
22 - SP-3375	1	12	0.016	4.519	0.79	9.48	12	2.4113	187%	No
23 - SP-143	1	12	0.015	4.375	0.80	9.60	12	2.4113	181%	No
24 - SP-5960	1	12	0.017	4.658	0.78	9.37	12	2.4113	193%	No
25 - SP-3376	1	12	0.017	4.658	0.78	9.37	12	2.4113	193%	No
26 - SP-4255	1	12	0.068	9.316	0.60	7.23	12	2.4113	386%	No
27 - SP-9049	1	12	0.020	5.052	0.76	9.09	12	2.4113	210%	No

High Flow Diversion

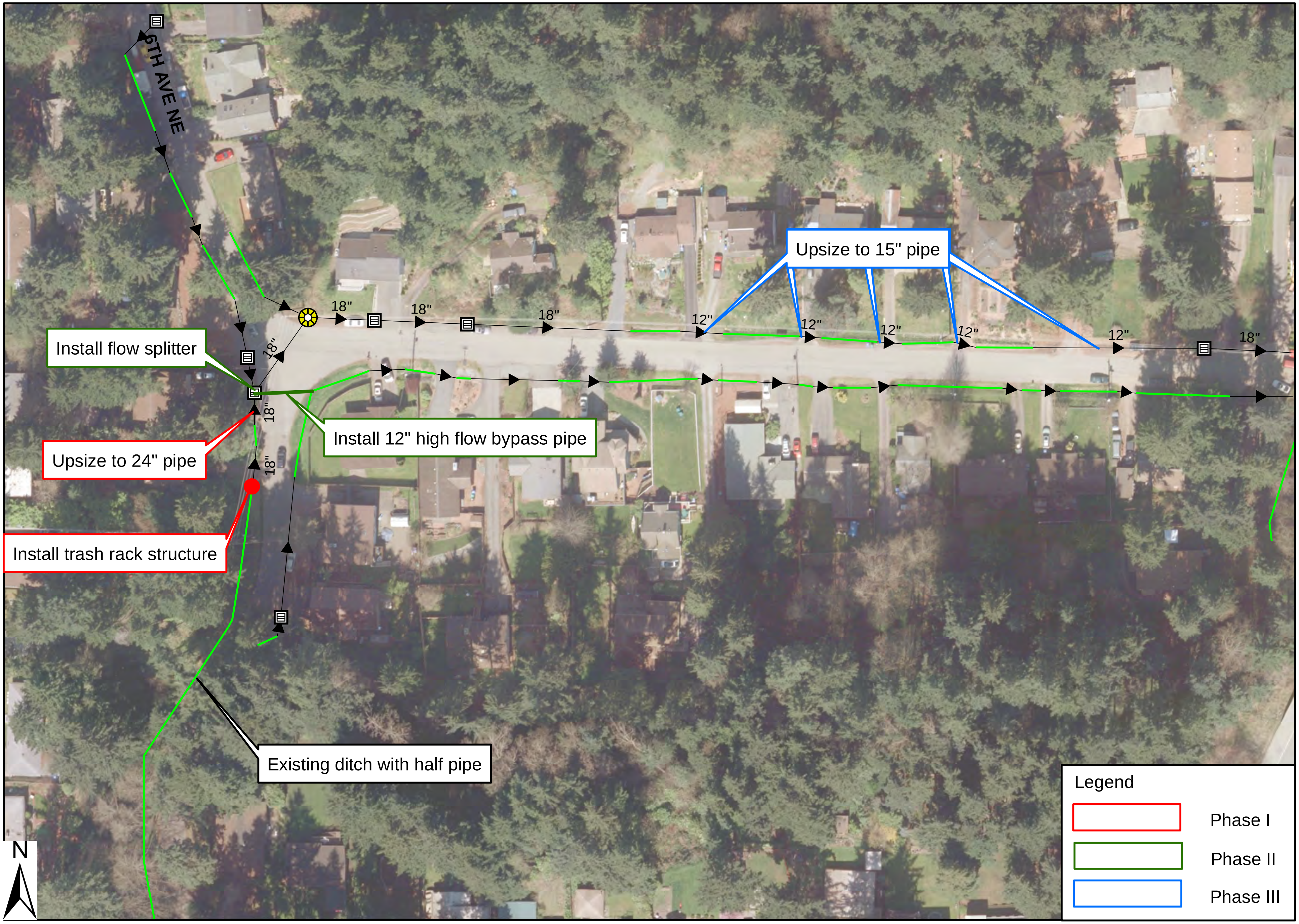
Minimum flow capacity	4.375	cfs
Required for ex. basin	2.4113	cfs
Additional capacity of system	1.964	cfs

6th Ave NE and NE 200th St. Flooding Improvements:

- Narrative:
  The existing collection and conveyance system is overwhelmed at the intersection of 6th Ave NE and NE 200th St. A half pipe carries flow down the hill (6th Ave NE) and then discharges into a structure that the City has recently upsized to a Type 2. The structure is located where the grade flattens out. The change in gradient combined with the open conveyance system (half pipe) which carries a lot of debris causes the structure to be overwhelmed. The proposed CIP will improve the collection and conveyance along 6th Ave NE.
- Conceptual Design:
  OCI proposes a three phase solution to address the flooding. Phase I includes installing a trash rack structure at the inlet of the driveway culvert SP-5111 to collect debris before it can clog the pipe system at the intersection of 6th Ave NE and NE 200th St. The existing pipe SP-5112 at CB-6373 is significantly flatter than the half pipe ditch and pipe SP-5111. Upsizing pipe SP-5112 to a 24-in pipe, in conjunction with replacing CB-6373 (currently a Type 1 CB) with a Type 2 CB, will alleviate flooding at the intersection by allowing more of the flow to remain in the pipe and structure and providing sediment storage. With the combination of the debris catcher and the increased conveyance/sediment storage capacity, this proposed solution will mitigate the flooding at 6th Ave NE and NE 200th St.

  If Phase I is determined to be infeasible or does not alleviate flooding to the desired level of service, a high flow bypass is proposed for Phase II. This phase calls for installing a flow splitter at CB-6373 and a pipe to the ditch at the southeast corner of the intersection of 6th Ave NE and NE 200th St.

  OCI completed basic sizing calculations to estimate the flow and pipe sizes required for the 25-year event, for all pipes from SP-5111 to the WSDOT culvert. Thirteen pipes, ranging from 12 to 24-inch diameter, make up the system. The first six pipes have an 18-inch diameter; the next five driveway culverts have a 12-inch diameter; and the last two pipes have 18-inch and 24-inch diameters, respectively. The sizing calculations show that the existing 18-inch pipe is not sufficient for conveyance at SP-5112, due to its flat slope, and none of the 12-inch pipes are sufficiently sized. The City has documented consistent flooding at this location due to sediment and debris, further confirming the calculation's findings. Phase III calls to upsize the 12-inch driveway culverts, totaling 219 LF, in the event that flooding continues at the site due to a constriction in the downstream pipes. The existing 12-inch pipes would need to be upsized to at least a 15-inch pipe.
- Design Considerations:
  1) This project is to be designed in conjunction with the City's replacement of CB-6373. The CB was a Type 1 CB and has recently been replaced with a Type 2 CB.
  2) The project may be constructed by the City's Operations and Maintenance (O&M) crews.
  3) The cost estimate assumes traffic control at the intersection will be required, and is divided by phase.



0 50 100 200 Feet

Disclaimer: All information obtained from GIS. Not for construction.

McAleer Creek Basin
6th Ave NE and NE 200th St Flood Reduction

CALCULATIONS COVER PAGE

REVISION 1 (DATE: 6/3/15)

PROJECT: Ballinger and McAleer Basin Plans	**OCI JOB NO.:** 10-130053	**PLAN NO.:**	**PAGE 1 OF 5** Total Pages includes Attachments.
CLIENT: City of Shoreline	**DEPARTMENT/DISCIPLINE:** Public Works	**CALCULATION NO.** 2	
SUBJECT/TITLE:	Echo Lake LID Biofiltration Sizing		

CALCULATION REV. NO.	ORIGINATOR	DISCIPLINE REVIEWER	TECHNICAL PEER REVIEWER (IF REQUIRED)	CONFIRMATION REQUIRED (Y/N) IF YES, INCLUDED ATTACHMENT II
0	MLP	LR		N
1				
2				
3				

CALCULATIONS OBJECTIVE

Determine the required sizing for the biofiltration swale proposed for the Echo Lake area. The proposed location of the swale is between Stone Ave N and the Interurban Trail north of N 195th St. No water quality features currently exist in the area. The proposed solution routes flow from N 195th St., N 196th St., and Stone Ave N to the biofiltration swale at Stone Ave N.

CALCULATION METHODOLOGY/ LIST OF ASSUMPTIONS

Assumptions:

1. The ROW on N 195th St., N 196th St., and Stone Ave N contribute to the biofiltration swale.
2. For modeling purposes and a conservative estimate, all area draining to the swale will be considered impervious roadway.
3. All areas were obtained using GIS data, including parcels, topography, and pavement edges.

Following is the process used to size the pipe:

1. Delineate Echo Lake LID basin in GIS using topography, parcels, and storm pipes.
2. Create basin in WWHM 2012 using characteristics determined in previous steps.
3. Obtain the water quality flow rate for Echo Lake LID basin.
4. Size the biofiltration swale (sand filter) in WWHM 2012.

REFERENCES / INPUTS

WWHM: See Page 3.

- Basin Characteristics:
  - Echo Lake LID Basin Area = 0.976 ac
  - Roads/Flat Area = 0.488 ac
  - Roads/Mod Area = 0.488 ac
- Sand Filter Characteristics:
  - Facility Dimensions:
    - Bottom Length: 300 ft
    - Bottom Width: 2 ft
    - Effective Depth: 1.5 ft

- Left Side Slope: 3:1 (Stone Ave NE side)
- Right Side Slope: 3:1 (Interurban Trail side, existing guardrails will need to remain and be shifted by 3 ft)
- Bottom Slope: 2% (50:1)

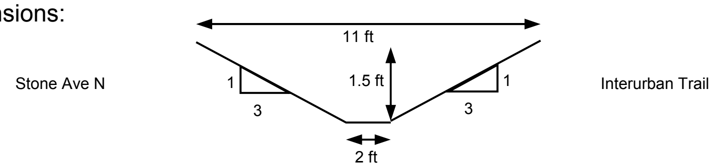
o Infiltration:
- Hydraulic Conductivity: 1.5 in/hr
- Filter Material Depth: 2 ft

o Outlet Structure:
- Riser Height: 1.3 ft
- Riser Diameter: 12 in
- Riser Type: Notched
- Notch Type: Rectangular
- Notch Height: 0.1 ft
- Notch Width: 0.1 ft
- Orifice Diameter: 0.5 in
- Orifice Height: 1.5 ft

CONCLUSIONS

% Filtration: 97.17% (2012 DOE Water Quality Standards require 91% filtration)

Swale Dimensions:



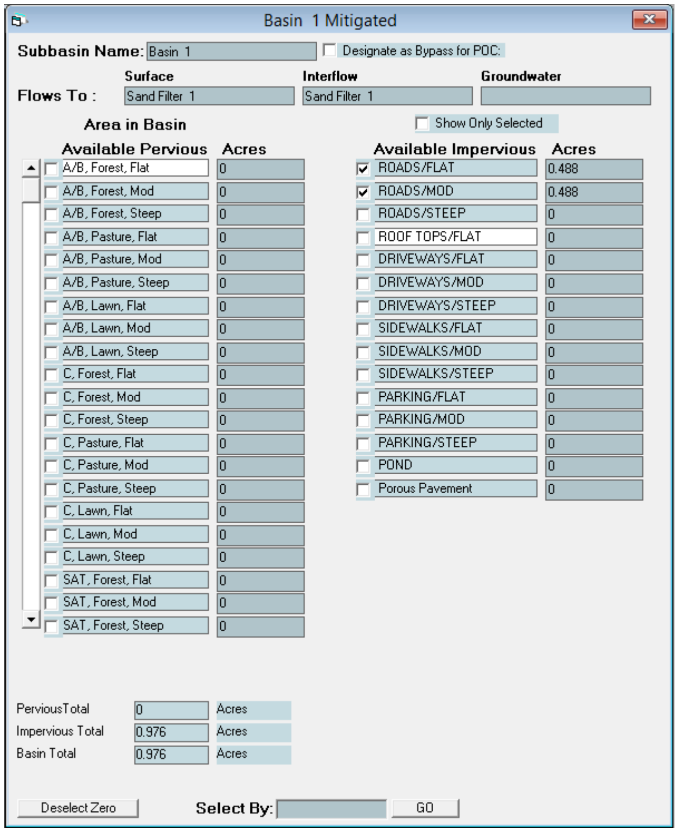
OCI proposes to install a 300 LF biofiltration swale in the green strip between Stone Ave N and the Interurban Trail. The swale will treat 0.976 acres of roadway runoff along N 195th St., N 196th St., and Stone Ave N. A new piped system is proposed along N 195th St. to direct runoff to the swale at Stone Ave N, as well as at N 196th St. to tie the system into the swale. The swale will tie into the existing system along the Interurban Trail at CB-196, which outlets into Echo Lake. The biofiltration swale will provide 97.17% filtration, meeting the current 2012 DOE water quality standard of 91%.

THE CALCULATIONS IS COMPLETED AND READY FOR DISCIPLINE REVIEW

Originator ……………………………………

Signature/Date

Basin Characteristics:



Basin 1 Mitigated

Subbasin Name: Basin 1 — Designate as Bypass for POC:

	Surface	Interflow	Groundwater
Flows To :	Sand Filter 1	Sand Filter 1	

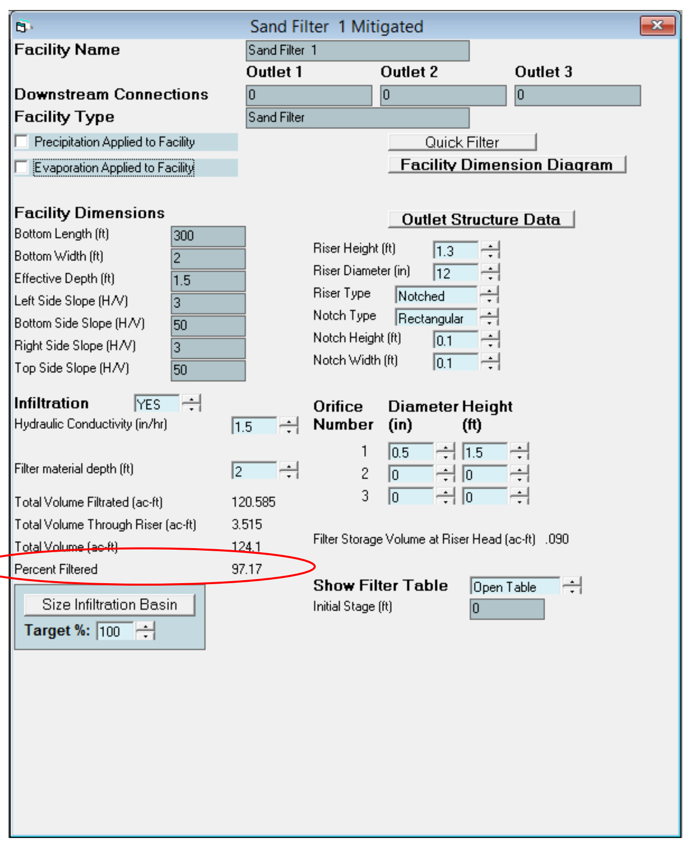
Area in Basin — Show Only Selected

Available Pervious	Acres	Available Impervious	Acres
A/B, Forest, Flat	0	ROADS/FLAT (checked)	0.488
A/B, Forest, Mod	0	ROADS/MOD (checked)	0.488
A/B, Forest, Steep	0	ROADS/STEEP	0
A/B, Pasture, Flat	0	ROOF TOPS/FLAT	0
A/B, Pasture, Mod	0	DRIVEWAYS/FLAT	0
A/B, Pasture, Steep	0	DRIVEWAYS/MOD	0
A/B, Lawn, Flat	0	DRIVEWAYS/STEEP	0
A/B, Lawn, Mod	0	SIDEWALKS/FLAT	0
A/B, Lawn, Steep	0	SIDEWALKS/MOD	0
C, Forest, Flat	0	SIDEWALKS/STEEP	0
C, Forest, Mod	0	PARKING/FLAT	0
C, Forest, Steep	0	PARKING/MOD	0
C, Pasture, Flat	0	PARKING/STEEP	0
C, Pasture, Mod	0	POND	0
C, Pasture, Steep	0	Porous Pavement	0
C, Lawn, Flat	0		
C, Lawn, Mod	0		
C, Lawn, Steep	0		
SAT, Forest, Flat	0		
SAT, Forest, Mod	0		
SAT, Forest, Steep	0		

PerviousTotal	0	Acres
Impervious Total	0.976	Acres
Basin Total	0.976	Acres

Deselect Zero — **Select By:** — GO

Sand Filter Characteristics:



Sand Filter 1 Mitigated

Facility Name: Sand Filter 1

	Outlet 1	Outlet 2	Outlet 3
Downstream Connections	0	0	0

Facility Type: Sand Filter

Precipitation Applied to Facility — Quick Filter

Evaporation Applied to Facility — **Facility Dimension Diagram**

Facility Dimensions

Bottom Length (ft)	300
Bottom Width (ft)	2
Effective Depth (ft)	1.5
Left Side Slope (H/V)	3
Bottom Side Slope (H/V)	50
Right Side Slope (H/V)	3
Top Side Slope (H/V)	50

Outlet Structure Data

Riser Height (ft)	1.3
Riser Diameter (in)	12
Riser Type	Notched
Notch Type	Rectangular
Notch Height (ft)	0.1
Notch Width (ft)	0.1

Infiltration YES

Hydraulic Conductivity (in/hr)	1.5
Filter material depth (ft)	2
Total Volume Filtrated (ac-ft)	120.585
Total Volume Through Riser (ac-ft)	3.515
Total Volume (ac-ft)	124.1
Percent Filtered	97.17

Orifice Number	Diameter (in)	Height (ft)
1	0.5	1.5
2	0	0
3	0	0

Filter Storage Volume at Riser Head (ac-ft) .090

Show Filter Table Open Table

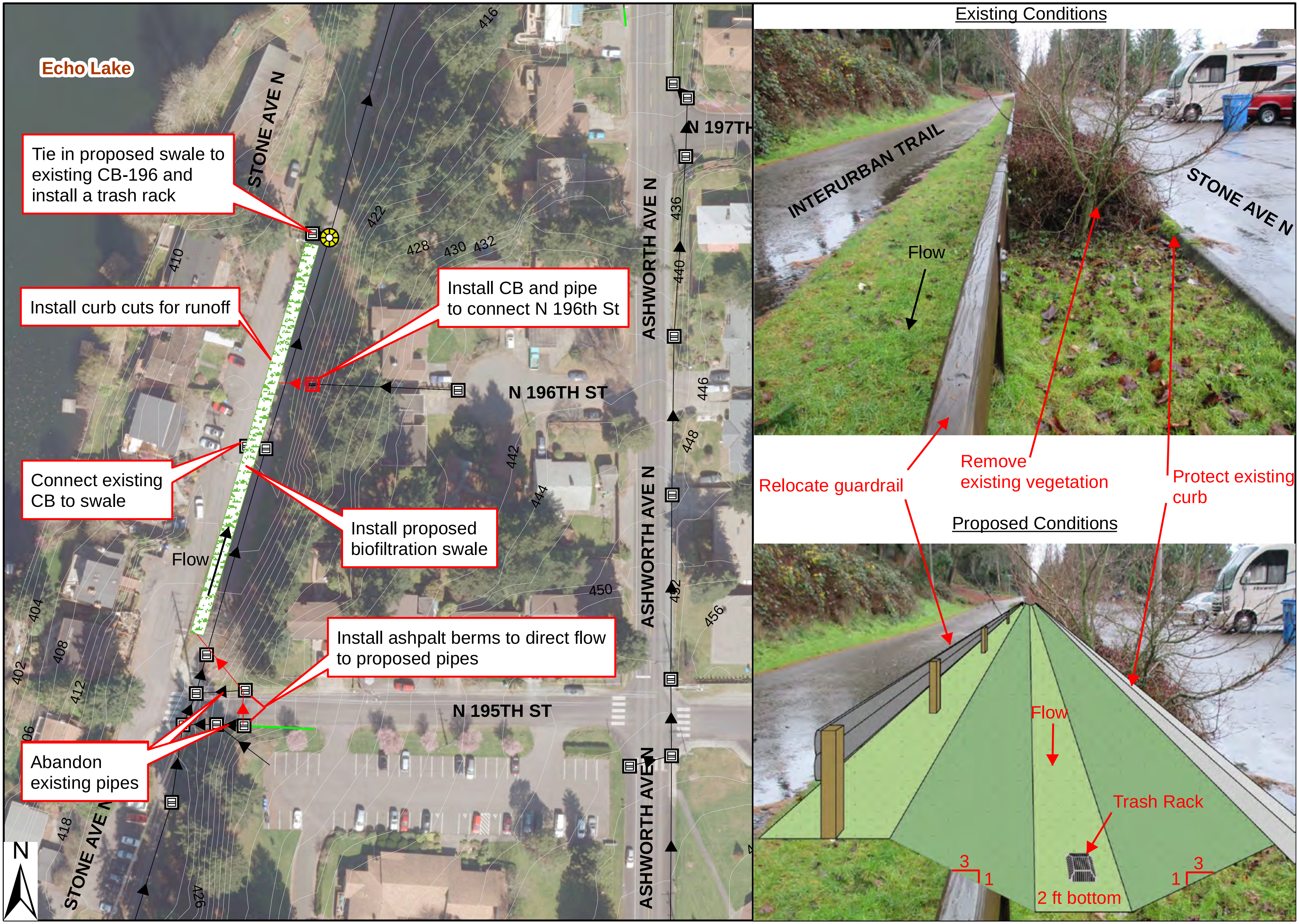
Initial Stage (ft) 0

Size Infiltration Basin

Target %: 100

Echo Lake LID:

- Narrative:
  Urban development has negatively impacted the water quality of Echo Lake and therefore it has been identified as a high priority for source control projects. The proposed CIP would retrofit the existing stormdrain system with additional water quality treatment of runoff discharging into Echo Lake. The proposed retrofit would be installing a biofiltration facility between Stone Ave and Interurban Trail.
- Conceptual Design:
  OCI proposes to install a 300 LF biofiltration swale in the green planting strip between Stone Ave N and the Interurban Trail. Swale dimensions are 2 foot wide bottom, 1.5 foot depth, and side slopes of 3:1. The swale will treat nearly 1 acre of roadway runoff from N 195th St., Stone Ave N, and N 196th St. A new pipe system is proposed on N 195th St. to capture runoff from both sides of the street. An additional pipe and catch basin are also proposed to tie the existing N 196th St system into the biofiltration swale. The swale will connect to the existing system along the Interurban Trail at CB-196, which outlets into Echo Lake. The biofiltration swale will provide 97.17% filtration, meeting the current 2012 DOE water quality standard of 91%.
- Design Considerations:
  1) Since phosphorous is a targeted pollutant of Echo Lake, the media and compost used in the small will need to be carefully specified during design to ensure that the proposed facility improves overall water quality including phosphorus loading.
  2) Coordination with Seattle City Light is required for work on the Interurban Trail.
  3) Coordination with neighbors along Stove Ave N may be required.
  4) Water and sewer lines cross the storm drain lines on N 195th St. and Stone Ave N. According to GIS data, the sewer line is several feet below the existing storm drain lines. However, no elevation data for the water line is in the GIS data, so potholing will be required to determine any conflicts with the water line.
  5) The existing guardrail will need to be relocated to allow for sufficient space for the swale.



0 50 100 200 Feet

Disclaimer: All information obtained from GIS. Not for construction.

McAleer Creek Basin
Biofiltration Swale at Echo Lake

McAleer Creek Basin Plan

Appendix B:

City of Shoreline McAleer Creek Basin Plan

Condition Assessment Summary

OSBORN CONSULTING INCORPORATED
1800 NE 112TH STREET
SUITE 220-E
BELLEVUE, WA 98004
(425) 451-4009

Date: June 12, 2015

Subject: City of Shoreline McAleer Creek Basin Plan – Condition Assessment Summary

This memorandum presents the results of the Condition Assessment completed as part of the development of the McAleer Creek Basin Plan for the City of Shoreline. The Condition Assessment work was conducted by Osborn Consulting Inc. (OCI) under contract to the City of Shoreline (City).

Table of Contents

Background and Purpose ....- 2 -
Inspection Standard and Process ....- 2 -
Condition Assessment Results ....- 3 -
Recommendations ....- 4 -
Structural Issues ....- 4 -
1.) Recommended Priority Open Cut Pipe Replacement ....- 4 -
2.) Recommended Priority Trenchless Pipe Repair ....- 4 -
3.) Illicit Utility Crossing ....- 4 -
4.) Improper Storm Drain Connection ....- 4 -
5.) Pipes Recommended for Second Tier Repair ....- 5 -
6.) Pipes Recommended for Operations and Maintenance (O&M) ....- 5 -
Maintenance Issues ....- 5 -
Pipe Relocations ....- 5 -
Prioritization Criteria ....- 5 -
Capital Improvement Projects ....- 6 -
2015 McAleer Creek Basin Stormwater Pipe Replacement ....- 7 -
2015 McAleer Creek Basin Trenchless Stormwater Pipe Repair ....- 7 -
Pipe Relocations to Right of Way ....- 7 -

BACKGROUND AND PURPOSE

The Condition Assessment included inspection of all pipes with a diameter of 12-inches or more and a length 25-feet or more within the McAleer Creek Subbasin within the McAleer Creek Watershed, excluding the recently constructed systems along Aurora Ave. N. Everson's Econo-Vac (Everson) was the vendor OCI selected to inspect and rate the pipes through Closed Circuit Television (CCTV) video recording. Everson began the CCTV inspections in May 2014 and completed the final inspections in November 2014. OCI processed and organized the CCTV inspection videos and reports, and updated the City's Geographic Information System (GIS) database with the inspection results.

INSPECTION STANDARD AND PROCESS

The inspection ratings for the pipes inspected through CCTV follow the National Association of Sewer Service Companies (NASSCO) system of rating. The rating system includes three categories; structural, maintenance, and overall pipe conditions. The Structural Pipe Rating (SPR), Maintenance Pipe Rating (MPR) and Overall Pipe Rating (OPR) are based on the sum of the defects (ranging from a score of 0 to 5 per defect) found in each pipe segment in each category, resulting in scores of 0 and above. The rating criteria is shown in **Table 1**.

The pipes were also compared using rating indices. The Structural Pipe Rating Index (SPRI), Maintenance Pipe Rating Index (MPRI), and Overall Pipe Rating Index (OPRI) represent the average of the individual defect scores for all of the defects found in a particular pipe segment, resulting in scores on a 0 to 5 scale.

Table 1: NASSCO Rating Criteria

Grade	Description	Estimated Time to Failure
0	EXCELLENT: No Defects.	Unlikely in the foreseeable future
1	EXCELLENT: Minor Defects.	Unlikely in the foreseeable future
2	GOOD: Defects that have not begun to deteriorate.	20 years or more
3	FAIR: Moderate defects that will continue to deteriorate.	10 to 20 years
4	POOR: Severe defects that will become grade 5 defects within the foreseeable future.	5 to 10 years
5	IMMEDIATE ATTENTION: Defects requiring immediate attention.	Has failed or will likely fail within the next 5 years

Culverts between 25 and 50-feet in length were not inspected using CCTV and the NASSCO rating system, rather through a visual inspection called "candling." Everson shone a flashlight down the length of the culvert and noted any deficiencies which were visible. These pipes were assigned ratings based on the notes provided.

CONDITION ASSESSMENT RESULTS

OCI compiled the information from Everson, including the number of pipes and structures inspected, approximate length in linear feet of inspected pipes, and the number of pipes in each rating category (See **Tables 2, 3,** and **4**). Seventy-one percent of the inventoried pipes have 20 years or more of life left; however, 24% require immediate attention. **Figure 1** shows all the pipes in McAleer Creek Subbasin, with pipes scoring a 5 or higher in SPR, SPRI, MPR and MPRI highlighted.

Table 2: McAleer Creek Infrastructure CCTV Inspection Summary			
	Number of Pipes	Number of Structures	LF of Inspected Pipes
Total	1,221	2267	93,401

Table 3: McAleer Creek Infrastructure Candling Inspection Summary		
	Number of Pipes	LF of Candled Pipes
Total	57	1,749

Table 4: Pipe Condition Summary						
	Rating=0	Rating=1	Rating=2	Rating=3	Rating=4	Rating=5+
SPR	804	34	71	29	39	301
MPR	520	29	121	66	90	452
OPR	331	29	104	56	83	675
SPRI	804	57	157	122	50	88
MPRI	520	71	396	140	37	114
OPRI	331	83	453	199	68	144
SPR&SPRI	804	33	64	19	16	88
MPR&MPRI	520	29	118	60	26	114
OPR&OPRI	331	29	96	44	29	144

OCI developed lists to succinctly illustrate the results of the inspections and condition of the pipes in McAleer Basin. **Tables 5** and **6** list the pipes inspected via CCTV and candling, respectively. The lists include the NASSCO ratings, and the pipe diameter, material, and length. Pipes which were identified to be inspected, but which Everson did not inspect are shown in **Table 7**, as well as the reason each pipe was not inspected. With some pipes, Everson was able to begin inspections, but was unable to complete due to a variety of reasons. **Table 8** lists the pipes and the reasons for the incomplete inspection. McAleer Creek Basin contains 1,278 pipes which were inspected either through CCTV or candling; of these, 292 contain no structural or maintenance issues and do not require further inspection. These pipes are summarized on **Table 9**.

RECOMMENDATIONS

Structural Issues

The pipes that were identified to have a poor SPR (≥ 5) were carefully reviewed and several categories were developed to organize the issues including; 1.) Recommended Priority Open Cut Pipe Replacement, 2.) Recommended Priority Trenchless Pipe Repair, 3.) Illicit Utility Crossing, 4.) Improper Storm Drain Connection, 5.) Pipes Recommended for Second Tier Repair, and 6.) Pipes Recommended for Operations and Maintenance (O&M). These categories are described below.

1.) Recommended Priority Open Cut Pipe Replacement

From the condition assessment, OCI identified pipes that need to be replaced immediately because of their significant deficiencies. These recommended pipe replacements would fix poorly rated pipes that were identified to be high risk of failure and would result in negative consequences associated with failure if that were to occur, based on the prioritization criteria outlined in the "Prioritization Criteria" section below. These pipes are summarized on **Table 10** and shown in **Figure 2**.

2.) Recommended Priority Trenchless Pipe Repair

This category included pipes that received a poor SPR and were identified to be of relatively high risk of failure and/or would result in negative consequences associated with failure if that were to occur. Upon further investigation by OCI, these pipes were identified to be candidates for a trenchless solution. Trenchless solutions including slip-lining, cured in place pipe (CIPP), pipe bursting, and pipe reaming. These pipes are summarized on **Table 11** and shown in **Figure 3**.

3.) Illicit Utility Crossing

There were several structural deficiencies that were a direct result of a utility crossing through the storm drain pipe. Gas lines, water lines, and conduits were identified as the primary crossing issues. It is recommended that the City identify the likely utility owner and coordinate relocation of the utility crossings and repair of the stormwater pipe. OCI has alerted the City to more serious issues, including gas line crossings, for more immediate action. These pipes are summarized on **Table 12** and shown in **Figure 4**.

4.) Improper Storm Drain Connection

Lateral or side storm connections improperly connected to the storm mainline is a common issue throughout the basin. Several of the connections were made with different pipe material and/or have not been grouted in and have resulted in a severe structural deficiency of the storm mainline. Generally the recommended solution for pipes in this category is to install a structure, such as a catch basin or tee and properly connect the incoming and outgoing pipes to the new structure. These pipes are summarized on **Table 13** and shown in **Figure 4**.

5.) Pipes Recommended for Second Tier Repair

Pipes that did not fall into the categories described above, yet have received a poor SPR were included in this category. Structural deficiencies in this category include pipes that have fractures, holes, or minor deformities. It is recommended that the City place these pipes on a "to be repaired" list to ensure the pipe does not fail before the next assessment period. These pipes are summarized on **Table 14** and shown in **Figure 5**.

6.) Pipes Recommended for Operations and Maintenance (O&M)

Several of the pipes require repairs that the City's Operations and Maintenance crews can complete without outside contractor assistance. Pipes that received a poor SPR and were thought to be relatively easy repairs that the City could complete were included in this category. Structural deficiencies in this category include pipes that have fractures, holes, and minor deformities within a relatively short length of pipe. It is recommended that the City monitor the pipes until the Operations and Maintenance crews are able to repair the failures. These pipes are summarized on **Table 15** and shown in **Figure 6**.

Maintenance Issues

The pipes that were identified to have a poor MPR (≥ 5) were carefully reviewed. The majority of the pipes require additional maintenance due to sediment, debris, or root build-up in the pipe. Several pipes are blocked completely by obstacles other than sediment, such as brick structures or basketballs, which need to be removed to ensure pipe functionality.

From the condition assessment several pipes were identified that are likely to need pipe jetting or increased maintenance. These pipes may also need to potentially be replaced in the future if the frequent sedimentation is due to an inadequate design. These pipes are summarized on **Table 16** and shown in **Figure 7**.

Pipe Relocations

A number of City owned pipes in the McAleer Creek Basin are located on or crossing private property. Many of the pipes were unable to be assessed during the condition assessment because no rights-of-entry (ROEs) were granted and the Everson crew was unable to access the catch basins or manholes. A total of 62 pipes were noted by OCI and the Everson crew as crossing parcel lines. Of the 62, 37 pipes were able to be accessed and assessed through structures located in the right-of-way. The condition of these pipes are summarized on **Table 17** and shown in **Figure 8**. Additionally, several of the pipes are recommended to be relocated to public right-of-way, or for the City to obtain an easement for better access for future maintenance.

PRIORITIZATION CRITERIA

OCI developed a list of criteria with which to evaluate the possibility of failure, extent of damage, importance of the pipe and impact to the public for each pipe in poor condition.

OCI also considered proximity to other structurally deficient pipes and reviewed other City projects within the basin. Each pipe was scored based on the below criteria.

- Risk of Failure:
  - Slope > 23% (1 point if slope > 23%, 0 points if slope < 23%)
  - Flood Hazard (1 point if in a flood hazard zone, 0 points if not) – no pipes within the McAleer Basin were located in a flood hazard zone
  - Slide Hazard (1 point if in a slide hazard zone, 0 points if not)
  - Erosion Hazard (1 point if in an erosion hazard zone, 0 points if not)
  - Presence of Void (1 point if a void is visible outside the pipe walls, 0 points if no void is visible)
- Consequence of Failure:
  - Arterial Proximity (1 point if crossing or adjacent to an arterial, 0 points if on a collector street)
  - Utility Crossing (1 point if crossed by an outside utility, 0 points if not)
- Importance of Pipe:
  - Location in basin (0 points if upper reach, 1 point if middle reach, or 2 points if lower reach)
  - Size of Storm Drain (0 points if diam. ≤ 12”, 1 point if 12” > diam. < 24”, or 2 points if diam. ≥ 24”)

The SPR and maintenance requirements were also taken into consideration when ranking the pipes. A pipes requiring maintenance due to a poor MPR was given 1 point; no required maintenance received 0 points. Points were then summed to give a total score. The total score dictates the order of priority. For example, a pipe with the following characteristics would receive a total score of 36.

- SPR is 30 (30 points)
- Pipe requires maintenance (1 point)
- Diameter is 18 inches (1 point)
- Is located on an arterial (1 point)
- Is located in the middle of the basin (1 point)
- Has a utility crossing (1 point)
- Does not have a void (0 points)
- Is on a steep slope (1 point)
- Is not in a slide or erosion hazard zone (0 points)

CAPITAL IMPROVEMENT PROJECTS

As a result of the Condition Assessment several Capital Improvement Projects were identified.

2015 McAleer Creek Basin Stormwater Pipe Replacement

This project would include upgrades and pipe replacement of stormwater pipes and structures throughout the McAleer Creek Basin. The project would include multiple locations, but be advertised as one construction project. The bid items at each location would be very similar and would achieve economy of scale and ultimately lower bid pricing. The locations would include high priority open cut pipe replacement and installation of storm structures from **Tables 10** and **13**, (excluding the standalone CIP outlined below). Pipes are listed in the tables in order of prioritization for replacement.

Estimated Project Cost = $1,112,200

2015 McAleer Creek Basin Trenchless Stormwater Pipe Repair

This project would include replacing approximately 1,189 linear feet of stormwater pipe in the McAleer Creek Basin. The project would include multiple locations, but be advertised as one construction project. Locations would include high priority trenchless pipe repairs, excluding the standalone CIP outlined below. Refer to **Table 11** for a prioritized list of pipes recommended for repair.

Estimated Project Cost = $401,600

Pipe Relocations to Right of Way

This project proposes to relocate three piped systems from private property to City owned right of way (ROW). An additional seven pipes require easement acquisition because it is infeasible to relocate to the ROW. OCI assessed each of the pipes crossing parcel lines for feasibility of relocation. **Table 17** details which pipes can be rerouted, which pipes cannot be rerouted but require the City to purchase an easement, and which pipes are low priority for either relocation or easement acquisition. The table also shows a prioritization of the reroute and easement acquisition projects; projects are listed in order of prioritization. Below is a summary of the top 3 piped systems proposed for relocation and their proposed routes.

SP-14371, SP-14372, SP-14374, and SP-5180 cross private property lines multiple times near a ROW parcel between NE 185th St., NE 184th Pl, and 15th Ave NE. The proposed solution includes abandoning SP-5180 and SP-14374, rerouting the flow through SP-14374 through a new pipe from CB-9160 to CB-5722. Currently, SP-14371 and SP-14372 (as well as SP-14373) intersect on private property, then SP-14372 crosses another private property line. The pipes will be replaced, they received poor ratings during the condition assessment, and a new CB installed within the ROW. Installation of the CB should be in such a way as to allow SP-14372 to cross only one property line. An easement will need to be purchased for SP-14372 as there is no feasible reroute.

An existing system spans three private properties from N 193rd St to 195th St. between Corliss Ave N and 1st Ave NE, via pipes SP-951, SP-952, and SP-2475. Stormdrain systems are present on both sides of 1st Ave NE, flowing in the direction of the pipes on private property. OCI proposes to abandon SP-951 and SP-952 and reroute east along N 193rd St., to tie into the system on the west side of 1st Ave NE. The existing system on the north side of N 193rd St. will be replaced with the new piped system to 1st Ave NE. SP-2475 will also be abandoned and rerouted east to the system on 1st Ave NE. New CBs will need to be installed on 1st Ave NE.

SP-4243 connects NE 198th St. and 6th Ave NE. The pipe is on private property, on a steep slope, and has an unknown object blocking flow. Rather than flowing through private property, the proposed solution reroutes SP-4243 south along 7th Ave NE to connect to the system at the intersection with 6th Ave NE.

Seven pipes within McAleer Creek Basin cross private property lines, and rerouting the pipes is infeasible (because of a lack of existing infrastructure, elevation differences, etc.), but it is recommended that the City acquire an easement. Several other pipes could require an easement in the future, but only priority pipes are mentioned in this memo. OCI suggests that the City acquire a drainage easement for SP-15087 and SP15381, SP-15101 and SP-7984, SP-12213 and SP-3552 and SP-344.

Estimated Project Cost = $1,716,400

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-10356	0	3	3	0	12	12	12	CP	25.702	Settled dirt and pine needles entire length of pipe
SP-10398	5	0	5	5	0	5	18	PE	136.23	Deformation in top of pipe (blocking 15% of pipe)
SP-10400	0	2	2	0	2	2	18	PE	140.28	attached encrusted deposits on side of pipe
SP-10401	0	2	2	0	2	2	18	PE	60.719	dirt in bottom of pipe, last 5 ft before downstream CB
SP-10507	5	0	5	10	0	10	12	PE	343.04	Deformation - pipe crushed in on side, more than 50% blocked, camera unable to continue, reverse inspection, no other issues in pipe except giant deformation.
SP-10508	3.5	0	3.5	7	0	7	12	PE	287.4	Deformation in side of pipe, 20% blocked, camera able to continue, sag
SP-10710	2	0	2	2	0	2	12	PE	26.544	Pipe cleaned. Sag (5% full for 4 ft at downstream end of pipe)
SP-10711	2	2	2	2	10	12	12	PE	63.339	Pipe cleaned. Deposits in bottom of pipe (10% full for 25 ft), sag (5% full for 2 ft at upstream end of pipe)
SP-10781	2	2.5	2.33	2	5	7	12	CMP	77.22	Roots at joint (medium), sag, sediment at bottom (last 4' of pipe)
SP-10782	0	1	1	0	1	1	12	CMP	1.4143	Fine roots blocking part of pipe at joint.
SP-10783	5	2.67	4	20	8	28	12	CMP	166.52	Mud in bottom of pipe, storm debris in pipe, mud in bottom of pipe (15 ft) - camera unable to continue. Pipe cleaned, gas line (yellow) bored through pipe revealed (along with hole with visible soil). Also, another service line (blue) through the pipe with a hole and soil visible (water?)
SP-111	0	4	4	0	8	8	12	PE	105.65	1st direction: sediment deposit (25%); 2nd direction: sediment (25% for 5 LF)
SP-1148	2	0	2	2	0	2	12	CP	59.912	Joint offset (large)
SP-1155	0	2.4	2.4	0	12	12	18	RCP	39.478	Infiltration runner/weeper, encrusted deposits (5% for 20 LF)
SP-11987	2	2	2	8	14	22	12	CMP	87.828	Sediment (5% for 40 LF), sag (10% for 20 LF)
SP-12023	3.5	0	3.5	7	0	7	12	PE	39.503	Deformation in pipe (slightly squished to form an oval), sag (10% full for 10 ft) at upstream end of pipe.
SP-12209	0	3	3	0	6	6	12	PE	13.588	Sediment (15% length of pipe)
SP-12210	0	2	2	0	6	6	12	PE	13.644	Sediment (10% length of pipe)
SP-12211	0	2	2	0	2	2	12	PE	21.277	Sediment deposit (10%)
SP-12213	0	2	2	0	6	6	12	CP	100.76	Roots at joint (x2), gravel in bottom of pipe (4 ft)
SP-12223	0	3	3	0	3	3	12	PE	72.92	Sediment deposit (15%)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-12225	0	2	2	0	10	10	12	PE	126.2	Sediment deposit (10%, 5% x2), sediment (5% for 10 LF)
SP-12226	2	0	2	2	0	2	12	PE	97.635	Sag (10%)
SP-12227	0	2	2	0	6	6	12	PE	52.585	Sediment deposit (10%), sediment (10% for 10 LF)
SP-12228	2	0	2	10	0	10	12	PE	90.724	Sag (10% x3, 15%, 5%)
SP-12229	0	2	2	0	8	8	12	PE	37.779	Sediment (5-10% for 20 LF)
SP-12230	3.67	0	3.67	11	0	11	12	PE	88.974	Sag (5%), deformation (10% and 15%)
SP-123	0	2	2	0	32	32	12	CP	82.791	Sediment, dirt and rocks (10%+ for 85 LF).
SP-1234	0	3	3	0	9	9	12	CP	45.211	Rocks (15% for 15 LF) - unable to pass, visually inspect last 15 ft of pipe to open ditch discharge point, pipe in good condition.
SP-12473	5	0	5	5	0	5	12	PVC	8.1572	PVC pipe with CMP trash rack at end of pipe, top of CMP is crushed.
SP-12529	3.5	1.6	2.14	7	8	15	12	CP	55.77	Gravel at bottom (x2), roots at joint (fine) (x2), crack, broken
SP-12530	1.5	0	1.5	3	0	3	12	CP	57.818	Joint offset (medium), crack
SP-12532	3.8	2	3.5	19	2	21	18	RCP	72.458	Cracks (multiplex4), broken pipe (2), encrusted deposits at joint
SP-12533	0	2	2	0	2	2	12	CMP	37.502	Obstacle (brick) in pipe, unable to continue. Last 20 feet of pipe candled. Debris visible, blocking 50% pipe. Pipe condition looks good.
SP-12534	5	0	5	5	0	5	18	CMP	63.796	Deformation/dent in top of pipe
SP-12535	4.67	2	3.6	14	4	18	18	CMP	202.24	Deformation with holes at top, fine roots at joint, deformation at top (x2), deposits/settled gravel at bottom of pipe
SP-12537	5	2	3.5	5	2	7	12	CP	111.91	Gravel at bottom, broken pipe (multiple large cracks around circumference)
SP-12682	3.5	4	3.67	7	4	11	12	CMP	48.166	12 in by 21 in oval pipe (GIS says 24 in pipe). Pipe inspected from downstream end, lots of rocks and sediment in bottom of pipe, camera only able to travel 16 ft (no report). Pipe cleaned and inspected from upstream end. Deformation in bottom of pipe (30% intruding), deposits and roots in bottom of pipe (25% full for 5 ft), sag (10% full for 2 ft), possible deformation in top of pipe not on report (hard to tell with oval pipe).
SP-127	0	2	2	0	8	8	12	CP	50.463	Gravel deposit, rocks, gravel (10% for 10 LF).
SP-12766	2	2	2	2	10	12	24	CMP	77.442	Pipe Cleaned. Deposits in bottom of pipe (10% full for 18 ft), sag?, large root ball in barrel of pipe, upstream CB buried.
SP-12821	0	2	2	0	4	4	12	PE	78.518	Fine sediment in bottom of pipe, active tap break in

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-12822	0	2	2	0	4	4	12	PE	72.918	Fine sediment in bottom of pipe
SP-12823	0	0	0	0	0	0	12	PE	112.93	Active tap break in
SP-12829	0	0	0	0	0	0	12	CP	35.588	12 in pipe changes to a 4 inch pipe 4 ft from upstream end. Appears to be a groundwater drain.
SP-12831	5	2	3.5	5	2	7	12	CMP	13.683	Gravel, deformation (15%)
SP-12832	3.25	0	3.25	13	0	13	12	PE	69.875	1st direction: joint separation (large), deformation; 2nd direction: same as 1st direction
SP-12836	5	0	5	5	0	5	12	PE	5.8263	Slight deformation (15%) in pipe 1 ft from downstream end. Pipe is only 5.5 LF.
SP-12846	0	2	2	0	2	2	12	DIP	54.783	One small rock in pipe
SP-12848	3	2	2.91	60	4	64	12	DIP	129.25	Pipe cleaned. Material changes from DIP to CP with slight change (15%) in alignment to the right, visible aggregate (100 ft), little rock in pipe (<5% blocked).
SP-134	2.67	0	2.67	8	0	8	12	CP	70.275	Pipe cleaned. Exposed aggregate entire length of pipe, joint offset large, camera unable to continue, visual inspection of remaining pipe looks ok.
SP-136	0	2	2	0	4	4	18	RCP	186.5	Sediment and roots at bottom of pipe
SP-13666	2	2	2	2	2	4	18	CMP	51.305	Surface spalling @ infiltration weep
SP-13668	0	2	2	0	14	14	18	CMP	83.484	Pipe blocked by large root ball. Pipe cleaned. Root or sealing ring at 21 ft (not in report?), gravel in bottom of pipe (10% full for 6 ft), intruding sealing ring (location where first video stopped with large volume of roots, sealing ring creates small dam in pipe, looks like exposed soil at joint), deposits attached encrusted, infiltration weeper, intruding sealing ring with deposits attached encrusted, and infiltration weeper (visible soil?).
SP-13669	0	2	2	0	2	2	12	CMP	156.44	Fine sediment in bottom of pipe (7'), obstacle (rock) in pipe, unable to continue. End of pipe candled. Pipe clear and in good condition.
SP-13700	2	0	2	2	0	2	12	PE	55.511	Sag (5%)
SP-138	4	3	3.33	4	6	10	12	CMP	165.5	Deposits on side of pipe, deposits on bottom of pipe (25% full for 5 ft), deformation/small dent in top side of pipe
SP-13888	2	0	2	2	0	2	18	PE	33.699	Sag (10%)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-139	4.5	0	4.5	9	0	9	12	CMP	86.971	Deformations/dents in top and sides of pipe (x4), Deformation/oval shape
SP-140	5	2	2.5	5	10	15	18	RCP	71.791	Gravel, large broken pipe/hole in bottom of pipe with soil visible. Pipe cleaned and reinspected 2 months later. Pipe 10% full of mud and debris entire length of pipe, hole is covered in mud and not visible in video or report.
SP-1406	5	2	4	10	2	12	12	CMP	111.91	Small hole with visible soil at joint, deposits in bottom of pipe (5 ft), deformation/big dent (15%) in top of pipe
SP-14371	3.32	0	3.32	63	0	63	18	CMP	143.58	Corrosion (full length of pipe), deformation/pipe bent at joint (x2), hole in side of pipe with soil visible, repair patch - hole covered with metal on outside of pipe, hole in bottom of pipe (corrosion at joint), large branch and board in catch basin (CB-11576)
SP-14372	3.06	0	3.06	52	0	52	24	RCP	81.596	Visible aggregate entire length of pipe, large hole with sandbag? plastic patch? bulging into top of pipe
SP-14374	1	0	1	1	0	1	12	CP	142.12	Joint separation (medium)
SP-14431	0	3	3	0	18	18	12	CMP	98.977	Fine sediment in bottom of pipe (30')
SP-14540	2	2	2	6	4	10	12	CP	213.49	Sag (10% full for 12 ft), sag (10% full for 10 ft), gravel in bottom of pipe (10% full for 5 ft), sag (10% full for 10 ft).
SP-1456	3.5	0	3.5	14	0	14	12	CP	119.29	6" stormwater tap break in with multiple cracks around connection, joint offset medium, material change from CP to CMP (6' of CMP), material change back to CP with hole with visible soil, CP for 44 feet, then back to CMP for 6 feet, deformation in CMP at transition back to CP
SP-1459	0	5	5	0	5	5	12	CP	64.775	Dirt and debris in bottom of pipe (5 ft) at downstream end
SP-146	2	0	2	4	0	4	12	PE	114.38	Sags (x2)
SP-1460	3	2	2.98	117	2	119	12	CP	214.09	Infiltration weeper at joint, exposed aggregate entire length of pipe
SP-147	0	5	5	0	5	5	12	CP	25.289	Sediment completely blocking pipe
SP-149	0	2.5	2.5	0	5	5	12	CP	35.532	Rocks, debris semi-blocking pipe, roots in top of pipe
SP-15069	0	2	2	0	4	4	12	CP	49.046	Gravel at bottom of pipe (x2)
SP-15073	2	1	1.67	4	1	5	12	RCP	27.396	Crack (x2), roots fine at joint
SP-15074	2	0	2	2	0	2	12	PE	131.97	Sag

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-15075	0	2	2	0	12	12	12	PE	70.767	Deposits in bottom of pipe (32 ft)
SP-15080	4	2	3.6	16	2	18	12	CP	115.4	Attached encrustation on side of pipe (3.5 ft), Broken pipe at joint, broken pipe at joint with visible soil partially patched with black plastic, broken pipe at joint with visible soil and CP to CMP conversion (6 ft section of CMP, rest is CP - joints at both ends of CMP offset)
SP-15081	0	3	3	0	3	3	12	CP	77.351	Mud and rocks in bottom of pipe (20% full for last 6 ft at downstream end), camera unable to reach CB, visual inspection of last 6 ft looks ok.
SP-15082	3	0	3	3	0	3	18	CP	107.46	Pipe broken at joint - no soil visible, debris (sticks and dirt) in CB-11590
SP-15083	0	0	0	0	0	0	12	PE	27.112	Pipe joint bent (protruding into pipe), ditch at outlet end of pipe is 6 inches higher than invert of pipe.
SP-15084	2	0	2	2	0	2	12	CP	30.776	Large joint offset at 3 feet.
SP-15086	0	2.5	2.5	0	5	5	12	CP	18.625	Fine deposits at joint, intruding sealing grout at joint blocking 20% of pipe.
SP-15088	1	2	1.5	1	2	3	12	CP	90.89	Infiltration weep at joint, circumferential cracks 1 ft from CB 11584.
SP-15094	5	2	4	10	2	12	12	CP	92.742	Broken pipe at joint (chunk missing in bottom of pipe), intruding sealing grout at joint blocking 10% of pipe, pipe broken at joint with soil visible (side of pipe)
SP-15097	0	2	2	0	2	2	12	CP	52.93	Hole in top of pipe (CMP pipe hanging down into pipe) repaired with patch, pipe material changes from CMP to CP 12 feet into pipe, deposits encrusted on sides of pipe
SP-15099	3	0	3	3	0	3	12	CP	189.22	Multiple longitudinal cracks on sides of pipe for entire 4 feet of pipe segment, with active 4" tap break-in (stormwater)
SP-151	2.5	2	2.33	5	2	7	12	CP	94.018	Multiple fractures, deposits in bottom of pipe, joint offset medium
SP-15107	2.67	0	2.67	8	0	8	18	RCP	82.321	Cracks (multiple x3)
SP-15110	0	3	3	0	3	3	12	CP	2.6912	Gravel in bottom of pipe, entire length of pipe (7 ft), camera unable to pass, good visual to end of 7 ft pipe
SP-15115	0	2	2	0	2	2	12	PE	29.251	Intruding sealing ring

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-15117	0	2.14	2.14	0	15	15	12	PE	22.427	Deposits settled fine (10% full for 30 ft), tap break in intruding into pipe, camera unable to pass tap break in, visual inspection for rest of pipe looks ok, just dirty.
SP-15120	2.76	0	2.76	47	0	47	18	RCP	82.18	Exposed aggregate along entire length of pipe, sag (20 feet long, pipe 25% full of water).
SP-15122	2.91	0	2.91	32	0	32	18	RCP	50.089	Exposed aggregate entire length of pipe, sag (15 ft long, 10% of pipe full of water)
SP-15123	2	0	2	2	0	2	18	RCP	120.68	Surface spalling at top of pipe
SP-15124	3	2	2.6	9	4	13	12	CP	122.49	Joint offset medium with attached encrusted deposits, material change from CP to CMP half way through with attached encrusted deposits, deformation/squished pipe, corrosion in top of pipe
SP-15128	1	2	1.78	2	14	16	12	CP	59.42	Infiltration weeper (x5+), joint offset medium (x2), deposits attached encrusted at joints (x2, blocking 10% of side of pipe), also, mud in bottom of pipe entire length (5-10%, not in report).
SP-15129	3.8	0	3.8	19	0	19	12	CMP	57.518	Hole with visible void in side of pipe (x2), hole in side of pipe (x3).
SP-15133	5	2	3.5	5	2	7	12	CP	43.315	Pipe cleaned. Intruding sealing grout (10% blocked), broken pipe with tiny visible void at joint.
SP-15143	2.29	3	2.38	16	3	19	12	CMP	179.73	Pipe cleaned. Sag (15% full for 15 ft), sag (10% full for 16 ft), deformation in side of pipe at joint, deposits in bottom of pipe (15% full for 4 ft), camera unable to pass deposits, last 2 ft of pipe looks ok.
SP-153	3.67	3	3.6	33	3	36	12	CP	79.186	Joint separation medium (x2), broken pipe with soil visible (x4), broken pipe with visible void, joint offset large with visible void (camera unable to continue - inspect from other end), deformation/dent in steel pipe, change from steel to CP, tap break in 4" storm.
SP-1541	0	3	3	0	3	3	12	PE	13.329	Sediment and roots (15%)
SP-157	0	2	2	0	8	8	12	CP	38.597	Pipe cleaned. Deposits in bottom of pipe (10% full for 22 ft).
SP-1599	0	1.17	1.17	0	7	7	12	CP	162.64	Pipe cleaned. Gravel and mud in bottom of pipe (5% full most of pipe), fine roots at joints (x5)
SP-1601	0	2	2	0	26	26	48	CMP	59.893	Deposits in bottom of pipe (10% full for entire length of pipe.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-1604	2.8	2	2.5	14	6	20	12	CP	73.591	Multiple fractures, longitudinal cracks (x2+), multiple cracks (x2), rocks in pipe (x2), fine deposits, 8" tap break in from CB-6387,
SP-1606	0	2	2	0	10	10	12	PE	60.566	Sediment (5-10% for 25 LF) - unable to pass, pipe in good condition
SP-1609	0	2	2	0	8	8	12	PE	48.405	Sediment (10% for 20 LF)
SP-161	3.25	0	3.25	13	0	13	12	CP	65.241	Surface aggregate visible entire length of pipe, joint separation large, large hole in top of pipe with visible soil.
SP-1610	2	2	2	2	10	12	12	PE	102.1	Pipe cleaned. Sag (5% full for 3 ft), deposits in bottom of pipe (10% full for 23 ft).
SP-1611	0	5	5	0	5	5	12	CP	12.395	Pipe cleaned. Last 2 ft at downstream end into open ditch 50% blocked with debris.
SP-1612	5	0	5	10	0	10	12	CP	56.653	Deformation/break at top of pipe, broken (x2)
SP-1614	2.92	0	2.92	181	0	181	18	RCP	299.41	Aggregate visible (length of pipe), sag (20% for 10 LF), crack
SP-1615	0	2	2	0	2	2	12	CP	66.961	Joint offset/separation (not scored in report), camera unable to pass, inspect from opposite end. Deposits in bottom of pipe (10% full for 5 ft), camera stuck at same joint offset/separation.
SP-1616	2.92	1.5	2.47	38	9	47	12	CP	63.188	Pipe cleaned. Exposed aggregate entire length of pipe, fine roots at joints and medium roots in barrel of pipe (20% full of roots for 13 ft), circumferential fracture, fine roots at joints (x2).
SP-162	2	3	2.83	2	15	17	12	Concrete	50.425	Gravel in pipe, encrusted attached deposits at joint, fine deposits (last 40'), longitudinal cracks, deposits settled compacted.
SP-1625	0	2.17	2.17	0	13	13	12	CP	131.62	Pipe cleaned. Rock obstacles (15% full), fine sediment deposits (10% for 12 ft), gravelly sediment deposits (5% full). Fine roots at joint (<1% blockage)
SP-1628	2	0	2	2	0	2	12	CP	52.854	Pipe cleaned. Pipe sag at 24.8 ft, puddle of water observed through remainder of pipe length (~25 ft).
SP-1629	0	3	3	0	3	3	12	Concrete	34.169	Pipe changes from CP to PE, debris (leaves, etc.) at outlet
SP-1630	5	3	4.6	20	3	23	12	Concrete	17.003	Debris at inlet & entire length of pipe (leaves, twigs, mud, rocks, garbage, etc.), broken pipe (x4)
SP-1631	2	2.25	2.2	2	9	11	12	CP	51.06	Sediment (10% for 10 LF), sediment deposit (x2), fracture
SP-1638	0	2	2	0	2	2	12	CP	20.025	Pipe cleaned. Water 5% full. Gravelly sediment deposits (10% full for 5 ft).
SP-1640	0	3	3	0	3	3	12	CMP	30.526	Fine sediment deposits (15% full for 2 feet)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-1648	0	3	3	0	15	15	12	PE	26.633	Fine deposits entire length of pipe
SP-1652	2	0	2	2	0	2	12	CP	97.365	Joint offset large 3 ft from outlet
SP-1655	4.5	5	4.67	9	5	14	12	Concrete	60.103	Broken pipe at bottom of joint (x2), gravel in bottom of pipe last 15 ft (40% full at outlet)
SP-168	1.5	3	2	3	3	6	12	CP	73.771	Joint offset medium, spiral crack, deposits attached encrusted, 2nd joint offset (not called out) at 63.9'
SP-1688	0	3	3	0	3	3	18	CMP	97.986	Gravel in pipe (10')
SP-1740	0	2	2	0	4	4	12	CP	45.163	Encrusted deposits (x2)
SP-1748	2	0	2	2	0	2	12	PE	91.098	Sag (5%)
SP-1750	0	2.5	2.5	0	5	5	12	CP	26.921	Gravel in bottom of pipe, rocks in bottom of pipe (5 ft)
SP-1757	2	0	2	4	0	4	12	CMP	31.306	CMP to Conc material change; medium separated joint; broken at joint
SP-1758	0	2	2	0	12	12	18	CMP	32.986	Sand throughout pipe
SP-1759	3	0	3	3	0	3	18	PE	83.333	3 small cuts in pipe wall
SP-1760	0	2.43	2.43	0	17	17	12	CP	200.52	Fine roots at joint (3); medium roots at bottom (2); infiltration stain; sand at bottom of pipe
SP-1763	2	1	1.8	8	1	9	12	CP	74.258	Crack (x4), tap-in, roots fine at joint
SP-1764	2	0	2	6	0	6	18	RCP	95.686	Crack (x3), tap-in
SP-1765	5	0	5	5	0	5	18	CP	28.488	Hole, high water level -unable to pass, pipe in good condition
SP-1769	3.6	2.33	3.13	18	7	25	12	CP	71.904	Encrusted deposits (x2), joint offset (medium) rocks visible, broken soil visible (x3), tap-in (x2), spiral crack, gravel blocking 20%
SP-1772	1	2.67	2.25	1	8	9	12	CP	191.78	Joint angular (medium), encrusted deposits, rocks, sediment deposit - unable to pass, pipe in good condition
SP-1783	3	2	2.33	3	4	7	12	CMP	38.797	1st direction: Gravel (10% for 10 LF); 2nd direction: corrosion, gravel (10% for 5 LF)
SP-1784	2	0	2	4	0	4	12	CP	36.779	Crack (circumferential), infiltration stain, crack (multiple)
SP-1785	1	2	1.5	1	2	3	12	PE	50.401	Gravel, crack
SP-1786	5	0	5	10	0	10	12	CP	110.38	Hole soil visible (x2)
SP-1787	4	2	2.29	4	12	16	12	CP	81.944	Gravel at bottom (2); multiple fractures; CB-5673 buried
SP-1789	1	0	1	2	0	2	12	CP	107.04	Joint offset medium, camera unable to pass, inspect from other direction. Pipe looks good from other direction up to same joint offset medium.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-1792	0	2	2	0	4	4	12	CP	36.525	Sediment in bottom
SP-1793	5	0	5	5	0	5	12	CP	65.476	Hole with visible soil
SP-1800	2	0	2	2	0	2	12	CP	11.64	Angular joint displacement observed. Roots observed through gap, however, no roots have grown pushed into the pipe.
SP-1802	1	0	1	1	0	1	12	CP	140.62	Joint separation medium, attempted repair with sock at joint separation, camera unable to continue past portions of sock intruding into pipe, inspect from other end. Camera able to reach joint separation medium with sock intruding into pipe.
SP-1803	0	2.67	2.67	0	8	8	12	CP	96.765	Fine sediment deposits 5% full for 46 feet with gravelly deposits and small rock obstructions (15% blockage) for 2 feet.
SP-1804	5	0	5	5	0	5	12	CP	84.835	Pipe break.
SP-1810	3	0	3	105	0	105	18	RCP	204.31	Aggregate visible entire length of pipe
SP-1811	0	2	2	0	4	4	12	CP	49.111	Sediment (10% for 10 LF)
SP-1814	1	2	1.5	1	2	3	12	CP	169.96	Joint offset (medium), material change to CMP, sediment
SP-1818	4	0	4	8	0	8	12	CP	31.065	Broken pipe segment (broken pipe and visible protruding rebar
SP-2001	4	0	4	4	0	4	12	CP	10.251	Crack longitudinal hinge (x2)
SP-2006	5	0	5	5	0	5	24	CMP	168.47	Repair patch (x3 in good shape), collapsed pipe - unable to pass, pipe is deformed for last 6 feet
SP-2008	3	2.43	2.5	3	17	20	18	CMP	87.249	1st direction: hole, encrusted deposits (5% for 15 LF), infiltration weeper/runner (x2), tap-in, sediment deposit; 2nd direction: infiltration weeper (x2), branch in pipe, hole
SP-2009	3	0	3	21	0	21	12	CP	29.18	Aggregate visible (length of pipe)
SP-2093	2.5	2	2.33	5	2	7	18	RCP	155.34	Sediment deposit, hole with rebar, sag (5%)
SP-2094	3	3	3	81	3	84	18	RCP	135.12	Aggregate visible (length of pipe), tap-in
SP-2095	2.67	2	2.4	8	4	12	12	CP	86.001	1st direction: joint offset (large); 2nd direction: sediment (10% for 5 LF), intruding sealing grout, broken (5 LF), joint offset (medium)
SP-2395	0	2.33	2.33	0	21	21	12	CP	88.98	Gravel (10-15% x4), roots at joint (fine x2, medium x3)
SP-2465	5	1.4	2	5	7	12	12	CP	76.947	Fine sediment deposits 5% full for 73 feet. Three joints observed with fine roots. Pipe break observed at one rooted joint with soil visible beyond pipe defect.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-2472	1	3	2	2	6	8	12	CP	152.64	Observed three locations with defective or intruding tap break (4-inch taps). Soil cave in observed at one of the broken 4-inch taps. Circumferential cracks observed around the 4-inch tap locations. Observed gap at last tap, pipe bedding material visible.
SP-2473	0	2	2	0	4	4	12	CP	7.8202	Pipe is 4-ft long. Gravelly deposits observed along full length of pipe (5% full).
SP-2477	0	2	2	0	2	2	12	CP	40.946	Sediment (10% for 5 LF)
SP-2480	5	2	3.5	5	2	7	12	CP	39.378	Pipe broken at bottom at joint, fine deposits
SP-2487	5	0	5	5	0	5	12	CP	70.153	Pipe broken, soil visible beyond defect.
SP-2488	1	2.14	2	1	15	16	12	CP	81.906	Fine sediment deposits 10% full for 30 feet. Roots observed at joints and wanders for approximately 15 feet. Medium joint offset. Compacted deposits, 25% full for 4 feet at pipe egress.
SP-2489	5	3	3.67	5	6	11	12	CP	56.111	Intruding sealing grout, camera unable to pass, inspect from other end. Broken pipe at joint with small visible void, same intruding sealing grout.
SP-2493	1	2	1.75	1	6	7	12	CP	45.445	Circumferential crack, gravel in bottom of pipe (10 ft)
SP-2498	0	2.33	2.33	0	14	14	12	PE	116.48	1st direction: sediment (15% for 10 LF); 2nd direction: sediment (5% for 20 LF), sediment deposit (20%)
SP-2499	3	0	3	6	0	6	12	CMP	32.967	Corrosion (multiple small holes top and sides of pipe for 11+ ft)
SP-2500	0	2	2	0	4	4	12	CMP	127.65	Deposits attached encrusted (inside ribs on side of pipe 100 ft), fine deposits bottom of pipe 7 ft)
SP-2503	2	2	2	4	14	18	12	PE	89.944	Sediment (5-10% for 40 LF), sediment deposit (10%), sag (5% for 10 LF)
SP-2508	0	2	2	0	2	2	12	CMP	71.817	Wood and pine needles in bottom of pipe (10% full)
SP-2509	0	3	3	0	3	3	18	CMP	135	Rocks (15%)
SP-2510	0	2.14	2.14	0	15	15	12	CMP	35.168	Fine deposits (30'), rocks in bottom of pipe (5') unable to pass pipe in good condition to CB
SP-2512	0	3	3	0	120	120	36	CMP	224.29	Sediment (15% for 95 LF), intruding utility
SP-2516	2	2	2	6	6	12	18	RCP	61.149	Sediment (10% for 15 LF), fracture, sag (10% for 10 LF)
SP-2517	3.08	0	3.08	77	0	77	18	RCP	127.32	Aggregate visible (length of pipe), broken soil visible at joint
SP-2522	0	2	2	0	4	4	12	CP	31.079	Fine deposits (10')

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-2530	3.75	1	3.2	15	1	16	12	CP	13.121	Pipe cleaned. Pipe 13 feet long. Surface damage reported (aggregate visible) for 11 feet. . Fine roots at joint. Bottom section of pipe chipped at the pipe outlet. Recorded as a hole in the pipe.
SP-2532	1	1	1	1	1	2	12	CP	51.806	Joint offset medium with roots (medium) at joint
SP-2544	0	2	2	0	2	2	18	CP	110.67	Roots at joint at 13.6ft (roots fine joint from 2 to 3), intruding sealing grout at 115.3 (from 7 to 8) not on report.
SP-2547	0	2	2	0	2	2	12	CP	22.443	Sediment at ditch
SP-2590	0	2	2	0	2	2	18	CP	102.52	Intruding sealing grout at joints
SP-2591	0	2	2	0	4	4	18	CP	58.797	Intruding sealing grout at joints, fine deposits ingressed at joint
SP-2655	4	0	4	8	0	8	18	CMP	84.742	Deformation - squashed x2
SP-2662	3.25	1.5	2.67	13	3	16	12	CP	64.444	Crack (circumferential), hole soil visible, cracks (multiple), encrusted deposits, roots at joint (fine), broken
SP-2665	3.38	3	3.3	27	6	33	12	CP	54.552	Hole, hole with visible soil, broken pipe, medium roots at joint (x2 at least), camera unable to get past first large root at large joint offset blocking 25% of pipe, one more medium roots at joint visible, pipe cleaned, large root still blocking pipe, survey from other end, broken pipe with multiple cracks in top of pipe, joint offset large
SP-2670	0	3	3	0	3	3	12	CMP	11.465	Unknown obstacle - maybe concrete
SP-2672	5	0	5	5	0	5	18	PE	45.125	Dent in bottom of pipe (15%) - does not need to be replaced
SP-2674	3.5	0	3.5	14	0	14	12	CP	75.372	Broken soil visible (x2), crack (x2)
SP-2675	0	2	2	0	8	8	12	PE	111.74	Pipe cleaned. Pipe 10% full of water, gravel in bottom of pipe (10% full for 15 ft), mud in bottom of pipe (5% full for 5 ft).
SP-2677	0	2	2	0	2	2	12	CP	8.194	Sediment (10% for 5 LF)
SP-2679	2	0	2	2	0	2	12	CP	31.027	Large joint offset at 14 feet. Soil visible beyond joint.
SP-2688	3	2.33	2.83	27	7	34	12	CP	47.689	Pipe cleaned. Aggregate visible (length of pipe), encrusted deposit at joint (15%), sediment deposit (5% x2)
SP-2690	3.5	3	3.33	7	3	10	12	CP	146.01	Tap break in (3), sag (10%+ full for 25 ft), dirt in bottom of pipe (15% full for 5 ft inside sag), gravel and rocks in bottom of pipe (not in report), broken pipe at joint with concrete protruding into pipe, repair patch at joint, but soil still visible.
SP-2691	2	2	2	4	2	6	12	PE	50.791	Gravel deposit, sag (5% x2)
SP-2693	0	2	2	0	2	2	12	PE	36.57	Sediment at bottom

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-2695	0	2	2	0	2	2	12	CP	52.999	Gravelly deposits 5% full observed at ditch opening. Gravelly deposits not observed for remainder of pipe section.
SP-2696	0	2	2	0	2	2	12	CP	31.434	Unknown obstacle
SP-2697	2	0	2	2	0	2	12	CP	36.649	Spalling at top of pipe
SP-2713	2	0	2	2	0	2	12	PE	77.724	Sag (5%)
SP-2882	2.33	0	2.33	7	0	7	12	CP	57.834	Joint offset (large), fracture
SP-2927	4	0	4	16	0	16	12	CP	62.671	Aggregate visible entire length of pipe, broken pipe at joint (x2)
SP-2932	3.06	2.25	2.97	95	9	104	12	CP	139.52	Aggregate visible (length of pipe), sediment deposit, hole soil visible, hole, sediment (10% for 15 LF), broken
SP-2934	2.8	2	2.67	14	2	16	12	CP	39.057	Longitudinal crack, exposed aggregate (23 ft), gravel in bottom of pipe (7 ft)
SP-2972	0	2	2	0	6	6	12	PE	33.849	Sediment (5% for 15 LF)
SP-2983	0	3	3	0	6	6	12	CMP	9.2247	Gravel deposit (15% x2)
SP-2985	2.8	2	2.73	28	2	30	12	CMP	39.19	Corrosion damage (pinholes and rough surface) observed for 38 feet. Water 10% full for 8 feet from pipe sag. Unable to track last foot of pipe due to root debris but no pipe defects observed or documented.
SP-3191	0	3	3	0	12	12	12	CMP	27.724	Gravel (20% for 20 LF)
SP-3192	2	3	2.5	4	6	10	12	CMP	105.21	Pipe cleaned. Medium joint offset at 19.1 feet. Pipe jogs down at 38.9 feet. Corrosion damage 7 feet from catch basin and fine sediment deposits observed final four feet of pipe (5% full or less)
SP-3346	0	2	2	0	6	6	12	CP	40.205	Fine sediment debris 10% full at 5-ft. Additional dried/caked fine sediment debris 5% full for 16 feet.
SP-3357	3	2	2.67	12	4	16	12	CP	288.38	Surface damage aggregate visible for 78 feet. Fine sediment deposits 10% full for 65 feet.
SP-3360	1	2	1.5	1	2	3	18	RCP	247.09	Deposits attached encrusted, circumferential crack
SP-3362	0	2	2	0	2	2	12	CP	12.089	Gravel
SP-3364	0	2	2	0	2	2	12	PE	55.366	Gravel - unable to pass, pipe in good condition
SP-3365	0	2	2	0	10	10	12	CMP	87.233	Gravel (20 LF), sediment
SP-3368	0	3	3	0	12	12	12	CP	79.568	Sediment (5-10% for 10 LF; 15%; 50%) - unable to pass, pipe in a good condition
SP-3369	3	3	3	3	9	12	12	CP	129.27	Sediment at joints (10% x2), crack, sediment blocking 50% of pipe - unable to pass, pipe in good condition

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-3374	2.33	2	2.2	7	4	11	12	CP	69.615	Rocks and dirt in pipe, hole with visible soil, joint angular/separation/offset - camera unable to continue, reverse inspection to same point.
SP-3377	5	0	5	5	0	5	12	CMP	132.04	Hole soil visible at joint
SP-338	2	0	2	4	0	4	12	CP	37.318	Joint offset large, joint separation large
SP-3380	0	5	5	0	5	5	12	CP	33.013	Water 15% full for entire pipe length. Water level in catch basin above pipe invert.
SP-3381	0	5	5	0	5	5	12	CP	33.053	Water 25% full for entire pipe length. Water level in catch basin above pipe invert.
SP-3388	4	0	4	4	0	4	12	PE	93.086	Deformation - squished pipe
SP-3393	5	0	5	15	0	15	12	CMP	213.65	Pipe cleaned. Broken pipe and hole with visible void at upstream end (pipe is bent in and restricting flow by 20%), camera unable to continue, inspect from other end. Camera able to inspect up to deformed/broken/bent pipe.
SP-3399	3.13	2	2.82	25	6	31	12	CP	38.825	Minor surface damage, aggregate visible for 34 feet. Fine to medium roots with chunks of soil washed into pipe observed at joint (13.3 ft mark) partially blocking pipe (15%). Medium roots observed at joint (31.5 ft mark) blocking 25% of pipe and wanders to end of pipe. Multiple fractures documented near the rooted joint. Small obstruction (water bottle) noted in the report at the manhole.
SP-34	2	1	1.67	4	1	5	12	CP	81.898	Pipe cleaned. Broken pipe at joint, fine roots at joint, joint angular medium with garbage/plastic coming through joint.
SP-340	0	2	2	0	4	4	12	CP	59.295	Sediment deposit, 2" PVC pipe inside CP pipe
SP-3404	0	2	2	0	16	16	12	CP	38.741	Sediment (10% for length of pipe)
SP-3405	3	0	3	66	0	66	18	RCP	111.88	Aggregate visible (length of pipe)
SP-3406	0	2.5	2.5	0	5	5	12	CP	25.81	Sediment deposit, rocks
SP-3410	3	2	2.25	3	6	9	12	CP	46.004	Gravel (x3), cracks (multiple) top and bottom
SP-3411	0	0	0	0	0	0	12	CMP	116.78	Tap-in
SP-3412	2	0	2	2	0	2	12	CP	11.294	Pipe cleaned. Pipe 12-ft long. Standing water approximately 10% full along pipe length.
SP-3413	4	0	4	4	0	4	12	CMP	60.746	Deformation

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-3417	1	2	1.75	1	6	7	12	CP	80.354	1-2" pipe inside storm pipe, joint offset (medium), sediment and root barrel
SP-3418	0	3	3	0	3	3	12	CMP	40.591	Gravel
SP-3420	3.18	1.67	2.95	54	5	59	12	CP	72.425	Surface damage, aggregate visible recorded for full length of pipe. Fine (small) rooted joints at two locations partially blocking pipe (<5%). Water 10% full from pipe sag for 78 feet. Bottom section of pipe broken with visible soil beyond break at first break. Second break with visible soil beyond break associated with two illicit pipe connections. Patch repair (mesh and concrete) observed at 45.1 ft mark. Water 5% full for last 15 feet.
SP-3434	3.33	1	2.75	10	1	11	18	CP	183.81	Broken soil visible, cracks (multiple), material change to PE with soil visible, joint separation (large) with roots
SP-3435	0	3	3	0	42	42	18	CP	70.782	Roots and debris at joint - medium (x18 - entire length of pipe)
SP-3436	3.43	0	3.43	24	0	24	12	CP	59.773	Bottom of pipe broken at joint (x6 for 20 ft), broken pipe at joint with soil visible, broken pipe with soil visible and grout protruding into pipe (camera unable to continue - survey from other end), joint offset large
SP-3447	0	2	2	0	6	6	12	CMP	73.93	Gravel in bottom of pipe, fine deposits in bottom of pipe (x2)
SP-345	0	2	2	0	8	8	12	CMP	57.058	Sediment and small rocks at bottom of pipe
SP-350	2	2	2	6	12	18	12	PE	131.59	Sag (10%), zip tie in joint, sediment (10% for 10 LF), encrusted deposits, sag (5% x2), sediment deposit and debris
SP-351	3	2	2.96	72	2	74	12	CP	118.46	Exposed aggregate entire length of pipe, intruding sealing grout (looks more like dirt?)
SP-352	5	2	3.5	10	4	14	12	CP	177.24	Deposits settled fine at each end of pipe, hole with visible soil, material changes from CP to PVC for 4 ft, then back to CP, broken pipe (x2)
SP-354	0	1.13	1.13	0	9	9	12	CP	106.66	Gravel in bottom of pipe, roots at joints (entire length of pipe)
SP-3544	0	2	2	0	6	6	18	PE	92.606	Sediment (10% for 15 LF)
SP-3546	0	1.86	1.86	0	13	13	12	CP	78.429	Fine roots at joints (x3), medium roots at joints (x2), deposits attached encrusted (dirt around joint from 2 to 10), infiltration weeper at joint
SP-3547	2	0	2	20	0	20	12	CP	63.722	Sag (50 ft, 10% full).

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-3549	2	0	2	4	0	4	12	PE	137.42	Joint separation (large), sag (10%)
SP-355	0	2	2	0	12	12	12	CP	30.933	Sediment (10% for length of pipe)
SP-3550	0	2	2	0	2	2	12	CP	114.05	Sediment deposit
SP-3552	0	3	3	0	6	6	18	CMP	22.498	Fine deposits in bottom of pipe (blocking 15%+, camera unable to continue), appears to be an unmentioned and unrated tap break in downstream (pipe protruding, large metal pieces protruding)
SP-3554	2	0	2	2	0	2	18	PE	166.87	Sag
SP-3555	3.86	0	3.86	27	0	27	12	CP	66.863	Multiple cracks, longitudinal crack, broken pipe with visible soil (x3), hole with visible void, joint offset large, hole repaired with cloth/burlap
SP-3556	5	2	3.5	5	2	7	12	CP	56.327	Pipe cleaned. Rock protruding 5% into pipe at joint with visible roots (roots not in report), hole in side of pipe with large visible void.
SP-3557	1	2.5	2.29	1	15	16	12	CP	30.488	Gravel (10% for 25 LF), gravel deposit (50%), joint offset (medium)
SP-3558	0	2	2	0	28	28	12	PE	123.14	Pipe cleaned. Pipe 15% full of water, gravel and mud in bottom of pipe (10% full for 67 ft), gravel in bottom of pipe (5% full for 3 ft)
SP-3559	1	2	1.5	1	2	3	12	CP	55.042	Joint offset medium with soil visible, rocks in pipe
SP-3566	0	2.5	2.5	0	5	5	12	CMP	75.398	Small debris; medium roots at joint
SP-3568	0	2.09	2.09	0	23	23	12	CP	80.665	1st direction: gravel, debris; 2nd direction: rocks (10% for 50 LF)
SP-3569	0	2	2	0	4	4	12	CP	72.819	Encrusted deposits (10% full for 10 feet).
SP-357	3	0	3	42	0	42	18	RCP	59.308	Aggregate visible (length of pipe)
SP-3573	2.75	2	2.38	11	8	19	12	CP	139.47	Fine sediment deposits (5% full) for 6 feet. Longitudinal hairline cracks observed between joints. Surface damage visible between 50.9 ft and 65.7 ft mark. Two 4-inch PVC pipe hammered/break in taps. One 4-inch corrugated plastic pipe hammered in and intruding. Fine sediment deposits. Hole with visible soil and roots at hole. Surface damage observed in proximity of hole. Rooted joints.
SP-359	0	2	2	0	2	2	12	CP	42.024	Unknown obstacle - maybe concrete
SP-3795	4.2	0	4.2	21	0	21	12	CP	50.583	Broken pipe with soil visible, Broken pipe (x3), pipe changes from 12 in to 10 in - camera unable to continue, end of pipe visible
SP-3796	5	0	5	10	0	10	12	CP	53.258	Broken pipe with visible soil (x2)
SP-3801	2	0	2	2	0	2	24	CMP	15.221	Sag (10%)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-3803	5	3	4.89	85	3	88	12	CMP	99.123	Holes (for 85 LF, intentional perforations?), sediment deposit (20%) - unable to finish, pipe in good condition
SP-3804	3.67	2	3	11	4	15	18	CMP	100.85	Encrusted deposits (x2), deformation, hole (x2)
SP-3870	0	2.5	2.5	0	5	5	12	PE	51.946	Sediment (5% for 5 LF), sediment deposit
SP-3893	3.5	0	3.5	7	0	7	12	CP	36.71	Hole (soil visible), joint offset (large)
SP-4079	3.5	0	3.5	7	0	7	12	CMP	84.875	Sag (20%), deformation, repair patch (good condition)
SP-4083	0	2	2	0	4	4	18	CMP	29.644	Fine deposits (13 ft)
SP-4109	2.83	2	2.8	68	2	10	12	CP	94.983	Exposed aggregate entire length of pipe, joint offset medium (x2), couple of small rocks in bottom of pipe (5% full for 3 ft)
SP-4198	4.5	3	3.6	9	9	18	12	CMP	51.221	Deformed (5%), hole soil visible, replaced section of pipe (concrete section in CMP pipe), sediment (sand/mud)
SP-4200	0	2.8	2.8	0	14	14	12	CP	33.56	Encrusted deposits 15% full for 22 feet, deposits are more concentrated at joints. Surface damage visible aggregate at joints, possible infiltration source through joints (not in report). Gravelly deposits 10% full for 1-ft.
SP-4201	0	3	3	0	12	12	12	CMP	32.676	Bends, sediment/gravel in pipe (10%)
SP-4202	2.5	2.67	2.63	5	16	21	12	CP	79.54	Sediment (15%: begin-18.4' & 72'-end), cracks, rocks
SP-4203	3	0	3	9	0	9	12	CP	59.382	Longitudinal crack (x2), hole with soil visible
SP-4204	3.13	3	3.11	25	3	28	18	RCP	181.19	Multiple cracks, broken pipe with soil visible, multiple cracks (12 ft), tap break in (x2), multiple fractures, spiral crack, longitudinal crack, hole repaired with burlap, rocks and grout with grout protruding into pipe (15%). Pipe inspected twice.
SP-4205	0	3	3	0	3	3	18	CMP	129.64	CB-778 is a saddle CB (built directly over pipe), medium roots at joint.
SP-4206	0	1.6	1.6	0	16	16	12	CP	39.901	Pipe 20% full of water for first 20 ft of video, roots at joints entire length of pipe, deposits in bottom of pipe (10% to 15% full) entire length of pipe.
SP-4208	2	0	2	8	0	8	12	CP	58.974	1st report: Joint offset (medium) - unable to pass, cannot complete; 2nd report: Aggregate visible (length of pipe), joint offset (medium)
SP-4210	3	0	3	15	0	15	12	CP	150.75	Joint angular (large x2), crack, joint offset (large), hole void visible
SP-4216	0	2.33	2.33	0	7	7	12	PE	68.177	Gravel in bottom of pipe (20 ft), fine deposits in bottom of pipe (5 ft)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-4218	3.67	0	3.67	22	0	22	12	CP	83.786	Pipe starts as PE pipe, crushed and split, pipe changes from PE to CP (not CMP as stated in report) 6 ft in, broken pipe at joint (x3), exposed aggregate entire length of CP
SP-4219	3	0	3	6	0	6	12	CP	60.103	Abandoned tap break in, exposed aggregate (30 ft)
SP-4221	2	0	2	4	0	4	12	CMP	187.1	Sag (90 ft)
SP-4222	5	2.25	2.8	5	9	14	12	CP	57.408	1st direction: gravel (5-10% for 20 LF), broken soil visible, rocks; 2nd direction: pipe in good condition
SP-4223	2.71	3	2.75	19	3	22	12	CP	92.626	Broken pipe with visible soil at joint, joint separation medium, joint offset medium, joint offset large, camera unable to continue, inspect from other end. Hole with visible soil in bottom of pipe at joint, hole repaired with mesh protruding into pipe, tap break in (stormwater), joint offset medium (same as joint offset large where camera had to stop from opposite end)
SP-4244	0	2.33	2.33	0	7	7	12	CP	28.07	Fine sediment deposits 5% to 20% full for entire pipe length. Catch basin sump filled with fine sediment deposits.
SP-4246	5	2	2.75	5	6	11	12	CP	52.217	Broken pipe at joint, sealing grout intruding into pipe, big rock in pipe, attached encrusted deposits
SP-4247	5	3	4	5	3	8	12	CP	73.466	Abandoned tap break in intruding into pipe , camera unable to continue. Reverse inspection, broken pipe with visible void.
SP-4250	4.33	0	4.33	13	0	13	12	CMP	102.95	Deformed (5% x2, 25%)
SP-4251	5	1.67	3.33	15	5	20	12	CMP	82.246	Deformed (25%), hole soil visible (x2) because of coaxial cable through top of pipe (25 LF), fine roots
SP-4253	2.67	1.33	2	8	4	12	12	CP	60.113	Joint with fine (to medium) roots that wander for 26 feet. Small hole with soil visible. Material change to CMP with joint offset medium. Fine sediment deposits 10% full for 7 feet.
SP-4254	3	2	2.22	6	14	20	12	CP	72.681	Gravel in bottom of pipe (30 ft), hole with soil visible, joint offset medium, tap break in active, fine settled deposits (7 ft)
SP-4257	0	2	2	0	12	12	12	CP	105.38	Water 15% full for 35 feet. Fine sediment deposits (mixed with grassy debris) 10% full for 25 feet, fine sediment deposits 5% full for 4 feet. Dried grassy debris observed on sidewalls for 79 feet (not recorded in report). Camera ends at catch basin control gate.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-4260	0	2	2	0	10	10	12	CP	133.4	New cb 95 ft from open ditch 12071. Fine (to gravelly) sediment deposits 10% full for 38 feet. Rock obstacles partially blocking pipe. Fine sediment deposits observed 5% full for 10 feet.
SP-4262	3	0	3	3	0	3	12	CMP	43.175	Corrosion - one spot cracked due to corrosion
SP-4266	0	3	3	0	24	24	12	CP	38.322	Gravel/sediment (length of pipe), plastic flower pot, material change (concrete to PE)
SP-4267	2	2	2	2	2	4	12	PE	74.629	Sag (10%), sediment deposit
SP-4271	0	2	2	0	20	20	36	CMP	73.821	Sediment (10% for 45 LF)
SP-4272	0	2.21	2.21	0	31	31	18	RCP	145.43	Gravel (10% for 35 LF), tap-in with infiltration gusher, gravel (10% for 25 LF), sediment deposit, tap-in
SP-4274	4	0	4	8	0	8	12	PE	103.62	Deformation (8 ft)/dent in top of pipe
SP-4277	5	2	3.5	5	2	7	12	CMP	110.45	(Lower line to SP-15144) Hole with soil visible and root barrel from top of pipe, possible corrosion (length of pipe - not noted in report/video)
SP-4279	0	5	5	0	5	5	12	PE	18.983	Big rocks & pink croquet ball in pipe - unable to continue, but can see outlet, pipe in great condition
SP-4280	0	1.75	1.6	1	7	8	12	CP	56.7	Joint separation medium, infiltration weeper, fine roots at joint (x2), tap break in intruding
SP-4281	3	1.67	2.59	60	15	75	12	CP	89.133	Surface damage, aggregate visible for full pipe length. Three joints with fine roots growing through; the roots at one of the joints was through a hole with visible soil beyond defect. Fine sediment deposits 10% full for 23 feet. Two locations where water observed at 5% full due to pipe sag. Hole with soil visible beyond defect noted at the 45-ft mark. Backwater from catch basin observed in final two feet of pipe.
SP-4283	0	2	2	0	4	4	12	CP	59.615	Encrusted deposits (x2)
SP-4286	0	3.33	3.33	0	10	10	12	CP	60.448	Fine deposits in bottom of pipe (17 ft)
SP-4292	0	3	3	0	6	6	12	CP	24.201	Water 5% full. Fine sediment deposits 10% full for 6 feet then fills up to 30% full with clumps of woody/grassy debris. Backwater from catch basin.
SP-4296	3	0	3	30	0	30	12	CP	118.8	Surface damage visible aggregate for 52 feet.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-4297	3.13	1.38	2.54	50	11	61	12	CP	73.856	Water 5% full for 60 feet. Surface damage visible aggregate for 74 feet. Wandering fine roots from joints for 30 feet. Fine roots from joint and wanders for 7 feet. Hole with rock plugging hole. Line jogs down in the last 4 feet.
SP-4306	1	0	1	1	0	1	12	CP	70.119	Joint offset medium
SP-4308	3	2	2.86	18	2	20	12	CMP	74.345	Compacted deposits on bottom of pipe (10 ft), corrosion (30 ft)
SP-4313	2	0	2	8	0	8	12	PE	54.722	Sag (20 ft)
SP-4316	2.5	2	2.25	5	4	9	12	CP	59.385	Longitudinal hinge crack (both sides of pipe), joint separation medium repaired with plastic, fine deposits and gravel in bottom of pipe
SP-4419	2	2	2	2	2	4	12	CMP	143.18	Sediment deposit at material change (CMP to CP), joint separation (large) at repair patch
SP-4427	5	2.2	3	10	11	21	12	CP	108	Fine ingressed deposits, badly broken pipe with visible soil, tap break in (4"), broken pipe repaired with some sort of rubber at joint, deposits attached encrusted, rocks in pipe (x2), trash and pine needles in pipe
SP-4431	0	2	2	0	10	10	12	CP	120.19	Gravel (10% for 20 LF), sediment deposit
SP-4435	1	2	1.67	1	4	5	12	CP	13.912	Small (1") pipe within pipe at bottom, leaves, joint offset (medium)
SP-4436	0	2	2	0	4	4	12	CP	52.969	Deposits attached encrusted (x2)
SP-4471	0	2	2	0	14	14	12	PE	36.581	Sediment (10% for 40 LF)
SP-469	2	0	2	2	0	2	12	CP	15.465	Longitudinal crack on bottom of pipe
SP-4698	5	5	5	5	10	15	12	CP	67.031	Broken pipe at joint, deposits in bottom of pipe (50% full for 15 ft at downstream end, camera unable to continue, visually inspected)
SP-4699	4.33	0	4.33	26	0	26	12	CP	148.73	Exposed aggregate entire length of pipe, broken pipe at joint, broken pipe with soil visible (x2), broken pipe with visible void
SP-4703	4.33	2	3.17	13	6	19	12	CP	96.644	Broken, hole soil visible, repair section (CMP for 80 LF), deformation (top of pipe), infiltration weeper (x2), encrusted deposits.
SP-4704	3.67	2.4	2.88	11	12	23	18	CMP	116.55	Infiltration weeper (x2), hole (x3), infiltration dripper (x2), encrusted deposits - unable to pass because of hole, no defects in rest of pipe
SP-4705	3	2	2.92	33	2	35	12	CP	43.307	Aggregate visible (length of pipe), fracture (multiple), joint offset (large), sediment deposit
SP-4742	0	2	2	0	4	4	12	PE	29.421	Sediment (5% for 5 LF)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-4760	4.33	0	4.33	13	0	13	12	CP	36.918	Material change (CP to steel), hole soil visible at deformation, corrosion, material change (steel to CP)
SP-4762	3	0	3	3	0	3	12	CP	154.64	Cracks (multiple)
SP-4763	0	2	2	0	10	10	12	CP	80.891	Sediment deposit, sediment (10% for 20 LF)
SP-4764	2	2	2	2	4	6	18	RCP	166.56	Encrusted deposits (x2), sag (5%)
SP-4766	0	2	2	0	6	6	12	CP	21.363	Sediment (10% for 15 LF)
SP-4916	0	5	5	0	5	5	12	CMP	35.082	Water level 10% full for entire pipe length. Water level in catch basin is within inch of pipe invert.
SP-4959	0	2.08	2.08	0	50	50	12	CMP	134.95	Sediment (5% for 110 LF), sediment (20% for 10 LF) - unable to pass, pipe in good condition
SP-5084	0	3	3	0	3	3	12	CP	79.693	Rocks
SP-5089	5	2	2.5	5	10	15	12	CP	110.88	Hole void visible, sediment (10% for 25 LF)
SP-5092	4	1.67	2	4	10	14	12	CP	76.892	Pipe cleaned. Fine roots at joints and in barrel of pipe, along with sticks, dirt and debris in bottom of pipe (15% full for 5 + ft), camera unable to continue, inspect from other end. Fine roots at joints and in between (20 ft), multiple fractures, camera unable to continue, appears to have reached same area as reverse inspection.
SP-5094	0	3	3	0	18	18	12	CP	62.538	Rocks (15% for length of pipe)
SP-5099	0	2	2	0	2	2	12	CP	36.155	Fine deposits in bottom of pipe (10 ft)
SP-5104	5	2	3.5	5	2	7	12	CP	49.406	Small hole observed at joint with soil visible beyond defect. Fine sediment deposits with few small rocks 10% full towards end of pipe.
SP-5105	2.2	0	2.2	11	0	11	12	CP	46.594	Hole with visible soil at joint, joint offset large, camera unable to continue, inspect from other end. Joint offset medium, joint angular medium, joint offset large (reverse slope), able to reach other end of pipe segment with large joint offset.
SP-5106	5	3	4	5	3	8	12	CP	51.651	Broken soil visible, sediment at open ditch (20%)
SP-5108	3	2	2.67	6	2	8	12	CP	58.175	Multiple (longitudinal and circumferential cracks) and surface damage observed for five feet. Roots appeared to be growing through a couple of the joints, however, camera did not stop to inspect. Gravelly deposits 10% full at last pipe section.
SP-5110	0	3	3	0	6	6	12	CP	27.542	Deposits in bottom of pipe, camera unable to get through pipe, visual inspection to next CB, pipe in good condition

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-5112	0	0	0	0	0	0	18	RCP	24.843	Surface damage with visible aggregate.
SP-5113	2	0	2	8	0	8	18	RCP	221.47	Sag (10% to 15% to 5%)
SP-5114	3.07	0	3.07	86	0	86	18	RCP	147.53	Hole soil visible, aggregate visible (135 LF)
SP-5115	0	2	2	0	2	2	12	CP	109.57	Pipe changes from CP to CMP, gravel in bottom of pipe, camera unable to get all the way through pipe, survey from both ends
SP-5116	2	2.09	2.08	4	23	27	12	CP	63.108	Sediment (5% length of pipe), joint separation (medium), aggregate visible (eroded small gap at joint), leaves and dirt, rocks
SP-5122	0	3.67	3.67	0	11	11	12	CP	63.894	Hole repaired with concrete/mesh, gravel in bottom of pipe (20% full for 4+ ft), camera unable to pass gravel, inspect from other end. Gravel in bottom of pipe, 10% to 20% full for 25+ ft), camera unable to pass, reached same spot as reverse inspection.
SP-5123	5	4	4.5	5	4	9	12	CP	58.713	Hinge crack reported at 36.4 ft mark. Video shows longitudinal cracks at the top, bottom, and sides extending one section of pipe (5ft). Surface damage with visible aggregate also noted in pipe section of concern. Pipe also seems slightly deformed through the pipe section. Encrusted debris partially blocking pipe flow (25%).
SP-5124	0	2.5	2.5	0	5	5	12	CP	63.536	Sediment (10%), tap-in (sediment and joint offset in tap-in) - unable to pass, pipe in good condition
SP-5125	2	2	2	4	2	6	18	CP	127.21	Gravel, sticks and debris in pipe. Pipe cleaned and reinspected 2 months later. 2 small sags (5% full for about 5 ft each).
SP-5130	2	1	1.4	4	3	7	12	PE	103.54	Water level 5% full. Some pipe sections water level 10% full and appears to be associated with pipe sag. Pipe joints with medium root mass partially blocking flow.
SP-5133	2.13	2	2.13	32	2	34	12	PE	193.82	Fine sediment deposits 5% full at beginning of video. Intermittent visible water level 5% to 10% full; first for 50 feet, second for 3 feet, third for 14 feet (standing water due to pipe sag). Small visible pipe dent observed at the 169 ft mark.
SP-5136	2	2	2	2	6	8	12	CP	88.557	Surface spalling, gravel (10% for 10 LF)
SP-5137	0	4	4	0	12	12	12	PE	74.438	1st direction: intruding utility; 2nd direction: sediment deposit
SP-5139	4.22	2	4	38	2	40	12	CP	180.28	Broken pipe (x3), hole with visible soil (x5), multiple fractures, deposits attached encrusted

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-5142	2	1	1.5	2	1	3	12	CMP	22.283	Joint offset large with large amount of fine roots, downstream manhole is some sort of control structure.
SP-5143	0	2	2	0	2	2	12	PE	89.481	Sealing ring intruding into pipe
SP-5145	2	5	3	4	5	9	18	RCP	217.79	Sediment deposit, sag (10% for 100 LF)
SP-5146	2.93	0	2.93	79	0	79	18	RCP	331.6	Aggregate visible (125 LF), sag (10% for 10 LF)
SP-5148	3	0	3	6	0	6	12	CP	66.995	Joint separation (medium) with hole (soil visible)
SP-5157	5	2	2.75	5	6	11	12	CP	90.718	Pipe cleaned. Gravelly sediment deposits 10% full for 14 feet. 4-inch tap (break in) at 32.7 ft mark and 56.6 ft mark. Sediment and gravel observed in the first 4-inch tap. Hole at joint with soil visible beyond defect.
SP-5158	4.5	0	4.5	18	0	18	12	CP	90.446	Broken pipe at joint with soil visible, broken pipe (x3)
SP-5159	5	2	2.75	5	6	11	12	CP	13.838	Pipe cleaned. Fine sediment deposits for full length of pipe. Top of pipe dented at end of pipe.
SP-5162	0	5	5	0	5	5	12	CP	18.641	This pipe has been candled. Rock obstructions partially blocking pipe (40%) near end of pipe. Camera unable to complete due to obstructions. Unable to evaluate pipe conditions on final pipe section.
SP-5163	0	2	2	0	2	2	12	PE	95.749	Fine deposits in bottom of pipe
SP-5164	1	2.75	2.17	2	11	13	12	CP	20.699	Leaves (20%, 15%), crack (circumferential), gravel deposit, joint offset (medium), sediment (15-10% for 5 LF)
SP-5170	0	3	3	0	6	6	12	PE	74.077	Pine needles in bottom of pipe (15 ft)
SP-5171	2.82	1	2.67	31	1	32	12	CP	51.794	Surface damage, aggregate visible for full pipe length. Rooted joint. Water 15% full due to pipe sag for 9 feet.
SP-5179	3	0	3	9	0	9	12	CMP	128.29	Corrosion with visible soil (x3 - first 50 ft of pipe)
SP-5289	2.5	2	2.4	10	2	12	24	RCP	87.066	Deposits attached encrusted (mineral deposit from small longitudinal crack), circumferential crack, multiple cracks (7 ft), broken pipe at joint
SP-5291	2.5	0	2.5	5	0	5	24	RCP	44.442	RCP segment replaced with PVC (4 ft) joints look separated, longitudinal crack, multiple cracks, pipe changes from RCP to CMP for last 2 ft of video (upstream end), and CB is actually saddled on top of pipe.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-5296	2	2	2	2	6	8	12	CP	26.819	Fine deposits in bottom of pipe (15 ft), joint offset large, camera unable to continue, CB one foot ahead
SP-5297	0	2	2	0	4	4	12	CMP	128.05	Roots at joint (x2)
SP-5298	2.33	2	2.25	7	2	9	12	CP	41.43	Deposits attached encrusted (5% blocked for 5 ft), joint offset medium (with angle), lateral cracks, multiple fractures
SP-5554	3	0	3	15	0	15	12	CMP	221.39	Hole (x2), hole soil visible, material change (CMP to CP), crack, joint offset (large)
SP-5556	0	3	3	0	12	12	12	CMP	24.03	Gravel (15% for 20 LF)
SP-5558	4	0	4	4	0	4	24	CMP	20.011	Deformation
SP-5559	4.67	0	4.67	14	0	14	24	CMP	211.91	1st direction: Repair patch (x2), collapse from top of pipe; 2nd direction: deformation
SP-560	5	0	5	5	0	5	18	CMP	171.17	Small hole visible at joint
SP-5600	0	2	2	0	4	4	12	PE	57.88	1st direction: none; 2nd direction: sediment (10% for 10+ LF)
SP-561	0	2.13	2.13	0	17	17	12	CMP	86.061	Sediment (10% for 15 LF), sediment (10% for 25 LF), sediment (15% for 5 LF)
SP-562	5	0	5	5	0	5	18	CMP	59.304	Hole at joint
SP-5624	3	2	2.5	21	14	35	12	CMP	38.932	Pipe corrosion (full circumference of pipe) for 37 feet. Water 5% full. Fine sediment deposits 5% full for 30 feet. Fine roots growing through barrel.
SP-5626	4	0	4	4	0	4	12	CP	57.032	Fracture (multiple)
SP-5632	0	2	2	0	6	6	12	CP	27.349	Gravel length of pipe
SP-5769	0	2	2	0	10	10	12	PE	37.246	Sediment (10% length of pipe)
SP-5811	3.67	2	2.83	11	6	17	18	CMP	209.59	1st direction: hole soil visible, sediment (10% for 10 LF), deformation; 2nd direction: gravel deposit, sag (10%)
SP-5812	2	0	2	2	0	2	18	CMP	194.26	Sag (10%)
SP-5813	0	2	2	0	2	2	18	CMP	8.3432	Sediment deposit
SP-5814	0	2	2	0	14	14	12	CMP	39.657	1st direction: sediment (10% for 20 LF); 2nd direction: sediment (5% for 10 LF)
SP-5816	0	2	2	0	2	2	12	CMP	158.97	Sediment deposit
SP-5929	3	3.67	3.5	3	11	14	18	RCP	138.15	Sediment deposit (30%, 10%, 40%), crack (multiple)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-5946	2	2.5	2.4	2	10	12	12	CP	157.31	First video starts at upstream catch basin. Surface damage with visible aggregate for 13 feet and fine sediment deposits (clumpy and large chunks) 5% full for 15 feet. Fine roots in joint (not in report) Deposits increased to 15% full, camera unable to complete due to debris. Second video starts at downstream ditch (no video available for second video). Encrusted fine sediment deposits 5% full for 57.9 feet. Circumferential fracture at joint. Fine sediment deposits become more clumpy partially blocking flow (~15 - 20%). Camera completes at ending point of first video.
SP-5948	0	4	4	0	8	8	12	CMP	150.05	1st direction: pine needles and dirt (15% for 5 LF) blocking pipe; 2nd direction: sediment (10%), pine needles and dirt
SP-5953	0	2	2	0	2	2	12	CMP	135.37	Gravel (10% 10 LF) - unable to pass, pipe in good condition
SP-5957	0	2	2	0	2	2	12	CMP	41.144	Sediment (10%)
SP-5958	5	0	5	5	0	5	12	CP	83.755	Point repair (metal). Void with soil visible beyond defect. Surface damage with visible aggregate for full length
SP-5963	0	2	2	0	4	4	12	CP	38.63	Fine sediment deposits with grassy debris (5% full for 10 feet). Surface damage aggregate visible (not in report). Joint with fine roots (not in report). Downstream catch basin does not have an ID.
SP-5966	2	0	2	2	0	2	12	CP	51.069	Sag (10%)
SP-5969	0	2	2	0	2	2	12	PE	33.998	Sediment deposit
SP-5974	0	0	0	0	0	0	12	CP	126.43	Tap-in
SP-5985	0	1	1	0	1	1	12	CP	96.05	Roots at joint (fine)
SP-5986	0	3	3	0	6	6	12	CP	56.736	Encrusted deposits (20-10% for 10 LF)
SP-5988	2	0	2	4	0	4	12	CP	54.099	Repair patch (x2, not in good shape)
SP-5998	1	0	1	9	0	9	12	CP	164.71	Joint offset (medium x8), tap-in, joint separated (medium)
SP-6002	0	2.5	2.5	0	10	10	12	CP	20.226	Sediment (5% for 10 LF, 15-20% for 15 LF)
SP-6005	0	2	2	0	8	8	12	PE	104.76	Sediment (5% for 15 LF), gravel (x2), tap-in
SP-6011	0	2	2	0	2	2	12	CMP	10.927	Sediment deposit
SP-6012	0	2.5	2.5	0	5	5	12	CMP	65.492	Sediment (10-15% for 20 LF)
SP-6013	1	2.33	2	1	7	8	12	CP	82.042	Encrusted deposits (x3), joint separation (medium)
SP-6024	0	3	3	0	3	3	12	CP	30.685	Sediment deposit - unable to pass
SP-6026	3.33	0	3.33	20	0	20	12	CMP	61.168	Corrosion on top of pipe (20 LF), hole soil visible

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-6031	4	1	3.4	16	1	17	12	Concrete	68.803	Joint offset (medium), broken (x2), deformation, roots at joint (fine)
SP-6032	0	3	3	0	9	9	12	CP	61.129	Roots at joint (medium), encrusted deposits (20% for 10 LF), size change (12" to 8") - unable to pass, pipe is good to outlet at ditch
SP-6033	3	2	2.33	3	4	7	12	CMP	139.65	Hole, sediment (10% for 10 LF)
SP-6040	0	2	2	0	10	10	12	CP	109.73	Encrusted deposits at joints (10% for 30 LF)
SP-6063	2	2.25	2.22	2	18	20	18	RCP	174.31	Gravel and deposits in pipe (5% full for 2 ft, 5% full for 3 ft, 10% full for 20 ft, 5-10% full for 10 ft), joint offset large, camera unable to pass, inspect from other end. Deposits in bottom of pipe (15% full for 16 ft) to large joint offset (same as other end).
SP-6127	4	2	2.67	4	4	8	18	CMP	33.677	Gravel (10% for 10 LF), deformation
SP-6129	1.5	2	1.67	3	2	5	18	PE	160.63	Sag (10%), crack (circumferential) with infiltration weeper
SP-6132	3.67	0	3.67	33	0	33	18	CP	47.447	Surface damage, visible aggregate for full pipe length. Hole at joint with visible soil beyond defect. Multiple fractures observed on two pipe sections (12 feet total). Longitudinal fractures top of pipe observed in one pipe section.
SP-6133	2.33	3	2.57	21	15	36	12	CP	66.812	Pipe cleaned. Gravel and mud in bottom of pipe (10% to 15% full for 20 ft), multiple cracks in pipe, camera unable to continue past gravel, inspect from opposite end, joint offset medium, sag (pipe 25% full of water for 6 ft), sag (pipe 25 % full of water for 25 ft), hole with visible void in side of pipe, gravel in bottom of pipe (3 ft), camera made it to the stopping point from the other direction.
SP-6135	0	2	2	0	4	4	12	CP	46.529	Gravelly sediment deposits 10% full for 26 feet. Final build up Camera unable to track over final pipe section due to debris, but catch basin was visible at stopping point.
SP-6136	3.08	3	3.08	77	3	80	12	CMP	118.05	Surface corrosion entire length of pipe, hole in top of pipe with visible soil (corrosion), deposits encrusted in bottom of pipe (20% full for 3 ft).
SP-6137	1.67	2	1.75	5	2	7	12	CP	107.01	1st direction: joint offset (medium); 2nd direction: rocks, broken
SP-6138	0	1.8	1.8	0	9	9	12	CP	106.46	Roots at joint (fine for 85 LF), sediment (5% for 20 LF), tap-in, roots at joint (medium)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-6142	2.38	5	2.67	19	5	24	12	CP	51.174	Needs more cleaning. Surface damage, aggregate visible for 27 feet. Surface spalling at joint. Medium joint offset for one pipe section. Rock obstruction partially block pipe (35%). Camera unable to continue due to rock obstruction. Last two sections of pipe visible, but unable to evaluate joint.
SP-6143	0	2	2	0	2	2	12	CP	48.313	Gravel at joint
SP-6144	4	2	3	4	2	6	12	PE	124.89	Deformation, zip tie in wall of pipe
SP-6151	2	2	2	4	2	6	12	CP	65.162	Sag (5% x2), encrusted deposits
SP-6152	0	3	3	0	12	12	12	CMP	19.48	Sediment (15% length of pipe)
SP-6153	0	2	2	0	10	10	12	PE	57.622	Gravel (5%, 10% for 20 LF)
SP-6154	0	2	2	0	4	4	12	CP	67.102	Sediment deposit, gravel deposit
SP-6157	3	0	3	6	0	6	12	CP	115.15	Cracks (multiple x2)
SP-616	3	2.6	2.83	21	13	34	12	CMP	38.739	Corrosion (length of pipe), sediment deposits, encrusted deposits (10 LF), gravel (10% for 10 LF), gravel deposit (40%)
SP-6165	0	2	2	0	12	12	12	CP	53.104	Dirt, rocks and debris on bottom of pipe (10% full for 13 ft). Pipe inspected again. Pipe still 10% full of dirt, rocks and debris for 15 ft. Camera able to inspect entire pipe both times.
SP-6175	5	3	8	10	9	19	12	PE	157.9	Concrete pipe at upstream end (70 ft), deposits in bottom of pipe (20% full for 8 ft), gas line through pipe (20% of pipe blocked), pipe broken with visible soil and roots where gas line punches through pipe, concrete chunk resting on gas line. Camera unable to continue. Inspect from other end. PE pipe for 85 ft, then material changes from PE to CP, stop at gas pipe, inspection complete.
SP-6419	5	0	5	10	0	10	12	CP	92.06	Broken, material change (CP to CMP), hole soil visible
SP-6444	5	2.33	2.71	5	14	19	18	CMP	218.85	Pipe cleaned. Fine sediment deposits 5% full for 7 feet, 10% full for 22 feet. Encrusted fine sediment on sidewall 10% full for 3 feet (not in report). Wood obstacle (wood post) through wall partially blocking flow (30%) (wood post punctured a hole through pipe with soil visible beyond hole).
SP-6480	0	2	2	0	2	2	12	CP	120.23	Sediment deposit, material change (CP to CMP)
SP-6481	0	2	2	0	4	4	12	CP	20.566	Sediment at joints (10% for 10 LF), repair patch (poor condition)
SP-6485	0	2	2	0	6	6	12	CP	11.415	Sediment (10% length of pipe)

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-6499	3	0	3	21	0	21	12	CMP	25.903	Pipe cleaned. Corrosion damage on pipe walls for full pipe length (38.3 ft).
SP-6679	0	4	4	0	4	4	12	CP	9.4769	Sediment (30% length of pipe)
SP-6684	0	4	4	0	4	4	12	CP	59.281	Sediment and roots at open ditch (25%)
SP-6713	0	2	2	0	4	4	12	CP	168.15	Sediment (10% for 20 LF)
SP-6800	4	2	2.75	12	10	22	12	CP	105.02	Blocked tap-in, roots at joint (fine for 10 LF), sediment deposit, hole soil visible (x2), fracture, root at joint
SP-6802	2	2	2	8	8	16	12	CP	52.582	Pipe cleaned. Gravel in bottom of pipe, deposits in bottom of pipe (17 ft 5% full), Sag (20 ft, 10% full - report says 10% full, but pipe is actually over half full at upstream end (camera under water)), also visible roots at all joints (not called out in report).
SP-6809	4.5	2.3	2.67	9	23	32	12	CP	147.33	Tap-in (x4, 2 active, 1 active/defective, 1 abandoned), roots at joint (fine for 10 LF), hole soil visible, root barrel (medium 20% for 15 LF), infiltration weeper (at joints for 110 LF), encrusted deposits (10% for 20 LF), fracture (multiple)
SP-6810	2	3	2.25	6	3	9	18	PE	162.36	Small rocks, sags (3)
SP-6812	4	0	4	16	0	16	18	RCP	39.644	Joint offset medium with broken/longitudinal fracture in pipe segment, fracture longitudinal hinge (4) for 6 ft.
SP-6814	2	0	2	4	0	4	12	CP	48.336	Joint offset (large x2)
SP-6815	0	2	2	0	8	8	12	CP	254.28	Pipe cleaned. Debris in bottom of pipe (5% full for 40 ft), exposed aggregate entire length of pipe (not in report), deposits on walls of pipe makes it hard to tell if there are any cracks.
SP-6816	2	2	2	2	4	6	12	CP	106.41	Crack (longitudinal), gravel (5% for 15 LF)
SP-6817	2.33	2	2.25	7	2	9	12	CP	58.229	Sediment deposit (10%), spiral crack, small piece of pipe broken in joint, longitudinal crack
SP-6818	3		3	6	0	6	12	CP	12.985	Medium joint separation, with soil visible washing in from separation (soil observation not in report). Hole with visible soil beyond.
SP-6826	1	0	1	1	0	1	12	CP	27.74	Joint offset (medium)
SP-6827	3	2	2.24	12	26	38	12	CP	113.32	Rocks, crack (longitudinal, multiple, spiral), encrusted deposits, broken (small piece of pipe in joint), sediment (5-10% for 55 LF)
SP-6829	0	3	3	0	27	27	12	CP	53.784	Deposits (dirt and mud) in bottom of pipe (5% to 15% full for 50 ft).

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-6830	2	2	2	4	14	18	12	CP	45.063	Gravel deposit, crack (spiral), rocks (10% for 15 LF), gravel (10% for 15 LF), surface spalling, repair section (PVC for 1 LF) with tap-in
SP-6831	3.5	2.57	2.78	7	18	25	12	CP	80.158	Gravel (15% for 25 LF), rocks, broken (x2), gravel (5% for 15 LF)
SP-6837	0	2.88	2.88	0	23	23	12	CP	83.944	Gravel (10%, 15% for 35 LF)
SP-6848	2	2	2	2	10	12	18	RCP	192.7	Fine sediment deposits (10% full for 39 feet and 5% full of encrusted deposits for last 26 feet). Gravelly deposits 5% full. Circumferential fracture at a joint. Jogs left (not in report)
SP-6854	0	5	5	0	5	5	12	CP	27.379	Water 20% full for entire pipe length
SP-6858	0	2	2	0	4	4	12	CP	28.543	Fine sediment deposits 5% full for 25 feet.
SP-6859	1	0	1	2	0	2	12	CP	68.216	Medium joint offset at two locations.
SP-6860	0	2.5	2.5	0	5	5	12	CP	53.271	Encrusted deposits 10% full and on sidewalls on last pipe section of video. Rock obstructions partially blocking flow (15%). Camera unable to pass rock obstruction, but candle light final three feet. No issues.
SP-6864	0	2	2	0	2	2	12	CP	44.208	Surface damage, visible aggregate for entire pipe length (not in report). Encrusted deposits 10% full for final 3 feet.
SP-6869	0	2	2	0	4	4	12	CP	58.85	Sediment (10% for 10 LF)
SP-6873	1	2	1.4	3	4	7	12	CMP	91.38	Gravel deposit, repair section (PE for 5 LF - in good shape), encrusted deposits, material change (CMP to PVC - in good shape), joint separation (medium x3)
SP-6878	2	0	2	2	0	2	12	CP	194.85	Crack (longitudinal)
SP-6886	0	2.9	2.9	0	29	29	12	PE	81.3	1st direction: sediment (20% for 15 LF), intruding utility (waterline); 2nd direction: sediment (10% for 25 LF)
SP-6888	0	2	2	0	8	8	12	CP	39.982	Gravel (10% length of pipe)
SP-6895	0	2	2	0	4	4	12	CP	38.254	Surface damage, visible aggregate for entire pipe length (not in report). Joints with fine roots (not observed in video but included in report). Fine deposits reported at pipe ingress 15% full. Observed a clump of fines clumped on sidewall at the first observable joint, does not appear to be ingress location as reported.
SP-6903	2.89	0	2.89	159	0	159	18	RCP	275.37	Aggregate visible (entire length), sag (15% for 25 LF), fracture, small piece of joint broken with crack, joint angular (medium)
SP-6905	0	0	0	0	0	0	12	CP	94.083	Tap-in

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-6912	0	1.67	1.67	0	5	5	12	CP	11.587	Pipe cleaned. Fine sediment deposits 10% full for 8 feet. Fine roots at joint.
SP-6913	0	3.5	3.5	0	7	7	12	Concrete	17.83	Sediment and gravel in pipe
SP-6914	0	3	3	0	3	3	12	PE	31.196	Sediment (20%)
SP-6916	2.5	0	2.5	5	0	5	12	CP	61.321	Joint separation (medium), crack
SP-6918	0	2	2	0	2	2	12	CP	48.806	Sediment (10%)
SP-6919	0	2	2	0	12	12	12	CMP	42.664	5% full of debris entire length of pipe, outfall is almost completely blocked by debris.
SP-7043	3	2.67	2.96	75	8	83	12	CP	139.57	1st direction: corrosion (125 LF), gravel deposit, material change (CMP to CP), roots at joint (medium); 2nd direction: no issues until roots & material change
SP-7076	5	0	5	10	0	10	12	CP	119.24	Broken (x2)
SP-7078	2.5	0	2.5	5	0	5	12	CP	88.581	Crack (longitudinal, multiple), material change (CP to PE)
SP-7085	0	2	2	0	2	2	12	PE	8.1128	Gravel (10% length of pipe) - unable to pass, pipe in good condition
SP-7088	0	2.5	2.5	0	5	5	12	CP	57.531	Encrusted deposits (x2)
SP-7182	0	2.8	2.8	0	14	14	12	CP	54.472	Sediment at joints (5% for 5 LF), rocks (15% for 20 LF)
SP-7303	3.67	3	3.5	11	3	14	12	CP	44.567	Aggregate visible (length of pipe), broken soil visible (possible failed attempt at tap-in), rocks
SP-7343	5	0	5	5	0	5	12	PE	72.832	Hole at pipe ingress with visible soil
SP-748	0	2	2	0	4	4	12	CP	50.213	Sediment deposit, encrusted deposit with ants
SP-750	0	2	2	0	8	8	12	PE	74.796	Sediment deposits (5% and 10%), sediment (10% for 10 LF)
SP-752	1	4	2.5	1	4	5	12	CP	70.225	Joint offset (medium), rocks
SP-755	0	3	3	0	3	3	10	CP	23.037	Sediment deposit
SP-757	3.75	2	3.4	15	2	17	12	CP	136.99	Broken (x2), crack (spiral, multiple), sediment deposit
SP-763	0	2	2	0	6	6	12	CP	91.045	Sediment (5% for 20 LF)
SP-764	2	1	1.56	10	4	14	12	CMP	40.249	Water 5% full for 14 feet then increases to 15% full due to pipe sag for 24 feet. Fine roots at joint for 13 feet and then 4 feet. Water in catch basin is above pipe invert.
SP-766	4	0	4	4	0	4	12	CP	59.053	Broken

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-773	4.6	2.5	4	23	5	28	12	CMP	138.32	Large hole in top of pipe, possibly repaired?, deposits attached encrusted, material change CMP to CP (103 ft CMP, 39 ft CP, with joint offset?), multiple cracks, broken pipe (bottom at joint) with soil visible, longitudinal hatch fracture (7.5 ft all over pipe), gravel and rocks in bottom of pipe last 3 ft.
SP-775	0	2	2	0	2	2	12	CP	16.772	Pipe cleaned. Rock obstructions partially blocking flow (10%). Observed fine sediment deposits and root debris (not in report).
SP-777	0	2	2	0	2	2	12	PE	175.74	Standing water in pipe, active tap break in (8 in)on side of pipe, active tap break in (6 in) on side of pipe, deposits in bottom of pipe (called out for last 3 ft of pipe, really entire length of pipe under standing water).
SP-778	0	1	1	0	8	8	12	Concrete	66.472	Fine roots at joints (entire length), deposits and big rocks in line, standing water in line (see video for true pipe condition - not all roots and rocks captured in report).
SP-781	3	0	3	3	0	3	12	Concrete	64.266	Rocks in bottom of pipe (one pile), broken pipe at joint, gravel and rocks in bottom of pipe (last 25 ft, camera unable to reach end of pipe)
SP-783	5	0	5	10	0	10	12	PE	10.336	Broken pipe
SP-784	1	3	2.5	1	9	10	12	CP	98.918	Joint offset medium with large mass of branches (roots?) blocking 80% of pipe, camera cannot continue, reverse inspection shows dirt, debris and garbage in bottom of pipe for approx 10 ft before branches/root blockage
SP-785	2.7	5	2.79	62	5	67	12	CP	90.003	Visible aggregate entire length of pipe, joint separation medium, joint offset medium (x3), broken pipe at joint (looks more like a fracture close to failure at top of pipe), leaves and branches in pipe at inlet (80% full)
SP-788	5	2	2.43	5	12	17	12	CP	124.77	Intruding sealing grout (x6, 5% blocked, intruding sealing grout at all joints), broken pipe at joint
SP-790	3.16	0	3.16	60	0	60	12	CP	85.852	Pipe cleaned. Surface damage, visible aggregate for entire pipe length. Pipe broken at one joint. Bottom of pipe missing at a second joint with soil visible.

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-798	4	0	4	20	0	20	12	CP	69.451	Broken pipe at joint bottom of pipe (x2), visible aggregate entire length of pipe, broken pipe at joint side of pipe
SP-7981	0	2	2	0	18	18	12	CP	65.356	Gravel and rocks in bottom of pipe almost entire length of pipe (10% full), lots of gunk stuck in or protruding from joints (possibly separated joints?)
SP-7982	0	2	2	0	2	2	12	CP	38.602	Dirt, rocks and debris in bottom of pipe (10% full for 10 ft at inlet)
SP-799	0	2.67	2.67	0	8	8	12	CP	42.871	Roots at joint (and between joints blocking 20%) medium for 17 ft at inlet, dirt and debris in bottom 10% of pipe last 10 ft
SP-800	0	1	1	0	2	2	12	CP	84.236	Roots at joint (fine for 10 LF)
SP-8002	0	3	3	0	18	18	24	CMP	41.732	Dirt, rocks and debris in bottom of pipe (20% full entire length of pipe), camera unable to reach end of pipe, but visual inspection to end of pipe looks good (pipe in good condition, lots of debris in bottom of pipe)
SP-810	0	2	2	0	2	2	12	Concrete	8.4455	Deposits in pipe (10%), very short pipe (7.4 ft) with ditch inlet to CB
SP-811	3	3	3	3	6	9	12	CP	26.423	Pipe cleaned. Leaves and branch debris partially blocking flow (20% and 15%) for 5 feet. Observed spalling at joint (not in report). Surface damage visible aggregate in last two pipe sections.
SP-8161	2	2	2	10	6	16	12	CMP	48.795	Starts as CMP for 2 ft, then 5 ft section of PVC, then back to CMP for remaining 40 ft. 10% full of solids for 14 ft, clear for 7 ft, then 10% - 20% full of standing water for 22 ft (sag), top 4 ft of pipe clean
SP-841	0	2	2	0	2	2	12	CP	43.986	Encrusted deposits
SP-8450	2	3	2.83	2	15	17	12	PE	90.158	Deposits in bottom of pipe (15% full for first 28 ft), small sag (5 ft long, 5% full)
SP-8487	2	0	2	2	0	2	12	CP	126.37	Large joint offset at upstream catch basin called out in report, but not shown or called out on the video.
SP-8583	0	2	2	0	4	4	12	CP	36.986	Rocks and vegetation, tap-in from the top, tap-in from side, sediment deposit
SP-8588	0	2	2	0	4	4	12	CP	154.74	Tap-in, sediment deposit (x2)
SP-8589	0	0	0	0	0	0	12	CP	223.22	Tap-in from side (x2)
SP-8593	0	2	2	0	2	2	12	CP	68.192	Two factory made taps (8-inch and 12-inch). Fine sediment deposits 5% full for final 3 feet.
SP-8596	0	0	0	0	0	0	12	CP	16.272	Tap-in

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-8600	0	0	0	0	0	0	12	CP	32.961	Tap-in
SP-8614	0	2	2	0	4	4	12	DIP	121.45	Gravel (10% for 100 LF), tap-in (no soil visible around pipe)
SP-8622	0	2	2	0	20	20	12	DIP	49.218	Sediment (10% for length of pipe)
SP-8627	5	0	5	5	0	5	12	PE	41.468	Hole soil visible
SP-8637	4	2	2.5	4	6	10	18	PE	53.508	Rocks (10% for 15 LF), deformation at end of pipe
SP-8654	5	0	5	5	0	5	12	PE	136.77	Pipe deformation at 74.9 ft mark (possibly a dent?) Potential pipe sag with no water (not in report)
SP-8674	4	0	4	4	0	4	12	PE	38.145	Deformation in top of pipe
SP-8749	0	2	2	0	2	2	12	CP	42.89	Rock obstruction partially blocking flow (5%) at pipe egress. Surface damage visible aggregate (full pipe length, not in report). Water in final 10 feet, less than 5% possibly due to pipe sag (not in report).
SP-8753	2.33	1.5	2	7	3	10	12	CP	150.11	Surface damage with visible aggregate for 150 feet. Fine root at joint. Circumferential crack at joint. Slight jog down towards pipe end. Fine sediment deposits final five feet.
SP-8798	2	2	2	2	4	6	18	RCP	38.521	Deposits in bottom of pipe (5% full for 15 ft), sag (10% full for 5 ft at downstream end)
SP-8803	3.5	0	3.5	14	0	14	12	CMP	83.79	12 in high x 18 in wide oval pipe, small sag (5% full for 3 ft), deformation of pipe (top of pipe squished - 30% blocked for last 12 ft at downstream end), also a sag in this area
SP-8817	1	0	1	1	0	1	18	RCP	163.51	Material changes from RCP to PE for approx 5 ft at upstream end of pipe, medium offset at joint, camera unable to continue, end of pipe visible, other than joint offset at material transition, in good condition.
SP-8821	2.56	0	2.56	23	0	23	12	Concrete	74.334	1st report: Circumferential crack (x2); 2nd report: Exposed aggregate in bottom half of pipe last 35 feet before open ditch.
SP-8847	2	1	1.4	4	3	7	24	RCP	164.12	Fine roots at joint (x3), sags (x2 - 10% depth for approx 20 ft and 10 ft).
SP-8876	3.5	0	3.5	7	0	7	12	CP	56.664	Joint angular large & hole with soil visible
SP-8877	0	2	2	0	4	4	12	CMP	51.936	Sediment (5% and 10%)
SP-8924	0	2	2	0	6	6	12	CMP	27.022	Rocks (10% for 15 LF)
SP-8925	0	2.62	2.62	0	34	34	18	CMP	109.17	Sediment (10% for 40 LF), gravel (25% for 20 LF)
SP-8926	3	0	3	3	0	3	12	CP	93.386	Broken

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-8967	0	4	4	0	16	16	12	CP	20.532	Fine (wet) sediment deposits 30% full for entire pipe length. Control structure (orifice) at end of pipe.
SP-8980	2	2	2	2	8	10	18	RCP	111.18	Gravel (10% for 20 LF), sag (5%)
SP-8981	1	2	1.33	2	2	4	12	CP	30.086	Sediment (5%), joint offset (medium x2)
SP-9015	0	2	2	0	10	10	24	CMP	41.744	Fine sediment deposits 10% full for 13 feet along pipe bottom, and 10% full for 14 feet along bottom side wall with standing water 5% full (water observation not in report). Deformation at final joint (not in report).
SP-9017	5	3	3.36	10	27	37	24	CMP	50.867	Gravel in bottom of pipe entire length of pipe 15% full, deformation in sides of pipe for approx 10 ft, CB-9489 is not real CB, just a hole in the top of the pipe with a riser and lid and at least one other CMP discharging into riser.
SP-9035	2	0	2	2	0	2	12	CMP	66.746	Sag (10%)
SP-9047	1	0	1	1	0	1	18	RCP	44.519	Joint offset (medium)
SP-905	2	2	2	32	18	50	12	PE	218.46	Sag (5%), gravel (5-10% for 30 LF), sag (5% for 60 LF), sediment deposit (x2), sag (5% for 15 LF)
SP-906	0	2	2	0	2	2	12	PE	83.961	Gravel
SP-907	0	2	2	0	6	6	12	CP	57.653	Rocks, gravel (x2)
SP-9087	0	3	3	0	36	36	36	RCP	108.17	Deposits in bottom of pipe (15% full for 60 ft)
SP-910	5	2	2.33	5	16	21	18	CMP	39.124	Sediment (5% for 20 LF), multiple small holes with soil visible, gravel (10% for 20 LF)
SP-912	2	0	2	2	0	2	18	PE	59.738	Pipe inspected twice. Water flowing in pipe in first inspection, no water flowing in 2nd inspection, but sag reported (10% full for 5 ft at downstream end of pipe) , ladder pulled from bottom of CB-10179.
SP-9121	4.13	2.86	3.53	33	20	53	12	CP	66.104	Pipe cleaned. Deposits attached encrusted (x5), large hole with visible soil on side of pipe (x2), large rocks in pipe, camera unable to pass, survey from other end. Large joint offset, hole with visible soil in bottom of pipe (x2), hole in side of pipe, hole with visible void, hole with large rocks over the top, same spot where camera stopped at other end.
SP-9124	3.5	2	3	7	2	9	18	CP	51.14	Encrusted deposits, deformation with fracture

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-913	2	0	2	2	0	2	12	CP	76.446	Surface damage with visible aggregate for 44 feet (not in report) Material change to PVC. Joint separation, primarily at top and sidewalls, at material transition point (not in report).
SP-914	2.67	1	2.25	8	1	9	12	CP	43.856	Pipe cleaned. Roots at joints (x2), joint separation medium & hole at joint with visible soil, longitudinal crack.
SP-9161	2	2	2	2	6	8	12	CP	156.08	Water 10% full for 20 feet then increases to 20% full due to pipe sag for 20 feet. Gravelly deposits 5% full. Fine roots at joint and wanders along bottom of pipe barrel for 10 feet. Water 5% full for final 17 feet due to pipe sag.
SP-9162	0	0	0	0	0	0	12	PVC	106.52	Sag (60%)
SP-917	3.5	0	3.5	7	0	7	12	CP	15.646	Joint angular (large), hole void visible
SP-919	1	0	1	1	0	1	12	CP	33.265	Repair section (PVC for 10 LF) with joint offset (medium)
SP-920	0	2	2	0	10	10	12	CP	211.55	Sediment at joint (x3), sediment, pine needles, dirt, and rocks
SP-921	1.67	3	2.2	5	6	11	12	CP	80.809	Sag (5% full for 10 ft), intruding sealing grout, camera cannot pass, inspect from other end. Joint offset medium, intruding sealing grout, same spot as reverse inspection.
SP-9212	3	2	2.5	6	4	10	12	CMP	39.628	Water 5% full in report (however noted that water observed was primarily within the pipe corrugations). Fine roots growing in pipe barrel. One root vein observed wandering for 6 feet. Corrosion damage.
SP-923	0	5	5	0	10	10	12	CP	76.81	Leaves, trash, dirt & roots (not called out in report) at upstream end of pipe, blocking more than 50% of pipe, possible joint separation or offset (not called out in report), camera not able to inspect (looks like debris caught at joint separation and rest of pipe clear), inspect from opposite end, no major defects (few small cracks not called out on report), camera able to reach joint offset/separation and root ball debris that stopped the camera from the other end. Joint Separation and roots not called out on report.
SP-924	0	0	0	0	0	0	12	PE	123.78	6 in tap break-in in top of pipe (x2)
SP-9243	4.33	2	3.75	13	2	15	12	CP	81.955	Broken (x3), material change (CP to CMP), gravel for 10 LF - unable to pass, pipe in good condition

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-925	3	2.25	2.5	6	9	15	12	PE	113.88	Cuts in pipe wall, 4" tap in - leads to catch basin, sediment and leaves deposit (10% x2), gravel deposit (5%), spiral fracture.
SP-926	0	2	2	0	4	4	12	PE	98.788	Sediment (5-10% for 40 LF) - unable to continue due to sediment, candled last few feet of pipe in good condition.
SP-927	0	2	2	0	16	16	12	CP	67.482	Dirt, rocks and debris in bottom of pipe (10% full for 16 ft), material change from CP to CMP (3 ft section of CMP in CP pipe), camera unable to continue through CMP, inspect from opposite direction, mud in pipe (5%-10% full for 10 ft), mud in bottom of pipe (5% full for 14 ft), camera stops at material change.
SP-9275	5	5	5	5	5	10	12	CMP	282.1	Utility through pipe near top, hole soil visible
SP-9288	2	2.5	2.45	2	25	27	24	RCP	67.283	gravel , rocks and debris in bottom of pipe (10% full for 25 ft), sag (10% full for 5 ft - looks more like water build up behind debris in pipe), material change from RCP to CMP for last 23 ft of pipe, gravel, rocks and debris 15% full in CMP section, camera unable to pass, pipe looks good to CB, possible debris in top of CB?.
SP-929	1.33	1.67	1.5	4	5	9	12	CP	79.638	Fine sediment deposits for 27 feet (15% to 20% full). Water 5% full reported, however, not clearly observed in video. Fine sediment deposits were muddy.
SP-9296	0	3	3	0	15	15	12	CMP	42.219	Sediment (20% for 30 LF)
SP-9307	1	0	1	3	0	3	12	CP	210.45	Water 5% full. Medium joint offsets at three locations. Sediment
SP-931	0	0	0	0	0	0	12	CP	63.863	No problems noted in report. However, joint offset observed at 58 ft mark in the video. Sections with surface damage/visible aggregate on bottom of pipe.
SP-9390	2	2	2	18	12	30	12	PE	72.256	Deposits in bottom of pipe (5% full for most of pipe), sags (5% deep for 10 ft and again for 40 ft), tap break in (stormwater) with 2 screws protruding though top of pipe.
SP-949	1.5	0	1.5	3	0	3	12	CP	31.708	Sag (5% deep for 3 ft), joint offset medium
SP-950	0	2	2	0	4	4	12	PE	101.77	Fine sediment deposits 5% full for 34 feet. Water 5% full for 11 feet due to pipe sag (not in report). Wet fine sediment deposits 5% full for 15 feet in a pipe sag. Fine (wet) sediment deposits at pipe ingress for 10 feet. General observation; bottom of pipe had a white coating in areas that did not have water or wet fine deposits (not in report).

Table 5: Pipes Inspected Through CCTV										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-952	0	2.5	2.5	0	5	5	12	CP	27.928	Fine sediment deposits 10% full and 20% full for 5 feet. Pipe appears to slope up and down at pipe ingress then slope up at the pipe egress.
SP-953	5	2.5	3.33	5	5	10	12	CP	18.253	Fine sediment and gravelly deposits at egress. Pipe broken at joint with visible soil beyond. General observation not included in report: all pipe joints appear to be offset with void or separation. Camera was unable to complete past rock obstructions, but candlelight showed pipe ingress to be in relatively good condition compared to downstream pipe sections.
SP-956	3	1	2.95	129	1	130	18	RCP	219.8	Aggregate visible entire length of pipe, dead mouse
SP-959	0	2	2	0	10	10	12	CP	43.978	Gravel (5% for 20 LF)
SP-961	5	0	5	5	0	5	12	PE	86.257	Material change (PE to CP), broken soil visible
SP-9664	0	2	2	0	2	2	12	PE	125.08	Sediment deposit
SP-967	2	0	2	8	0	8	12	CP	40.009	Medium joint separation/offset at several joints within pipe. Hole with visible soil. Rock wedged in joint (not in report).
SP-9674	0	2	2	0	8	8	12	PE	19.883	Sediment (10% for length of pipe)
SP-971	0	3	3	0	3	3	18	CP	31.333	Fine sediment deposits (mixed with grassy debris) 20% full for final two pipe sections. Camera unable to complete fully to catch basin, but catch basin is visible.
TK-97	0	2	2	0	26	26	36	CMP	92.378	Fine sediment deposits 5% full for 64 feet. Water reported at 5% full, however standing water primarily limited to corrugations within the pipe. 5% full at pipe egress. Pipe reduction noted at discharge point.

Table 6: Pipes Inspected Through Candling										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-128	0	4	4	0	4	4	12	CMP	31.00525	45% full
SP-2524	0	3	3	0	3	3	12	CP	26.05709	30% debris
SP-2531	0	0	0	0	0	0	12	CP	32.11682	Good condition (listed as 100% blocked in earlier report)
SP-2533	0	2	2	0	2	2	12	CP	45.28302	Good condition, 25% debris
SP-2666	0	5	5	0	5	5	12	CP	49.0324	Good condition, 75-100% full dirt and trash
SP-2699	0	1	1	0	1	1	18	CP	39.8	Good condition, 10% full
SP-2924	0	1	1	0	1	1	12	CMP	25.2551	Good condition, 5% full of debris
SP-3391	0	5	5	0	5	5	12	CP	34.21669	50% debris
SP-353	0	1	1	0	1	1	12	CP	9.55389	15% debris
SP-3543	0	5	5	0	5	5	12	CP	41.46759	Good condition, 50-100% full dirt
SP-3567	0	1	1	0	1	1	12	CP	5.002397	Great condition, 10% debris
SP-4224	0	2	2	0	2	2	12	CP	28.04828	Good condition, 25% full
SP-4225	0	2	2	0	2	2	12	CP	46.83704	Good condition, 25% full
SP-4226	0	1	1	0	1	1	12	CP	44.98821	Good condition, 15% full
SP-4233	0	1	1	0	1	1	12	CP	34.9602	Good condition, 15% full
SP-4238	0	5	5	0	5	5	12	CP	29.03305	Buried under rock
SP-5093	0	1	1	0	1	1	12	CP	27.02436	Good condition, 15% full
SP-5096	0	2	2	0	2	2	12	CP	47.71883	25% full
SP-5103	0	4	4	0	4	4	12	CP	26.07534	Good condition, 40% debris
SP-5111	0	1	1	0	1	1	18	RCP	27.08805	Good condition, 15% full
SP-5290	0	1	1	0	1	1	12	CP	36.13985	Good condition, 15% full of debris
SP-5959	0	3	3	0	3	3	12	CMP	28.05641	Good condition, 30% full
SP-6001	0	5	5	0	5	5	12	CP	34.24053	75% debris
SP-6007	0	4	4	0	4	4	12	CP	30.12952	40% debris
SP-6008	0	1	1	0	1	1	12	CP	34.45161	10% debris
SP-6096	0	5	5	0	5	5	18	PE	34.75812	Good condition, 50% water
SP-6125	0	2	2	0	2	2	12	CP	42.79737	Good condition, 25% debris
SP-6161	0	2	2	0	2	2	12	CP	29.8793	Good condition, 20% full
SP-6163	0	3	3	0	3	3	12	CP	27.65883	30% full
SP-6164	0	5	5	0	5	5	12	CP	45.92256	50% full
SP-6171	0	3	3	0	3	3	12	CP	26.3515	30% debris

Table 6: Pipes Inspected Through Candling										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Condition
SP-6172	0	5	5	0	5	5	12	CP	26.53493	Good condition, 50% debris
SP-6683	0	5	5	0	5	5	12	PE	28.54767	Good condition, 100% debris
SP-6834	0	1	1	0	1	1	12	CP	39.17935	Good condition, 15% gravel
SP-6836	0	2	2	0	2	2	12	CP	36.74795	Good condition, 25% gravel
SP-6893	0	1	1	0	1	1	12	CP	28.43554	Good condition, 5% debris
SP-6894	0	5	5	0	5	5	12	CP	25.6066	50% full of debris, visible pipe good condition
SP-780	0	5	5	0	5	5	12	CP	40.17598	85% debris
SP-896	0	2	2	0	2	2	12	CP	31.71702	Good condition, rocks & dirt

Table 7: Pipes Unable to be Inspected				
Asset ID	Diam.	Material	Length	Reason Not Inspected
SP-10477			50.299894	On private property
SP-10696			25.1542841	Too dirty
SP-10700			48.9999606	On private property
SP-10701	12	PE	39.0000525	On private property
SP-10702	12	PE	81.5632815	On private property
SP-10712	8	PE	125.271824	8" Pipe
SP-10784			0.28961583	Culvert under 25'
SP-11060	12		27.3784254	Too dirty, with 75% debris
SP-11153	8	PE	16.4551995	8" Pipe
SP-11362	24		64.3858386	On private property
SP-11410			35.3230458	On private property
SP-11411	12	PE	141.224865	On private property
SP-11938	8	PE	10.7120501	8" Pipe
SP-12472			2.42303491	On private property
SP-12493			47.0666878	On private property
SP-12678	12	CP	140.814043	Too dirty
SP-12762	6	CP	15.9306062	6" Pipe
SP-12764	8	CP	50.5448732	Upper end 8", lower end full of roots
SP-12765	4	CP	59.9682367	4" Pipe
SP-12819		CP	99.7366421	On private property
SP-12834	8	CP	8.74052001	8" Pipe
SP-12835	8	CP	6.03725346	8" Pipe
SP-12847	6	CP	25.9374087	6" Pipe
SP-12852	6	CP	40.460167	6" Pipe
SP-12905	8	CP	3.91016725	8" Pipe
SP-12909	8	CP	31.8675639	8" Pipe
SP-13091		CP	89.0361321	On private property
SP-13092		CP	61.0776858	On private property
SP-13093		CP	72.6123312	On private property
SP-13117			175.395067	80% water; carrying McAleer Creek across 205th
SP-13331		CP	58.01195	On private property
SP-13548	12	CP	25.0962336	Abandoned, full of concrete
SP-13670	12	CMP	234.029378	No access
SP-14373	12	CP	131.567538	Too dirty, with 50% debris
SP-15070	8	CP	11.4428297	8" Pipe
SP-15090		CP	42.8193855	Too dirty, with 40% mud
SP-15103		CP	110.159499	Too dirty
SP-15109		CP	29.9243649	Too dirty
SP-15112		CP	24.1081653	Too dirty
SP-15130		CP	110.524681	Illegal connection on NE Perkins Way
SP-15139		CP	94.6992786	Too dirty
SP-15282		CP	7.07240398	Too dirty, with 50% full of mineral deposits
SP-154	12	PE	17.9469071	Too dirty
SP-156	12	CMP	82.6955532	Too dirty

Table 7: Pipes Unable to be Inspected				
Asset ID	Diam.	Material	Length	Reason Not Inspected
SP-160	8	CP	16.6197072	12" reduces to 8" at 2 ft; too dirty, with 45% debris
SP-1608	12	CMP	38.2442202	Too dirty, with 25% debris
SP-1624	12	CP	16.3940108	Too dirty
SP-164	12	CP	30.2804255	Too dirty, with 40% gravel
SP-1647	18	CMP	43.1190078	Too dirty, with 50% debris
SP-174	12	PE	20.5520689	Too dirty, with 40% debris
SP-1798	12	CP	10.3174103	Too dirty
SP-2004		CP	48.4622774	Too dirty, with 60% water
SP-2470	12	CP	22.1866517	Too dirty
SP-2485	12	CP	21.1228407	Too dirty
SP-2486	12	CP	122.909567	On private property
SP-2501	12	CP	82.6326579	Too dirty
SP-2513	12	CP	35.107721	Too dirty
SP-2515	12	CP	91.8865135	Too dirty
SP-2521	12	CMP	40.2818408	On private property
SP-2523	12	CP	40.096417	Conflict, pipe blocked
SP-2545	18	CMP	7.87336033	Culvert under 25'
SP-2550	18	CMP	16.7340976	Too dirty, with 50% debris
SP-2661	12	CP	78.5516251	Too dirty
SP-3367	12	CP	26.9891931	Lower end full of slurry, upper end buried
SP-3389	6	CP	39.6272162	6" Pipe
SP-339	12	PE	14.2354254	In construction zone, no access
SP-3395	12	CP	25.0174634	Conflict, pipe blocked
SP-3400	12	CP	88.5981484	Too dirty
SP-3402	12	CP	21.2548803	Too dirty
SP-3409	12	CP	195.458167	Too dirty
SP-346	12	CMP	23.2985445	Too dirty, with 80% debris
SP-3570	10	CMP	33.9641056	10" Pipe
SP-3572	12	CP	13.4485374	Culvert under 25'
SP-4199	18	CMP	29.1181221	Too dirty, with 40% mud
SP-4217	12	CP	112.971224	No access
SP-4236	8	CP	25.1339284	8" Pipe
SP-4248	12	CP	63.4590052	Too dirty
SP-4273	12	CP	24.3504191	Too dirty
SP-4289	12	CP	22.9848569	No access into line, buried
SP-4312	18	CMP	12.0346127	Too dirty, with 50% debris
SP-4317	12	CP	9.2288892	Too dirty, with 40% debris
SP-5090	12	CP	76.1893559	Capped pipe at both ends
SP-5120	12	CP	18.3878936	Too dirty
SP-5161	8	CP	96.5177988	8" on lower end, upper end buried
SP-5294	12	CMP	38.0415945	Too dirty, with 50% water and 30% debris
SP-5295	12	PE	276.615818	On private property
SP-5555	12	CP	55.9263295	50% full of roots
SP-5608	12	CP	28.4419707	Too dirty
SP-5627	24	CMP	41.5453239	Camera under water

Table 7: Pipes Unable to be Inspected				
Asset ID	Diam.	Material	Length	Reason Not Inspected
SP-5975	12	CMP	159.203786	Too dirty
SP-5978	12	CMP	30.6391342	Too dirty
SP-5979	12	CP	124.630549	Too dirty
SP-5980	12	CP	82.8022298	Too dirty
SP-599	12	PE	39.4966078	Conflict; cannot locate, buried lid
SP-5996	12	CP	41.5453835	Too dirty
SP-5997	12	CP	45.66664	Too dirty
SP-5999	12	CP	49.365832	Too dirty
SP-6017	12	CP	122.68203	Too dirty, with 30% rocks
SP-6028	12	PE	64.487343	Too dirty, with 75% debris
SP-6124	12	CP	73.3173077	Cleaned, but still 30% full of dirt
SP-6128	12	CMP	88.0393013	Too dirty, with 30% gravel
SP-6150	12	CP	32.4900099	Too dirty
SP-6159	12	CP	22.3453363	Culvert under 25'
SP-6160	12	CP	18.4548096	Culvert under 25'
SP-6162	12	CP	14.3183815	Culvert under 25'
SP-6173	12	CP	7.3042731	Too dirty
SP-6443	12	CMP	64.509477	Too dirty, with 30% debris
SP-6839	12	CP	23.6671094	Culvert under 25'
SP-6870	15	CP	39.3360367	Too dirty
SP-6871	15	CP	22.7987306	No access
SP-6882	12	CP	68.961117	Too dirty
SP-6884	12	CMP	52.1544291	Too dirty, with 25% debris
SP-6889	12	CP	78.7413624	Too dirty, with 50% dirt
SP-6900	12	CMP	282.942993	Too dirty
SP-7372	18	CMP	59.6414256	On private property
SP-751	12	CMP	120.707223	Too dirty, with 25% debris
SP-759	12	CP	33.6356298	Too dirty
SP-7746		CP	37.2813182	On private property
SP-7810	12	CP	279.304076	On private property
SP-7856		CP	204.828044	On private property
SP-791	8	CP	74.6620288	Upper side is 8"; lower side too dirty, with 75% debris
SP-793	12	CP	56.8751405	Too dirty
SP-7999	8	CP	168.149836	8" Pipe
SP-802	12	CP	118.940385	Too dirty
SP-804	12	CP	76.4306675	Too dirty, with 100% debris
SP-806	12	CP	55.0644621	Too dirty, with 50% debris
SP-8350	6		12.4645359	6" Pipe
SP-8364	12	CP	20.835119	No access, construction zone
SP-8365	12	CP	12.000015	No access, construction zone
SP-8452	12	CP	112.574839	On private property
SP-8625	12	CP	38.5627566	Too dirty
SP-8667	36	PE	221.789229	No access, construction zone
SP-8688	8	CP	17.2525771	8" Pipe
SP-8858	8	CP	25.6751593	8" Pipe

Table 7: Pipes Unable to be Inspected				
Asset ID	Diam.	Material	Length	Reason Not Inspected
SP-8888	8	PE	39.681341	No access, construction zone
SP-8919	18	CP	107.639609	Conflict; inside drop, no access
SP-9013	12	CMP	24.0687287	Conflict; inside drop, no access
SP-9211	30	CP	64.2476531	Control structure in manhole and no access to ditch
SP-928	12	CMP	37.180694	Too dirty, with 30% mud
SP-9317	12	CMP	11.4666476	Conflict; inside drop, no access
SP-936	12	CP	19.0921721	Culvert under 25'
SP-938	12	CP	10.7693885	Culvert under 25'
SP-963	8	CP	14.3698503	8" Pipe
SP-9642		CP	134.158142	On private property
SP-9647	12	PE	119.189634	On private property
SP-9648	12	PE	237.871394	On private property
SP-966	12	CP	27.2181398	Too dirty
SP-9745	8	CP	31.6120463	8" Pipe
SP-9753	8	CP	75.9021309	8" Pipe
SP-9834		CP	9.00749081	Too dirty, with 40% debris
SP-9927		CP	48.9217865	Too dirty, with 50% debris
SP-9928		CP	14.7609569	Culvert under 25'
TK-167	36	CMP	22.3321586	No access, construction zone

McAleer

Table 8: Pipes with Incomplete Inspections

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-10742	0	5	5	0	5	5			23.11354	Needs more cleaning	Maintenance
SP-10958	3	2.25	2.33	3	18	21	15x21	CMP	82.97306	15" high by 21" wide oval CMP. Discharges to pond. Pipe 20% full of water at inlet, deposits in bottom of pipe (10% to 5% full entire length), camera underwater 25 ft from inlet, surface corrosion (hole in pipe underwater), camera unable to continue due to water level.	Maintenance
SP-11138	0	3	3	0	3	3	12	CMP	19.26535	Needs cleaning. Gravel in bottom of pipe (15% full for 4+ ft), camera unable to continue due to debris.	Maintenance
SP-1210	0	5	5	0	5	5	12	CP	30.39878	INCOMPLETE - blocked	Maintenance
SP-12212	0	4.33	4.33	0	13	13	12	CP	106.9262	Large rocks in pipe, basketball in pipe, pipe paused for cleaning, reverse inspection after cleaning, basketball gone, but large rocks pushed to downstream end of pipe, camera unable to pass, remainder of pipe visible and looks to be in good condition.	Maintenance
SP-12214	0	3.5	3.5	0	7	7	12	CP	131.9796	Pipe cleaned. Gravel in bottom of pipe at outlet end, tap break in - stormwater (not in report), debris in bottom 40% of pipe, camera unable to continue.	Maintenance
SP-126	0	3.5	3.5	0	7	7	12	DIP	90.42185	Pipe over 40% full of gravel, unable to continue.	Maintenance
SP-12763	2	3	2.75	2	9	11	12	CP	54.16542	Encrusted deposits (x3), joint offset (large) - unable to pass	Structural
SP-12850	5	0	5	5	0	5	12	CP	23.07208	Collapsed pipe	Structural
SP-12851	5	2	3.5	5	2	7	12	CMP	63.70148	1st direction: sediment; 2nd direction: repair section (PVC for 6 LF), collapsed pipe	Structural
SP-132	1.58	1.17	1.44	19	7	26	12	CP	48.9776	Pipe cleaned. Sediment in bottom of pipe (5% full for 26 ft), visible aggregate (20 ft), joint offset (very) large, camera unable to continue, inspect from other end. Visible aggregate (19 ft), joint angular medium, longitudinal cracks, debris in bottom of pipe (15% full), camera unable to continue.	Structural and Maintenance
SP-13308	0	2.5	2.5	0	5	5	12	CP	34.59778	Deposits ingressed fine, rocks in pipe, camera unable to continue (can see pipe completely blocked ahead with rocks & garbage and some sort of pipe or post protruding through pipe)	Structural and Maintenance
SP-1404	0	2	2	0	10	10	18	CMP	39.38225	Pipe cleaned. Needs more cleaning. Fine sediment with small rocks (5% full for 12ft then becomes about 15% full for 10+ft). Camera unable to continue due to debris.	Maintenance
SP-1405	0	2	2	0	6	6	12	CMP	174.6259	Deposits in bottom of pipe (x3), brick and debris in upstream end of pipe (10 ft), camera unable to continue to CB, last 10 ft looks really dirty.	Maintenance
SP-144	5	2	2.3	5	18	23	12	CMP	260.8976	Pipe cleaned. Deposits in bottom of pipe (10% full for 34 ft and 10% full for 10 ft), deformation in side of pipe blocking 50% of pipe, camera unable to continue, catch basin visible beyond deformation.	Structural
SP-14410	0	2	2	0	10	10	12	CP	55.29366	Needs more cleaning. Roots at joint (10% full), ~20 feet settled fine deposits. Camera unable to continue to continue due to debris.	Maintenance
SP-145	4	0	4	12	0	12	12	CP	114.1013	Hole at joint, joint offset large at material change from CP to CMP, deformation in CMP pipe, unable to pass, survey from other side, hole with visible soil at joint, giant hole in bottom of pipe, unable to reach bad part where they stopped on the other end, possible illicit connection in portion camera unable to reach.	Structural
SP-14673	1.5	1.85	1.8	3	20	23	12	CP	137.1919	Deposits in bottom of pipe (5-10% full for 35 ft), fine roots at joint (2 joints called out in report, roots actually visible at most joints in pipe), deposits ingressed gravel (deposits attached encrusted), mineral deposits blocking 25% if pipe, camera unable to pass, inspect from other end. Infiltration weeper (x3), joint offset large/joint separation medium (same joint), camera unable to continue. illicit stormwater connection visible in top of pipe upstream (actively discharging water into pipe).	Structural and Maintenance
SP-14824	0	3	3	0	6	6	12	CP	174.1266	Dirt and debris in bottom of pipe (15-20% full for 39 ft), camera unable to continue due to debris.	Maintenance
SP-15098	2.67	2.2	2.45	16	11	27	12	CP	150.4666	1st report: Fine deposits first foot from CB 15098, broken pipe at joint with visible void, fine deposits ingressed at joint, pipe changes from 12 in CP to 4" PE, unable to continue in 4" pipe, deposits at transition. 2nd report: Pipe cleaned. Circumferential crack, medium roots at joint, joint offset medium, deposits in bottom of pipe (10% full for 3 ft), exposed aggregate (15 ft), fine roots, pipe then changes from 12 in CP to 8 in PE, camera unable to continue.	Structural
SP-15100	5	2	2.6	5	8	13	12	CP	57.09978	Broken (soil visible), sediment (5-10% length of pipe) - unable to continue due to debris	Maintenance
SP-15101	0	2	2	0	12	12	12	CP	298.1246	Tap in, gravel in bottom of pipe (10% for 30 LF) - unable to continue due to debris	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-15104	0	1.67	1.67	0	5	5	12	CP	146.3394	Roots at joint (fine for 20 LF - not noted in report), gravel deposit (10%), sediment deposit (10%) - unable to continue due to debris	Maintenance
SP-15106	0	2	2	0	8	8	18	RCP	71.99552	Pipe cleaned. Mud and sticks in bottom of pipe (5% full for 6 ft), leaves, sticks and roots in bottom of pipe (5% full for 3 ft), mud and sticks in bottom of pipe (5-10% full for 20 ft), camera unable to continue past deposits and debris. Needs more cleaning	Maintenance
SP-15116	5	3	4	5	3	8	12	CP	152.62	Hole with visible soil at bottom of pipe at joint, tap break in protruding almost completely though pipe, top half of pipe blocked, camera unable to continue	Tap-in
SP-15118	0	3	3	0	3	3	12	CP	108.6922	Rocks in pipe, concrete chunks completely blocking upstream end of pipe (collapsed pipe?), upstream end unknown	Structural
SP-15119	5	2	3.5	5	2	7	12	CMP	57.24052	Patch covering cut pipe, deformation/squished in on side/top, deposits in bottom of pipe, drop into CB, camera unable to continue, but pipe looks good.	Maintenance
SP-15121	1	0	1	1	0	1	12	CP	51.83147	Joint offset medium, camera stuck, unable to continue, upstream end of pipe unknown.	Structural
SP-15131	0	2	2	0	2	2	12	CMP	32.00116	Pipe 10% full of water, gravel in bottom of pipe (10% full for 5 ft), bend in pipe, camera unable to continue, upstream CB unknown.	Structural
SP-15134	0	2	2	0	14	14	12	PE	63.95886	Pipe cleaned. Deposits in bottom of pipe (5% full for 13 ft), deposits in bottom of pipe (10% full for 20 ft), camera unable to continue past deposits, visual inspection of remainder of pipe looks ok.	Maintenance
SP-15135	3	1.33	2.09	15	8	23	12	CP	273.3952	Pipe cleaned. Exposed aggregate entire length of pipe, fine roots at joints (x4), deposits in bottom of pipe (5% full for 10 ft), camera stuck on a root, cannot continue.	Maintenance
SP-152	3.14	1.83	2.75	44	11	55	12	CP	218.5366	Pipe cleaned. Gravel in bottom of pipe (10% full for 16 ft), fine roots at joint, deposits in bottom of pipe (10% full for 10 ft), camera unable to get past rock, inspect from other end. Exposed aggregate (65 ft), broken pie with visible soil, camera unable to continue past broken pieces of pipe.	Structural and Maintenance
SP-155	5	2.67	3.25	5	8	13	12	CP	74.29284	Sediment deposit (10%) with gravel from hole with soil visible, infiltration runner, rocks and sediment deposit - unable to continue due to rocks	Maintenance
SP-1597	0	2	2	0	4	4	12	CMP	66.50274	Sediment and roots at bottom of pipe - camera unable to pass	Maintenance
SP-1598	3.5	3	3.33	7	3	10	12	CP	27.81948	Tap-in, repair (10 LF of PE pipe), sag in PE pipe, deformation in PE pipe - unable to pass	Structural
SP-1600	2.33	2	2.25	7	2	9	12	CP	76.42096	Under water, extreme sag. Pipe cleaned. Exposed aggregate entire length of pipe, joint angle medium, debris in pipe (5% full), camera unable to continue past angle in pipe. No access other manhole.	Structural
SP-1603	3	1.75	2.55	21	7	28	12	RCP	130.2178	Pipe cleaned. Exposed aggregate (36 ft), fine roots at joint, fine roots in barrel of pipe (10 ft+), alignment right (pipe bends to right), camera unable to get through fine roots and bend in pipe. Upper CB not accessible.	Structural and Maintenance
SP-1627	3	2.25	2.81	36	9	45	12	CP	85.63785	Pipe cleaned. Surface damage along bottom of pipe for total of 48 feet. Fine sediment deposits and small rock obstructions (10% full for 12 feet). Hole with visible soil beyond. Camera unable to continue due to debris.	Maintenance
SP-1632	3.5	3.33	3.4	7	10	17	12	CP	120.7693	Rock in pipe, change from CP to PE, active tap break in 3" storm, large joint separation at PE to CP transition, change from PE to CP, attached encrusted deposits, rocks in pipe, change from CP to Steel, large rock in pipe, deformed/crushed pipe, unable to continue.	Structural
SP-1635	1.5	0	1.5	3	0	3	12	CP	52.03799	Pipe cleaned. Pipe 15% full of water, weird structure with pipe going though it, camera unable to pass, inspect from other end. Joint offset medium, sag (20% full for 5 ft), joint offset large, unable to reach weird structure.	Structural
SP-173	0	2	2	0	4	4	12	CP	66.29518	Sediment and rocks length of pipe - unable to pass; all joints look separated	Maintenance
SP-1747	3.18	3	3.17	54	3	57	12	CP	91.57241	Pipe cleaned. Exposed aggregate entire length of pipe, broken pipe at joint, hole with soil visible at joint, medium roots at joint protruding all the way across pipe, camera unable to pass, more large root balls at joints visible upstream	Maintenance
SP-175	0	2.33	2.33	0	14	14	12	CP	51.02898	Pipe cleaned. Needs more cleaning. Fine sediment deposits observed for full length of video. 10% full for first 19 feet, then 40% to 50% full. Camera unable to continue due to sediment build up. Fine root observed at joint (5% blockage).	Maintenance
SP-1766	0	5	5	0	5	5	12	CP	42.60024	blocked, needs cleaning	Maintenance
SP-1767	5	1.75	2.83	10	7	17	12	CP	132.2481	Pipe cleaned. Broken pipe at joint with roots (roots not in report) , tap break in (stormwater) with large amount of roots (roots not in report), fine roots at joint (at all joints, only one called out in report), deposits in bottom of pipe (10% full for 15 ft), then camera unable to continue.	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-1768	0	2.6	2.6	0	13	13	12	CP	44.08889	Pipe cleaned. Deposits in bottom of pipe (5% full for 20 ft), bend in pipe (not in report), cracked pipe at bend (not in report), pipe 50% full of debris after bend, camera unable to continue.	Maintenance
SP-1771	0	5	5	0	10	10	12	CP	125.853	No scores on first half of inspection. Deposits in bottom of pipe (5-20% full for 15 ft), camera unable to continue, inspect from other side. Tap break in (stormwater, connecting pipe 20% full of debris), deposits in bottom of pipe (5-50% full for 12 ft+), camera unable to pass, giant root visible downstream.	Maintenance
SP-1773	3	2	2.77	30	6	36	12	CMP	115.8996	Surface corrosion entire length of pipe, gravel in bottom of pipe (5% full for 10 ft), gravel in bottom of pipe (10% full for 7 ft), camera unable to continue due to gravel in bottom of pipe.	Maintenance
SP-1781	2	2	2	2	2	4	12	CP	26.43226	Pipe cleaned. Deposits in bottom of pipe (10% full for 6 ft), pipe 10% full of water, joint offset large, pipe 90% full of water beyond large joint offset.	Structural
SP-1782	3	4	3.05	60	4	64	12	CP	24.44363	Aggregate visible (length of pipe), sediment (25% for 5 LF) - unable to pass	Maintenance
SP-1788	5	3	3.67	5	6	11	12	CP	72.52958	Intruding sealing grout, broken void visible, sediment (25% for 10 LF) - unable to pass after jetting	Maintenance
SP-1794	0	3	3	0	3	3	18	RCP	78.44782	needs more cleaning. Water level 10% full with fine and gravelly sediment deposits observed along edge of pipe then increasing to 20% full for 4 feet. Camera unable to continue due to sediment.	Maintenance
SP-1797	2	3	2.33	4	3	7	12	CP	145.4296	Large joint offset, camera unable to continue, inspect from other end. Camera out of focus, circumferential fracture at joint, dirt and debris in bottom of pipe (15% full for 5+ ft), camera unable to continue past debris, unable to reach large joint offset. Pipe needs more cleaning.	Maintenance
SP-1799	2.67	0	2.67	8	0	8	12	CP	319.6423	partially under water. Water level 5% full through pipe length recorded. 3-ft pipe section of PVC pipe. Circumferential fracture observed but no associated washout at 40.2 ft marker. Pipe break at joint followed by large joint offset (identified soil void outside of pipe). Camera unable to continue due to large joint offset.	Structural
SP-1801	0	2.5	2.5	0	5	5	12	CP	81.06723	Fine sediment deposits 5% full then gradually increases to 20% full for 45 feet. Camera unable to continue because mud line has been jetted.	Maintenance
SP-1805	2	3.25	3	2	13	15	12	CP	68.88511	Rocks, dirt and debris (steel? & trash) in pipe (5-50% full for 10 ft), camera unable to continue past debris, material change visible downstream (CP to PE), inspect from other end. Joint offset large with rocks and debris, camera unable to pass, camera unable to reach debris and material change from other end.	Structural and Maintenance
SP-1806	0	1.5	1.5	0	3	3	12	CP	57.70831	Needs more cleaning. Fine sediment deposits 5% full at ingress. Fine roots at joint. Full pipe blockage (rocks and fine sediment) camera unable to complete due to debris.	Maintenance
SP-2010	4	0	4	4	0	4	12	CP	107.8991	Codes on report don't match codes on video. Deposits attached encrusted at 15.2, CP to CMP at 29.7, hole with chunks of metal pipe protruding repaired with plastic, camera cannot pass, no reverse inspection completed as discharge point is buried.	Structural
SP-2475	0	3	3	0	6	6	12	CP	144.513	No access to bottom cb, needs more cleaning. Fine wet sediment deposits (muddy), 15% full for 14+feet. Camera unable to continue due to deposits.	Maintenance
SP-2482	0	1.92	1.92	0	23	23	12	CP	61.45686	Needs more cleaning. Fine sediment deposits (10% full for 55+ feet) with occasional woody debris (i.e., grass, roots, branches). Fine roots also observed at joints. Camera unable to continue due to deposits.	Maintenance
SP-2483	0	3	3	0	3	3	12	CMP	41.82998	Pipe cleaned. Needs more cleaning. Fine sediment deposits observed for entire pipe length. 20% full for first 10+ feet. Camera unable to continue due to sediment build up.	Maintenance
SP-2514	0	2.5	2.5	0	5	5	12	CP	63.13317	Roots at joint (medium for 5 LF), rocks, sediment, and deposits at joints - unable to continue	Maintenance
SP-2523	0	5	5	0	5	5	12	CP	40.09642	Conflict - blocked	Maintenance
SP-2527	0	1	1	0	1	1	12	CP	149.1494	Pipe cleaned. Fine roots at joint. Survey abandoned at 111 feet due to bad concrete patch repair section.	Structural
SP-2528	0	2	2	0	18	18	12	CP	93.52767	Pipe cleaned. Needs more jetting, rocks. Gravelly deposits with some rocks 10% full for 10 feet. Fine sediment deposits 5% full for 34 feet. Camera unable to complete due to rock obstructions.	Maintenance
SP-2529	0	2	2	0	6	6	12	CP	56.25824	Pipe cleaned. Needs more cleaning. Rock obstructions 10% full for 8 feet. Gravelly deposits 10% full for 23 feet with rocks. Camera unable to complete final three pipe sections due to rock obstructions.	Maintenance
SP-2535	0	4	4	0	12	12	12	PE	60.70465	Pine needle deposits (30-10% for 20 LF) - unable to pass after jetting	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-2536	2.14	3	2.25	15	3	18	12	CP	53.22608	needs more cleaning. Medium joint offset observed at three locations. Medium joint separation, rocks and soil visible beyond defect. Hole in pipe with visible soil beyond defect. Surface damage (aggregate visible for 10 feet. Slurry (construction debris obstruction). Camera unable to continue due to slurry obstruction.	Maintenance
SP-2537	0	5	5	0	5	5	12	CP	144.0577	Roots and sediment blocking pipe - unable to continue	Maintenance
SP-2548	2	0	2	2	0	2	12	CP	39.86841	Joint offset (large) - unable to pass	Structural
SP-2551	3.5	3.33	3.4	7	10	17	12	CP	91.32122	Joint offset large, electrical conduit or gas line of some sort through pipe, paused for cleaning. Pipe cleaned. Hole at joint with visible void, rocks and debris in pipe (25% full), camera unable to pass.	Maintenance
SP-2566	0	5	5	0	5	5	18	CP	45.02062	Needs more cleaning	Maintenance
SP-2664	5	3	3.67	10	12	22	12	CMP	142.9281	Pipe cleaned. Pipe 10% full of water, hole with visible soil in top of pipe (x2), another hole with visible soil in top of pipe at 28 ft (not listed in report), gravel in bottom of pipe (10% to 20% full for 20 ft), camera unable to continue, visual inspection of remaining pipe - looks like a joint separation and possibly another hole.	Maintenance
SP-2673	0	5	5	0	5	5	12	CP	24.92649	50% debris - 3 passes will not clean	Maintenance
SP-2676	3	2.93	2.94	6	44	50	12	CP	90.73726	Pipe cleaned. Deposits (mud, rocks and debris) in bottom of pipe (10% to 15% full entire length of pipe), hole with visible soil and large void and deposits ingressed fine in side of pipe, roots at joints (not in report) joint offset medium, camera unable to complete inspection due to large amount of gravel in pipe.	Maintenance
SP-2687	3	5	3.18	30	5	35	12	CP	87.49707	Deposits (dirt and gravel) in bottom of pipe (10-50% full for 7+ft), camera unable to continue, inspect from other end. Visible aggregate entire length of pipe, steep slope changes to moderate slope, water level in pipe 40%+, camera unable to continue, needs more cleaning, camera unable to reach original MSA point.	Maintenance
SP-2689	0	3	3	0	9	9	12	CP	30.39445	Deposits attached encrusted (x2), deposits settled compacted filling 75% or more of the pipe 27 ft in. UNKNOWN OUTFALL LOCATION	Maintenance
SP-2692	2.5	3	2.83	5	12	17	12	CP	129.4751	Multiple cracks, joint offset large, camera unable to get through joint offset, inspect from opposite end, mud and rocks in bottom of pipe (10% to 15% full for 20 ft), camera unable to get through deep mud, camera unable to reach large joint offset that stopped inspection in other direction.	Maintenance
SP-2971	5	0	5	10	0	10	12	PE	99.75205	1st direction: deformation (50%); 2nd direction: deformation (90%) - unable to inspect middle section of pipe	Structural
SP-2984	3	0	3	3	0	3	12	CMP	41.28239	Hole observed around 29.5 feet with PVC patch. Camera unable to continue due to dent/bend on pipe from repair.	Structural
SP-3015	0	2.33	2.33	0	21	21	12	CP	77.92972	Dirt, rocks and debris in bottom of pipe (10% full for 23 ft), camera stuck on stick in pipe, inspect from opposite end, dirt, rocks and debris AND ROOTS in bottom of pipe (10% full for 12 ft), roots not mentioned in report, dirt, rocks and debris in bottom of pipe (10% full for 3+ ft to point where camera got stuck from opposite end).	Maintenance
SP-3232	0	3	3	0	3	3	12	CMP	81.39102	Tap-in, pipe half full with water	Maintenance
SP-3351	3.25	2.86	3	13	20	43	12	CP	207.0904	Rocks in bottom of pipe (15% full for 3 ft at 2 locations), material change (CP to PE), rocks in bottom of pipe (15% full for 4 ft), broken pipe (something is pushing hole in side of pipe), rocks in bottom of pipe (10% full for 3 ft), material change (PE to CP for 3 ft, then CP to PE), rocks in bottom of pipe at change from CP to PE (15% full for 2+ ft), camera unable to continue, inspect from other end. Pipe 20% full of water at downstream end, material change (CP to PE), sag (30% deep for 25 ft), material change (PE to CP), joint offset medium, material change at joint offset (CP to PE), rocks in pipe (15% full for 3 ft), deformation in PE pipe (pipe no longer round), rocks in bottom of pipe (15% full for 5+ ft), camera unable to pass rocks, needs more cleaning.	Maintenance
SP-3352	1.5	1.5	1.5	3	3	6	12	CP	81.43662	Water 10% full for first 24.7 feet of CP. Fine roots at joint. There appears to be a couple locations where material changes along pipe length which were not recorded in the report. Joint offset was observed at all material changes joints. Water was observed dripping at one of the material change joints. Metal pipe (24.7 to 45.3 feet), concrete section (45.3 to 48 feet), metal (48 feet to 59.6 ft), concrete pipe to end. Longitudinal crack recorded at top of pipe. A couple medium joint offsets observed in last 15 feet. Weeping hole at 78.8 feet. Camera unable to complete due to offset at weeping hole, however, able to observe conditions of final section.	Structural
SP-3366	2.33	4	2.75	7	4	11	12	CP	156.964	Broken at joint, joint offset (medium soil visible), joint separation (medium soil visible), large rocks, repair section (PE pipe), material change to CMP - unable to pass rocks	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-3371	5	3	3.4	5	12	17	12	CP	24.33628	Sediment, broken at joint, bend in pipe at start and end - unable to pass bend at end	Structural
SP-3372	3	2	2.5	6	4	10	12	CP	87.20545	Needs more cleaning. Fine sediment deposits, which appeared like caked mud at the bottom of the pipe (10% full for 18 feet). Surface damage aggregate visible recorded for 24 feet. Camera was unable to complete due to complete sediment debris obstruction at 24 feet.	Maintenance
SP-3373	0	1	1	0	2	2	12	CP	29.07882	Fine roots blocking part of pipe at two joints.	Maintenance
SP-3378	1	3	2.5	1	9	10	12	CP	37.50715	Fine roots at joint, dirt in bottom of pipe (10% full for 6+ ft), camera unable to continue past dirt, inspect from other end. Joint angular medium (change in slope - reverse slope), dirt in bottom of pipe (10% full), camera unable to pass dirt, needs more cleaning.	Maintenance
SP-3379	5	0	5	5	0	5	12	CP	26.15736	50% offset	Structural
SP-3390	0	2.6	2.6	0	13	13	12	CP	36.29057	needs more cleaning. Fine sediment deposits mixed with dried vegetation (5% full for 20 feet), then increases to 50% full at 25ft mark. Camera unable to complete due to sediment obstruction.	Maintenance
SP-3395	0	5	5	0	5	5	12	CP	25.01746	Conflict - blocked	Maintenance
SP-3421	3	2	2.62	24	10	34	12	CP	116.3605	Exposed aggregate entire length of pipe, dirt in bottom of pipe (5% full for 15 ft), fine roots at joint, pipe appears to be capped with asphalt. 100% full of asphalt. Camera unable to pass. Inspect from other end. Pipe 15% full of water, dirt and debris in bottom of pipe (20% full for 4 ft - to "capped" point), pipe appears to be capped with asphalt (100% full).	Structural
SP-3423	0	2	2	0	4	4	12	CP	11.79383	Gravelly deposits 10% full for 6 feet. Camera unable to complete due to debris.	Maintenance
SP-3439	5	1.67	2.5	5	5	10	12	CP	137.5152	Fine roots at joints (x5), Tap break in - short 6-inch pipe on top of pipe with catch basin lid, change from CP to corrugated PE (looks like lining?), deformation in corrugated PE pipe - camera unable to continue	Structural
SP-347	0	1.25	1.25	0	10	10	12	CP	123.0888	Rocks and gravel in bottom of pipe (5% to 20% full for 42 ft), camera unable to pass, inspect from other end. Dirt and debris in bottom of pipe (15% full for 4+ ft), camera unable to reach same spot from opposite end.	Maintenance
SP-3545	2	0	2	2	0	2	12	CP	77.57046	Joint offset large, "line is in really bad shape" camera unable to continue after large joint offset 6 ft into pipe, can see several offset joints and lots of debris in pipe bottom (50% or more) upstream.	Structural
SP-3561	1	1.56	1.5	1	14	15	12	CP	162.4299	Gravel in bottom of pipe (10% full for 11 ft), joint offset medium, camera unable to pass debris, inspect from other end. Dirt and gravel in bottom of pipe (5% full for 17 ft), fine roots at joints (6 ft), gravel in bottom of pipe (10% full for 20 ft), camera unable to pass debris and big rocks, unable to reach same spot from opposite end.	Maintenance
SP-3565	5	3.5	4	5	7	12	12	CP	126.3137	Mud and debris in bottom of pipe (5% full for 6 ft), broken pipe with visible soil at tap break in (4" stormwater), camera unable to continue, inspect from opposite end, pipe 45% full of rocks and debris at upstream end, camera only able to make it 6 ft into pipe.	Tap-in
SP-3571	0	3.33	3.33	0	10	10	12	CP	162.3503	Needs more cleaning. Smashed can recorded as an obstruction (10% blockage). Fine sediment deposits 15% full for 6+ feet with dried vegetation stuck to pipe sidewalls. Candlelight shows sediment deposits up to 60% full downstream of stopping point (not documented in the report). Camera unable to complete due to debris.	Maintenance
SP-3574	3	2	2.6	9	4	13	12	CP	82.14902	Needs more cleaning. Surface damage visible aggregate for 6 feet. Material change twice concrete to CMP then CMP to concrete. Gap observed between CP / CMP material change with observed soil washout into pipe. Fine sediment deposits 10% full for 10 feet (full length of CMP). Fine sediments do not appear to have been transported downstream of the CMP section. Camera unable to complete at second material change location/camera unable to move over concrete pipe wall.	Structural
SP-358	3	3	3	3	6	9	12	CMP	26.66282	Needs more cleaning. Fine (clumpy) sediment deposits 15% to 10% full for 10 feet. Surface damage observed (corrosion). Camera unable to complete due to deposits.	Maintenance
SP-3905	0	2	2	0	10	10	12	CP	176.6813	Gravel in bottom of pipe (5% full for 20 ft), large piece of wood in pipe at large joint separation (looks like repaired with bricks), camera unable to continue.	Structural
SP-4066	5	0	5	5	0	5	12	CMP	221.436	Pipe cleaned. Collapsed pipe - unable to locate upstream CB	Structural
SP-4082	2	4.5	3.67	2	9	11	12	CP	149.9196	Joint separation large, roots in pipe barrel, large rocks blocking 70% of pipe - camera unable to continue	Maintenance
SP-4207	0	3.5	3.5	0	7	7	12	CP	66.8184	Gravel and mud in bottom of pipe (10% to 25% full for 6 ft), camera unable to pass debris, inspect from opposite end, gravel and mud in bottom of pipe (10% to 15% full for 4 ft), camera unable to continue, camera unable to reach spot where they had to stop from the other end.	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-4214	5	2.25	2.46	5	9	14	12	CP	205.2476	Pipe completely blocked with what looks like a smaller CP inserted into pipe (possible repair?), but completely full of mud and debris. Inspect from other side, tap break in (4" stormwater) in side of pipe, dirt in bottom of pipe (5% to full), camera unable to continue, camera cannot reach same blockage point from other end.	Maintenance
SP-4234	1	1.5	1.4	1	6	7	12	CP	79.36805	Water 25% full and gradually reducing to 10% full for 66 feet. Water level in catch basin above pipe invert. Tap break 4inch plastic corrugated pipe, complete blockage of soil. Rooted joints (fine) partially blocking pipe at three locations. Medium joint gap with soil visible beyond opening. Potential infiltration stains for 10 feet starting at the 74.7 ft mark which was not recorded in the report. Camera unable to complete 2 feet before pipe end.	Structural
SP-4235	1	0	1	2	0	2	12	CP	33.25401	Medium joint offset and separation. Construction debris (orange plastic tape) observed poking through gap. Gravel visible beyond gap. Camera unable to complete due to offset, however end of pipe visible.	Structural
SP-4243	0	2.6	2.6	0	13	13	12	CP	105.9582	Tap break in, drop in pipe, unknown thing protruding into pipe - camera unable to continue to unknown discharge point. Pipe cleaned and reinspected 2 months later. Debris in bottom of pipe (5% full for 12 ft), tap break in (stormwater), tap break in (unknown - odd looking steel thing protruding all the way through pipe), drop in pipe, camera unable to continue.	Structural
SP-4252	0	5	5	0	5	5	12	CMP	22.65071	Heavy roots	Maintenance
SP-4261	4	2.33	3	8	7	15	12	CP	90.56885	Needs more cleaning and has a gas line through pipe. Fine (with clumps) sediment deposits 10% full for 7 feet. Small hole with visible gravel beyond hole. Fine sediment deposits 5% full for 5 feet. 40% pipe damage at illicit pipe connection (~2 to 3-inch gas line). Camera unable to continue due to pipe damage and gas pipe line obstruction.	Structural
SP-4269	2	2.11	2.1	2	19	21	12	CP	65.81573	Offset joint. Surface damage with aggregate visible. Water 10% full for 15 feet. Gravel deposits 5% full for 5 feet. Intruding sealing ring observed at five joints (also noted that pipe is offset at the joints). Standing water at joint offsets from sags. Fine roots observed at three of the joints. Large joint offset near end of pipe. Pipe beyond the offset appeared to be 25% full of fine sediment deposits (not in report). Camera unable to continue to pipe end due to joint offset.	Structural
SP-4270	2.14	2.25	2.18	15	9	24	12	CP	99.55304	Water level. Gravel deposits 25% full for 9 feet. Rooted (medium) joints partially blocking pipe (20%). Gravel deposits 10% full for 11 feet. Water 10% full from pipe sag for 11 feet. And 10% full of water due to a sag for 15 feet. Water level increases to 20% then 40% for 4 feet. Camera unable to continue due to water level >50%	Maintenance
SP-4288	1	2.19	2.12	1	35	36	12	CP	129.3578	Pipe cleaned. Needs more cleaning, stop at 107 ft. Rock obstructions partially blocking pipe at three locations along pipe. Fine (and gravelly) sediment deposits 5% to 15% for 33 feet. Medium joint offset with fine roots at joint. Fine (more like gravelly) sediment deposits 10% full for 20 feet then up to 40% full at 107 ft mark. Water at 5% full due to sediment backup and camera unable to continue.	Maintenance
SP-4298	0	5	5	0	5	5	12	CP	31.62786	Candled - 100% blockage, no visual on condition (32 LF)	Maintenance
SP-4300	0	5	5	0	10	10	12	CP	63.07073	Cables through pipe and continue on down the pipe - camera unable to continue	Structural
SP-4310	0	4	4	0	16	16	12	PE	27.58707	Pipe is 30%+ full of debris entire circumference of pipe, camera only able to go 24 ft into pipe	Maintenance
SP-4311	0	5	5	0	5	5	12	CP	167.3502	Gravel filling 50%+ of pipe, after 3 jetting attempts, pipe is still full.	Maintenance
SP-4315	3	2	2.33	3	4	7	12	CP	65.35148	Crack (multiple), pipe in line, encrusted deposit - unable to pass pipe in line	Maintenance
SP-4321	0	4	4	0	4	4	12	CP	61.0293	Pipe cleaned. Needs more cleaning. Fine (clumpy and gravelly) sediment deposits 25% full. Camera unable to start due to debris build up.	Maintenance
SP-4322	0	5	5	0	5	5	12	CP	26.8189	Candled - 90% blockage, no visual on condition (42.1 LF)	Maintenance
SP-473	2	2.5	2.33	2	5	7	12	CP	77.6416	Water 5% full. Longitudinal crack. Rock obstructions partially blocking pipe flow (10%). Longitudinal crack (potentially surficial) along top of pipe for approximately 1 foot. Fine sediment deposits mixed with trash debris and woody sticks 15% full. Water flow over debris to pipe outlet / camera unable to due to debris.	Maintenance
SP-474	0	2.5	2.5	0	10	10	12	CP	86.67443	Water 5% full. Line jogs up and then jogs down. Gravel sediment deposits (10% full for 6 feet). Fine roots at joint that wanders 6 feet. Rock obstruction partially blocking flow (5%). Fine sediment deposits 50% full. End of pipe visible through debris deposits, however, camera unable to complete due to debris.	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-475	2.69	0	2.69	35	0	35	12	CP	64.77158	Gravel in bottom of pipe (8 ft), Joint offset medium with attached encrusted deposits, broken pipe with attached encrusted deposits, tap break in (4"), pipe blocked with trash and dirt (and more joint offsets?). Pipe cleaned. Exposed aggregate entire length of pipe, joint offset medium, hole with visible soil, longitudinal crack (x2), tap break in (stormwater), joint offset medium, pipe still 100% full of dirt and garbage, camera unable to continue.	Maintenance
SP-4761	1.5	0	1.5	3	0	3	12	CP	48.19708	Joint offset (medium and large) - unable to pass	Structural
SP-4765	0	2.33	2.33	0	7	7	12	CMP	40.05682	Needs more cleaning. Water 5% full. Fine sediment deposits (20% full for 12 feet). Appears to be a dent on the pipe sidewall where medium roots are growing from joint. Camera unable to complete due to debris.	Maintenance
SP-4915	5	0	5	5	0	5	24	CMP	59.92288	Entrance to pipe blocked in MH-5 by corrugated metal pipe through structure, unable to access pipe, water able to get to pipe, but not camera. Pipe entrance at MH 696 too dirty to inspect.	Tap-in
SP-5083	5	2.83	3.14	5	17	22	12	CP	101.3067	Sediment (10-15% for 25 LF), intruding grout at joint, broken/holes at joint - unable to pass sediment	Maintenance
SP-5091	0	3	3	0	12	12	12	CP	61.93574	Compacted deposits (15-20% for 20 LF) - unable to pass after jetting	Maintenance
SP-5095	5	2	2.43	5	12	17	12	CP	77.14527	Needs more cleaning. Fine (clumpy) sediment debris 10% full for 31 feet. Surface damage with visible aggregate observed. Pipe dent (deformity) observed at 31.3 ft mark partially blocking flow (40%). Two small diameter (~1-inch) observed penetrating sidewall - intruding pipes do not fully cross pipe cross section. Camera unable to continue due to pipe deformity, however, it appears that fine sediment deposits continues through end of pipe.	Structural
SP-5117	0	3	3	0	9	9	12	CP	32.33355	Gravel at bottom of pipe (10-15% for length of pipe) - unable to continue due to gravel	Maintenance
SP-5126	0	2	2	0	4	4	12	CP	67.43112	Fine sediment deposits 10% full. Camera unable to complete due to debris buildup. Candlelight shows deposits continue beyond stopping point, however not clear if end of pipe was visible.	Maintenance
SP-5140	0	5	5	0	5	5	8	CMP	44.91552	Needs cleaned and cannot access due to bend and smaller pipe	Structural
SP-5141	4	2.33	3	16	14	30	12	CMP	142.1961	Dirt in bottom of pipe (10% full for 20 ft), surface corrosion, hole with visible soil, deformation in top of pipe blocking 20% of pipe, broken pipe with metal protruding into pipe, camera unable to pass, inspect from other end. Gravel in bottom of pipe (15% full for 9+ ft), camera unable to pass, needs more cleaning, camera unable to reach area where inspection stopped from other end.	Maintenance
SP-5154	0	2.5	2.5	0	5	5	12	CP	20.78831	Pipe cleaned. Needs more cleaning. Material change 2 ft from downstream end (PE to CP), gravel in bottom of pipe (15% full), camera unable to continue, inspect from other end. Gravel and rocks in bottom of pipe (10% full for 2+ ft), camera unable to pass, camera unable to reach same area as reverse inspection.	Maintenance
SP-5160	3	2	2.15	6	22	28	12	CP	90.47009	Pipe cleaned. Needs more cleaning. Fine roots at joint. Multiple fractures for 50 feet. Pipe section also has water 15% full due to pipe sag. Fine sediment deposits 10% full for 45 feet. Tap break in. Camera unable to complete due to debris buildup, candle rest of pipe with sediment deposits.	Maintenance
SP-5165	0	3	3	0	6	6	12	CMP	37.37543	Deposits in bottom of pipe, camera unable to get through pipe, visual inspection to next CB, pipe in good condition	Maintenance
SP-5166	0	5	5	0	5	5	12	CP	27.05141	Candled - 75% debris, unable to inspect (28.3 FT)	Maintenance
SP-5180	0	2	2	0	2	2	12	CP	70.63805	Sealing grout intruding into pipe, camera unable to pass	Maintenance
SP-5299	0	3	3	0	6	6	12	CP	69.11705	Pipe cleaned. Gravel in bottom of pipe (5% full for 10 ft), gravel blocking 30% of pipe, camera unable to continue.	Maintenance
SP-5300	0	2	2	0	26	26	12	CP	93.43705	25% full of water, deposits attached encrusted to side of pipe (10% protruding, for 30 ft), camera unable to continue through deposits.	Maintenance
SP-5560	0	2.83	2.83	0	17	17	12	CP	43.75325	Gravel (10% for 6 LF, 20% for 25 LF) - unable to pass, rest of pipe in good structural condition	Maintenance
SP-5927	3	3	3	9	3	12	12	CP	215.7115	needs more cleaning & root blockages. Water 10% full for 54 feet and then increases to 50% full due to pipe sag for 14 feet. Fine sediment deposits 20% full with portion sticking out of the water. Camera unable to continue due to sediment obstruction.	Maintenance
SP-5928	2.98	2	2.96	164	2	166	12	CP	293.6184	Exposed aggregate entire length of pipe, sag (10% deep for 6 ft), debris and water in pipe (50% full), camera unable to continue, inspect from other side. Exposed aggregate entire length of pipe, deposits in bottom of pipe (10% full for 3 ft), material change (CP to PE), camera unable to pass, camera unable to reach reverse inspection stopping point, needs more cleaning.	Structural

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-5946	2.67	2.5	2.56	8	15	23	12	CP		Exposed aggregate entire length of pipe, deposits (dirt and roots) in bottom of pipe (5-15% full for 15 ft), camera unable to continue, inspect from other end. Deposits in bottom of pipe (5% full for 80 ft, 15% full for 5 ft), circumferential fracture at joint, camera unable to continue, needs more cleaning, camera unable to reach same area as reverse inspection.	Maintenance
SP-5956	3.5	4.5	3.7	28	9	37	15	CP	105.5409	Pipe 10-50% full of water, paused for cleaning. Pipe cleaned, exposed aggregate entire length of pipe, giant root ball blocking 55% of pipe, broken pipe (where roots are getting in), camera unable to continue, inspect from other end. Exposed aggregate entire length of pipe, camera able to make it to other side of giant root ball and broken pipe.	Structural
SP-5961	1	3	2	1	3	4	12	CP	46.03558	Giant rock blocking 90% of pipe 9 ft from downstream end, camera unable to continue, inspect from other end. Circumferential crack at joint, debris and deposits (20%+ full for most of pipe, starting 15 ft from upstream end, probably up to the large rock blocking the pipe at the downstream end), camera unable to continue.	Maintenance
SP-5967	0	3.2	3.2	0	16	16	12	CP	66.50775	Sediment (10% for 10 LF to 100%, completely blocked) - unable to pass, jetting will not help. Upstream manhole not known. Pipe cleaned. Dirt, rocks, roots & debris in pipe (10-30% full for 4+ft, camera unable to continue, pipe completely blocked upstream.	Maintenance
SP-5970	2.9	4	3.08	29	8	37	12	CP	55.78781	needs more cleaning. Surface damage visible aggregate for 42 feet. One location with surface spalling (looks like a gouge), cause is not evident. Rock and log obstruction partially blocking (50 to 75%). Camera unable to continue due to obstructions.	Maintenance
SP-5976	5	0	5	5	0	5	12	CMP	41.75588	Pipe cleaned. Msa deformed pipe. Dent observed at start of video. Camera unable to complete due to dent.	Structural
SP-5981	0	2	2	0	2	2	12	CP	38.89864	needs more cleaning. Rock and debris obstruction, 10% full. Camera unable to complete due to obstruction.	Maintenance
SP-6000	0	2	2	0	10	10	12	DIP	138.6281	Pipe cleaned. Needs more cleaning - 100% full at 22.7 ft from downstream end, inspect from other end, 10% full of water and debris at 7.5 ft from upstream end, camera unable to continue.	Maintenance
SP-612	0	3	3	0	3	3	12	CP	55.6554	Tap-in - unable to inspect rest of line	Tap-in
SP-6134	0	3	3	0	6	6	12	CP	33.61862	Dirt, roots, rocks and debris in pipe (15% full for 12+ ft), camera unable to pass, inspect from other end. Tap break in 9 ft from upstream end with grout intruding into pipe, camera unable to pass, unable to complete inspection.	Tap-in
SP-6145	3	3	3	3	6	9	12	CMP	121.8644	Tap break in (x2), material change CMP to CP, multiple cracks at 2nd tap break in, camera unable to pass tap break in, visual inspection last 10 ft of pipe looks good.	Tap-in
SP-6146	0	5	5	0	5	5	12	PE	46.17593	needs more cleaning. Water 35% full. Camera unable to complete due to debris in water.	Maintenance
SP-6147	2	5	3.5	2	5	7	12	PE	44.80509	Joint offset large at material change from PE to CP, camera unable to continue, several large joint offsets observed downstream along with large amounts (50% full) of debris.	Structural
SP-6148	0	2	2	0	2	2	12	CP	133.0047	Blocked, 20% gravel	Maintenance
SP-6155	5	3.75	4	5	15	20	12	CP	119.8058	Tap break in (stormwater) intruding with hole with visible soil, pipe 100% blocked by dirt, roots and debris at buried catch basin-like structure (bridge?), camera unable to pass, inspect from other end. 10-40% full of dirt for 16 ft, camera unable to continue, unable to reach buried structure thing from other end.	Maintenance
SP-6167	0	3	3	0	6	6	18	RCP	77.72271	Water 15% full. Joints with medium roots which wanders for 10 feet partially blocking flow (15%). Clumps of fine sediment deposits also observed on sidewall (15% full for 18 feet, not in report). Camera unable to complete due to root mass.	Maintenance
SP-617	5	2	4	10	2	12	12	CMP	38.6443	Water 5% full. Dent partially block flow (20%). Fine sediment deposits 5% full for 5 feet. Pipe collapsed appears to have hole. Soil in vicinity of hole appears to have washed into pipe due to hole. Camera unable to complete due to pipe damage.	Structural
SP-6170	0	2	2	0	6	6	12	CMP	108.6353	1st direction: roots at joint (fine and medium), sediment (ant colony); 2nd direction: (concrete pipe) sediment (20%)	Maintenance
SP-6443	0	3	3	0	3	3	12	CMP	64.50948	Conflict - blocked (30% debris)	Maintenance
SP-6445	4.2	2.04	2.79	63	57	120	12	CMP	233.6767	Pipe cleaned. Needs more cleaning. Three small holes with visible soil (corrosion), dirt, mud and rocks in bottom of pipe (10%+ full for 15 ft), camera unable to continue, inspect from other end. Gravel in bottom of pipe (10%-20% full entire length of pipe), small to large holes with visible soil (corrosion) entire length of pipe, fine roots in barrel of pipe (from hole), hole in side of pipe (not from corrosion) with visible soil, hole with visible soils and gasket (not from corrosion), camera unable to continue due to debris.	Maintenance
SP-6477	0	2	2	0	2	2	15	CMP	152.5754	Blocked, 25% gravel	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-6482	0	2.47	2.47	0	37	37	12	CMP	85.32079	1st direction: sediment at joints (10% for 50 LF), sediment deposit, sediment (10% for 5 LF, 10-15% for 10 LF); 2nd direction: sediment (15% for 15 LF), material change (CMP to CP - first 5 ft are CMP) - no video of 2nd direction (15 ft), but do have report, camera unable to make it to same point as end of reverse inspection, but is able to zoom - no damage visible, just sediment.	Maintenance
SP-6689	0	3	3	0	3	3	12	CMP	53.18697	Pipe cleaned. Needs more cleaning. Rock obstruction partially blocking pipe (20%). Camera unable to complete due to rock obstruction.	Maintenance
SP-6690	0	5	5	0	5	5	12	CP	25.38235	Candled - 100% blockage on down stream side and clear pipe on up stream	Maintenance
SP-6801	0	2.14	2.14	0	45	45	12	CP	141.9629	Pipe cleaned. Gravel and mud in bottom of pipe (5% full for 20 ft and 5% full for 80 ft), large root and dirt pile blocking 40% of pipe, camera unable to continue, visual inspection - looks like mud and roots in remainder of pipe (not in report).	Maintenance
SP-6808	2	2	2	2	2	4	12	CMP	29.60548	Gravel, illegal connection blocking pipe	Tap-in
SP-6820	2.5	3	2.67	10	6	16	12	CMP	180.5898	Tap break in protruding halfway into pipe, camera unable to continue, inspect from other end, joint offset medium (x2), material change CP to CMP, corrosion, deformation (20% blocked on side of pipe)	Structural and Tap-in
SP-6832	0	5	5	0	5	5	12	CP	33.30225	INCOMPLETE (blocked)	Maintenance
SP-6843	5	0	5	10	0	10	12	CP	187.6399	Needs more cleaning. Hole with visible soil beyond at two locations.	Maintenance
SP-6844	0	5	5	0	5	5	12	CP	41.09681	Candled - 100% full (29.4 LF)	Maintenance
SP-6845	0	2	2	0	6	6	12	CP	60.50225	Needs more cleaning. Fine sediment deposits mixed with leaves (10% full for 5 feet). Camera unable to complete due to debris.	Maintenance
SP-6846	2	0	2	2	0	2	12	CP	141.1651	Joint offset - incomplete inspection	Structural
SP-6849	3	2.33	2.6	6	7	13	12	CP	62.48852	Exposed aggregate entire length of pipe, deposits in bottom of pipe (10% full for 10 ft), pipe bends to right, camera unable to track past bend in pipe, inspect from other end. Deposits in bottom of pipe (20% full for 2+ ft), camera unable to pass debris, pipe needs more cleaning.	Maintenance
SP-6850	0	1.67	1.67	0	5	5	12	CP	55.98826	Pipe cleaned, needs more cleaning. Pipe 100% blocked with debris 4 ft from upstream end, even after cleaning. Inspect from other end. Dirt and debris in pipe (5% full for 12+ ft), fine roots at joint, material change from CP to CMP, camera unable to continue past slight angle in the pipe at material change, 100% blockage visible upstream.	Structural
SP-6855	2	3	2.5	2	3	5	12	CP	30.43264	Water level 10% full. Fine sediment deposits 15% full at large joint offset. Camera unable to complete due to joint offset.	Structural
SP-6857	2.75	3	2.8	11	3	14	12	CP	66.82611	Rocks in pipe, camera unable to pass, inspect from other end (no scores for first portion of pipe). Hole with visible void at medium joint separation, joint offset large, hole with plastic liner protruding (attempted repair?), asphalt chunks in pipe, camera unable to complete inspection.	Maintenance
SP-6867	0	0	0	0	0	0	12	CP	49.46308	Vertical bend in pipe	Structural
SP-6872	0	3	3	0	12	12	12	CP	39.26814	Sediment and leaves (10-15% for length of pipe) - unable to continue due to debris	Maintenance
SP-6877	3	2	2.25	6	12	18	12	CP	278.1364	Pipe cleaned, needs more cleaning. Exposed aggregate entire length of pipe, dirt and debris in bottom of pipe (15% full for 4 ft), camera unable to pass debris (Possible gas line through pipe covered by debris?), inspect from other end. Fine roots at joints (12 ft), mud and rocks in bottom of pipe (5%+ full for 42 ft), camera unable to pass debris, inspection not complete.	Maintenance
SP-6883	0	3	3	0	3	3	12	CP	106.4945	Material changes (CMP to CP, CP to PVC, PVC to CP), sediment at joint, pipe slip line - unable to pass	Structural
SP-6892	0	4	4	0	4	4	12	CP	105.838	Fine sediment deposits mixed with grassy debris 30% full. Survey abandoned due to condition of the pipe.	Maintenance
SP-6901	2.93	1.86	2.57	41	13	54	12	CP	129.0554	Pipe cleaned, needs more cleaning. Exposed aggregate entire length of pipe, medium roots at joint, fine roots at joints (x2), dirt and rocks in bottom of pipe (10% full for 10 ft), hole with visible soil and roots, camera unable to continue because of mud and debris, inspect from other end. Exposed aggregate entire length of pipe, joint separation medium, alignment up, joint offset large, alignment down, camera unable to continue, pipe suddenly slopes steep down/reverse slope.	Structural and Maintenance
SP-6902	0	3.25	3.25	0	13	13	12	CP	38.68787	Small wandering root observed for 8 feet, which increases to medium root barrels partially blocking pipe 15% and a root ball barrel blocking pipe 75%. Camera unable to complete due to root mass.	Maintenance
SP-6908	2	2	2	2	8	10	12	CP	150.3981	Pipe cleaned. Stop due to debris from TBI, bottom end reduces to 8" at 5 ft. Gravelly deposits 10% full for 20 feet. Water 20% full due to pipe sag. Camera unable to complete due to debris. Candle light shows increased debris buildup and tap location approx. 20ft from end point.	Maintenance
SP-6917	0	0	0	0	0	0	18	CMP	46.42033	Tee in pipe - unable to pass, pipe in good condition	Structural

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-6921	0	2	2	0	2	2	12	PE	30.81662	Needs more cleaning. Fine sediment deposits mixed with dried grass, 10% full for entire pipe length. Camera unable to complete due to debris.	Maintenance
SP-695	0	5	5	0	5	5	12	CP	46.56503	Underwater & roots (50% under water)	Maintenance
SP-7081	5	0	5	5	0	5	24	CMP	141.8644	Collapse and basketball in the pipe- unable to pass, other end cannot be accessed	Structural
SP-7086	2	0	2	2	0	2	12	CP	27.97281	Joint offset (large) - unable to pass	Structural
SP-7400	0	0	0	0	0	0	12	CP	42.84677	Material change (CP to PVC), size change (12" to 8") - unable to pass or access other end of pipe	Structural
SP-756	0	4	4	0	4	4	12	CP	24.0916	Sediment deposit - unable to pass after 3 passes	Maintenance
SP-758	0	4	4	0	4	4	12	CP	61.03948	Sediment deposit (30%) - unable to continue due to sediment	Maintenance
SP-761	1	1	1	1	1	2	12	CMP	129.9385	Joint offset. Water 5% full. Water is actively flowing downstream, source of water not known (not in report). Fine roots at one joint. Material change includes a 2 foot PVC section to 54 foot CMP section to concrete pipe. Voids observed at PVC/CMP transition. Medium joint offset at CMP/CP transition. Camera unable to complete due to joint offset.	Structural
SP-762	0	5	5	0	5	5	18	CP	62.74501	Underwater (completely under water 3 ft in line)	Maintenance
SP-7695	3	4	3.33	6	4	10	18	CMP	36.68059	Needs more cleaning. Corrosion observed. Fine sediment deposits 25% full. Camera unable to continue due to debris buildup. Candling shows continued fine sediment deposits downstream of the sediment debris obstruction. Water level reported at 5% full however, the water observed in video was limited to the standing water trapped in the corrugations.	Maintenance
SP-7747	0	1	1	0	2	2	12	CP	149.2286	Fine roots at joints (15 ft), 1/2 in tree root with cracks in pipe, camera unable to pass, pause for cleaning, line cleaned, only able to get an additional 15 ft before encountering long 1/2 in tree root, camera unable to continue again. More large roots visible farther up pipe, along with a material change from CP to CMP and possibly a bend.	Maintenance
SP-776	0	5	5	0	5	5	12	CP	35.4896	Pipe completely blocked by a basketball, Rockstar can, and illicit connection protruding though top of pipe. Camera unable to continue. No survey from other end.	Tap-in
SP-786	4	2.07	2.39	12	31	43	12	CP	77.50071	Pipe 25% full of water, multiple fractures in pipe for 10 ft, fine roots at joints for 10 ft, camera unable to continue past debris, inspect from other end. Mud in bottom of pipe (5% full for 60 ft), multiple fractures in top and sides of pipe for 4 ft, fine roots at joint, material change (CP to PE), alignment shifts to the left, large root ball in pipe (60% blocked), camera cannot continue.	Maintenance
SP-792	0	4	4	0	8	8	12	CP	22.65189	Gravel in bottom of pipe (15% for length of pipe), large rock - unable to continue due to rock	Maintenance
SP-7984	4	2.29	2.91	16	16	32	12	CP	292.1988	Tap break in(?) with roots, broken soil visible (x4), tap break in, rocks and gravel in bottom of pipe, unable to finish because of tee	Structural
SP-8001	0	2	2	0	2	2	12	CP	43.46701	Needs more cleaning. Fine sediment deposits (mixed with lots of grassy-like debris) 10% full. Camera unable to track forward from starting point due debris.	Maintenance
SP-8379	0	3	3	0	3	3	12	PE	44.25078	Needs more cleaning. Fine sediment deposits 20% full (formed a little dam) and camera unable to continue past the debris pile. Candlelight appears to show end of pipe, however, unable to clearly observe pipe conditions in video.	Maintenance
SP-8587	1	0	1	1	0	1	12		7.500483	Conflict - lateral connection	Tap-in
SP-8681	0	4	4	0	4	4	12	PE	63.33548	Needs more cleaning. Fine sediment deposits (clumped in piles along side walls) 25% full. Camera unable to complete due to debris.	Maintenance
SP-8686	2	0	2	4	0	4	12	CP	320.5233	Joint separation (large), tap-in, joint offset (large) - unable to pass	Structural
SP-8802	0	3.5	3.5	0	14	14	12	CP	83.45992	Roots and dirt in bottom of pipe (40% full for 2+ft), camera unable to continue, inspect from other end. Dirt and roots in pipe (15% full for 10 ft), medium roots at joint (25% blocked), camera unable to pass, inspection not complete, needs more cleaning.	Maintenance
SP-901	0	3	3	0	15	15	12	PE	54.24859	Tap-in, gravel (15% for 20 LF) - unable to pass, pipe in good condition	Maintenance
SP-9014	0	3	3	0	3	3	12	CP	54.8993	Sediment and leaves (15%) - unable to continue due to debris	Maintenance
SP-9048	3	2	2.5	6	4	10	18	CP	89.00716	Needs more cleaning. Surface damage with visible aggregate recorded for at least 57 feet. Fine sediment deposits with occasional small rocks 10% full for 35 feet. Camera unable to track to end of pipe due to debris. Candlelight observations not include in report shows fine sediment and large rocks up to ~25% full downstream of stopping point. Unable to visually confirm condition of pipe downstream of rock obstructions.	Maintenance
SP-9049	0	5	5	0	5	5	12	CP	49.24088	Candled - 100% full (53 LF)	Maintenance

Table 8: Pipes with Incomplete Inspections											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Reason Incomplete
SP-9051	0	0	0	0	0	0	12	PE	65.43682	Water level at 10-50% - unable to continue due to water	Maintenance
SP-9058	2.5	2.33	2.4	10	14	24	12	CP	93.23813	Aggregate visible entire length of pipe, roots at joint (fine 50 LF, medium x4), sag (downstream 40 LF) - unable to pass roots	Maintenance
SP-9060	0	2.5	2.5	0	5	5	12	CMP	49.50872	Deposits attached encrusted (10% blocked for approx 5 ft), tap break in protruding 50% into pipe, material change from CMP to CP and change in slope, camera unable to continue.	Structural
SP-9080	2.17	2	2.14	13	2	15	12	CP	45.04371	Offset joint and roots. Surface damage with visible aggregate for 16 feet. Medium joint offset due to pipe displacement (joint separated). One large joint offset. Sediment deposits 10% full at offset. Camera unable to complete due to offset.	Structural
SP-9088	0	2	2	0	12	12	36	CMP	66.84224	Needs more cleaning. Fine sediment deposits for 28.5 feet with channel of water approximately 10% full. Camera unable to complete due to debris.	Maintenance
SP-915	0	5	5	0	5	5	12	CP	42.2797	Gravelly deposits 40% full. Camera unable to complete due to gravel.	Maintenance
SP-922	2	3.5	3	2	7	9	12	CP	43.44979	Gravel in bottom of pipe, large joint separation, pipe 45% full of debris at large joint separation, camera unable to continue.	Structural
SP-9223	4	2.2	2.5	4	11	15	12	CP	24.2699	Sediment (length of pipe), fracture, intruding sealing grout - unable to pass, pipe in good condition	Maintenance
SP-9273	0	2	2	0	2	2	12	CP	173.1558	Sediment (10% x2) - Report doesn't match video	Maintenance
SP-9306	5	2	3.8	15	4	19	12	CP	98.84663	1st direction: broken, encrusted deposits, material change (12" CP to 8" PE); 2nd direction: gravel (10%), broken at bottom, broken at top, material change (12" CP to 8" PE)	Structural
SP-9309	0	0	0	0	0	0	12	CMP	40.27088	12" pipe goes to 8" pipe, dead end at control structure.	Structural
SP-9320	4	0	4	4	0	4	24	CMP	163.8137	Hole in side of pipe repaired with CMP patch, deformation in side of pipe (10% into pipe for approx 6 ft), water too deep to continue, rest of pipe looks good, water level in pipe 15% full to 50% full at upstream end.	Maintenance
SP-935	0	4	4	0	4	4	12	PE	147.1013	Gravel (30%) - unable to pass	Maintenance
SP-941	0	5	5	0	5	5	12	CP	31.35384	Candled - 50% full (28.2 LF)	Maintenance
SP-943	0	4	4	0	4	4	18	RCP	137.6373	Needs more cleaning. Water 10% full. Fine sediment deposits 30% full. Fine roots growing at joints (not in report). Camera unable to complete due to debris.	Maintenance
SP-951	4	3.2	3.43	8	16	24	12	CP	254.8073	Gravel and rocks in bottom of pipe (15-20% full for 13 ft), longitudinal fracture, broken pipe, large rock in pipe, camera unable to pass, inspect from other end. Tap break in (stormwater x2), mud, dirt, rocks and debris in pipe (15 % full for 15+ ft), camera unable to pass, inspection not complete.	Maintenance
SP-958	0	3	3	0	3	3	12	CMP	77.64358	Gravel (15%) - unable to pass, pipe in good condition	Maintenance
SP-96	0	4	4	0	4	4	12	CMP	41.76992	Pipe cleaned. Msa camera under water. Water level 20% full and increased to 50% full. Camera underwater and unable to complete.	Maintenance
SP-9679	0	2.88	2.88	0	23	23	36	CMP	63.91428	Gravel, rocks and debris in pipe (15% full for 30 ft), obstruction - two metal rods stuck through top of pipe, one blocking 75%, the other all the way to bottom of pipe, trapping debris, tap break in in top of pipe (daylight visible). Make-shift CB camera can't pass metal rods, unable to inspect tap break in ahead, but it's clearly visible.	Structural
SP-968	0	2	2	0	6	6	18	RCP	51.29878	Needs more cleaning. Fine sediment (and gravelly) deposits at ingress and then 10% full for 10+ feet. Camera unable to complete due to debris.	Maintenance
SP-9682	5	0	5	5	0	5	12	CMP	41.63808	Deformation in side of pipe - unable to pass	Structural
SP-970	5	3	4	5	3	8	12	CMP	108.5458	Hole soil visible at joint, sediment (20%) - unable to pass, rest of pipe in good condition	Maintenance
SP-9832	0	2.45	2.45	0	27	27	12	CP	72.94116	Pipe cleaned. Needs more cleaning. Water 5% full and meandering through deposits in pipe. Fine sediment deposits 15% full for 25 feet. Gravelly deposits 10% for 28 feet. 4-inch tap break which is 30% full of water. Water 10% full (not in report). Camera unable to continue due to debris and water.	Maintenance
SP-9843	0	3	3	0	3	3	12	CP	131.3649	Gravel, rocks and debris in pipe (20%+ full), camera unable to pass debris & water over debris, downstream pipe ends in open ditch, rest of pipe that is visible looks to be full of debris and rocks and roots.	Maintenance
SP-9844	0	2.17	2.17	0	50	50	12	CP	101.9272	Infiltration weeper with encrusted deposits (length of pipe), tap-in, rocks and sediment for 30 LF (filling 50% of pipe) - unable to pass	Maintenance

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-10396	0	0	0	0	0	0	12	PE	12.02323
SP-10397	0	0	0	0	0	0	18	PE	48.74107
SP-10399	0	0	0	0	0	0	18	PE	117.6108
SP-10402	0	0	0	0	0	0	18	PE	26.31908
SP-10403	0	0	0	0	0	0	18	PE	31.01926
SP-10404	0	0	0	0	0	0	18	PE	166.011
SP-10505	0	0	0	0	0	0	12	PE	19.68005
SP-10506	0	0	0	0	0	0	10	PE	102.1281
SP-10520	0	0	0	0	0	0	12	DIP	35.57782
SP-10669	0	0	0	0	0	0	12	PE	21.81698
SP-10697	0	0	0	0	0	0	12	PE	29.96506
SP-10698	0	0	0	0	0	0	12	PE	33.31726
SP-10699	0	0	0	0	0	0	12	PE	10.20944
SP-10703	0	0	0	0	0	0	12	PE	104.4366
SP-10704	0	0	0	0	0	0	12	PE	85.56342
SP-10705	0	0	0	0	0	0	12	DIP	51.98664
SP-10709	0	0	0	0	0	0	12	CP	34.81862
SP-10733	0	0	0	0	0	0	12	CP	304.7892
SP-10819	0	0	0	0	0	0	12	PE	27.36464
SP-11132	0	0	0	0	0	0			2.316934
SP-11258	0	0	0	0	0	0	12	PE	22.16228
SP-1149	0	0	0	0	0	0	12	PE	42.40645
SP-11541	0	0	0	0	0	0	12	CP	75.89455
SP-12030	0	0	0	0	0	0	18	RCP	136.1259
SP-12031	0	0	0	0	0	0	30	RCP	29.33134
SP-12208	0	0	0	0	0	0	12	PE	28.08069
SP-124	0	0	0	0	0	0	12	CP	144.9115
SP-12474	0	0	0	0	0	0			6.383391
SP-12475	0	0	0	0	0	0	18	RCP	10.69066
SP-125	0	0	0	0	0	0	12	CP	38.10579
SP-12531	0	0	0	0	0	0	12	PE	4.282056
SP-12681	0	0	0	0	0	0	12	CP	45.37164
SP-12768	0	0	0	0	0	0	18	RCP	193.2688
SP-12828	0	0	0	0	0	0	12	PE	31.76989
SP-12833	0	0	0	0	0	0	12	PE	27.29925
SP-13080	0	0	0	0	0	0	18	RCP	30.58016
SP-133	0	0	0	0	0	0	12	CP	63.39963
SP-135	0	0	0	0	0	0	18	RCP	181.0674
SP-13880	0	0	0	0	0	0	12	CP	33.6844
SP-13887	0	0	0	0	0	0	12	PE	13.93107
SP-13893	0	0	0	0	0	0	18	PE	52.86483
SP-13894	0	0	0	0	0	0	12	CP	19.09157
SP-13895	0	0	0	0	0	0	18	RCP	29.22251
SP-13896	0	0	0	0	0	0	18	RCP	113.6037

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-13897	0	0	0	0	0	0	18	RCP	116.9883
SP-1449	0	0	0	0	0	0	12	PE	122.9582
SP-14538	0	0	0	0	0	0	12	CP	32.21147
SP-1457	0	0	0	0	0	0	18	RCP	146.7861
SP-1458	0	0	0	0	0	0	12	CP	17.8364
SP-1461	0	0	0	0	0	0	12	CP	192.9854
SP-14822	0	0	0	0	0	0	12	CP	257.2676
SP-15071	0	0	0	0	0	0	12	PE	30.52035
SP-15072	0	0	0	0	0	0	12	CP	22.73217
SP-15077	0	0	0	0	0	0	12	PE	138.9124
SP-15078	0	0	0	0	0	0	12	CP	178.3113
SP-15085	0	0	0	0	0	0	12	PE	133.3204
SP-15087	0	0	0	0	0	0	12	CP	106.016
SP-15089	0	0	0	0	0	0	12	CMP	44.40425
SP-15091	0	0	0	0	0	0	12	CMP	47.77039
SP-15093	0	0	0	0	0	0	12	CP	68.70452
SP-15095	0	0	0	0	0	0	12	CP	9.859668
SP-15096	0	0	0	0	0	0	12	CP	54.859
SP-15102	0	0	0	0	0	0	12	PE	70.83533
SP-15108	0	0	0	0	0	0	12	CP	2.79287
SP-15111	0	0	0	0	0	0	18	PVC	6.7908
SP-15113	0	0	0	0	0	0	12	CP	12.94349
SP-15114	0	0	0	0	0	0			12.57988
SP-15125	0	0	0	0	0	0	12	CP	36.93638
SP-15127	0	0	0	0	0	0	12	PE	4.346089
SP-15132	0	0	0	0	0	0	18	PE	84.39763
SP-15141	0	0	0	0	0	0	12	PE	13.8173
SP-15144	0	0	0	0	0	0	12	CMP	110.6961
SP-1607	0	0	0	0	0	0	12	CMP	78.63819
SP-1620	0	0	0	0	0	0	12	CP	33.15734
SP-1626	0	0	0	0	0	0	12	PE	39.33446
SP-1636	0	0	0	0	0	0	12	CP	24.4311
SP-1637	0	0	0	0	0	0	12	PE	16.62235
SP-1639	0	0	0	0	0	0	12	PE	162.9596
SP-1641	0	0	0	0	0	0	12	CP	106.5507
SP-1687	0	0	0	0	0	0	18	CMP	54.84245
SP-169	0	0	0	0	0	0	12	CP	65.04906
SP-1755	0	0	0	0	0	0	12	CPP	17.78659
SP-1761	0	0	0	0	0	0	12	PE	84.43287
SP-1762	0	0	0	0	0	0	12	PE	40.06115
SP-177	0	0	0	0	0	0	12	PE	39.40423
SP-1770	0	0	0	0	0	0	12	CP	82.78379
SP-1808	0	0	0	0	0	0	12	CP	15.15882
SP-1809	0	0	0	0	0	0	12	CP	10.56832
SP-1813	0	0	0	0	0	0	12	CP	48.86461

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-2005	0	0	0	0	0	0	18	CMP	53.14647
SP-2007	0	0	0	0	0	0	24	PE	155.0872
SP-2011	0	0	0	0	0	0	12	CP	57.15376
SP-2300	0	0	0	0	0	0	18	CMP	148.5752
SP-2334	0	0	0	0	0	0	12	CMP	39.77947
SP-2464	0	0	0	0	0	0	12	CP	52.74926
SP-2466	0	0	0	0	0	0	12	CP	25.17414
SP-2476	1	0	1	1	0	1	18	RCP	228.9179
SP-2478	0	0	0	0	0	0	12	PE	43.43254
SP-2481	0	0	0	0	0	0	12	CP	50.65791
SP-2484	0	0	0	0	0	0	15	CMP	152.8713
SP-2492	0	0	0	0	0	0	12	CP	34.52598
SP-2505	0	0	0	0	0	0	12	CPP	58.06439
SP-2507	0	0	0	0	0	0	12	CP	10.97211
SP-2511	0	0	0	0	0	0	12	PE	152.5725
SP-2525	0	0	0	0	0	0	12	PE	62.51872
SP-2538	0	0	0	0	0	0	12	CP	25.62111
SP-2546	0	0	0	0	0	0	12	CMP	55.59159
SP-2552	0	0	0	0	0	0	12	PE	65.20389
SP-2561	0	0	0	0	0	0	12	CMP	103.758
SP-2669	0	0	0	0	0	0	12	PE	54.35325
SP-2671	0	0	0	0	0	0	12	CMP	25.55465
SP-2678	0	0	0	0	0	0	12	CP	18.56986
SP-2680	0	0	0	0	0	0	12	CP	82.40968
SP-2694	0	0	0	0	0	0	12	CP	64.46545
SP-2698	0	0	0	0	0	0	12	CP	11.78321
SP-2700	0	0	0	0	0	0	12	CP	5.537069
SP-2925	0	0	0	0	0	0	12	CMP	80.06522
SP-2931	0	0	0	0	0	0	18	CMP	23.08741
SP-2933	0	0	0	0	0	0	12	CMP	124.0491
SP-3190	0	0	0	0	0	0	12	CMP	39.21217
SP-3343	0	0	0	0	0	0	18	CP	37.81379
SP-3356	0	0	0	0	0	0	12	CP	5.800442
SP-3359	0	0	0	0	0	0	18	RCP	238.1602
SP-3361	0	0	0	0	0	0	18	RCP	241.4185
SP-337	0	0	0	0	0	0	18	PE	11.70833
SP-3382	0	0	0	0	0	0	12	CP	101.5907
SP-3396	0	0	0	0	0	0	12	PE	58.93302
SP-3398	0	0	0	0	0	0	12	CP	3.924178
SP-3401	0	0	0	0	0	0	12	PE	32.97951
SP-341	0	0	0	0	0	0	12	CMP	33.40208
SP-3414	0	0	0	0	0	0	12	CP	63.5026
SP-3415	0	0	0	0	0	0	12	CP	14.97413
SP-3416	0	0	0	0	0	0	18	CMP	32.07116
SP-3422	0	0	0	0	0	0	12	DIP	33.07864

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-3433	0	0	0	0	0	0	12	PE	148.9883
SP-3438	0	0	0	0	0	0	12	PE	17.37921
SP-3446	0	0	0	0	0	0	12	CMP	16.3304
SP-3448	0	0	0	0	0	0	12	CMP	58.13588
SP-356	0	0	0	0	0	0	12	CMP	63.7868
SP-3797	0	0	0	0	0	0	12	CP	94.73077
SP-380	0	0	0	0	0	0	18	RCP	46.94128
SP-3802	0	0	0	0	0	0	24	CPP	13.5781
SP-381	0	0	0	0	0	0	12	CMP	36.32777
SP-3869	0	0	0	0	0	0	12	CP	10.4225
SP-3875	0	0	0	0	0	0	18	PE	31.56908
SP-3879	0	0	0	0	0	0	12	CP	147.3704
SP-3880	0	0	0	0	0	0	12	CP	209.5414
SP-4081	0	0	0	0	0	0	12	CMP	25.67511
SP-4209	0	0	0	0	0	0	12	CP	10.55509
SP-4213	0	0	0	0	0	0	12	PE	12.73772
SP-4227	0	0	0	0	0	0	12	CP	40.37799
SP-4228	0	0	0	0	0	0	12	CP	4.972983
SP-4241	0	0	0	0	0	0	12	CP	31.65022
SP-4242	0	0	0	0	0	0	12	DIP	23.02582
SP-4263	0	0	0	0	0	0	12	CMP	20.87078
SP-4264	0	0	0	0	0	0	12	CP	35.79431
SP-4265	0	0	0	0	0	0	12	PE	56.87233
SP-4268	0	0	0	0	0	0	12	CPP	214.0556
SP-4275	0	0	0	0	0	0	12	PE	51.17791
SP-4276	0	0	0	0	0	0	12	PE	57.452
SP-4282	0	0	0	0	0	0	12	CMP	16.60849
SP-4284	0	0	0	0	0	0	12	CP	17.81791
SP-4287	0	0	0	0	0	0	12	PE	77.5041
SP-4291	0	0	0	0	0	0	12	CP	9.616484
SP-4299	0	0	0	0	0	0	12	PE	146.2915
SP-4301	0	0	0	0	0	0	12	CP	11.59873
SP-4302	0	0	0	0	0	0	12	CP	63.90745
SP-4309	0	0	0	0	0	0	12	PE	84.34587
SP-4314	0	0	0	0	0	0	18	CP	39.06998
SP-4426	0	0	0	0	0	0	12	CP	34.76564
SP-4432	1	0	1	1	0	1	12	CP	139.1829
SP-4700	0	0	0	0	0	0	12	CP	40.0797
SP-4701	0	0	0	0	0	0	12	CP	69.40622
SP-4746	0	0	0	0	0	0	12	CMP	95.82936
SP-4749	0	0	0	0	0	0	12	CP	47.38374
SP-4767	0	0	0	0	0	0	12	CP	18.36498
SP-4768	0	0	0	0	0	0	12	CP	57.97342
SP-4769	0	0	0	0	0	0	12	CP	196.549
SP-5026	0	0	0	0	0	0	12	CP	49.39165

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-5085	0	0	0	0	0	0	12	PE	35.5822
SP-5086	0	0	0	0	0	0	12	PE	19.82286
SP-5087	0	0	0	0	0	0	12	CP	159.5163
SP-5088	0	0	0	0	0	0	12	PE	58.38013
SP-5119	0	0	0	0	0	0	15	CP	147.126
SP-5131	0	0	0	0	0	0	12	CMP	50.78749
SP-5135	0	0	0	0	0	0	12	PE	18.16975
SP-5138	0	0	0	0	0	0	12	CMP	73.95313
SP-5144	0	0	0	0	0	0	12	CP	38.31851
SP-5149	0	0	0	0	0	0	12	CP	29.80767
SP-5155	0	0	0	0	0	0	12	PE	61.30122
SP-5167	0	0	0	0	0	0	12	CMP	31.57921
SP-5173	0	0	0	0	0	0	12	CP	74.65461
SP-5177	0	0	0	0	0	0	12	PE	149.9595
SP-5178	0	0	0	0	0	0	12	CP	46.98251
SP-5181	0	0	0	0	0	0	12	CP	62.2781
SP-5187	0	1	1	0	1	1	12	CP	41.38719
SP-5192	0	0	0	0	0	0	12	CP	18.29935
SP-5288	0	0	0	0	0	0	12	CP	48.86812
SP-5293	0	0	0	0	0	0	18	RCP	36.9669
SP-5548	0	0	0	0	0	0	18	CMP	58.67198
SP-5601	0	0	0	0	0	0	12	CP	31.05078
SP-5602	0	0	0	0	0	0	12	PE	73.96381
SP-5625	0	0	0	0	0	0	18	RCP	198.3064
SP-5628	0	0	0	0	0	0	12	CP	137.3228
SP-5815	0	0	0	0	0	0	12	CMP	6.099588
SP-5949	0	0	0	0	0	0	18	RCP	229.4228
SP-5950	0	0	0	0	0	0	18	RCP	199.9197
SP-5951	0	0	0	0	0	0	12	CP	40.63552
SP-5954	0	0	0	0	0	0	12	PE	19.99725
SP-5955	0	0	0	0	0	0	12	CMP	151.33
SP-5968	0	0	0	0	0	0	12	PE	30.31001
SP-5971	0	0	0	0	0	0	12	CPP	108.391
SP-5972	0	0	0	0	0	0	12	CPP	55.2513
SP-5973	0	0	0	0	0	0	12	CP	11.72434
SP-5977	0	0	0	0	0	0	12	PE	81.54119
SP-5982	0	0	0	0	0	0	12	CP	39.79579
SP-5983	0	0	0	0	0	0	12	CP	38.64467
SP-5984	0	0	0	0	0	0	12	CP	38.70725
SP-6003	0	0	0	0	0	0	12	PE	12.66056
SP-6004	0	0	0	0	0	0	12	CP	24.12908
SP-6009	0	0	0	0	0	0	12	CMP	82.1577
SP-6010	0	0	0	0	0	0	18	CMP	66.67481
SP-6022	0	0	0	0	0	0	12	CP	13.70381
SP-608	0	0	0	0	0	0	12	PE	85.4918

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-6113	0	0	0	0	0	0	12	PE	2.825643
SP-6123	0	0	0	0	0	0	18	PE	121.1567
SP-6130	0	0	0	0	0	0	12	CP	37.56876
SP-6131	0	0	0	0	0	0	12	PE	82.1933
SP-6149	0	0	0	0	0	0	12	CP	72.96302
SP-6158	0	0	0	0	0	0	12	CMP	7.849662
SP-618	0	0	0	0	0	0	12	CP	8.702756
SP-6218	0	0	0	0	0	0	12	PE	30.52051
SP-6500	0	0	0	0	0	0	12	CP	65.81393
SP-6501	0	0	0	0	0	0	12	CP	43.04436
SP-6502	0	0	0	0	0	0	12	CP	147.7387
SP-6680	0	0	0	0	0	0	18	CP	27.70182
SP-6701	0	0	0	0	0	0	12	CP	32.0347
SP-6702	0	0	0	0	0	0	12	CMP	113.3962
SP-6797	0	0	0	0	0	0	12	PE	219.134
SP-6811	0	0	0	0	0	0	12	CMP	55.33136
SP-6838	0	0	0	0	0	0	12	CP	48.51565
SP-6841	0	0	0	0	0	0	12	CP	49.86557
SP-6847	0	0	0	0	0	0	12	CP	43.65158
SP-6856	0	0	0	0	0	0	18	RCP	14.54446
SP-6861	0	0	0	0	0	0	12	CP	57.53616
SP-6865	0	0	0	0	0	0	12	CP	16.82376
SP-6866	0	0	0	0	0	0	15	CP	33.4486
SP-6868	0	0	0	0	0	0	12	CP	66.1996
SP-6874	0	0	0	0	0	0	12	CP	33.21244
SP-6875	0	0	0	0	0	0	12	CP	32.31408
SP-6876	0	0	0	0	0	0	12	PE	181.3949
SP-6880	0	0	0	0	0	0	12	CP	40.15621
SP-6887	0	0	0	0	0	0	12	PE	78.04423
SP-6890	0	0	0	0	0	0	12	CMP	19.26645
SP-6891	0	0	0	0	0	0	12	CP	47.59091
SP-6896	0	0	0	0	0	0	12	PE	35.51045
SP-6898	0	0	0	0	0	0	12	CP	38.69354
SP-6899	0	0	0	0	0	0	12	PE	87.28247
SP-6909	0	0	0	0	0	0	12	CP	72.68269
SP-6910	0	0	0	0	0	0	12	CP	41.37233
SP-6911	0	0	0	0	0	0	12	CP	17.64935
SP-6915	0	0	0	0	0	0	12	PE	108.4478
SP-6922	0	0	0	0	0	0	12	CP	33.10356
SP-7061	0	0	0	0	0	0	12	CMP	5.925137
SP-7077	0	0	0	0	0	0	12	PE	139.6387
SP-7082	0	0	0	0	0	0	24	CMP	102.8176
SP-7083	0	0	0	0	0	0	18	CMP	55.98695
SP-7084	0	0	0	0	0	0	18	PE	29.05853
SP-7345	0	0	0	0	0	0	12	DIP	31.57418

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-754	0	0	0	0	0	0	12	CP	58.19009
SP-760	0	0	0	0	0	0	12	PE	97.20017
SP-765	0	0	0	0	0	0	12	CP	31.26708
SP-774	0	0	0	0	0	0	12	PE	31.6261
SP-779	0	0	0	0	0	0	12	Concrete	15.83062
SP-782	0	0	0	0	0	0	12	CP	72.15961
SP-7983	0	0	0	0	0	0	12	CP	3.949979
SP-801	0	0	0	0	0	0	12	PE	30.42895
SP-803	0	0	0	0	0	0	12	CP	15.72244
SP-8449	0	0	0	0	0	0	12	PE	28.22542
SP-8494	0	0	0	0	0	0	12	CP	27.59526
SP-8594	0	0	0	0	0	0	12	CP	14.37531
SP-8595	0	0	0	0	0	0	12	CP	54.90503
SP-8597	0	0	0	0	0	0	12	CP	90.28547
SP-8598	0	0	0	0	0	0	12	CP	76.19124
SP-8634	0	0	0	0	0	0	12	CP	21.35603
SP-8652	0	0	0	0	0	0	12	PE	26.10915
SP-8679	0	0	0	0	0	0	18	PE	170.7961
SP-8680	0	0	0	0	0	0	12	PE	13.62077
SP-8765	0	0	0	0	0	0	12	PE	79.60424
SP-8799	0	0	0	0	0	0	18	RCP	25.06614
SP-8819	0	0	0	0	0	0	12	PE	12.2026
SP-8820	0	0	0	0	0	0	12	PE	71.64613
SP-8857	0	0	0	0	0	0	12	CP	13.72158
SP-8886	0	0	0	0	0	0	12	CP	47.36171
SP-8887	0	0	0	0	0	0	12	CP	4.72788
SP-8979	0	0	0	0	0	0	18	RCP	36.98132
SP-9012	0	0	0	0	0	0	12	CMP	74.48463
SP-9020	0	0	0	0	0	0	36	CMP	36.16282
SP-9022	0	0	0	0	0	0	18	RCP	73.8252
SP-9050	0	0	0	0	0	0	12	PE	18.59019
SP-9059	0	0	0	0	0	0	12	CP	79.85395
SP-908	0	0	0	0	0	0	12	CPP	49.05164
SP-9089	0	0	0	0	0	0	24	RCP	195.0269
SP-9135	0	1	1	0	1	1	12	CP	13.59051
SP-9144	0	0	0	0	0	0	36	CMP	72.84442
SP-916	0	0	0	0	0	0	12	CMP	31.95464
SP-9206	0	0	0	0	0	0	24	RCP	49.66862
SP-9244	0	0	0	0	0	0	12	CP	73.60258
SP-9258	0	0	0	0	0	0	24	CMP	74.37711
SP-9318	0	0	0	0	0	0	18	RCP	104.1487
SP-934	0	0	0	0	0	0	12	PE	47.56603
SP-9359	0	0	0	0	0	0	12	PE	14.76539
SP-937	0	0	0	0	0	0	12	CP	17.82653
SP-9373	0	0	0	0	0	0	12	PE	25.30109

Table 9: Pipes Not Requiring Further Inspection									
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length
SP-939	0	0	0	0	0	0	12	CP	61.52351
SP-9837	0	0	0	0	0	0	23	PE	38.13929

Table 10: Recommended Open Cut Pipe Replacement

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	SPR	Diam	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
SP-15129	3.8	0	3.8	19	0	19	12	CMP	57.52	Hole with visible void in side of pipe (x2), hole in side of pipe (x3).	Y	N	L			X				Pipe is located in the ROW of NE Perkins Way; site visit 10/15/14 identified as pipe repair CIP with high priority - private property driveway caving.	19	0	1	0	0	0	0	1	0	0	0	21
SP-132	1.58	1.17	1.44	19	7	26	12	CP	48.98	Pipe cleaned. Sediment in bottom of pipe (5% full for 26 ft), visible aggregate (20 ft), joint offset (very) large, camera unable to continue, inspect from other end. Visible aggregate (19 ft), joint angular medium, longitudinal cracks, debris in bottom of pipe (15% full), camera unable to continue.	Y	N	M		X					Pipe is located in the intersection of NE 193rd St and 3rd Ave NE; site visit 10/15/14 identified pipe repair CIP.	19	0	1	0	0	0	1	0	0	0	0	21
SP-1600	2.33	2	2.25	7	2	9	12	CP	76.42	Under water, extreme sag. Pipe cleaned. Exposed aggregate entire length of pipe, joint angle medium, debris in pipe (5% full), camera unable to continue past angle in pipe. No access other manhole.	Y	N	M							Pipe cleaned. Tie-in with CB 3958 is at an extreme adverse angle. Site visit 10/15/14 identified as pipe repair CIP.	7	0	1	0	0	0	0	0	0	0	0	8
SP-2971	5	0	5	10	0	10	12	PE	99.75	1st direction: deformation (50%); 2nd direction: deformation (90%) - unable to inspect middle section of pipe		Y	L		X		X			Roughly half pipe not TV'd; site visit 10/15/14 identified as pipe repair CIP with high priority - there was a complete restriction of flow.	10	0	0	1	0	0	1	0	1	0	0	13
SP-785	2.7	5	2.79	62	5	67	12	CP	90.00	Visible aggregate entire length of pipe, joint separation medium, joint offset medium (x3), broken pipe at joint (looks more like a fracture close to failure at top of pipe), leaves and branches in pipe at inlet (80% full)	Y	Y	L		X		X	X	X	Pipe in ROW/shoulder of 25th Ave NE.	62	0	1	1	0	0	1	0	1	1	1	68
SP-5139	4.22	2	4	38	2	40	12	CP	180.28	Broken pipe (x3), hole with visible soil (x5), multiple fractures, deposits attached encrusted		N	L			X			X	Under 16th Ave NE	38	0	0	0	0	0	0	1	0	0	1	40
SP-9121	4.13	2.86	3.53	33	20	53	12	CP	66.10	Pipe cleaned. Deposits attached encrusted (x5), large hole with visible soil on side of pipe (x2), large rocks in pipe, camera unable to pass, survey from other end. Large joint offset, hole with visible soil in bottom of pipe (x2), hole in side of pipe, hole with visible void, hole with large rocks over the top, same spot where camera stopped at other end.	Y	Y	U			X				Remove large rocks and replace pipe. Pipe in ROW of Ashworth Ave N.	33	0	1	1	0	0	0	1	0	0	0	36
SP-8833	0	5	5	0	5	5	12	CMP	69.73	40% full of dirt (no video), needs more cleaning, lower end of pipe is crushed.	Y	Y	U				X			OCI added scores as no report or video was provided. Adjacent to SP-9121	0	0	1	1	0	0	0	0	1	0	0	3
SP-4705	3	2	2.92	33	2	35	12	CP	43.31	Aggregate visible (length of pipe), fracture (multiple), joint offset (large), sediment deposit		Y	L								33	0	0	1	0	0	0	0	0	0	0	34
SP-2676	3	2.93	2.94	6	44	50	12	CP	90.74	Pipe cleaned. Deposits (mud, rocks and debris) in bottom of pipe (10% to 15% full entire length of pipe), hole with visible soil and large void and deposits ingressed fine in side of pipe, roots at joints (not in report) joint offset medium, camera unable to complete inspection due to large amount of gravel in pipe.	Y	N	U		X	X				Pipe is in ROW of Wallingford Ave N between 195th and 192nd. Site visit on 10/15/14 revealed possible damage by another utility (water?) and identified as pipe repair CIP	6	0	1	0	0	0	1	1	0	0	0	9

* U= Upper McAleer, M = Middle McAleer, L = Lower McAleer

Table 11: Recommended Trenchless Pipe Repair

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	SPR	Diam	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
SP-6445	4.2	2.04	2.79	63	57	120	12	CMP	233.68	Pipe cleaned. Needs more cleaning. Three small holes with visible soil (corrosion), dirt, mud and rocks in bottom of pipe (10%+ full for 15 ft), camera unable to continue, inspect from other end. Gravel in bottom of pipe (10%-20% full entire length of pipe), small to large holes with visible soil (corrosion) entire length of pipe, fine roots in barrel of pipe (from hole), hole in side of pipe (not from corrosion) with visible soil, hole with visible soils and gasket (not from corrosion), camera unable to continue due to debris.	Y	Y	L				X	X	X		63	0	1	1	0	0	0	0	1	1	1	68
SP-14371	3.3	0	3.32	63	0	63	18	CMP	143.58	Corrosion (full length of pipe), deformation/pipe bent at joint (x2), hole in side of pipe with soil visible, repair patch - hole covered with metal on outside of pipe, hole in bottom of pipe (corrosion at joint), large branch and board in catch basin (CB-11576)		N	L			X	X		X		63	1	0	0	0	0	0	1	1	0	1	67
SP-1747	3.2	3	3.17	54	3	57	12	CP	91.57	Pipe cleaned. Exposed aggregate entire length of pipe, broken pipe at joint, hole with soil visible at joint, medium roots at joint protruding all the way across pipe, camera unable to pass, more large root balls at joints visible upstream	Y	N	U								54	0	1	0	0	0	0	0	0	0	0	55
SP-4699	4.3	0	4.33	26	0	26	12	CP	148.73	Exposed aggregate entire length of pipe, broken pipe at joint, broken pipe with soil visible (x2), broken pipe with visible void		Y	L			X	X	X	X		26	0	0	1	0	0	0	1	1	1	1	31
SP-2985	2.8	2	2.73	28	2	30	12	CMP	39.19	Corrosion damage (pinholes and rough surface) observed for 38 feet. Water 10% full for 8 feet from pipe sag. Unable to track last foot of pipe due to root debris but no pipe defects observed or documented.	Y	Y	U								28	0	1	1	0	0	0	0	0	0	0	30
SP-5624	3	2	2.5	21	14	35	12	CMP	38.93	Pipe corrosion (full circumference of pipe) for 37 feet. Water 5% full. Fine sediment deposits 5% full for 30 feet. Fine roots growing through barrel.	Y	Y	U								21	0	1	1	0	0	0	0	0	0	0	23
SP-7984	4	2.29	2.91	16	16	32	12	CP	292.20	Tap break in(?) with roots, broken soil visible (x4), tap break in, rocks and gravel in bottom of pipe, unable to finish because of tee	Y	N	M	mwater						Add CB at tee	16	0	1	0	0	1	0	0	0	0	0	18
SP-3574	3	2	2.6	9	4	13	12	CP	82.15	needs more cleaning. Surface damage visible aggregate for 6 feet. Material change twice concrete to CMP then CMP to concrete. Gap observed between CP / CMP material change with observed soil washout into pipe. Fine sediment deposits 10% full for 10 feet (full length of CMP). Fine sediments do not appear to have been transported downstream of the CMP section. Camera unable to complete at second material change location/camera unable to move over concrete pipe wall.	Y	Y	M							The soil transport will eventually build up within the CMP section and then transport downstream.	9	0	1	1	0	0	0	0	0	0	0	11
SP-4234	1	1.5	1.4	1	6	7	12	CP	79.37	Water 25% full and gradually reducing to 10% full for 66 feet. Water level in catch basin above pipe invert. Tap break 4inch plastic corrugated pipe, complete blockage of soil. Rooted joints (fine) partially blocking pipe at three locations. Medium joint gap with soil visible beyond opening. Potential infiltration stains for 10 feet starting at the 74.7 ft mark which was not recorded in the report. Camera unable to complete 2 feet before pipe end.	Y	Y	M	mwater							1	0	1	1	0	1	0	0	0	0	0	4
SP-6902	0	3.25	3.25	0	13	13	12	CP	38.69	msa due to roots. Small wandering root observed for 8 feet, which increases to medium root barrels partially blocking pipe 15% and a root ball barrel blocking pipe 75%. Camera unable to complete due to root mass.	Y	Y	L								0	0	1	1	0	0	0	0	0	0	0	2

* U = Upper McAleer, M= Middle McAleer, L = Lower McAleer

Table 12: Illicit Utility Crossing

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial (Y/N)	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-2551	3.5	3.33	3.4	7	10	17	12	CP	Joint offset large, electrical conduit or gas line of some sort through pipe, paused for cleaning. Pipe cleaned. Hole at joint with visible void, rocks and debris in pipe (25% full), camera unable to pass.	Y	N	M	Electrical & Gas			
SP-10783	5	2.67	4	20	8	28	12	CMP	Mud in bottom of pipe, storm debris in pipe, mud in bottom of pipe (15 ft) - camera unable to continue. Pipe cleaned, gas line (yellow) bored through pipe revealed (along with hole with visible soil). Also, another service line (blue) through the pipe with a hole and soil visible (water?)	Y	N	U	Gas & Water			
SP-1635	1.5	0	1.5	3	0	3	12	CP	Pipe cleaned. Pipe 15% full of water, weird structure with pipe going though it, camera unable to pass, inspect from other end. Joint offset medium, sag (20% full for 5 ft), joint offset large, unable to reach weird structure.	Y	N	L	Gas & Water			
SP-6175	5	3	8	10	9	19	12	PE	Concrete pipe at upstream end (70 ft), deposits in bottom of pipe (20% full for 8 ft), gas line through pipe (20% of pipe blocked), pipe broken with visible soil and roots where gas line punches through pipe, concrete chunk resting on gas line. Camera unable to continue. Inspect from other end. PE pipe for 85 ft, then material changes from PE to CP, stop at gas pipe, inspection complete.	Y	N	U	Gas	X		
SP-4261	4	2.33	3	8	7	15	12	CP	needs more cleaning and has a gas line through pipe. Fine (with clumps) sediment deposits 10% full for 7 feet. Small hole with visible gravel beyond hole. Fine sediment deposits 5% full for 5 feet. 40% pipe damage at illicit pipe connection (~2 to 3-inch gas line). Camera unable to continue due to pipe damage and gas pipe line obstruction.	Y	N	U	Gas			
SP-5137	0	4	4	0	12	12	12	PE	1st direction: intruding utility; 2nd direction: sediment deposit		N	U	Gas			
SP-6877	3	2	2.3	6	12	18	12	CP	Pipe cleaned, needs more cleaning. Exposed aggregate entire length of pipe, dirt and debris in bottom of pipe (15% full for 4 ft), camera unable to pass debris (Possible gas line through pipe covered by debris?), inspect from other end. Fine roots at joints (12 ft), mud and rocks in bottom of pipe (5%+ full for 42 ft), camera unable to pass debris, inspection not complete.	Y	N	M	Gas			Thorough cleaning required to determine if it is a gas line stopping debris in pipe, gas line needs to be removed via open cut.
SP-4251	5	1.67	3.3	15	5	20	12	CMP	Deformed (25%), hole soil visible (x2) because of coaxial cable through top of pipe (25 LF), fine roots		Y	L	Cable			
SP-4300	0	5	5	0	10	10	12	CP	Cables through pipe and continue on down the pipe - camera unable to continue		N	M	Cable			
SP-3420	3.2	1.67	3	54	5	59	12	CP	Surface damage, aggregate visible recorded for full length of pipe. Fine (small) rooted joints at two locations partially blocking pipe (<5%). Water 10% full from pipe sag for 78 feet. Bottom section of pipe broken with visible soil beyond break at first break. Second break with visible soil beyond break associated with two illicit pipe connections. Patch repair (mesh and concrete) observed at 45.1 ft mark. Water 5% full for last 15 feet.		N	L	Water x2			Water in last 15 feet was not included in the report. Two repair locations potential.
SP-2512	0	3	3	0	120	120	36	CMP	Sediment (15% for 95 LF), intruding utility	Y	Y	L	Water			
SP-6886	0	2.9	2.9	0	29	29	12	PE	1st direction: sediment (20% for 15 LF), intruding utility (waterline); 2nd direction: sediment (10% for 25 LF)	Y	Y	U	Water			
SP-9275	5	5	5	5	5	10	12	CMP	Utility through pipe near top, hole soil visible		Y	L	Water			
SP-4315	3	2	2.3	3	4	7	12	CP	Crack (multiple), pipe in line, encrusted deposit - unable to pass pipe in line		N	L	Galvanized pipe			Unknown utility
SP-4435	1	2	1.7	1	4	5	12	CP	Small (1"?) pipe within pipe at bottom, leaves, joint offset (medium)		N	U	Galvanized pipe			Unknown utility

Table 12: Illicit Utility Crossing

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial (Y/N)	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-4243	0	2.6	2.6	0	13	13	12	CP	Tap break in, drop in pipe, unknown thing protruding into pipe - camera unable to continue to unknown discharge point. Pipe cleaned and reinspected 2 months later. Debris in bottom of pipe (5% full for 12 ft), tap break in (stormwater), tap break in (unknown - odd looking steel thing protruding all the way through pipe), drop in pipe, camera unable to continue.		N	M	Stormwater & unknown			Site visit 10/15/14, unsure what object protruding in pipe is, but it was discussed to see if it is possible to re-route the pipe.
SP-6808	2	2	2	2	2	4	12	CMP	Gravel, illegal connection blocking pipe	Y	N	U	Unknown			
SP-3421	3	2	2.6	24	10	34	12	CP	Exposed aggregate entire length of pipe, dirt in bottom of pipe (5% full for 15 ft), fine roots at joint, pipe appears to be capped with asphalt? 100% full of asphalt. Camera unable to pass. Inspect from other end. Pipe 15% full of water, dirt and debris in bottom of pipe (20% full for 4 ft - to "capped" point), pipe appears to be capped with asphalt (100% full).	Y	N	L	Mailboxes			Google street view shows 4 mailboxes at the approximate spot where the pipe is blocked. Site visit 10/15/14 identified as spot repair CIP (O&M).

* U= Upper McAleer, M= Middle McAleer, L = Lower McAleer

Table 13: Improper Storm Drain Connection

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-6809	4.5	2.3	2.67	9	23	32	12	CP	Tap-in (x4, 2 active, 1 active/defective, 1 abandoned), roots at joint (fine for 10 LF), hole soil visible, root barrel (medium 20% for 15 LF), infiltration weeper (at joints for 110 LF), encrusted deposits (10% for 20 LF), fracture (multiple)		N	U	Stormwater x4			
SP-2690	3.5	3	3.33	7	3	10	12	CP	Tap break in (3), sag (10%+ full for 25 ft), dirt in bottom of pipe (15% full for 5 ft inside sag), gravel and rocks in bottom of pipe (not in report), broken pipe at joint with concrete protruding into pipe, repair patch at joint, but soil still visible.	Y	N	U	Stormwaterx3			
SP-2472	1	3	2	2	6	8	12	CP	Observed three locations with defective or intruding tap break (4-inch taps). Soil cave in observed at one of the broken 4-inch taps. Circumferential cracks observed around the 4-inch tap locations. Observed gap at last tap, pipe bedding material visible.		N	M	Stormwater x3			
SP-3573	2.8	2	2.38	11	8	19	12	CP	Fine sediment deposits (5% full) for 6 feet. Longitudinal hairline cracks observed between joints. Surface damage visible between 50.9 ft and 65.7 ft mark. Two 4-inch PVC pipe hammered/break in taps. One 4-inch corrugated plastic pipe hammered in and intruding. Fine sediment deposits. Hole with visible soil and roots at hole. Surface damage observed in proximity of hole. Rooted joints.		Y	M	Stormwater x3			
SP-5160	3	2	2.15	6	22	28	12	CP	Pipe cleaned. Needs more cleaning. Fine roots at joint. Multiple fractures for 50 feet. Pipe section also has water 15% full due to pipe sag. Fine sediment deposits 10% full for 45 feet. Tap break in. Camera unable to complete due to debris buildup, candle rest of pipe with sediment deposits.	Y	N	L	Stormwater x3			
SP-5095	5	2	2.43	5	12	17	12	CP	needs more cleaning. Fine (clumpy) sediment debris 10% full for 31 feet. Surface damage with visible aggregate observed. Pipe dent (deformity) observed at 31.3 ft mark partially blocking flow (40%). Two small diameter (~1-inch) observed penetrating sidewall - intruding pipes do not fully cross pipe cross section. Camera unable to continue due to pipe deformity, however, it appears that fine sediment deposits continues through end of pipe.	Y	Y	M	Stormwater x2	X		
SP-1769	3.6	2.3	3.13	18	7	25	12	CP	Encrusted deposits (x2), joint offset (medium) rocks visible, broken soil visible (x3), tap-in (x2), spiral crack, gravel blocking 20%		N	U	Stormwater x2			
SP-4204	3.1	3	3.11	25	3	28	18	RCP	Multiple cracks, broken pipe with soil visible, multiple cracks (12 ft), tap break in (x2), multiple fractures, spiral crack, longitudinal crack, hole repaired with burlap, rocks and grout with grout protruding into pipe (15%). Pipe inspected twice.		N	U	Stormwater x2			
SP-4272	0	2.2	2.21	0	31	31	18	RCP	Gravel (10% for 35 LF), tap-in with infiltration gusher, gravel (10% for 25 LF), sediment deposit, tap-in	Y	Y	L	Stormwater x2			
SP-6145	3	3	3	3	6	9	12	CMP	Tap break in (x2), material change CMP to CP, multiple cracks at 2nd tap break in, camera unable to pass tap break in, visual inspection last 10 ft of pipe looks good.	Y	N	U	Stormwater x2			
SP-777	0	2	2	0	2	2	12	PE	Standing water in pipe, active tap break in (8 in)on side of pipe, active tap break in (6 in) on side of pipe, deposits in bottom of pipe (called out for last 3 ft of pipe, really entire length of pipe under standing water).	Y	Y	L	Stormwater x2			
SP-8583	0	2	2	0	4	4	12	CP	Rocks and vegetation, tap-in from the top, tap-in from side, sediment deposit		Y	M	Stormwater x2			

Table 13: Improper Storm Drain Connection

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-8589	0	0	0	0	0	0	12	CP	Tap-in from side (x2)		Y	M	Stormwater x2			
SP-924	0	0	0	0	0	0	12	PE	6 in tap break-in in top of pipe (x2)		N	U	Stormwater x2			Install CBs at TBIs
SP-4243	0	2.6	2.6	0	13	13	12	CP	Tap break in, drop in pipe, unknown thing protruding into pipe - camera unable to continue to unknown discharge point. Pipe cleaned and reinspected 2 months later. Debris in bottom of pipe (5% full for 12 ft), tap break in (stormwater), tap break in (unknown - odd looking steel thing protruding all the way through pipe), drop in pipe, camera unable to continue.		N	M	Stormwater & unknown			Site visit 10/15/14, unsure what object protruding in pipe is, but it was discussed to see if it is possible to re-route the pipe.
SP-6155	5	3.8	4	5	15	20	12	CP	Tap break in (stormwater) intruding with hole with visible soil, pipe 100% blocked by dirt, roots and debris at buried catch basin-like structure (bridge?), camera unable to pass, inspect from other end. 10-40% full of dirt for 16 ft, camera unable to continue, unable to reach buried structure thing from other end.	Y	N	M	Stormwater & mailboxes			Mailboxes above mystery buried structure; site visit 10/15/14 identified as pipe repair CIP with medium priority.
SP-10733	0	0	0	0	0	0	12	CP	Tap (factory made?) - 4-inch stormwater		Y	M	Stormwater			
SP-12214	0	3.5	3.5	0	7	7	12	CP	Pipe cleaned. Gravel in bottom of pipe at outlet end, tap break in - stormwater? (Not in report!), debris in bottom 40% of pipe, camera unable to continue.	Y	Y	U	Stormwater			
SP-12821	0	2	2	0	4	4	12	PE	Fine sediment in bottom of pipe, active tap break in		N	L	Stormwater			
SP-12823	0	0	0	0	0	0	12	PE	Active tap break in		N	L	Stormwater			
SP-1456	3.5	0	3.5	14	0	14	12	CP	6" stormwater tap break in with multiple cracks around connection, joint offset medium, material change from CP to CMP (6' of CMP), material change back to CP with hole with visible soil, CP for 44 feet, then back to CMP for 6 feet, deformation in CMP at transition back to CP		Y	U	Stormwater			
SP-14673	1.5	1.9	1.8	3	20	23	12	CP	Deposits in bottom of pipe (5-10% full for 35 ft), fine roots at joint (2 joints called out in report, roots actually visible at most joints in pipe), deposits ingressed gravel (deposits attached encrusted?), mineral deposits blocking 25% if pipe, camera unable to pass, inspect from other end. Infiltration weeper (x3), joint offset large/joint separation medium (same joint), camera unable to continue. illicit stormwater connection visible in top of pipe upstream (actively discharging water into pipe).	Y	N	L	Stormwater			
SP-15099	3	0	3	3	0	3	12	CP	Multiple longitudinal cracks on sides of pipe for entire 4 feet of pipe segment, with active 4" tap break-in (stormwater)		Y	M	Stormwater			
SP-15101	0	2	2	0	12	12	12	CP	Tap in, gravel in bottom of pipe (10% for 30 LF) - unable to continue due to debris	Y	N	M	Stormwater			

Table 13: Improper Storm Drain Connection

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-15116	5	3	4	5	3	8	12	CP	Hole with visible soil at bottom of pipe at joint, tap break in protruding almost completely though pipe, top half of pipe blocked, camera unable to continue		N	U	Stormwater			
SP-15117	0	2.1	2.14	0	15	15	12	PE	Deposits settled fine (10% full for 30 ft), tap break in intruding into pipe, camera unable to pass tap break in, visual inspection for rest of pipe looks ok, just dirty.	Y	N	U	Stormwater			
SP-15144	0	0	0	0	0	0	12	CMP	(Upper line to SP-4277) Tap in		Y	L	Stormwater			
SP-153	3.7	3	3.6	33	3	36	12	CP	Joint separation medium (x2), broken pipe with soil visible (x4), broken pipe with visible void, joint offset large with visible void (camera unable to continue - inspect from other end), deformation/dent in steel pipe, change from steel to CP, tap break in 4" storm.		N	L	Stormwater	X	X	
SP-1598	3.5	3	3.33	7	3	10	12	CP	Tap-in, repair (10 LF of PE pipe), sag in PE pipe, deformation in PE pipe - unable to pass		N	M	Stormwater			
SP-1604	2.8	2	2.5	14	6	20	12	CP	Multiple fractures, longitudinal cracks (x2+), multiple cracks (x2), rocks in pipe (x2), fine deposits, 8" tap break in from CB-6387,		Y	L	Stormwater			
SP-1632	3.5	3.3	3.4	7	10	17	12	CP	Rock in pipe, change from CP to PE, active tap break in 3" storm, large joint separation at PE to CP transition, change from PE to CP, attached encrusted deposits, rocks in pipe, change from CP to Steel, large rock in pipe, deformed/crushed pipe, unable to continue.	Y	N	L	Stormwater			
SP-1763	2	1	1.8	8	1	9	12	CP	Crack (x4), tap-in, roots fine at joint		N	U	Stormwater			
SP-1764	2	0	2	6	0	6	18	RCP	Crack (x3), tap-in		N	U	Stormwater			
SP-1767	5	1.8	2.83	10	7	17	12	CP	Pipe cleaned. Broken pipe at joint with roots (roots not in report) , tap break in (stormwater) with large amount of roots (roots not in report), fine roots at joint (at all joints, only one called out in report), deposits in bottom of pipe (10% full for 15 ft), then camera unable to continue.	Y	N	U	Stormwater			
SP-1771	0	5	5	0	10	10	12	CP	No scores on first half of inspection. Deposits in bottom of pipe (5-20% full for 15 ft), camera unable to continue, inspect from other side. Tap break in (stormwater, connecting pipe 20% full of debris), deposits in bottom of pipe (5-50% full for 12 ft+), camera unable to pass, giant root? visible downstream.	Y	N	U	Stormwater			
SP-2008	3	2.4	2.5	3	17	20	18	CMP	1st direction: hole, encrusted deposits (5% for 15 LF), infiltration weeper/runner (x2), tap-in, sediment deposit; 2nd direction: infiltration weeper (x2), branch in pipe, hole		N	L	Stormwater	X		
SP-2094	3	3	3	81	3	84	18	RCP	Aggregate visible (length of pipe), tap-in		Y	U	Stormwater			
SP-3232	0	3	3	0	3	3	12	CMP	Tap-in, pipe half full with water	Y	N	L	Stormwater			
SP-3411	0	0	0	0	0	0	12	CMP	Tap-in		Y	L	Stormwater			
SP-3439	5	1.7	2.5	5	5	10	12	CP	Fine roots at joints (x5), Tap break in - short 6-inch pipe on top of pipe with catch basin lid, change from CP to corrugated PE (looks like lining?), deformation in corrugated PE pipe - camera unable to continue		N	L	Stormwater			Catch basin inlet installed over top of pipe. Upstream portion of pipe appears to be a concrete pipe with a corrugated PE pipe shoved inside, and the whole thing crushed.

Table 13: Improper Storm Drain Connection

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-3552	0	3	3	0	6	6	18	CMP	Fine deposits in bottom of pipe (blocking 15%+, camera unable to continue), appears to be an unmentioned and unrated tap break in downstream (pipe protruding, large metal pieces protruding)		N	U	Stormwater			
SP-3565	5	3.5	4	5	7	12	12	CP	Mud and debris in bottom of pipe (5% full for 6 ft), broken pipe with visible soil at tap break in (4" stormwater), camera unable to continue, inspect from opposite end, pipe 45% full of rocks and debris at upstream end, camera only able to make it 6 ft into pipe.	Y	N	U	Stormwater			
SP-4214	5	2.3	2.46	5	9	14	12	CP	Pipe completely blocked with what looks like a smaller CP inserted into pipe (possible repair?), but completely full of mud and debris. Inspect from other side, tap break in (4" stormwater) in side of pipe, dirt in bottom of pipe (5% to full), camera unable to continue, camera cannot reach same blockage point from other end.	Y	N	U	Stormwater			
SP-4234	1	1.5	1.4	1	6	7	12	CP	Water 25% full and gradually reducing to 10% full for 66 feet. Water level in catch basin above pipe invert. Tap break 4inch plastic corrugated pipe, complete blockage of soil. Rooted joints (fine) partially blocking pipe at three locations. Medium joint gap with soil visible beyond opening. Potential infiltration stains for 10 feet starting at the 74.7 ft mark which was not recorded in the report. Camera unable to complete 2 feet before pipe end.	Y	Y	M	Stormwater			
SP-4247	5	3	4	5	3	8	12	CP	Abandoned tap break in intruding into pipe , camera unable to continue. Reverse inspection, broken pipe with visible void.		N	M	Stormwater			
SP-4254	3	2	2.22	6	14	20	12	CP	Gravel in bottom of pipe (30 ft), hole with soil visible, joint offset medium, tap break in active, fine settled deposits (7 ft)		N	M	Stormwater			
SP-4280	0	1.8	1.6	1	7	8	12	CP	Joint separation medium, infiltration weeper, fine roots at joint (x2), tap break in intruding		N	M	Stormwater			
SP-4427	5	2.2	3	10	11	21	12	CP	Fine ingressed deposits, badly broken pipe with visible soil, tap break in (4"), broken pipe repaired with some sort of rubber at joint, deposits attached encrusted, rocks in pipe (x2), trash and pine needles in pipe	Y	N	U	Stormwater			
SP-475	2.7	0	2.69	35	0	35	12	CP	Gravel in bottom of pipe (8 ft), Joint offset medium with attached encrusted deposits, broken pipe with attached encrusted deposits, tap break in (4"), pipe blocked with trash and dirt (and more joint offsets?). Pipe cleaned. Exposed aggregate entire length of pipe, joint offset medium, hole with visible soil, longitudinal crack (x2), tap break in (stormwater), joint offset medium, pipe still 100% full of dirt and garbage, camera unable to continue.	Y	N	U	Stormwater			
SP-5124	0	2.5	2.5	0	5	5	12	CP	Sediment (10%), tap-in (sediment and joint offset in tap-in) - unable to pass, pipe in good condition		N	M	Stormwater			
SP-5974	0	0	0	0	0	0	12	CP	Tap-in		N	M	Stormwater			
SP-5998	1	0	1	9	0	9	12	CP	Joint offset (medium x8), tap-in, joint separated (medium)		N	M	Stormwater			
SP-6005	0	2	2	0	8	8	12	PE	Sediment (5% for 15 LF), gravel (x2), tap-in		Y	L	Stormwater			
SP-612	0	3	3	0	3	3	12	CP	Tap-in - unable to inspect rest of line		N	L	Stormwater			

Table 13: Improper Storm Drain Connection

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-6134	0	3	3	0	6	6	12	CP	Dirt, roots, rocks and debris in pipe (15% full for 12+ ft), camera unable to pass, inspect from other end. Tap break in 9 ft from upstream end with grout intruding into pipe, camera unable to pass, unable to complete inspection.	Y	N	U	Stormwater			
SP-6138	0	1.8	1.8	0	9	9	12	CP	Roots at joint (fine for 85 LF), sediment (5% for 20 LF), tap-in, roots at joint (medium)	Y	Y	M	Stormwater			
SP-6800	4	2	2.75	12	10	22	12	CP	Blocked tap-in, roots at joint (fine for 10 LF), sediment deposit, hole soil visible (x2), fracture, root at joint		Y	U	Stormwater		X	
SP-6820	2.5	3	2.67	10	6	16	12	CMP	tap break in protruding halfway into pipe, camera unable to continue, inspect from other end, joint offset medium (x2), material change CP to CMP, corrosion, deformation (20% blocked on side of pipe)		Y	U	Stormwater	X		
SP-6830	2	2	2	4	14	18	12	CP	Gravel deposit, crack (spiral), rocks (10% for 15 LF), gravel (10% for 15 LF), surface spalling, repair section (PVC for 1 LF) with tap-in	Y	N	U	Stormwater			
SP-6905	0	0	0	0	0	0	12	CP	Tap-in		Y	L	Stormwater			
SP-6908	2	2	2	2	8	10	12	CP	Pipe cleaned. MSA due to debris from TBI, bottom end reduces to 8" at 5 ft. Gravelly deposits 10% full for 20 feet. Water 20% full due to pipe sag. Camera unable to complete due to debris. Candle light shows increased debris buildup and tap location approx. 20ft from end point.	Y	N	L	Stormwater			
SP-7303	3.7	3	3.5	11	3	14	12	CP	Aggregate visible (length of pipe), broken soil visible (failed attempt at tap-in?), rocks		N	M	Stormwater			
SP-776	0	5	5	0	5	5	12	CP	Pipe completely blocked by a basketball, Rockstar can, and illicit connection protruding though top of pipe. Camera unable to continue. No survey from other end.		Y	L	Stormwater			
SP-7984	4	2.3	2.91	16	16	32	12	CP	Tap break in(?) with roots, broken soil visible (x4), tap break in, rocks and gravel in bottom of pipe, unable to finish because of tee	Y	N	M	Stormwater			Add CB at tee
SP-8587	1	0	1	1	0	1	12		Conflict - lateral connection?		Y	M	Stormwater			
SP-8588	0	2	2	0	4	4	12	CP	Tap-in, sediment deposit (x2)		Y	M	Stormwater			
SP-8596	0	0	0	0	0	0	12	CP	Tap-in		Y	M	Stormwater			
SP-8600	0	0	0	0	0	0	12	CP	Tap-in		Y	M	Stormwater			
SP-8686	2	0	2	4	0	4	12	CP	Joint separation (large), tap-in, joint offset (large) - unable to pass		Y	U	Stormwater			Citizen complaint of broken pipe
SP-901	0	3	3	0	15	15	12	PE	Tap-in, gravel (15% for 20 LF) - unable to pass, pipe in good condition	Y	N	U	Stormwater			
SP-9060	0	2.5	2.5	0	5	5	12	CMP	Deposits attached encrusted (10% blocked for approx 5 ft), tap break in protruding 50% into pipe, material change from CMP to CP and change in slope, camera unable to continue.		Y	U	Stormwater			Install CB at TBI/pipe material transition
SP-925	3	2.3	2.5	6	9	15	12	PE	Cuts in pipe wall, 4" tap in - leads to catch basin, sediment and leaves deposit (10% x2), gravel deposit (5%), spiral fracture.		N	U	Stormwater			
SP-9390	2	2	2	18	12	30	12	PE	Deposits in bottom of pipe (5% full of most of pipe), sags (5% deep for 10 ft and again for 40 ft), tap break in (stormwater) with 2 screws protruding though top of pipe.		Y	U	Stormwater			

Table 13: Improper Storm Drain Connection																	
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
SP-9832	0	2.5	2.45	0	27	27	12	CP	Pipe cleaned. Needs more cleaning. Water 5% full and meandering through deposits in pipe. Fine sediment deposits 15% full for 25 feet. Gravelly deposits 10% for 28 feet. 4-inch tap break which is 30% full of water. Water 10% full (not in report). Camera unable to continue due to debris and water.	Y	Y	L	Stormwater			
SP-9844	0	2.2	2.17	0	50	50	12	CP	Infiltration weeper with encrusted deposits (length of pipe), tap-in, rocks and sediment for 30 LF (filling 50% of pipe) - unable to pass		N	M	Stormwater			

* U= Upper McAleer, M= Middle McAleer, L = Lower McAleer

Table 14: Pipes Recommended for Second Tier Repair

Repair Type	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	OPR	Diam	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
Trenchless	SP-6903	2.89	0	2.89	159	0	159	18	RCP	275.37	Aggregate visible (entire length), sag (15% for 25 LF), fracture, small piece of joint broken with crack, joint angular (medium)		Y	L				X				159	1	0	1	0	0	0	0	1	0	0	162
	SP-6136	3.08	3	3.08	77	3	80	12	CMP	118.05	Surface corrosion entire length of pipe, hole in top of pipe with visible soil (corrosion), deposits encrusted in bottom of pipe (20% full for 3 ft).	Y	Y	U								80	0	1	1	0	0	0	0	0	0	0	82
	SP-2517	3.08	0	3.08	77	0	77	18	RCP	127.32	Aggregate visible (length of pipe), broken soil visible at joint		Y	L								77	1	0	1	0	0	0	0	0	0	0	79
	SP-3420	3.18	1.67	2.95	54	5	59	12	CP	72.43	Surface damage, aggregate visible recorded for full length of pipe. Fine (small) rooted joints at two locations partially blocking pipe (<5%). Water 10% full from pipe sag for 78 feet. Bottom section of pipe broken with visible soil beyond break at first break. Second break with visible soil beyond break associated with two illicit pipe connections. Patch repair (mesh and concrete) observed at 45.1 ft mark. Water 5% full for last 15 feet.		N	L	Water x2							59	0	0	0	0	1	0	0	0	0	0	60
	SP-6132	3.67	0	3.67	33	0	33	18	CP	47.45	Surface damage, visible aggregate for full pipe length. Hole at joint with visible soil beyond defect. Multiple fractures observed on two pipe sections (12 feet total). Longitudinal fractures top of pipe observed in one pipe section.		N	U								33	1	0	0	0	0	0	0	0	0	0	34
	SP-4204	3.13	3	3.11	25	3	28	18	RCP	181.19	Multiple cracks, broken pipe with soil visible, multiple cracks (12 ft), tap break in (x2), multiple fractures, spiral crack, longitudinal crack, hole repaired with burlap, rocks and grout with grout protruding into pipe (15%). Pipe inspected twice.		N	U	Stormwater x2			X				28	1	0	0	0	1	0	0	1	0	0	31
	SP-3436	3.43	0	3.43	24	0	24	12	CP	59.77	Bottom of pipe broken at joint (x6 for 20 ft), broken pipe at joint with soil visible, broken pipe with soil visible and grout protruding into pipe (camera unable to continue - survey from other end), joint offset large		N	M				X		X		24	0	0	0	0	0	0	0	1	0	1	26
	SP-3573	2.75	2	2.38	11	8	19	12	CP	139.47	Fine sediment deposits (5% full) for 6 feet. Longitudinal hairline cracks observed between joints. Surface damage visible between 50.9 ft and 65.7 ft mark. Two 4-inch PVC pipe hammered/break in taps. One 4-inch corrugated plastic pipe hammered in and intruding. Fine sediment deposits. Hole with visible soil and roots at hole. Surface damage observed in proximity of hole. Rooted joints.		Y	M	Stormwater x3							19	0	0	1	0	1	0	0	0	0	0	21
	SP-4703	4.33	2	3.17	13	6	19	12	CP	96.64	Broken, hole soil visible, repair section (CMP for 80 LF), deformation (top of pipe), infiltration weeper (x2), encrusted deposits.		N	L		X					Site visit 10/15/14 identified pipe is monitoring CIP.	19	0	0	0	0	0	1	0	0	0	0	20
	SP-5559	4.67	0	4.67	14	0	14	24	CMP	211.91	1st direction: Repair patch (x2), collapse from top of pipe; 2nd direction: deformation		Y	L		X		X			Only need repair at collapse, repair patches in good condition. Site visit 10/15/14 identified pipe as monitoring CIP. When replaced, needs to be rerouted.	14	2	0	1	0	0	1	0	1	0	0	19
	SP-140	5	2	2.5	5	10	15	18	RCP	71.79	Gravel, large broken pipe/hole in bottom of pipe with soil visible. Pipe cleaned (? Maybe) and reinspected 2 months later. Pipe 10% full of mud and debris entire length of pipe, hole is covered in mud and not visible in video or report.		N	M			X				Under intersection of 6th Ave NE and Ne 200th St	15	1	0	0	0	0	0	1	0	0	0	17
	SP-2465	5	1.4	2	5	7	12	12	CP	76.95	fine sediment deposits 5% full for 73 feet. Three joints observed with fine roots. Pipe break observed at one rooted joint with soil visible beyond pipe defect.		N	M								12	0	0	0	0	0	0	0	0	0	0	12
	SP-5105	2.2	0	2.2	11	0	11	12	CP	46.59	Hole with visible soil at joint, joint offset large, camera unable to continue, inspect from other end. Joint offset medium, joint angular medium, joint offset large (reverse slope), able to reach other end of pipe segment with large joint offset.	Y	N	M							Reverse slope at large joint offsets. Site visit 10/15/14 identified pipe as a monitoring CIP.	11	0	1	0	0	0	0	0	0	0	0	12
	SP-2006	5	0	5	5	0	5	24	CMP	168.47	Repair patch (x3 in good shape), collapsed pipe - unable to pass, pipe is deformed for last 6 feet		Y	L		X		X		X	Open cut only for collapse, repairs are fine. Possibly from winding road sign? Site visit 10/15/14 identified pipe as monitoring CIP.	5	2	0	1	0	0	1	0	1	0	1	11
	SP-7081	5	0	5	5	0	5	24	CMP	141.86	Collapse and basketball in the pipe- unable to pass, other end cannot be accessed		Y	L		X		X		X	Collapse at repair patch on road shoulder. Site visit 10/15/14 identified pipe as monitoring CIP.	5	2	0	1	0	0	1	0	1	0	1	11
	SP-9212	3	2	2.5	6	4	10	12	CMP	39.63	Water 5% full in report (however noted that water observed was primarily within the pipe corrugations). Fine roots growing in pipe barrel. One root vein observed wandering for 6 feet. Corrosion damage.	Y	Y	U								10	0	1	1	0	0	0	0	0	0	0	12
	SP-953	5	2.5	3.33	5	5	10	12	CP	18.25	Fine sediment and gravelly deposits at egress. Pipe broken at joint with visible soil beyond. General observation not included in report: all pipe joints appear to be offset with void or separation. Camera was unable to complete past rock obstructions, but candlelight showed pipe ingress to be in relatively good condition compared to downstream pipe sections.	Y	N	M								10	0	1	0	0	0	0	0	0	0	0	11

Table 14: Pipes Recommended for Second Tier Repair

Repair Type	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	OPR	Diam	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
	SP-3893	3.5	0	3.5	7	0	7	12	CP	36.71	Hole (soil visible), joint offset (large)		Y	L			X	X			Site visit 10/15/14 identified pipe as a monitoring CIP.	7	0	0	1	0	0	0	1	1	0	0	10
	SP-967	2	0	2	8	0	8	12	CP	40.01	Medium joint separation/offset at several joints within pipe. Hole with visible soil. Rock wedged in joint (not in report).	Y	Y	M								8	0	1	1	0	0	0	0	0	0	0	10
	SP-5123	5	4	4.5	5	4	9	12	CP	58.71	Hinge crack reported at 36.4 ft mark. Video shows longitudinal cracks at the top, bottom, and sides extending one section of pipe (5ft). Surface damage with visible aggregate also noted in pipe section of concern. Pipe also seems slightly deformed through the pipe section. Encrusted debris partially blocking pipe flow (25%).		N	M								9	0	0	0	0	0	0	0	0	0	0	9
	SP-12851	5	2	3.5	5	2	7	12	CMP	63.70	1st direction: sediment; 2nd direction: repair section (PVC for 6 LF), collapsed pipe		Y	L							Under 15th Ave NE; site visit 10/15/14 identified pipe is monitoring CIP.	7	0	0	1	0	0	0	0	0	0	0	8
	SP-3352	1.5	1.5	1.5	3	3	6	12	CP	81.44	Water 10% full for first 24.7 feet of CP. Fine roots at joint. There appears to be a couple locations where material changes along pipe length which were not recorded in the report. Joint offset was observed at all material changes joints. Water was observed dripping at one of the material change joints. Metal pipe (24.7 to 45.3 feet), concrete section (45.3 to 48 feet), metal (48 feet to 59.6 ft), concrete pipe to end. Longitudinal crack recorded at top of pipe. A couple medium joint offsets observed in last 15 feet. Weeping hole at 78.8 feet. Camera unable to complete due to offset at weeping hole, however, able to observe conditions of final section.		Y	M								6	0	0	1	0	0	0	0	0	0	0	7
	SP-96	0	4	4	0	4	4	12	CMP	41.77	Pipe cleaned. Msa camera under water. Water level 20% full and increased to 50% full. Camera underwater and unable to complete.	Y	Y	L								4	0	1	1	0	0	0	0	0	0	0	6
	SP-1635	1.5	0	1.5	3	0	3	12	CP	52.04	Pipe cleaned. Pipe 15% full of water, weird structure with pipe going though it, camera unable to pass, inspect from other end. Joint offset medium, sag (20% full for 5 ft), joint offset large, unable to reach weird structure.	Y	N	L	Gas & Water							3	0	1	0	0	1	0	0	0	0	0	5
	SP-9307	1	0	1	3	0	3	12	CP	210.45	Water 5% full. Medium joint offsets at three locations. Sediment		Y	M				X				3	0	0	1	0	0	0	0	1	0	0	5
	SP-15084	2	0	2	2	0	2	12	CP	30.78	Large joint offset at 3 feet.		N	L				X				2	0	0	0	0	0	0	0	1	0	0	3
	SP-1800	2	0	2	2	0	2	12	CP	11.64	Angular joint displacement observed. Roots observed through gap, however, no roots have grown pushed into the pipe.		Y	M								2	0	0	1	0	0	0	0	0	0	0	3
	SP-2679	2	0	2	2	0	2	12	CP	31.03	Large joint offset at 14 feet. Soil visible beyond joint.		N	U								2	0	0	0	0	0	0	0	0	0	0	2
	SP-6901	2.93	1.86	2.57	41	13	54	12	CP	129.055	Pipe cleaned, needs more cleaning. Exposed aggregate entire length of pipe, medium roots at joint, fine roots at joints (x2), dirt and rocks in bottom of pipe (10% full for 10 ft), hole with visible soil and roots, camera unable to continue because of mud and debris, inspect from other end. Exposed aggregate entire length of pipe, joint separation medium, alignment up, joint offset large, alignment down, camera unable to continue, pipe suddenly slopes steep down/reverse slope.	Y	Y	L							Pipe has reverse slope in middle of pipe.	54	0	1	1	0	0	0	0	0	0	0	56
	SP-153	3.67	3	3.6	33	3	36	12	CP	79.1857	Joint separation medium (x2), broken pipe with soil visible (x4), broken pipe with visible void, joint offset large with visible void (camera unable to continue - inspect from other end), deformation/dent in steel pipe, change from steel to CP, tap break in 4" storm.		N	L	Stormwater	X	X			X	Adjacent to SP-4269	36	0	0	0	0	1	1	1	0	0	1	40
	SP-5956	3.5	4.5	3.7	28	9	37	15	CP	105.541	Pipe 10-50% full of water, paused for cleaning. Pipe cleaned, exposed aggregate entire length of pipe, giant root ball blocking 55% of pipe, broken pipe (where roots are getting in), camera unable to continue, inspect from other end. Exposed aggregate entire length of pipe, camera able to make it to other side of giant root ball and broken pipe.	Y	N	L							Roots blocking over half of pipe after cleaning.	37	1	1	0	0	0	0	0	0	0	0	39

Table 14: Pipes Recommended for Second Tier Repair

Repair Type	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	OPR	Diam	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
Open Cut	SP-6133	2.33	3	2.57	21	15	36	12	CP	66.8123	Pipe cleaned. Gravel and mud in bottom of pipe (10% to 15% full for 20 ft), multiple cracks in pipe, camera unable to continue past gravel, inspect from opposite end, joint offset medium, sag (pipe 25% full of water for 6 ft), sag (pipe 25 % full of water for 25 ft), hole with visible void in side of pipe, gravel in bottom of pipe (3 ft), camera made it to the stopping point from the other direction.	Y	N	U			X				Pipe in Right of Way of Wallingford Ave N, north of 192nd.	36	0	1	0	0	0	0	1	0	0	0	38
	SP-475	2.69	0	2.69	35	0	35	12	CP	64.7716	Gravel in bottom of pipe (8 ft), Joint offset medium with attached encrusted deposits, broken pipe with attached encrusted deposits, tap break in (4"), pipe blocked with trash and dirt (and more joint offsets?). Pipe cleaned. Exposed aggregate entire length of pipe, joint offset medium, hole with visible soil, longitudinal crack (x2), tap break in (stormwater), joint offset medium, pipe still 100% full of dirt and garbage, camera unable to continue.	Y	N	U	Stormwater			X				35	0	1	0	0	1	0	0	1	0	0	38
	SP-2665	3.38	3	3.3	27	6	33	12	CP	54.5521	Hole, hole with visible soil, broken pipe, medium roots at joint (x2 at least), camera unable to get past first large root at large joint offset blocking 25% of pipe, one more medium roots at joint visible, pipe cleaned, large root still blocking pipe, survey from other end, broken pipe with multiple cracks in top of pipe, joint offset large	Y	N	U							Pipe not located under street - in ROW of Stone Ave N.	33	0	1	0	0	0	0	0	0	0	0	34
	SP-773	4.6	2.5	4	23	5	28	12	CMP	138.315	Large hole in top of pipe, possibly repaired?, deposits attached encrusted, material change CMP to CP (103 ft CMP, 39 ft CP, with joint offset?), multiple cracks, broken pipe (bottom at joint) with soil visible, longitudinal hatch fracture (7.5 ft all over pipe), gravel and rocks in bottom of pipe last 3 ft.		Y	L		X					Possible utility damage at large repaired hole and longitudinal hatch fracture. Only fracture needs repair.	28	0	0	1	0	0	1	0	0	0	0	30
	SP-3555	3.86	0	3.86	27	0	27	12	CP	66.8628	Multiple cracks, longitudinal crack, broken pipe with visible soil (x3), hole with visible void, joint offset large, hole repaired with cloth/burlap		N	U								27	0	0	0	0	0	0	0	0	0	0	27
	SP-14673	1.5	1.85	1.8	3	20	23	12	CP	137.192	Deposits in bottom of pipe (5-10% full for 35 ft), fine roots at joint (2 joints called out in report, roots actually visible at most joints in pipe), deposits ingressed gravel (deposits attached encrusted?), mineral deposits blocking 25% if pipe, camera unable to pass, inspect from other end. Infiltration weeper (x3), joint offset large/joint separation medium (same joint), camera unable to continue. illicit stormwater connection visible in top of pipe upstream (actively discharging water into pipe).	Y	N	L	Stormwater							23	0	1	0	0	1	0	0	0	0	0	25
	SP-144	5	2	2.3	5	18	23	12	CMP	260.898	Pipe cleaned. Deposits in bottom of pipe (10% full for 34 ft and 10% full for 10 ft), deformation in side of pipe blocking 50% of pipe, camera unable to continue, catch basin visible beyond deformation.	Y	Y	U		X					Pipe is located in ROW of N 200th St. Adjacent to SP-145	23	0	1	1	0	0	1	0	0	0	0	26
	SP-6800	4	2	2.75	12	10	22	12	CP	105.02	Blocked tap-in, roots at joint (fine for 10 LF), sediment deposit, hole soil visible (x2), fracture, root at joint		Y	U	Stormwater		X					22	0	0	1	0	1	0	1	0	0	0	25
	SP-4269	2	2.11	2.1	2	19	21	12	CP	65.8157	msa due to offset joint. Surface damage with aggregate visible. Water 10% full for 15 feet. Gravel deposits 5% full for 5 feet. Intruding sealing ring observed at five joints (also noted that pipe is offset at the joints). Standing water at joint offsets from sags. Fine roots observed at three of the joints. Large joint offset near end of pipe. Pipe beyond the offset appeared to be 25% full of fine sediment deposits (not in report). Camera unable to continue to pipe end due to joint offset.	Y	N	L							End of pipe was visible at the survey end point, but report did not include visible sediment shown in the video. Adjacent to SP-153	21	0	1	0	0	0	0	0	0	0	0	22
	SP-4223	2.71	3	2.75	19	3	22	12	CP	92.6263	Broken pipe with visible soil at joint, joint separation medium, joint offset medium, joint offset large, camera unable to continue, inspect from other end. Hole with visible soil in bottom of pipe at joint, hole repaired with mesh protruding into pipe, tap break in (stormwater), joint offset medium (same as joint offset large where camera had to stop from opposite end)		N	M								22	0	0	0	0	0	0	0	0	0	0	22
	SP-6063	2	2.25	2.22	2	18	20	18	RCP	174.315	Gravel and deposits in pipe (5% full for 2 ft, 5% full for 3 ft, 10% full for 20 ft, 5-10% full for 10 ft), joint offset large, camera unable to pass, inspect from other end. Deposits in bottom of pipe (15% full for 16 ft) to large joint offset (same as other end).	Y	N	M								20	1	1	0	0	0	0	0	0	0	0	22
	SP-6155	5	3.75	4	5	15	20	12	CP	119.806	Tap break in (stormwater) intruding with hole with visible soil, pipe 100% blocked by dirt, roots and debris at buried catch basin-like structure (bridge?), camera unable to pass, inspect from other end. 10-40% full of dirt for 16 ft, camera unable to continue, unable to reach buried structure thing from other end.	Y	N	M	Stormwater & mailboxes						Mailboxes above mystery buried structure; site visit 10/15/14 identified as pipe repair CIP with medium priority.	20	0	1	0	0	1	0	0	0	0	0	22

Table 14: Pipes Recommended for Second Tier Repair

Repair Type	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	OPR	Diam	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
	SP-6175	5	3	8	10	9	19	12	PE	157.905	Concrete pipe at upstream end (70 ft), deposits in bottom of pipe (20% full for 8 ft), gas line through pipe (20% of pipe blocked), pipe broken with visible soil and roots where gas line punches through pipe, concrete chunk resting on gas line. Camera unable to continue. Inspect from other end. PE pipe for 85 ft, then material changes from PE to CP, stop at gas pipe, inspection complete.	Y	N	U	Gas	X		X				19	0	1	0	0	1	1	0	1	0	0	23
	SP-2536	2.14	3	2.25	15	3	18	12	CP	53.2261	needs more cleaning. Medium joint offset observed at three locations. Medium joint separation, rocks and soil visible beyond defect. Hole in pipe with visible soil beyond defect. Surface damage (aggregate visible for 10 feet. Slurry (construction debris obstruction). Camera unable to continue due to slurry obstruction.	Y	N	M						X	Pipe cleaned.	18	0	1	0	0	0	0	0	0	0	1	20
	SP-2692	2.5	3	2.83	5	12	17	12	CP	129.475	Multiple cracks, joint offset large, camera unable to get through joint offset, inspect from opposite end, mud and rocks in bottom of pipe (10% to 15% full for 20 ft), camera unable to get through deep mud, camera unable to reach large joint offset that stopped inspection in other direction.	Y	N	U							Pipe cleaned.	17	0	1	0	0	0	0	0	0	0	0	18
	SP-9080	2.17	2	2.14	13	2	15	12	CP	45.0437	msa - offset joint and roots. Surface damage with visible aggregate for 16 feet. Medium joint offset due to pipe displacement (joint separated). One large joint offset. Sediment deposits 10% full at offset. Camera unable to complete due to offset.	Y	Y	M								15	0	1	1	0	0	0	0	0	0	0	17
	SP-1805	2	3.25	3	2	13	15	12	CP	68.8851	Rocks, dirt and debris (steel? & trash) in pipe (5-50% full for 10 ft), camera unable to continue past debris, material change visible downstream (CP to PE), inspect from other end. Joint offset large with rocks and debris, camera unable to pass, camera unable to reach debris and material change from other end.	Y	N	M								15	0	1	0	0	0	0	0	0	0	0	16
	SP-145	4	0	4	12	0	12	12	CP	114.101	Hole at joint, joint offset large at material change from CP to CMP, deformation in CMP pipe, unable to pass, survey from other side, hole with visible soil at joint, giant hole in bottom of pipe, unable to reach bad part where they stopped on the other end, possible illicit connection in portion camera unable to reach.		Y	U		X	X				Under Whitman Ave N at N 200th St; site visit 10/15/14, identified as pipe repair CIP. Adjacent to SP-144	12	0	0	1	0	0	1	1	0	0	0	15
	SP-617	5	2	4	10	2	12	12	CMP	38.6443	Water 5% full. Dent partially block flow (20%). Fine sediment deposits 5% full for 5 feet. Pipe collapsed appears to have hole. Soil in vicinity of hole appears to have washed into pipe due to hole. Camera unable to complete due to pipe damage.		Y	U		Dent(s)?					Pipe collapse may have resulted from possible utility. Soil appears to have washed through the hole.	12	0	0	1	0	0	0	0	0	0	0	13
	SP-4066	5	0	5	5	0	5	12	CMP	221.436	Pipe cleaned. Msa - collapsed pipe - unable to locate upstream CB	Y	Y	L				X	X	X		5	0	1	1	0	0	0	0	1	1	1	10
	SP-1799	2.67	0	2.67	8	0	8	12	CP	319.642	partially under water. Water level 5% full through pipe length recorded. 3-ft pipe section of PVC pipe. Circumferential fracture observed but no associated washout at 40.2 ft marker. Pipe break at joint followed by large joint offset (identified soil void outside of pipe). Camera unable to continue due to large joint offset.		Y	M				X			Only need replacement at joint offset with soil visible.	8	0	0	1	0	0	0	0	1	0	0	10
	SP-1797	2	3	2.33	4	3	7	12	CP	145.43	Large joint offset, camera unable to continue, inspect from other end. Camera out of focus, circumferential fracture at joint, dirt and debris in bottom of pipe (15% full for 5+ ft), camera unable to continue past debris, unable to reach large joint offset. Pipe needs more cleaning.	Y	Y	M								7	0	1	1	0	0	0	0	0	0	0	9
	SP-6855	2	3	2.5	2	3	5	12	CP	30.4326	Water level 10% full. Fine sediment deposits 15% full at large joint offset. Camera unable to complete due to joint offset.	Y	N	M								5	0	1	0	0	0	0	0	0	0	0	6
	SP-8686	2	0	2	4	0	4	12	CP	320.523	Joint separation (large), tap-in, joint offset (large) - unable to pass		Y	U	Stormwater			X			Citizen complaint of broken pipe	4	0	0	1	0	1	0	0	1	0	0	7
	SP-15118	0	3	3	0	3	3	12	CP	108.692	Rocks in pipe, concrete chunks completely blocking upstream end of pipe (collapsed pipe?), upstream end unknown		Y	U				X			Unable to locate upstream end of pipe	3	0	0	1	0	0	0	0	1	0	0	5

* U= Upper McAleer, M= Middle McAleer, L= Lower McAleer

Table 15: Pipes Recommended for Operations and Maintenance (O&M)

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	SPR	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Total
SP-152	3.14	1.83	2.75	44	11	55	12	CP	218.54	Pipe cleaned. Gravel in bottom of pipe (10% full for 16 ft), fine roots at joint, deposits in bottom of pipe (10% full for 10 ft), camera unable to get past rock, inspect from other end. Exposed aggregate (65 ft), broken pie with visible soil, camera unable to continue past broken pieces of pipe.	Y	N	U				X				44	1	0	0	0	0	0	1	0	0	46
SP-3421	3	2	2.62	24	10	34	12	CP	116.36	Exposed aggregate entire length of pipe, dirt in bottom of pipe (5% full for 15 ft), fine roots at joint, pipe appears to be capped with asphalt? 100% full of asphalt. Camera unable to pass. Inspect from other end. Pipe 15% full of water, dirt and debris in bottom of pipe (20% full for 4 ft - to "capped" point), pipe appears to be capped with asphalt (100% full).	Y	N	L	Mailboxes						Google street view shows 4 mailboxes at the approximate spot where the pipe is blocked. Site visit 10/15/14 identified as spot repair CIP (O&M).	24	1	0	0	1	0	0	0	0	0	26
SP-12532	3.8	2	3.5	19	2	21	18	RCP	72.46	Cracks (multiplex4), broken pipe (2), encrusted deposits at joint		Y	L				X				19	0	1	0	0	0	0	1	0	0	21
SP-6681	4.2	2	3.83	21	2	23	12	CP	80.68	Repair patch (steel) with cracks at joint (multiple), encrusted deposits, broken soil visible (x3, large rocks protruding through pipe), crack (multiple)		N	M						X	Site visit 10/15/14 identified as spot repair CIP (O&M).	21	0	0	0	0	0	0	0	0	1	22
SP-15098	2.67	2.2	2.45	16	11	27	12	CP	150.47	1st report: Fine deposits first foot from CB 15098, broken pipe at joint with visible void, fine deposits ingressed at joint, pipe changes from 12 in CP to 4" PE, unable to continue in 4" pipe, deposits at transition. 2nd report: Pipe cleaned. Circumferential crack, medium roots at joint, joint offset medium, deposits in bottom of pipe (10% full for 3 ft), exposed aggregate (15 ft), fine roots, pipe then changes from 12 in CP to 8 in PE, camera unable to continue.	Y	N	M								16	1	0	0	0	0	0	0	0	0	17
SP-6857	2.75	3	2.8	11	3	14	12	CP	66.83	Rocks in pipe, camera unable to pass, inspect from other end (no scores for first portion of pipe). Hole with visible void at medium joint separation, joint offset large, hole with plastic liner protruding (attempted repair?), asphalt chunks in pipe, camera unable to complete inspection.	Y	N	M							Site visit 10/15/14 identified as spot repair CIP (O&M).	11	1	0	0	0	0	0	0	0	0	12
SP-2551	3.5	3.33	3.4	7	10	17	12	CP	91.32	Joint offset large, electrical conduit or gas line of some sort through pipe, paused for cleaning. Pipe cleaned. Hole at joint with visible void, rocks and debris in pipe (25% full), camera unable to pass.	Y	N	M	Electrical & Gas			X		X		7	1	0	0	1	0	0	1	0	1	11
SP-5095	5	2	2.43	5	12	17	12	CP	77.15	needs more cleaning. Fine (clumpy) sediment debris 10% full for 31 feet. Surface damage with visible aggregate observed. Pipe dent (deformity) observed at 31.3 ft mark partially blocking flow (40%). Two small diameter (~1-inch) observed penetrating sidewall - intruding pipes do not fully cross pipe cross section. Camera unable to continue due to pipe deformity, however, it appears that fine sediment deposits continues through end of pipe.	Y	Y	M	Stormwater x2	X						5	1	1	0	1	1	0	0	0	0	9
SP-15100	5	2	2.6	5	8	13	12	CP	57.10	Broken (soil visible), sediment (5-10% length of pipe) - unable to continue due to debris	Y	N	M								5	1	0	0	0	0	0	0	0	0	6
SP-3556	5	2	3.5	5	2	7	12	CP	56.33	Pipe cleaned. Rock protruding 5% into pipe at joint with visible roots (roots not in report), hole in side of pipe with large visible void.	Y	N	U			X				Pipe is in ROW of Wallingford Ave N between 195th and 192nd; site visit 10/15/14 identified as spot repair CIP (O&M).	5	1	0	0	0	0	1	0	0	0	7
SP-3378	1	3	2.5	1	9	10	12	CP	37.51	Fine roots at joint, dirt in bottom of pipe (10% full for 6+ ft), camera unable to continue past dirt, inspect from other end. Joint angular medium (change in slope - reverse slope), dirt in bottom of pipe (10% full), camera unable to pass dirt, needs more cleaning.	Y	N	M							Reverse slope	1	1	0	0	0	0	0	0	0	0	2

* U= Upper McAleer, M= Middle McAleer, L= Lower McAleer

Table 16: Pipes Recommended for Jetting or Increased Maintenance

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	MPR	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard
SP-4959	0	2.08	2.08	0	50	50	12	CMP	134.95	Sediment (5% for 110 LF), sediment (20% for 10 LF) - unable to pass, pipe in good condition	Y	Y	L				X				50	1	1	0	0	0	0	1	0	0
SP-9844	0	2.17	2.17	0	50	50	12	CP	101.93	Infiltration weeper with encrusted deposits (length of pipe), tap-in, rocks and sediment for 30 LF (filling 50% of pipe) - unable to pass		N	M	Stormwater							50	0	0	0	1	0	0	0	0	0
SP-6801	0	2.14	2.14	0	45	45	12	CP	141.96	Pipe cleaned. Gravel and mud in bottom of pipe (5% full for 20 ft and 5% full for 80 ft), large root and dirt pile blocking 40% of pipe, camera unable to continue, visual inspection - looks like mud and roots in remainder of pipe (not in report).	Y	Y	U								45	1	1	0	0	0	0	0	0	0
SP-6482	0	2.47	2.47	0	37	37	12	CMP	85.32	1st direction: sediment at joints (10% for 50 LF), sediment deposit, sediment (10% for 5 LF, 10-15% for 10 LF); 2nd direction: sediment (15% for 15 LF), material change (CMP to CP - first 5 ft are CMP) - no video of 2nd direction (15 ft), but do have report, camera unable to make it to same point as end of reverse inspection, but is able to zoom - no damage visible, just sediment.	Y	Y	M				X				37	1	1	0	0	0	0	1	0	0
SP-8925	0	2.62	2.62	0	34	34	18	CMP	109.17	Sediment (10% for 40 LF), gravel (25% for 20 LF)	Y	Y	M								34	1	1	0	0	0	0	0	0	0
SP-4272	0	2.21	2.21	0	31	31	18	RCP	145.43	Gravel (10% for 35 LF), tap-in with infiltration gusher, gravel (10% for 25 LF), sediment deposit, tap-in	Y	Y	L	Stormwater x2							31	1	1	0	1	0	0	0	0	0
SP-786	4	2.07	2.39	12	31	43	12	CP	77.50	Pipe 25% full of water, multiple fractures in pipe for 10 ft, fine roots at joints for 10 ft, camera unable to continue past debris, inspect from other end. Mud in bottom of pipe (5% full for 60 ft), multiple fractures in top and sides of pipe for 4 ft, fine roots at joint, material change (CP to PE), alignment shifts to the left, large root ball in pipe (60% blocked), camera cannot continue.	Y	N	L						X	CIP only for increased maintenance; site visit 10/15/14 showed not CIP for open cut/trenchless.	31	1	0	0	0	0	0	0	0	1
SP-123	0	2	2	0	32	32	12	CP	82.79	Sediment, dirt and rocks (10%+ for 85 LF).	Y	N	L								32	1	0	0	0	0	0	0	0	0
SP-9832	0	2.45	2.45	0	27	27	12	CP	72.94	Pipe cleaned. Needs more cleaning. Water 5% full and meandering through deposits in pipe. Fine sediment deposits 15% full for 25 feet. Gravelly deposits 10% for 28 feet. 4-inch tap break which is 30% full of water. Water 10% full (not in report). Camera unable to continue due to debris and water.	Y	Y	L	Stormwater			X			Unable to evaluate reason for water and sediment debris buildup. May have pipe sag.	27	1	1	0	1	0	0	1	0	0
SP-6886	0	2.9	2.9	0	29	29	12	PE	81.30	1st direction: sediment (20% for 15 LF), intruding utility (waterline); 2nd direction: sediment (10% for 25 LF)	Y	Y	U	Water							29	1	1	0	1	0	0	0	0	0
SP-9017	5	3	3.36	10	27	37	24	CMP	50.87	gravel in bottom of pipe entire length of pipe 15% full, deformation in sides of pipe for approx 10 ft, CB-9489 is not real CB, just a hole in the top of the pipe with a riser and lid and at least one other CMP discharging into riser.		Y	U		X		X			Pipe and CB in ROW for Ashworth Ave N at N 199th St., this pipe and SP-9320 connect at CB-9489 and have similar issues. Located at Echo Lake Park	27	0	1	0	0	1	0	1	0	0
SP-3558	0	2	2	0	28	28	12	PE	123.14	Pipe cleaned. Pipe 15% full of water, gravel and mud in bottom of pipe (10% full for 67 ft), gravel in bottom of pipe (5% full for 3 ft)	Y	N	U								28	1	0	0	0	0	0	0	0	0
SP-2482	0	1.92	1.92	0	23	23	12	CP	61.46	needs more cleaning. Fine sediment deposits (10% full for 55+ feet) with occasional woody debris (i.e., grass, roots, branches). Fine roots also observed at joints. Camera unable to continue due to deposits.	Y	Y	L								23	1	1	0	0	0	0	0	0	0
SP-5300	0	2	2	0	26	26	12	CP	93.44	25% full of water, deposits attached encrusted to side of pipe (10% protruding, for 30 ft), camera unable to continue through deposits.	Y	N	U								26	1	0	0	0	0	0	0	0	0
SP-9288	2	2.5	2.45	2	25	27	24	RCP	67.28	gravel , rocks and debris in bottom of pipe (10% full for 25 ft), sag (10% full for 5 ft - looks more like water build up behind debris in pipe), material change from RCP to CMP for last 23 ft of pipe, gravel, rocks and debris 15% full in CMP section, camera unable to pass, pipe looks good to CB, possible debris in top of CB?.	Y	Y	U								25	1	1	0	0	0	0	0	0	0
SP-4266	0	3	3	0	24	24	12	CP	38.32	Gravel/sediment (length of pipe), plastic flower pot, material change (concrete to PE)	Y	N	U								24	1	0	0	0	0	0	0	0	0
SP-2395	0	2.33	2.33	0	21	21	12	CP	88.98	Gravel (10-15% x4), roots at joint (fine x2, medium x3)	Y	Y	M								21	1	1	0	0	0	0	0	0	0
SP-3568	0	2.09	2.09	0	23	23	12	CP	80.66	1st direction: gravel, debris; 2nd direction: rocks (10% for 50 LF)	Y	N	U								23	1	0	0	0	0	0	0	0	0

Table 16: Pipes Recommended for Jetting or Increased Maintenance

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	MPR	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard
SP-6809	4.5	2.3	2.67	9	23	32	12	CP	147.33	Tap-in (x4, 2 active, 1 active/defective, 1 abandoned), roots at joint (fine for 10 LF), hole soil visible, root barrel (medium 20% for 15 LF), infiltration weeper (at joints for 110 LF), encrusted deposits (10% for 20 LF), fracture (multiple)		N	U	Stormwater x4							23	0	0	0	1	0	0	0	0	0
SP-6837	0	2.88	2.88	0	23	23	12	CP	83.94	Gravel (10%, 15% for 35 LF)	Y	N	U								23	1	0	0	0	0	0	0	0	0
SP-3351	3.25	2.86	3	13	20	43	12	CP	207.09	Rocks in bottom of pipe (15% full for 3 ft at 2 locations), material change (CP to PE), rocks in bottom of pipe (15% full for 4 ft), broken pipe (something is pushing hole in side of pipe), rocks in bottom of pipe (10% full for 3 ft), material change (PE to CP for 3 ft, then CP to PE), rocks in bottom of pipe at change from CP to PE (15% full for 2+ ft), camera unable to continue, inspect from other end. Pipe 20% full of water at downstream end, material change (CP to PE), sag (30% deep for 25 ft), material change (PE to CP), joint offset medium, material change at joint offset (CP to PE), rocks in pipe (15% full for 3 ft), deformation in PE pipe (pipe no longer round), rocks in bottom of pipe (15% full for 5+ ft), camera unable to pass rocks, needs more cleaning.	Y	Y	M		X x2						20	1	1	0	0	0	0	0	0	0
SP-6831	3.5	2.57	2.78	7	18	25	12	CP	80.16	Gravel (15% for 25 LF), rocks, broken (x2), gravel (5% for 15 LF)	Y	N	U								18	1	0	0	0	0	0	0	0	0
SP-5083	5	2.83	3.14	5	17	22	12	CP	101.31	Sediment (10-15% for 25 LF), intruding grout at joint, broken/holes at joint - unable to pass sediment		N	U								17	0	0	0	0	0	0	0	0	0
SP-5946	2.67	2.5	2.56	8	15	23	12	CP	157.31	Exposed aggregate entire length of pipe, deposits (dirt and roots) in bottom of pipe (5-15% full for 15 ft), camera unable to continue, inspect from other end. Deposits in bottom of pipe (5% full for 80 ft, 15% full for 5 ft), circumferential fracture at joint, camera unable to continue, needs more cleaning, camera unable to reach same area as reverse inspection.	Y	N	M								15	1	0	0	0	0	0	0	0	0
SP-616	3	2.6	2.83	21	13	34	12	CMP	38.74	Corrosion (length of pipe), sediment deposits, encrusted deposits (10 LF), gravel (10% for 10 LF), gravel deposit (40%)	Y	Y	U				X				13	1	1	0	0	0	0	1	0	0
SP-6872	0	3	3	0	12	12	12	CP	39.27	Sediment and leaves (10-15% for length of pipe) - unable to continue due to debris	Y	Y	L								12	1	1	0	0	0	0	0	0	0
SP-6877	3	2	2.25	6	12	18	12	CP	278.14	Pipe cleaned, needs more cleaning. Exposed aggregate entire length of pipe, dirt and debris in bottom of pipe (15% full for 4 ft), camera unable to pass debris (Possible gas line through pipe covered by debris?), inspect from other end. Fine roots at joints (12 ft), mud and rocks in bottom of pipe (5%+ full for 42 ft), camera unable to pass debris, inspection not complete.	Y	N	M	Gas					X	Thorough cleaning required to determine if it is a gas line stopping debris in pipe, gas line needs to be removed via open cut.	12	1	0	0	1	0	0	0	0	1
SP-3390	0	2.6	2.6	0	13	13	12	CP	36.29	needs more cleaning. Fine sediment deposits mixed with dried vegetation (5% full for 20 feet), then increases to 50% full at 25ft mark. Camera unable to complete due to sediment obstruction.	Y	N	U				X				13	1	0	0	0	0	0	1	0	0
SP-4200	0	2.8	2.8	0	14	14	12	CP	33.56	Encrusted deposits 15% full for 22 feet, deposits are more concentrated at joints. Surface damage visible aggregate at joints, possible infiltration source through joints (not in report). Gravelly deposits 10% full for 1-ft.	Y	N	U								14	1	0	0	0	0	0	0	0	0
SP-6919	0	2	2	0	12	12	12	CMP	42.66	5% full of debris entire length of pipe, outfall is almost completely blocked by debris.	Y	N	L								12	1	0	0	0	0	0	0	0	0
SP-9058	2.5	2.33	2.4	10	14	24	12	CP	93.24	Aggregate visible entire length of pipe, roots at joint (fine 50 LF, medium x4), sag (downstream 40 LF) - unable to pass roots	Y	N	U								14	1	0	0	0	0	0	0	0	0
SP-9088	0	2	2	0	12	12	36	CMP	66.84	needs more cleaning. Fine sediment deposits for 28.5 feet with channel of water approximately 10% full. Camera unable to complete due to debris.	Y	Y	U				X			Unable to evaluate	12	1	1	0	0	0	0	1	0	0
SP-2664	5	3	3.67	10	12	22	12	CMP	142.93	Pipe cleaned. Pipe 10% full of water, hole with visible soil in top of pipe (x2), another hole with visible soil in top of pipe at 28 ft (not listed in report), gravel in bottom of pipe (10% to 20% full for 20 ft), camera unable to continue, visual inspection of remaining pipe - looks like a joint separation and possibly another hole.	Y	N	U		X					3 holes in top of CMP pipe with soil visible could be from surrounding utilities. Pipe located in ROW of Stone Ave N, north of 188th.	12	1	0	0	0	1	0	0	0	0
SP-474	0	2.5	2.5	0	10	10	12	CP	86.67	Water 5% full. Line jogs up and then jogs down. Gravel sediment deposits (10% full for 6 feet). Fine roots at joint that wanders 6 feet. Rock obstruction partially blocking flow (5%). Fine sediment deposits 50% full. End of pipe visible through debris deposits, however, camera unable to complete due to debris.	Y	Y	L								10	1	1	0	0	0	0	0	0	0

Table 16: Pipes Recommended for Jetting or Increased Maintenance

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	MPR	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard
SP-1616	2.92	1.5	2.47	38	9	47	12	CP	63.19	Pipe cleaned. Exposed aggregate entire length of pipe, fine roots at joints and medium roots in barrel of pipe (20% full of roots for 13 ft), circumferential fracture, fine roots at joints (x2).	Y	Y	L								9	1	1	0	0	0	0	0	0	0
SP-4270	2.14	2.25	2.18	15	9	24	12	CP	99.55	msa due to water level. Gravel deposits 25% full for 9 feet. Rooted (medium) joints partially blocking pipe (20%). Gravel deposits 10% full for 11 feet. Water 10% full from pipe sag for 11 feet. And 10% full of water due to a sag for 15 feet. Water level increases to 20% then 40% for 4 feet. Camera unable to continue due to water level >50%	Y	Y	L								9	1	1	0	0	0	0	0	0	0
SP-1603	3	1.75	2.55	21	7	28	12	RCP	130.22	Pipe cleaned. Exposed aggregate (36 ft), fine roots at joint, fine roots in barrel of pipe (10 ft+), alignment right (pipe bends to right), camera unable to get through fine roots and bend in pipe. Upper CB not accessible.	Y	Y	L				X				7	1	1	0	0	0	0	1	0	0
SP-6908	2	2	2	2	8	10	12	CP	150.40	Pipe cleaned. MSA due to debris from TBI, bottom end reduces to 8" at 5 ft. Gravelly deposits 10% full for 20 feet. Water 20% full due to pipe sag. Camera unable to complete due to debris. Candle light shows increased debris buildup and tap location approx. 20ft from end point.	Y	N	L	Stormwater							8	1	0	0	1	0	0	0	0	0
SP-15135	3	1.33	2.09	15	8	23	12	CP	273.40	Pipe cleaned. Exposed aggregate entire length of pipe, fine roots at joints (x4), deposits in bottom of pipe (5% full for 10 ft), camera stuck on a root, cannot continue.	Y	Y	M								8	1	1	0	0	0	0	0	0	0
SP-2932	3.06	2.25	2.97	95	9	104	12	CP	139.52	Aggregate visible (length of pipe), sediment deposit, hole soil visible, hole, sediment (10% for 15 LF), broken		N	M				X				9	0	0	0	0	0	0	1	0	0
SP-5117	0	3	3	0	9	9	12	CP	32.33	Gravel at bottom of pipe (10-15% for length of pipe) - unable to continue due to gravel	Y	N	M								9	1	0	0	0	0	0	0	0	0
SP-10783	5	2.67	4	20	8	28	12	CMP	166.52	Mud in bottom of pipe, storm debris in pipe, mud in bottom of pipe (15 ft) - camera unable to continue. Pipe cleaned, gas line (yellow) bored through pipe revealed (along with hole with visible soil). Also, another service line (blue) through the pipe with a hole and soil visible (water?)	Y	N	U	Gas & Water							8	1	0	0	1	0	0	0	0	0
SP-155	5	2.67	3.25	5	8	13	12	CP	74.29	Sediment deposit (10%) with gravel from hole with soil visible, infiltration runner, rocks and sediment deposit - unable to continue due to rocks	Y	N	M								8	1	0	0	0	0	0	0	0	0
SP-7043	3	2.67	2.96	75	8	83	12	CP	139.57	1st direction: corrosion (125 LF), gravel deposit, material change (CMP to CP), roots at joint (medium); 2nd direction: no issues until roots & material change		Y	U				X			Add CB at bend	8	0	1	0	0	0	0	1	0	0
SP-792	0	4	4	0	8	8	12	CP	22.65	Gravel in bottom of pipe (15% for length of pipe), large rock - unable to continue due to rock	Y	N	M								8	1	0	0	0	0	0	0	0	0
SP-13117	0	5	5	0	5	5			175.40	Large pipe that is 80% full. Unable to tv. Has creek running though it. Mountlake Terrace. Ballinger Creek. Crossing 205th.	Y	Y	M				X				5	1	1	0	0	0	0	1	0	0
SP-2529	0	2	2	0	6	6	12	CP	56.26	Pipe cleaned. Needs more cleaning. Rock obstructions 10% full for 8 feet. Gravelly deposits 10% full for 23 feet with rocks. Camera unable to complete final three pipe sections due to rock obstructions.	Y	N	L							End of pipe visible, but unable to evaluate pipe and joint conditions.	6	1	0	0	0	0	0	0	0	0
SP-2537	0	5	5	0	5	5	12	CP	144.06	Roots and sediment blocking pipe - unable to continue	Y	N	M				X		X		5	1	0	0	0	0	0	1	0	1
SP-2688	3	2.33	2.83	27	7	34	12	CP	47.69	Pipe cleaned. Aggregate visible (length of pipe), encrusted deposit at joint (15%), sediment deposit (5% x2)	Y	N	U						X		7	1	0	0	0	0	0	0	0	1
SP-1769	3.6	2.33	3.13	18	7	25	12	CP	71.90	Encrusted deposits (x2), joint offset (medium) rocks visible, broken soil visible (x3), tap-in (x2), spiral crack, gravel blocking 20%		N	U	Stormwater x2							7	0	0	0	1	0	0	0	0	0
SP-1773	3	2	2.77	30	6	36	12	CMP	115.90	Surface corrosion entire length of pipe, gravel in bottom of pipe (5% full for 10 ft), gravel in bottom of pipe (10% full for 7 ft), camera unable to continue due to gravel in bottom of pipe.	Y	Y	U								6	1	1	0	0	0	0	0	0	0
SP-2475	0	3	3	0	6	6	12	CP	144.51	no access to bottom cb, needs more cleaning. Fine wet sediment deposits (muddy), 15% full for 14+feet. Camera unable to continue due to deposits.	Y	N	M								6	1	0	0	0	0	0	0	0	0
SP-2483	0	3	3	0	3	3	12	CMP	41.83	Pipe cleaned. Needs more cleaning. Fine sediment deposits observed for entire pipe length. 20% full for first 10+ feet. Camera unable to continue due to sediment build up.	Y	Y	L				X				3	1	1	0	0	0	0	1	0	0

Table 16: Pipes Recommended for Jetting or Increased Maintenance

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	MPR	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard
SP-4321	0	4	4	0	4	4	12	CP	61.03	Pipe cleaned. Needs more cleaning. Fine (clumpy and gravelly) sediment deposits 25% full. Camera unable to start due to debris build up.	Y	Y	L							This pipe does not look like it was cleaned.	4	1	1	0	0	0	0	0	0	0
SP-6167	0	3	3	0	6	6	18	RCP	77.72	Water 15% full. Joints with medium roots which wanders for 10 feet partially blocking flow (15%). Clumps of fine sediment deposits also observed on sidewall (15% full for 18 feet, not in report). Camera unable to complete due to root mass.	Y	N	M								6	1	0	0	0	0	0	0	0	0
SP-6850	0	1.67	1.67	0	5	5	12	CP	55.99	Pipe cleaned, needs more cleaning. Pipe 100% blocked with debris 4 ft from upstream end, even after cleaning. Inspect from other end. Dirt and debris in pipe (5% full for 12+ ft), fine roots at joint, material change from CP to CMP, camera unable to continue past slight angle in the pipe at material change, 100% blockage visible upstream.	Y	N	M						X	Pipe completely blocked with debris.	5	1	0	0	0	0	0	0	0	1
SP-6854	0	5	5	0	5	5	12	CP	27.38	Water 20% full for entire pipe length	Y	Y	M								5	1	1	0	0	0	0	0	0	0
SP-15104	0	1.67	1.67	0	5	5	12	CP	146.34	Roots at joint (fine for 20 LF - not noted in report), gravel deposit (10%), sediment deposit (10%) - unable to continue due to debris	Y	N	M								5	1	0	0	0	0	0	0	0	0
SP-2514	0	2.5	2.5	0	5	5	12	CP	63.13	Roots at joint (medium for 5 LF), rocks, sediment, and deposits at joints - unable to continue	Y	N	M								5	1	0	0	0	0	0	0	0	0
SP-5927	3	3	3	9	3	12	12	CP	215.71	needs more cleaning & root blockages. Water 10% full for 54 feet and then increases to 50% full due to pipe sag for 14 feet. Fine sediment deposits 20% full with portion sticking out of the water. Camera unable to continue due to sediment obstruction.	Y	Y	M				X				3	1	1	0	0	0	0	1	0	0
SP-6142	2.38	5	2.67	19	5	24	12	CP	51.17	needs more cleaning. Surface damage, aggregate visible for 27 feet. Surface spalling at joint. Medium joint offset for one pipe section. Rock obstruction partially block pipe (35%). Camera unable to continue due to rock obstruction. Last two sections of pipe visible, but unable to evaluate joint.	Y	N	U				X				5	1	0	0	0	0	0	1	0	0
SP-758	0	4	4	0	4	4	12	CP	61.04	Sediment deposit (30%) - unable to continue due to sediment	Y	N	M				X				4	1	0	0	0	0	0	1	0	0
SP-9048	3	2	2.5	6	4	10	18	CP	89.01	needs more cleaning. Surface damage with visible aggregate recorded for at least 57 feet. Fine sediment deposits with occasional small rocks 10% full for 35 feet. Camera unable to track to end of pipe due to debris. Candlelight observations not include in report shows fine sediment and large rocks up to ~25% full downstream of stopping point. Unable to visually confirm condition of pipe downstream of rock obstructions.	Y	N	M						X		4	1	0	0	0	0	0	0	0	1
SP-1630	5	3	4.6	20	3	23	12	Concr	17.00	Debris at inlet & entire length of pipe (leaves, twigs, mud, rocks, garbage, etc.), broken pipe (x4)	Y	N	L								3	1	0	0	0	0	0	0	0	0
SP-1782	3	4	3.05	60	4	64	12	CP	24.44	Aggregate visible (length of pipe), sediment (25% for 5 LF) - unable to pass, cannot TV rest of pipe	Y	N	U						X		4	1	0	0	0	0	0	0	0	1
SP-2687	3	5	3.18	30	5	35	12	CP	87.50	Deposits (dirt and gravel) in bottom of pipe (10-50% full for 7+ft), camera unable to continue, inspect from other end. Visible aggregate entire length of pipe, steep slope changes to moderate slope, water level in pipe 40%+, camera unable to continue, needs more cleaning, camera unable to reach original MSA point.	Y	N	U								5	1	0	0	0	0	0	0	0	0
SP-3803	5	3	4.89	85	3	88	12	CMP	99.12	Holes (for 85 LF, intentional perforations?), sediment deposit (20%) - unable to finish, pipe in good condition	Y	N	L								3	1	0	0	0	0	0	0	0	0
SP-5961	1	3	2	1	3	4	12	CP	46.04	Giant rock blocking 90% of pipe 9 ft from downstream end, camera unable to continue, inspect from other end. Circumferential crack at joint, debris and deposits (20%+ full for most of pipe, starting 15 ft from upstream end, probably up to the large rock blocking the pipe at the downstream end), camera unable to continue.	Y	N	M				X				3	1	0	0	0	0	0	1	0	0
SP-9014	0	3	3	0	3	3	12	CP	54.90	Sediment and leaves (15%) - unable to continue due to debris	Y	Y	M								3	1	1	0	0	0	0	0	0	0
SP-915	0	5	5	0	5	5	12	CP	42.28	Gravelly deposits 40% full. Camera unable to complete due to gravel.	Y	N	U							Unable to evaluate	5	1	0	0	0	0	0	0	0	0
SP-943	0	4	4	0	4	4	18	RCP	137.64	needs more cleaning. Water 10% full. Fine sediment deposits 30% full. Fine roots growing at joints (not in report). Camera unable to complete due to debris.	Y	N	M							Unable to evaluate pipe condition.	4	1	0	0	0	0	0	0	0	0
SP-1806	0	1.5	1.5	0	3	3	12	CP	57.71	needs more cleaning. Fine sediment deposits 5% full at ingress. Fine roots at joint. Full pipe blockage (rocks and fine sediment) camera unable to complete due to debris.	Y	N	M								3	1	0	0	0	0	0	0	0	0

Table 16: Pipes Recommended for Jetting or Increased Maintenance

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard	Notes	MPR	Increased Maintenance	Arterial	Basin Location	Illicit Connection	Possible Utility	Void	Slope >23%	Slide Hazard	Erosion Hazard
SP-5928	2.98	2	2.96	##	2	166	12	CP	293.62	Exposed aggregate entire length of pipe, sag (10% deep for 6 ft), debris and water in pipe (50% full), camera unable to continue, inspect from other side. Exposed aggregate entire length of pipe, deposits in bottom of pipe (10% full for 3 ft), material change (CP to PE), camera unable to pass, camera unable to reach reverse inspection stopping point, needs more cleaning.	Y	Y	M								2	1	1	0	0	0	0	0	0	0
SP-5976	5	0	5	5	0	5	12	CMP	41.76	Pipe cleaned. Msa deformed pipe. Dent observed at start of video. Camera unable to complete due to dent.	Y	Y	L		Maybe?		X				0	1	1	0	0	0	0	1	0	0
SP-7695	3	4	3.33	6	4	10	18	CMP	36.68	needs more cleaning. Corrosion observed. Fine sediment deposits 25% full. Camera unable to continue due to debris buildup. Candling shows continued fine sediment deposits downstream of the sediment debris obstruction. Water level reported at 5% full however, the water observed in video was limited to the standing water trapped in the corrugations.	Y	N	U								4	1	0	0	0	0	0	0	0	0
SP-926	0	2	2	0	4	4	12	PE	98.79	Sediment (5-10% for 40 LF) - unable to continue due to sediment, candled last few feet of pipe in good condition.	Y	N	U								4	1	0	0	0	0	0	0	0	0
SP-1781	2	2	2	2	2	4	12	CP	26.43	Pipe cleaned. Deposits in bottom of pipe (10% full for 6 ft), pipe 10% full of water, joint offset large, pipe 90% full of water beyond large joint offset.	Y	N	U								2	1	0	0	0	0	0	0	0	0

* U= Upper McAleer, M= Middle McAleer, L= Lower McAleer

Table 17: Pipes Recommended for Relocation to Right of Way

Project	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
Relocate 1	SP-14371	3.32	0	3.32	63	0	63	18	CMP	143.58	Corrosion (full length of pipe), deformation/pipe bent at joint (x2), hole in side of pipe with soil visible, repair patch - hole covered with metal on outside of pipe, hole in bottom of pipe (corrosion at joint), large branch and board in catch basin (CB-11576)		N	L			X	Mostly within ROW. CB is on property line. May want to replace with SP-14272.
	SP-14374	1	0	1	1	0	1	12	CP	142.12	Joint separation (medium)		N	L				Reroute as part of repair/replacement of SP-14371 & SP-14372
	SP-5180	0	2	2	0	2	2	12	CP	70.64	sealing grout intruding into pipe, camera unable to pass		N	L				Pipe passes through corner of private property. Easement not really needed, but could reroute as part of adjacent reroute/repair/replacement.
	SP-14372	3.06	0	3.06	52	0	52	24	RCP	81.60	Visible aggregate entire length of pipe, large hole with sandbag? plastic patch? bulging into top of pipe		Y	L				Connects pipe network through 2 properties. Unable to reroute. Need easement. When pipe is replaced, replace on one property and obtain easement.
Relocate 2	SP-2475	0	3	3	0	6	6	12	CP	144.51	no access to bottom cb, needs more cleaning. Fine wet sediment deposits (muddy), 15% full for 14+feet. Camera unable to continue due to deposits.	Yes	N	M				Pipe needs to be cleaned. CB's are both within ROW and Powerline easement.
	SP-951	4	3.2	3.43	8	16	24	12	CP	254.81	Gravel and rocks in bottom of pipe (15-20% full for 13 ft), longitudinal fracture, broken pipe, large rock in pipe, camera unable to pass, inspect from other end. Tap break in (stormwater x2), mud, dirt, rocks and debris in pipe (15 % full for 15+ ft), camera unable to pass, inspection not complete.	Yes	N	M	Stormwater x2			Site visit 10/15/14, possible re-route to avoid private property. Partial ROE granted.
	SP-952	0	2.5	2.5	0	5	5	12	CP	27.93	Fine sediment deposits 10% full and 20% full for 5 feet. Pipe appears to slope up and down at pipe ingress then slope up at the pipe egress.	Yes	N	M				May need to do some adjustment on this pipe to improve flows and discourage sediment buildup.
Relocate 3	SP-4243	0	2.6	2.6	0	13	13	12	CP	105.96	Tap break in, drop in pipe, unknown thing protruding into pipe - camera unable to continue to unknown discharge point. Pipe cleaned and reinspected 2 months later. Debris in bottom of pipe (5% full for 12 ft), tap break in (stormwater), tap break in (unknown - odd looking steel thing protruding all the way through pipe), drop in pipe, camera unable to continue.		N	M	Stormwater & something else			Site visit 10/15/14, unsure what object protruding in pipe is, but it was discussed to see if it is possible to re-route the pipe.
Possible Future Relocate	SP-5559	4.67	0	4.67	14	0	14	24	CMP	211.91	1st direction: Repair patch (x2), collapse from top of pipe; 2nd direction: deformation		Y	L		X		Only need repair at collapse, repair patches in good condition. Site visit 10/15/14 identified pipe as monitoring CIP. Pipe crosses through frontage/corners of 4 private properties. Replace entire pipe in ROW.
	SP-10698	0	0	0	0	0	0	12	PE	33.32	No problems. On private property.							Reroute
	SP-10699	0	0	0	0	0	0	12	PE	10.21	No problems. On private property.							Reroute
	SP-10700									49.00	On private property							Reroute
	SP-10701							12	PE	39.00	On private property							Reroute
	SP-10702							12	PE	81.56	On private property			L				Reroute
	SP-10703	0	0	0	0	0	0	12	PE	104.44	No problems. On private property.							Reroute
	SP-10704	0	0	0	0	0	0	12	PE	85.56	No problems. On private property.							Reroute

Project	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
	SP-2508	0	2	2	0	2	2	12	CMP	71.82	wood and pine needles in bottom of pipe (10% full)	Yes	Y	L				Pipe passes through corner of private property. Reroute as part of adjacent reroute project.
Easement 1	SP-15087	0	0	0	0	0	0	12	CP	106.02	No problems							Obtain easement for SP-15087 and SP-15381
Easement 2	SP-15101	0	2	2	0	12	12	12	CP	298.12	Tap in, gravel in bottom of pipe (10% for 30 LF) - unable to continue due to debris	Yes	N	M	Stormwater			Reroute not possible. Needs Easement
	SP-7984	4	2.29	2.91	16	16	32	12	CP	292.20	Tap break in(?) with roots, broken soil visible (x4), tap break in, rocks and gravel in bottom of pipe, unable to finish because of tee	Yes	N	M	Stormwater			Add CB at tee. Where does this go??? No reroute possible.
Easement 3	SP-12213	0	2	2	0	6	6	12	CP	100.76	roots at joint (x2), gravel in bottom of pipe (4 ft)		N	U				Obtain Easement. Second half of pipe run (SP-12214) already has easement.
Easement 4	SP-3552	0	3	3	0	6	6	18	CMP	22.50	Fine deposits in bottom of pipe (blocking 15%+, camera unable to continue), appears to be an unmentioned and unrated tap break in downstream (pipe protruding, large metal pieces protruding)		N	U	Stormwater			Appears to be an illicit connection downstream of where the camera is forced to stop due to debris. ROE granted. Downstream pipes already have easements. Need easement for SP-344 too.
Other Pipes Requiring Easement Acquisition	SP-15088	1	2	1.5	1	2	3	12	CP	90.89	Infiltration weep at joint, circumferential cracks 1 ft from CB 11584.		N	L				Adjacent to ingress/eagress easement. Obtain drainage easement for SP-15142 and SP-6040
	SP-6040	0	2	2	0	10	10	12	CP	109.73	Encrusted deposits at joints (10% for 30 LF)	Yes	N	L				Reroute on ROW not feasible. Obtain Easement for SP-15088 and SP-15142
	SP-2689	0	3	3	0	9	9	12	CP	30.39	deposits attached encrusted (x2), deposits settled compacted filling 75% or more of the pipe 27 ft in. UNKNOWN OUTFALL LOCATION	Yes	N	U				locate outfall location. Easement needed. Pipe discharges on private property.
	SP-7747	0	1	1	0	2	2	12	CP	149.23	Fine roots at joints (15 ft), 1/2 in tree root with cracks in pipe, camera unable to pass, pause for cleaning, line cleaned, only able to get an additional 15 ft before encountering long 1/2 in tree root, camera unable to continue again. More large roots visible farther up pipe, along with a material change from CP to CMP and possibly a bend.	Yes	Y	L				Roots very very bad! Trenchless after cutting roots probably won't work with material change and bend. CIP? Conveys drainage from large multi building apartment complex down a steep slope. No reroute feasible. Need easement.
	SP-7746									37.28	On private property		N	L				Conveys drainage from large multi building apartment complex down a steep slope. No reroute feasible.
	SP-15099	3	0	3	3	0	3	12	CP	189.22	Multiple longitudinal cracks on sides of pipe for entire 4 feet of pipe segment, with active 4" tap break-in (stormwater)		Y	M	Stormwater			Section of pipe with illicit connection needs to be replaced. Inspection stops short of CB, why? Pipe is adjacent to street ROW. Obtain easement for now, but when pipe replaced, then relocate a few feet north.
	SP-7372							18	CMP	59.64	On private property		N	U				Conveys drainage from neighborhood through commercial/retail parking lot to Aurora. No reasonable reroute. Need easement all the way to Aurora (includes SP-8783, 7375, 7374, 7371, and 7377)
	SP-9296	0	3	3	0	15	15	12	CMP	42.22	Sediment (20% for 30 LF)	Yes	N	L				Conveys drainage from a detention tank on a private residence. ROE granted. Obtain easement for TK-191 too.
	SP-9309	0	0	0	0	0	0	12	CMP	40.27	12" pipe goes to 8" pipe, dead end? Control structure?		N	L				Pipe conveys drainage from a house behind a house to the pipe network. ROE granted. Looks like 8 inch pipe from back house to 42 inch detention tank. Detention tank drains to 8 inch/12 inch pipe before discharging into pipe network? Control Structure? Also obtain easement for TK-100, SP-8822 and SP-8985
Other Pipes Crossing Private Property	SP-10477									50.30	On private property		Y	M				Picking up drainage on one commercial property (A Place for Kids Early Childhood Academy).
	SP-11362							24		64.39	On private property		Y	U				Picking up drainage on commercial property (Bartells, etc @ 185th & Aurora)

Table 17: Pipes Recommended for Relocation to Right of Way

Project	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
	SP-11410									35.32	On private property		N	U				Sky Nursery
	SP-11411							12	PE	141.22	On private property		N	U				Seattle City Light (from Sky Nursery)
	SP-12214	0	3.5	3.5	0	7	7	12	CP	131.98	Pipe cleaned. Gravel in bottom of pipe at outlet end, tap break in - stormwater? (Not in report!), debris in bottom 40% of pipe, camera unable to continue.	Yes	Y	U	Stormwater			Open cut to relocate illicit connection. Already has a drainage easement
	SP-12472									2.42	On private property		N	U				Seattle City Light (from Sky Nursery)
	SP-12493									47.07	On private property		Y	M				Shoreline Stadium parking lot
	SP-12819									99.74	On private property		N	L				On private road (22nd Pl NE @ NE 75th St), within and ingress and egress easement.
	SP-13091									89.04	On private property		N	L				Apartment complex
	SP-13092									61.08	On private property		N	L				Apartment complex
	SP-13093									72.61	On private property		N	L				Apartment complex
	SP-13331									58.01	On private property		Y	L				From commercial property
	SP-15131	0	2	2	0	2	2	12	CMP	32.00	Pipe 10% full of water, gravel in bottom of pipe (10% full for 5 ft), bend in pipe, camera unable to continue, upstream CB unknown.		N	L				Looks like pipe bends and continues down driveway of 1820 NE Perkins Way. Pipe might be coming from private residence 1820 NE Perkins Way.
	SP-1688	0	3	3	0	3	3	18	CMP	97.99	Gravel in pipe (10')	Yes	Y	L				Pipe passes through corner of private property.
	SP-2486							12	CP	122.91	On private property		N	M				Within Ingress and Egress Easement.
	SP-2521							12	CMP	40.28	On private property		Y	L				Apartment complex
	SP-2561	0	0	0	0	0	0	12	CMP	103.76	large hole in side of pipe repaired with CMP piece, no metal intruding into pipe.		N	L				Pipe passes through corner of private property.
	SP-2591	0	2	2	0	4	4	18	CP	58.80	intruding sealing grout at joints, fine deposits ingressed at joint		Y	L				Pipe is in ROW, but CB is on property line.
	SP-3232	0	3	3	0	3	3	12	CMP	81.39	Tap-in, pipe half full with water	Yes	N	L	Stormwater			Is water because of tap-in? Pipe connects natural drainage channel to pipe network. Looks to be filled in and constructed by homeowner. Pipe is under sport court. Easement needed. ROE NOT granted. Pipe discharges outside Shoreline City Limits
	SP-4282	0	0	0	0	0	0	12	CMP	16.61	Material change (CMP to PVC)		Y	L				From commercial property (Schucks, Precision Tune, Budget Glass)
	SP-5295							12	PE	276.62	On private property		N	U				Already has drainage easement.

Table 17: Pipes Recommended for Relocation to Right of Way																			
Project	Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam. (inches)	Material	Length	Problem	Increased Maintenance	Arterial	Basin Location*	Illicit Connection	Possible Utility	Void	Notes
	SP-5967	0	3.2	3.2	0	16	16	12	CP	66.51	Sediment (10% for 10 LF to 100%, completely blocked) - unable to pass, jetting will not help. Upstream manhole not known. Pipe cleaned. Dirt, rocks, roots & debris in pipe (10-30% full for 4+ft, camera unable to continue, pipe completely blocked upstream.	Yes	N	U				Pipe completely blocked with debris. Upstream end is unknown, on private property (19522 Echo Lake Pl NE), and at the top of the stormwater system in the area. Pipe collects drainage from a small apartment complex.
	SP-6809	4.5	2.3	2.67	9	23	32	12	CP	147.33	Tap-in (x4, 2 active, 1 active/defective, 1 abandoned), roots at joint (fine for 10 LF), hole soil visible, root barrel (medium 20% for 15 LF), infiltration weeper (at joints for 110 LF), encrusted deposits (10% for 20 LF), fracture (multiple)		N	U	Stormwater x4			Check to see if there is a sag. Already has drainage easement.
	SP-776	0	5	5	0	5	5	12	CP	35.49	Pipe completely blocked by a basketball, Rockstar can, and illicit connection protruding though top of pipe. Camera unable to continue. No survey from other end.		Y	L	Stormwater			Hard to tell what kind of connection with basketball in the way, probably stormwater. Pipe crosses over Shoreline City Limits into private property in Lake Forest Park.
	SP-7810							12	CP	279.30	On private property		Y	L				Drainage from apartment complex. No reroute feasible.
	SP-8452							12	PE	112.57	On private property		N	U				Seattle City Light (from Sky Nursery)
	SP-9642									134.16	On private property		Y	U				Seattle City Light (in front of Dunn Lumber)
	SP-9647							12	PE	119.19	On private property		N	U				Seattle City Light (from Sky Nursery)
	SP-9648							12	PE	237.87	On private property		Y	U				Seattle City Light (from Sky Nursery)
	SP-9844	0	2.17	2.17	0	50	50	12	CP	101.93	Infiltration weeper with encrusted deposits (length of pipe), tap-in, rocks and sediment for 30 LF (filling 50% of pipe) - unable to pass		N	M	Stormwater			Pipe passes through corner of private property. If pipe is ever replaced, it could be rerouted around corner.

* U= Upper McAleer, M= Middle McAleer, L= Lower McAleer

McAleer Creek Basin Plan

Appendix C:
Service Calls – Flooding Calls for Lyon Creek Basin

McAleer Creek Basin
Flooding Calls Received between 2002 and 2014 (GIS Database)

CALLDATE	PROBLEM	RESPONSIBLE	COMMENTS	ADDRESS
1/2/2002	FLOODING	SURFACE WATER	THE CURRENT ADDRESS AT THE SERVICE CALL USED TO BE THE CALLERS RESIDENCE, BUT NOW IS JUST HER PROPERTY. THE BACKYARD IS FLOODED, REALLY MUCKY AND WET	1813 NE 189TH ST
1/30/2002	FLOODING	SURFACE WATER	THERE IS A LARGE PUDDLE THAT IS FORMING AND IS HALF-WAY OVER THE MEDIAN IN THE ROAD. THIS IS NOT THE ONLY TIME THAT THERE HAS BEEN FLOODING, AND MR.	18011 25TH AVE NE
3/12/2002	FLOODING	PRIVATE PROPERTY MATTER	CAN THE SHOULDERS IN FRONT OF THIS RESIDENCE BE PULLED TO PREVENT THE DELUGE OF WATER FORM COMING DOWN	19605 10TH AVE NE
1/3/2003	FLOODING	SURFACE WATER	FRONT YARD IS FLOODED AS WELL AS NEIGHBORS SIDE YARD. DRAIN THAT SITS ABOVE EASMENT IS NOT DRAINING.	1910 N 192ND ST
10/20/2003	FLOODING	SURFACE WATER	THE CREEK IS FLOODING THE BACKYARD AND UNDERNEATH THE PROPERTY. THE DRAIN IS	1536 NE 196TH ST
10/20/2003	FLOODING	SURFACE WATER	FLOODED WATER IN BACK YARD, AT THIS TIME NO WATER IN HOUSE 1 INCH AWAY	615 NE 200TH ST
10/20/2003	FLOODING	SURFACE WATER	DRIVEWAY FLOODED WITH WATER	842 NE 200TH ST
11/18/2003	FLOODING	SURFACE WATER	FLOODING - IN DRIVEWAY & BASEMENT - RIVER OF WATER	17724 25TH AVE NE
8/9/2004	FLOODING	PRIVATE PROPERTY	FLOOD DAMAGE FROM FRIDAY 8/6/04 WATER IN BATHROOM AND DOWNSTAIRS	2114 NE 177TH ST
8/9/2004	FLOODING	SURFACE WATER	THE OPEN DITCH IS SO FULL OF VEGETATION IT DOES NOT ALLOW WATER TO FLOW THROUGH. THE WATER IS NOW FLOODING ALONG THE	18355 11TH AVE NE
8/9/2004	FLOODING	SURFACE WATER	INTERSECTION FLOODING	18516 7TH AVE NE
8/9/2004	FLOODING	SURFACE WATER	WE LIVE BEHIND THE SHORELINE PUBLIC STADIUM. THERE IS A STORM DRAIN & DITCH FOR THE STADIUM DRAINAGE, BUT THE DITCH AS FILL W/DEBRIS, THE WATER COULDN	18808 5TH AVE NE
8/9/2004	FLOODING	SURFACE WATER	DRIVEWAY IS REVERSE GRADE FROM SURROUNDING NEIGHBORS. HE HAS NO STREET PROTECTION. DURING THE FLOOD ON 8/6/04 HE RECEIVED WATER IN HIS BASEMENT.	1613 NE 189TH ST
8/9/2004	FLOODING	PRIVATE PROPERTY	FLOODING IN THE HOUSE. THE YARD IS ALSO A MESS	408 NE 189TH CT
8/9/2004	FLOODING	SURFACE WATER	WHILE INVESTIGATING 408 NE 189TH I ALSO SPOKE WITH THIS SITE, THEY HAD INTERIOR FLODDING OF THE ENTIRE BASEMENT.	414 NE 189TH CT
8/9/2004	FLOODING	SURFACE WATER	THERE ARE TWO STORM DRAINS ACROSS THE STREET FROM HIM THAT ARE PLUGGED. THE WATER SHEET FLOWED ACROSS THE STREET AND INTO HIS YARD, THEN FLOODED HIS	19244 12TH AVE NE
8/9/2004	FLOODING	SURFACE WATER	THE CALLER WOULD LIKE TO GET HELP PUMPING HER HOUSE OUT.	623 NE 200TH ST
8/9/2004	FLOODING	SURFACE WATER	MAJOR FLOODING REPORTED AT THIS LOCATION, FIRE TRUCK ON SCENE	611 NE 200TH ST
8/9/2004	FLOODING	SURFACE WATER	BOTH DRIVEWAYS UNDER WATER	801 NE 200TH ST

McAleer Creek Basin
Flooding Calls Received between 2002 and 2014 (GIS Database)

CALLDATE	PROBLEM	RESPONSIBLE	COMMENTS	ADDRESS
8/23/2004	FLOODING	SURFACE WATER	STORM DRAIN BURIED WEST OF DRIVEWAY.	2428 NE 178TH ST
8/23/2004	FLOODING	SURFACE WATER	OP#106 REPORTS GRAVEL ON ROADWAY	17841 24TH AVE NE
8/23/2004	FLOODING	SURFACE WATER	WASHOUT SHOULDER RUT	17820 24TH AVE NE
8/23/2004	FLOODING	SURFACE WATER	OP#106 REPORTS GRAVEL ON ROADWAY	17845 24TH AVE NE
8/23/2004	FLOODING	SURFACE WATER	CALL TENANT CHUCK CADIEUX 841-4562 REGARDING THIS MATTER. STORM DRAINS & LINES HAVE TOTALLY SILTED UP SO WATER IS OVERFLOWING INTO LIVING QUARTERS IN	1670 NE 185TH ST
8/23/2004	FLOODING	SURFACE WATER	OUT IN FRONT OF HOUSE, ROAD HAS BEEN RE-SURFACED/PAVED	
8/23/2004	FLOODING	SURFACE WATER	DITCH ON THE NORTH SIDE OF THE ROAD USED TO TAKE ALL THE WATER, NOW CUSTOMER'S PROPERTY GETS WATER, AND THINKS THE SYSTEM IS CLOGGED SOMEWHERE.	
8/24/2004	FLOODING	STREETS/ROADWAY	CONCERNED ABOUT DRAINAGE. LIP AT ROADWAY NEEDS TO GO DOWN FURTHER AROUND THE CORNER. RAIN IS CAUSING A	1018 NE 182ND ST
9/9/2004	FLOODING	SURFACE WATER	DURING HEAVY RAINS THE CUSTOMERS SITE WILL FLOOD. HE HAS A LAKE IN THE BACK YARD. THE WATER COMES FROM ALL DIRECTIONS AS HIS HOUSE IS IN A HOLE. HE	18516 7TH AVE NE
1/30/2006	FLOODING	FACILITIES DEPARTMENT	THE PRECINCT OFFICE IS FLOODING THROUGH THE ROOF. THE WATER IS LANDING ON THE	1206 N 185TH ST
12/4/2007	FLOODING	SURFACE WATER	WATER OVERFLOWING ONTO HIS PROPERTY	327 NE 194TH ST
12/4/2007	FLOODING	SURFACE WATER	GARAGE FLOODING - EOC # 1015	1610 N 197TH PL
12/13/2007	FLOODING	SURFACE WATER		18042 10TH AVE NE
12/13/2007	FLOODING	SURFACE WATER		19517 NORTH PARK AVE N
12/14/2007	FLOODING	SURFACE WATER		1114 NE 200TH ST
8/12/2008	FLOODING	SURFACE WATER	WATER FLOODING CALLER'S BASEMENT, COMING FROM THE SOUTH PART OF THE HOUSE AT THE BACK AND FLOWING ACROSS THE YARD - FROM AN UNDERGROUND STREAM	19001 18TH AVE NE
11/19/2009	FLOODING	SURFACE WATER	DITCH IS PLUGGED AND GETTING READY TO OVERFLOW IT'S BANKS.	327 NE 194TH ST
12/16/2010	FLOODING	SURFACE WATER	FIRE REQUESTS ASSISTANCE WITH SANDBAGS, POOL AND STORAGE AREA ARE FLOODING.	1160 N 192ND ST
3/14/2011	FLOODING	SURFACE WATER	CALLER REPORTING A BLOCKED / PLUGGED DRAINAGE DITCH NEAR 303 NE 194TH ST. (UPDATE FROM RANDY AFTER INITIAL VIEW: REQUIRES REVIEW FROM SURFACE WATER DE	303 NE 194TH ST
4/11/2011	FLOODING	SURFACE WATER	The resident of 1536 NE 196 Street called to report that water behind the dam at McAleer Creek was spilling over and that the water level	1536 NE 196TH ST
10/31/2012	FLOODING	SURFACE WATER	THE RETENTION POND ADJACENT TO HIS HOME IS 2 FEET ABOVE NORMAL LEVEL AND LOOK LIKE IT WILL POTENTIALLY FLOOD.	18331 10TH AVE NE
11/19/2012	FLOODING	SURFACE WATER	WATER IS COMING INTO HOME	408 NE 189TH CT

McAleer Creek Basin
Flooding Calls Received between 2002 and 2014 (GIS Database)

CALLDATE	PROBLEM	RESPONSIBLE	COMMENTS	ADDRESS
11/19/2012	FLOODING	SURFACE WATER	SURFACE WATER FLOODED HIS BASEMENT	19217 12TH AVE NE
11/19/2012	FLOODING	SURFACE WATER	WALK IS 5 INCHES DEEP IN THE PARKING LOT OF THE YMCA	19290 AURORA AVE N
11/19/2012	FLOODING	SURFACE WATER	WATER FLOODING INTO DWELLING FIRE DEPT ONSITE PUMPING. THEY WOULD LIKE THE ADJACENT STORM DRAIN CHECKED.	1132 N 195TH ST
11/19/2012	FLOODING	SURFACE WATER	PL N	N

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
1/14/2002	drainage	SURFACE WATER	SAYS THE DRAIN IN FRONT OF HIS HOUSE IS CLOGGED, WATER IS NOT DRAINING PROPERLY AND CAUSING WATER ON THE ROAD WHEN IT RAINS. NEEDS TO HAVE THE DRAIN C	19663 20TH AVE NE
1/22/2002	Maintenance	SURFACE WATER	SAYS THE DRAINAGE DITCH AT THIS LOCATION HAS TREE AND SHRUBS GROWING IN IT. SHE HAS CLEANED EVERYTHING AROUND THE DRAIN BUT IS UNABLE TO GET INSIDE AN	18514 FIRLANDS WAY N
2/11/2002	Maintenance	SURFACE WATER	SHE SAID THE CB IN FRONT OF HER HOUSE WAS PLUGGED.	19701 WHITMAN AVE N
4/16/2002	Maintenance	SURFACE WATER	THE DRAINAGE PIPE (RUNS N/S) IS BLOCKED AND WHEN IT RAINS HARD THE DITCH DOES NOT DRAIN AND GOES INTO THE ROAD.	2157 N 194TH ST
6/3/2002	Private	PRIVATE PROPERTY MATTER	SAYS SHE HAS WATER FLOWING FROM HER NEIGHBORS EASEMENT INTO HER HOUSE. WOULD LIKE TO HAVE THIS LOOKED AT. NEIGHBORS HOUSE IS ON THE WESTSIDE OF HER PR	17835 24TH PL NE
6/6/2002	drainage	SURFACE WATER	THE WATER IS NOT BEING CHANNELED INTO THE STORM DRAINS ON HIS STREET (ABOUT 10TH AVE NE). IT IS RUNNING DOWN THE SIDE OF THE STREET AND WASHING DOWN	849 NE 195TH ST
6/10/2002	Drainage	SURFACE WATER	CALLER SAYS THERE IS A HILL THAT WATER RUNS DOWN WHEN IT RAINS AND FUNNELS INTO HIS DRIVEWAY. SAYS HE HAS TRIED TO DIVERT THE WATER BUT HIS NEIGHBOR H	1646 NE 185TH ST
7/5/2002	Other	SHORELINE WATER	SAYS THERE IS WATER BUBBLING UP FROM BELOW THE GROUND ONTO THE ROAD. SAYS IT HAS BEEN DOING THIS SINCE YESTERDAY. WOULD LIKE TO HAVE THIS LOOKED AT.	17740 22ND AVE NE
9/6/2002	flood	SURFACE WATER	THERE IS A DRAIN IN THEIR DRIVEWAY THAT CANNOT HANDLE MUCH WATER. THEY HAVE INSTALLED A SUMP PUMP TO HELP WITH THE VOLUME OF WATER BUT IS CONCERNED TH	19815 ASHWORTH AVE N
9/9/2002	Maintenance	SURFACE WATER	THE CB IN FRONT OF HER SITE IS 1/2 FULL OF DEBRIS	ST
9/26/2002	Maintenance	SURFACE WATER	BLOCKED.	NE
10/28/2002	Other	SURFACE WATER		18855 FIRLANDS WAY N
11/18/2002	Sink Hole	SURFACE WATER	CALLER SAID HE HAS A SINK HOLE IN HIS YARD THINKS DRAINAGE IS RUNNING UNDER DRIVEWAY IN FRONT YARD. SAID HE HAS FILLED IT IN SEVERAL TIMES AND IT NEED	18316 7TH AVE NE
12/4/2002	Maintenance	SURFACE WATER	THE DRAINAGE DITCH ACROSS THE STREET IS PLUGGED AND OVERGROWN WITH BLACKBERRIES.	18228 24TH AVE NE
1/22/2003	private	PRIVATE PROPERTY MATTER	APARTMENT COMPLEX HAS A MINI-RIVER NEAR THEIR ROCKERY, ABOUT 10 FEET FROM IT. NOW WATER IS DRAINING ONTO CALLER'S PROPERTY.	

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
1/27/2003	drainage	SURFACE WATER	SURFACE WATER COLLECTS IN FRONT OF HOME THAT DRAINS FROM STREET. CALLER WOULD LIKE TO KNOW IF ANYTHING CAN BE DONE	2108 N 194TH ST
1/31/2003	drainage	SURFACE WATER	WATER IS DRAINING FROM STREET DOWN TO UNDERNEATH OF HOUSE. CUSTOMER WOULD LIKE SOMEONE TO TAKE A LOOK AND SEE WHAT CAN BE DONE TO PREVENT SURFACE WATE	1508 NE 195TH ST
3/31/2003	Other	SURFACE WATER	PILCHUCK CONTRACTORS WORKED ON GAS LINES AND REMOVED THE BURM. CUSTOMER WOULD LIKE THE BURM PUT BACK IN.	1646 NE 185TH ST
4/23/2003	Maintenance	SURFACE WATER	CUSTOMER WOULD LIKE DITCH IN FRONT OF HIS PROPERTY AND IN FRONT OF PARK FILLED IN. CUSTOMER SAYS IT IS OVERGROWN WITH	19815 ASHWORTH AVE N
5/2/2003	other	CODE ENFORCEMENT	RESIDENTS ARE FILLING IN DITCH WITH YARD DEBRIS	135 NE 194TH ST
5/13/2003	Private	PRIVATE PROPERTY	Sinkhole at back of caller's property..behind caller's property. (Sunk in 3 inches)	
7/22/2003	Other	SURFACE WATER	THERE IS WATER COMING OUT OF A DRAIN IN THE PARKING LOT OF DUNN LUMBER.	1108 N 185TH ST
8/18/2003	drainage	SURFACE WATER	PROBLEM HAS BEEN OCCURING FOR THE LAST THRE OR FOUR YEARS WITH HER NEW NEIGHBORS. CUSTOMER'S TILED DRAINAGE DITCH IS STARTING TO ERODE AWAY AND OWULD	19815 LINDEN AVE N
9/1/2003	water quality	SURFACE WATER	THERE IS A BAD SMELL COMING FROM THE CB IN FRONT OF THEIR HOUSE. THEY THINK IT MAY BE A DEAD ANIMAL. CAN SOMEONE INVESTIGATE.	19542 6TH AVE NE
9/2/2003	private	PRIVATE PROPERTY MATTER	CUSTOMER REPORTS AN AREA IN HER PROPERTY IS SINKING. CUSTOMER SAID THEY DID SOME DIGGING THIS WEEKEND AND LOCATED A CANAL THAT GOES BETWEEN THE PROPER	924 N 195TH ST
9/19/2003	drainage	SURFACE WATER	CUSTOMER REPORTS WATER RUN OFF FROM THE STREET IS GOING ACROSS HIS DRIVEWAY ONTO HIS PROPERTY.	20033 WALLINGFORD AVE N
9/29/2003	Other	SURFACE WATER	THERE I A POSSIBLE WATER MAIN BREAK, WATER IS FLOWING LIKE A RIVER DOWN THE DRAINAGE DITCH. IT HAS BEEN LIKE THIS SINCE LAST NIGHT.	18236 24TH AVE NE
10/1/2003	Other	SHORELINE WATER	CUSTOMER REPORTS DITCH IN FRONT OF HER HOUSE IS FULL OF RUNNING WATER AND SHE IS NOT SURE WHY SINCE IT HAS NOT BEEN RAINING LATELY.	18117 24TH AVE NE

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
10/8/2003	private	PRIVATE PROPERTY MATTER	SHE IS THE ONSITE APT MANAGER AND SAYS THERE IS A 6IN PVC PIPE BY THE SIDEWALK THAT IS GUSHING WATER.	19623 15TH AVE NE
10/9/2003	sink hole	SURFACE WATER	KAREN IS A KC SIGNAL TECH, WHILE INSPECTING A SIGNAL BOX SHE NOTICE A SINKHOLE AT THE CORNER OF THIS LOCATION. SHE SAID IT WAS 2FT DIAMETER AND APPROX	20409 AURORA AVE N
10/28/2003	other	SURFACE WATER	NEIGHBOR KIDS ARE BUILDING DAMS IN DRAINAGE DITCH CAUSING THE DITCH TO OVERFLOW WHEN IT RAINS HARD.	623 NE 200TH ST
11/24/2003	Maintenance	SURFACE WATER	CUSTOMER WOULD LIKE DITCH IN FRONT OF THE BALLINGER REALITY CLEANED OUT. CUSTOMER WOULD LIKE YOU TO CALL BEFORE YOU GO OUT SO THAT SHE MAY MEET YOU O	20324 19TH AVE NE
1/22/2004	Maintenance	SURFACE WATER	NEW OWNER OF THIS HOUSE IS REQUESTING THE DITCH ON THE CORNER BE RE-DEFINED AND THE DRIVEWAY CULVERT BE CLEANED OUT.	2358 N 193RD ST
2/19/2004	Maintenance	SURFACE WATER	CUSTOMER REPORTS CLOGGED CULVERT IN FRONT OF HIS RESIDENCE. CUSTOMER ALSO REPORTS THE STREET NEEDS TO BE SWEPT BECAUSE THE DEBRIS AND SAND LEFT OVER	1021 NE 187TH ST
5/12/2004	Maintenance	SURFACE WATER	WATER IS NOT FLOWING PROPERLY ACROSS HER ROAD SHOULDER AND INTO THE OPEN DITCH.	18355 11TH AVE NE
5/27/2004	other	SURFACE WATER	CUSTOMER CALLED FOR STATUS UPDATE ON 15197 ** THIS WAS NEVER REVIEWED BY CRT** CUSTOMER IS REQUESTING BERM AND WAS TOLD THERE WAS A WORK ORDER FOR IT	19705 10TH AVE NE
5/28/2004	drainage	SURFACE WATER	CUSTOMER WANTS BURM. PLEASE CALL BEFORE YOU GO OUT.	745 N 198TH ST
6/17/2004	Maintenance	SURFACE WATER	CALLER IS REQUESTING DRAINS BE CLEARED/CLEANED OUT (2 DRAINS IN FRONT OF PROPERTY) WATER WAS UNABLE TO ENTER DRAINS.	1215 NE 198TH ST
6/22/2004	Maintenance	SURFACE WATER	CITIZEN WOULD LIKE TO KNOW IF HE MAINTAINS THE DITCH IF THE CITY WOULD PICK UP DEBRIS WHEN NEEDED. SAID HE HAS SPOKE TO YOU ABOUT THIS BEFORE.	605 NE 200TH ST
7/30/2004	Maintenance	SURFACE WATER	AREA OVER DRAINAGE DITCH IS CAVING IN ABOVE CULVERT. SHE IS CONCERNED BECAUSE LARGE TRUCKS ACCESS DRIVEWAY.	2039 NE 177TH ST

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
7/30/2004	other	SURFACE WATER	CATCH BASIN OR DRAINAGE OVERFLOW AREA FULL OF STANDING WATER / STAGNANT WATER. CALLER SAYS MOSQUITOS MAY BE HATCHING / GROWING FROM THE POOL OF WATER	1636 N 199TH ST
8/12/2004	drainage	SURFACE WATER	CUSTOMER SUBMITTED A WALK-IN REQUEST FORM, HIS COMMENTS ARE AS FOLLOWS: LOCATION: DRIVEWAY DRAINAGE. WATER FROM THE STREET + NEIGHBORS FLOWS DOWN OUR	516 NE 195TH ST
8/30/2004	flood	SURFACE WATER	STREET WAS PAVED LAST YEAR. RECENTLY, THERE HAVE BEEN SOME SURFACE WATER ISSUES AND FLOODING ISSUES POSSIBLY DUE TO THE RAISED	1020 NE 196TH ST
9/1/2004	Erosion	SURFACE WATER	DRAINAGE SYSTEM IN FRONT OF THE SITE IS INADEQUATE, CB IS W/S OF DRIVEWAY. WHEN WATER PASSES OVER CB CREATES RUTS IN HIS	1519 NE 192ND ST
9/7/2004	drainage	SURFACE WATER	CITIZEN REPORTS SINCE THE ROAD WAS RE-PAVED WATER IS GOING INTO HER BASEMENT. SHE WOULD LIKE TO KNOW IF ANYTHING CAN BE DONE ABOUT	1025 NE 196TH ST
9/22/2004	Private	PRIVATE PROPERTY MATTER	CITIZEN REPORTS UNDERGROUND CREEK THAT RUNS ALONG THE WEST SIDE OF HIS HOUSE IS GETTING CLOSER TO HOUSE CAUSING BASEMENT TO FLOOD.	19227 16TH AVE NE
9/24/2004	Drainage	SURFACE WATER	5-6""INCH DEEP TRENCH THAT RUNS ALONG THE EDGE OF THE ASPHALT THAT IS GETTING WORSE.	1643 NE 186TH ST
9/24/2004	Other	SURFACE WATER	EDGE OF ROAD HAS A BERM TO KEEP WATER FROM COMING ONTO PROPERTY. SECTION OF BERM BROKEN AWAY - ALL SURFACE WATER GOES THROUGH GAP IN BERM AND GOES INT	18716 18TH AVE NE
9/28/2004	Drainage	SURFACE WATER	THE CITY JUST INSTALLED A A BERM AT HIS NEIGHBORS HOUSE AND HE HAS THE SAME PROBLEM. DURING THE LAST RAIN STORMS, WATER RAN DOWN HIS DRIVEWAY AND FLO	18316 7TH AVE NE
9/30/2004	Maintenance	SURFACE WATER	SURFACE WATER IS RUNNING INTO CALLERS YARD BECAUSE IT IS NOT FLOWING THROUGH CULVERT.	1626 NE 189TH ST
10/25/2004	Erosion	SURFACE WATER	FROM IN FRONT OF THIS RESIDENCE ON THE SOUTH SIDE OF THE ROAD EAST TO 24TH AVE NE IS AN EROSION PROBLEM. WHEN IT RAINS IT IS CREATING A TROUGH. SOME O	1631 NE 185TH ST
11/2/2004	Maintenance	SURFACE WATER	CUSTOMER CALLED TO REPORT A PLUGGED CULVERT THAT IS OVERFLOWING AND ERODING HIS DRIVEWAY. HE IS NOT RECEIVING ANY FLOODING OF	1231 NE 188TH ST
11/2/2004	drainage	SURFACE WATER	OWNER HAS A SURFACE WATER PROBLEM AT THIS LOCATION. SURFACE WATER RUNS OFF MULTIPLE DRIVEWAYS AND OFF THE STREET AND RUNS DOWN HIS DRIVEWAY. THIS CR	1234 NE BALLINGER PL
12/9/2004	Maintenance	SURFACE WATER	CUSTOMERS DITCH FILLED UP WITH DEBRIS. SHE IS CONCERNED THAT WITH THE COMING RAIN SHE WILL BE FLOODED OUT. SHE ROUTINELY MAINTAINS THE DITCH BUT THIS	622 NE 200TH ST

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
12/10/2004	other	SURFACE WATER	CALL REQUESTING DRAIN IN THE PARK BE CHECKED, A LOT OF TIMES IT GETS CLOGGED WITH LEAVES AND SHE DOES NOT WANT TO FLOOD.	19901 ASHWORTH AVE N
12/13/2004	Drainage	SURFACE WATER	CALLER WOULD LIKE DRAIN AT END OF DRIVEWAY LOOKED AT SHE DOES NOT KNOW IF IT IS A CITY OR PRIVATE DRAIN. SHE IS NOT SURE WHERE RUN-OFF IS COMING FROM	19011 8TH AVE NE
12/14/2004	Drainage	SURFACE WATER	CUST LIVES ON A SMALL HILL AND HER NEIGHBORS HAVE BERMS TO DEFLECT WATER. SHE SAID WATER HAS CREATED A TRENCH AND SHE WANTS TO KNOW WHO IS RESPONSIBL	1023 NE 182ND ST
1/6/2005	Private	PRIVATE PROPERTY MATTER	CALLER REPORTS WATER IS COMING INTO DRIVEWAY AND BECOMING A SHEET OF ICE. SHE IS UNSURE IF IT IS A PRIVATE OR PUBLIC DRAINAGE SYSTEM CAUSING THE PROBL	1641 NE 190TH ST
3/15/2005	other	SURFACE WATER	A CAR LEFT THE ROAD AND CRASHED INTO THE DITCH. IT MESSED UP THE DITCH VERY BAD.	19539 6TH AVE NE
5/9/2005	maintenance	SURFACE WATER	CONCRETE STORMLINE BROKEN AND CAUSING A SINKHOLE IN FRONT OF THIS ADDRESS.	19532 7TH AVE NE
5/24/2005	Drainage	SURFACE WATER	THERE IS A TRENCH BETWEEN HER FRONT YARD AND THE STREET THAT HAS FILLED UP WITH WATER RECENTLY. SHE CAN'T PARK ON THE STREET IN FRONT OF HER HOUSE DUE	1023 NE 182ND ST
7/6/2005	Maintenance	SURFACE WATER	ONE OF THREE STORM DRAINS NEAR THIS APARTMENT COMPLEX IS CLOGGED/BLOCKED.	
7/12/2005	drain	SURFACE WATER	DRAIN NEXT TO CALLER'S DRIVEWAY, IN FRONT OF THEIR HOUSE, BY THE MAILBOX AREA, IS DRAINING INTO CALLER'S BACK YARD.	
7/13/2005	Maintenance	SURFACE WATER	CALLER SAYS THERE IS A DRAINAGE / FLOODING SITUATION AT HIS APARTMENT COMPLEX. HE SAYS THERE IS A LOT OF WATER BUILDING UP, AND IS REQUESTING THAT THE	19711 15TH AVE NE
7/14/2005	water quality	SURFACE WATER	THIS CALLER IS REPORTING THAT ANOTHER CALLER (SEE CALL LIST) REPORTED THAT PAINT IS BEING DUMPED IN A STORM DRAIN AT APPROX 1160 N 198TH ST.	1150 N 198TH ST
7/19/2005	Private	PRIVATE PROPERTY MATTER	STORM DRAIN ON PATIO FOR UNIT # 5 IN THIS CONDO COMPLEX - COVER IS WOODEN AND CLOSE TO 20 YEARS OLD, AND CALLER SAYS IT IS "ROTTED"	1572 NE 177TH ST
8/2/2005	Sink Hole	STREETS/ROADWAY	POTHOLE/SINKHOLE IS STARTING TO APPEAR NEXT TO THE STORM DRAIN ON THE NORTH SIDE OF THE STREET AND LID SEEMS TO BE TILTING.""	1646 NE 185TH ST

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
8/4/2005	Maintenance	SURFACE WATER	CALLER IS REQUESTING THAT THE DRAINAGE DITCH / CULVERT IN FRONT OF HIS PROPERTY BE CLEARED OF VEGETATION, WEEDS, ETC. HE SAYS THE DITCH GOES DOWN THE	1225 NE 188TH ST
8/26/2005	Drainage, seepage	SURFACE WATER	CALLER IS REPORTING A VERY SMALL FLOW OF WATER COMING OUT OF AN UNDERGROUND PIPE AND FLOWING INTO HER PROPERTY ON THE RIGHT SIDE OF THEIR FRONT DRIVEW	2017 NE PERKINS WAY
9/12/2005	flood	SURFACE WATER	CUSTOMER SAYS THAT WATER IS PUDDLING NEAR HIS PROPERTY. IT'S ALWAYS ""THERE"" AND HE BELIVES IT'S COMING FROM A BROKEN PIPE THAT MAY BE UP THE HILL NEAR	20125 FOREST PARK DR NE
10/4/2005	private	SURFACE WATER	CUSTOMER SAYS THAT THE PREVIOUS RESIDENT OF HER HOUSE PUT GRAVEL OUT IN THE FRONT YARD, AND COVERED OVER A STORM DRAIN WITH	
10/5/2005	drainage	SURFACE WATER	DURING SATURDAY EVENING RAINSTORM WATER FLOODED THE SITE AND INTO THE CONDOS. THE CUST STATED THERE IS A CB ON THE ROAD, BUT ON	19528 ECHO LAKE PL N
10/6/2005	drainage	SURFACE WATER	CUSTOMER IS REQUESTING THAT THE CITY LOOK AT A DRAINAGE PROBLEM IN THE AREA OF 735 N 198TH ST. CUSTOMER ALSO SAYS SHE IS UNHAPPY WITH THE CITY IN GENE	735 N 198TH ST
10/10/2005	drainage	SURFACE WATER	CUSTOMER SAYS THAT THERE IS A DRAINAGE SITUATION NEAR HIS PROPERTY, RELATING TO THE DRAINAGE DITCH ("GULLY") BEING CLOGGED / FULL OF DEBRIS. HE SAYS T	611 NE 200TH ST
10/17/2005	Maintenance	STREETS/ROADWAY	THE CUST REPORTED A MISSING CB LID IN FRONT OF HIS SITE.	18312 24TH AVE NE
11/2/2005	Maintenance	SURFACE WATER	CUSTOMER SAYS THAT A DRAINAGE DITCH ON THE EAST SIDE OF 624 NE 200TH ST IS FULL OF DEBRIS. CUSTOMER IS REQUESTING THAT IT BE CLEARED OUT. (SEE ALSO: S	624 NE 200TH ST
11/3/2005	Other	SURFACE WATER	SINCE THE SLURRY SEAL WATER NOW ENTERS HIS SITE OVER THE BERM. HE IS ALSO CONCERNED ABOUT HIS BULKHEAD, IT IS CRACKED AND HE THINKS IT MAY FAIL.	19034 12TH AVE NE
11/3/2005	drainage	SURFACE WATER	CALLER IS THE OWNER OF THE ECHO LAKE TAVERN AND STATES THAT A BERM PLACED AT APTS NEXT DOOR APPROX. 2 MONTHS AGO NOW DIRECTS WATER ONTO HER SITE. SHE	19508 AURORA AVE N
11/7/2005	Maintenance	SURFACE WATER	CUSTOMER IS REQUESTING CLEANING/CLEARING FOR A DRAINAGE DITCH IN FRONT OF A NEIGHBORING HOUSE AT 808 NE 200TH ST. (SEE ALSO SR # 21918 AND SR # 18160	802 NE 200TH ST

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
11/15/2005	Other	SURFACE WATER	CALLER IS ON THE BORDERLINE OF THE CITY, BUT FEELS THAT A CITY DRAIN IS PLUGGED WITH A LOG (SEE CAN SEE THE LOG), AND CAUSING THE STREAM TO PLUG HER D	16509 35TH AVE NE
12/1/2005	flood	SURFACE WATER	IN A PREVIOUS SERVICE REQUEST (SR # 21281) CUSTOMER REPORTED A SITUATION WHERE WATER IS PUDDLING UP NEAR HIS PROPERTY. IT'S ALWAYS	20125 FOREST PARK DR NE
1/18/2006	private	PRIVATE PROPERTY MATTER	CUSTOMER SAYS AN APARTMENT COMPLEX NEAR THEIR PROPERTY HAS THEIR DRAIN/DOWNSPOUTS GOING INTO HIS PROPERTY. THE WATER FROM THE DOWNSPOUTS IS DAMAGING H	20019 AURORA AVE N
1/30/2006	flood	SURFACE WATER	CUSTOMER SAYS THE CREEK BEHIND THEIR PROPERTY IS STARTING TO FLOOD. SHE SAYS IT HAS NOT HAPPENED BEFORE NOW.	1536 NE 196TH ST
2/1/2006	drainage	SURFACE WATER	CUSTOMER SAYS THERE IS STANDING WATER IN THEIR NEIGHBOR'S PROPERTY LOT, AND IS CONCERNED THAT IT MAY FLOOD HIS SITE EVENTUALLY. HE SAYS THE NEIGHBORS	517 N 205TH ST
2/2/2006	Maintenance	SURFACE WATER	THE CB IN FRONT OF HER SITE IS 1/2 FULL OF DEBRIS	1813 NE 185TH ST
2/24/2006	Maintenance	SURFACE WATER	CUSTOMER IS REPORTING THAT THE DITCH IN FRONT OF 18821 18TH AVE NE IS NOT DRAINING CORRECTLY, AND THINKS THAT IT'S CLOGGED BY	18821 18TH AVE NE
3/16/2006	Erosion	SURFACE WATER	CUSTOMER SAYS THAT THERE IS A LOT OF EROSION ALONG THE SIDE OF THE ROAD NEAR CALLER'S DRIVEWAY. HE SAYS THAT WHENEVER IT RAINS, DIRT	2027 NE PERKINS WAY
3/24/2006	drainage	SURFACE WATER	CUSTOMER IS REQUESTING THAT THE CITY LOOK INTO IMPROVING DRAINAGE IN FRONT OF HIS PROPERTY. HE SAYS THAT HE WOULD LIKE HIS SIDE OF THE STREET TO ""MIRR	903 N 195TH ST
3/30/2006	Maintenance	SURFACE WATER	CUSTOMER SAYS THAT A DRAIN IS COMPLETELY CLOGGED/FULL OF DEBRIS. THERE WERE ALSO 4 POSTS (POSSIBLY BOLLARDS) AROUND THE DRAIN, AND TWO OF THE BOLLARDS	2210 NE 197TH PL
3/31/2006	Drainage	SURFACE WATER	THE CUST STATES THE WATER FLOWING DOWN PERKINS WAY CROSSES OVER THE GRAVEL SHOULDER AND PUSHES GRAVEL OVER AND INTO THE CB AT THE EAST SIDE OF HIS SIT	1847 NE PERKINS WAY
4/18/2006	Maintenance	SURFACE WATER	CUSTOMER SAYS THAT LAST WEEK THERE WAS A WATER LEAK NEAR CALLER'S HOUSE. SPU TRIED TO DRAIN SOME OF THE WATER INTO A STORM DRAIN/CB BY CALLER'S HOUSE,	2346 N 193RD ST
5/11/2006	erosion	SURFACE WATER	CUSTOMER SAYS THAT THEY ARE CONCERNED THAT THE HILLSIDE / SLOPE MAY BE SINKING OR COLLAPSING. IT'S LOCATED NEAR THE RIGHT OF WAY BY HER HOUSE, OFF 6TH	19539 6TH AVE NE

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
8/14/2006	Drainage	SURFACE WATER	NOT 100% SURE WHAT THE CALLERS ISSUE IS. HER ACCENT WAS NOT UNDERSTANDABLE BY TELEPHONE. I DID CATCH THAT THE CALL HAD SOMETHING TO DO WITH DRAINAGE A	1615 NE 185TH ST
11/20/2006	Maintenance	RONALD WASTEWATER	CUSTOMER STATES THAT A MANHOLE COVER IS LOOSE, AND MAKING A LOT OF NOISE WHEN VEHICLES DRIVE OVER IT. IT'S NEAR THE INTERSECTION OF 25TH AVE NE AND 26	17535 25TH AVE NE
11/22/2006	Maintenance	SURFACE WATER	OBSERVED AND CLEANED AN OPEN DITCH LINE (THAT WAS PLUGGED WITH VEGETATION / DEBRIS)	17535 25TH AVE NE
11/26/2006	Maintenance	SURFACE WATER	CUSTOMER REPORTED THAT WATER THAT NORMALLY RUNS ALONG THE SIDE OF HIS HOUSE IN THE OPEN DITCH IS NOT DRAINING. THE CULVERT UNDER THE ROAD IS PLUGGED	19233 18TH AVE NE
2/13/2007	water quality	SURFACE WATER	IT APPEARS THAT THE STUCCO SIDING CREW AT THE NEW AW/KFC IS ALLOWING THE SLUDGE TO ENTER THE STORM DRAINS.	19557 AURORA AVE N
2/21/2007	Drainage	SURFACE WATER	CUSTOMER SUBMITTED A WALKIN REQUEST STATING THAT THERE ARE PUDDLES FORMING AT THEIR ADDRESS, AND IT'S NOT DRAINING OFF VERY	19011 8TH AVE NE
3/22/2007	flood	SURFACE WATER	CATCH BASINS ON THE SOUTH SIDE OF THE PROPERTY (1207 N 200TH ST?) ARE OVERFLOWING, THEN FLOWING SOUTH ACROSS THE CALLER'S	1207 N 200TH ST
3/27/2007	drainage	SURFACE WATER	CUSTOMER IS REQUESTING REVIEW OF THIS DRAINAGE SITUATION IN FRONT OF HIS PROPERTY, HE SAYS THAT THE EXISTING CATCH BASINS ARE NOT	1639 N 199TH ST
3/29/2007	Other	SURFACE WATER	A contact form has been submitted from the web site: Name:Fred Seidel	
6/26/2007	Maintenance	SURFACE WATER	CUSTOMER IS CONCERNED ABOUT THE GROWTH OF VEGETATION AND CERTAIN WEEDS IN THE DITCHES IN THE AREA.	18721 18TH AVE NE
8/14/2007	Maintenance	SURFACE WATER	THE DRAINAGE DITCH NORTH OF HER HOUSE NEEDS TO BE OPENED AGAIN.	18355 11TH AVE NE
8/20/2007	Maintenance	SURFACE WATER	THE CB IN FRONT OF HIS HOUSE IS NOT WORKING PROPERLY.	19711 WHITMAN AVE N
9/10/2007	flood	SURFACE WATER	THE CUSTOMER REPORTED THE LAST TIME WE HAD HEAVY RAIN, THE DITCH ON HER SIDE OF 200TH (N SIDE) WAS FLOWING WELL BUT THE DITCH ON THE SOUTH SIDE HAD VE	622 NE 200TH ST
9/24/2007	sink hole	SURFACE WATER	CALLER CONCERNED ABOUT A HOLE THAT MAY BE OPENING UP NEXT TO A STORM DRAIN NEAR 1109 NE 200TH ST	1109 NE 200TH ST
10/24/2007	flood	SURFACE WATER	THE STREET ACROSS FROM THE DRIVEWAY IS FLOODING.	19542 ECHO LAKE PL N

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
11/13/2007	flood	SURFACE WATER	Stormwater from the street ponds at the entrance to the property, in the right-of-way along 19th Ave NE. The ponding is substantial and poses a safet	
11/19/2007	Maintenance	SURFACE WATER	RESIDENT CALLED SHORELINE WATER TO REPORT THAT STORM DRAIN WAS PLUGGED AT THIS LOCATION.	20122 6TH AVE NE
12/3/2007	flood	SURFACE WATER	OVERFLOWING DITCH	622 NE 200TH ST
12/10/2007	Maintenance	SURFACE WATER	DRAINAGE ISSUE ALONG 25TH AVE NE NEAR 16803 25TH AVE NE - CALLER THINKS THAT A DITCH NEEDS TO BE DUG OUT (ACROSS THE STREET NEAR A CB). CUSTOMER WOULD	16803 25TH AVE NE
12/12/2007	drainage	SURFACE WATER	CALLER HAS SPENT $30,000 ON FIXING THE DRAINAGE SYSTEM AT FREMONT AVE N @ N 195TH ST, HE STATES THAT DRAINS WERE INSTALLED BY THE CITY WERE HIGHER THA	19506 FREMONT AVE N
12/17/2007	flood	SURFACE WATER	CUSTOMER REQUESTING REPAIR FOR THE STORM DRAIN PIPE THAT MAY BE CAUSING FLOODING FOR THE NEARBY PROPERTIES. (STORM DRAIN IS IN FRONT OF 20217 8TH AVE	20217 8TH AVE NE
12/18/2007	Maintenance	SURFACE WATER	STORM DRAIN AT THE BOTTOM OF THE DRIVEWAY WAS BLOCKED/BACKED UP DURING THE STORM. HE IS REQUESTING THAT THE CITY CLEAR IT.	17519 25TH AVE NE
1/23/2008	Drainage, seepage	SURFACE WATER	WATER DEPARTMENT PATCH JOB A LONG TIME AGO HAS BEEN LEAKING, AND NOW CREATING A POOL OF GROUNDWATER THAT BLOCKS THE WALKWAY, AND CREATES A HAZARD WHEN	18624 20TH PL NE
5/5/2008	Maintenance	SURFACE WATER	BROKEN STORM DRAIN LID IN FRONT OF THIS ADDRESS	1647 N 196TH PL
6/3/2008	flood	SURFACE WATER	there is a storm drain pipe that crosses the private site. water is coming out of the ground where it shouldn't and is flooding the the site and may e	20218 8TH AVE NE
7/21/2008	erosion	SURFACE WATER	CALLER IS WORRIED ABOUT EROSION THAT IS TAKING PLACE NEXT TO THE INTERURBAN TRAIL, AND HER HOUSE.	1308 N 196TH ST
7/30/2008	draiange	SURFACE WATER	CALLER IS REQUESTING THAT THE CITY ADD A BERM OR SOMETHING AT THE TOP OF HER DRIVEWAY. SHE STATES THAT A LOT OF RAINWATER FLOWS DOWN AND ENTERS THE CA	19706 12TH AVE NE

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
11/24/2008	Maintenance	SURFACE WATER	CALLER'S NEIGHBOR (FROM 2 HOUSES TO THE SOUTH) BLEW THEIR LEAVES OUT INTO THE STREET. CALLER STATES THAT THESE LEAVES WILL EVENTUALLY END UP CLOGGING	20205 8TH AVE NE
12/30/2008	Flood	SURFACE WATER	Dear Sir, I live at 1231 ne 184th pl and have for 26 years. It was previously owned by my in-laws so I know the history. I flood too the point of f	1231 NE 184TH PL
1/15/2009	Drainage	SURFACE WATER	LARGE PUDDLE CONSTANTLY FORMS ON THE SIDE OF THE ROAD AT THIS ADDRESS. SEE ALSO # 27950.	19011 8TH AVE NE
1/30/2009	Sink Hole	SURFACE WATER	THERE IS A LARGE HOLE IN THE DRAIN ON SOUTH WEST CORNER OF THIS PROPERTY.	18820 AURORA AVE N
2/24/2009	drainage	SURFACE WATER	A FEW YEARS AGO THERE WAS WORK ON 205TH TO RAISE THE ROAD AND IT HAS CAUSED SEVERE PUDDLING IN HER DRIVEWAY. SHE IS NOT SURE IF THE CITY OR STATE DID	517 N 205TH ST
9/16/2009	Drainage	SURFACE WATER	EVERYTIME IT RAINS THERE IS A 20 FOOT PUDDLE FROM THE STREET THAT FLOWS INTO HIS YARD AND FLOODS HIS PROPERTY. HE WOULD LIKE TO HAVE THE CITY LOOK AT	19011 8TH AVE NE
10/13/2009	Drainage	SURFACE WATER	King county put an asphalt bern on the side of his road some time ago. The berm has since eroded so now when it rains the water is coming from the str	19016 12TH AVE NE
10/19/2009	flood	SURFACE WATER	Donald Davis's daughter called on Saturday morning the Public Works line requesting assistance with a flooding problem on Saturday morning, oct 17th,	19542 ECHO LAKE PL N
10/26/2009	Maintenance	SURFACE WATER	OBSERVED CLOGGED DRAIN TILE / CATCH BASIN - ROB AND BOB CLEARED IT. COMPLETE	833 NE 195TH ST
10/26/2009	flood	SURFACE WATER	ONE OF TWO DRAINS NEAR 19542 ECHO LAKE PL N IS CLOGGED AND COULD POTENTIALLY FLOOD CALLER'S BASEMENT (WATER IS BYPASSING STORM DRAIN, SEE LOG NOTES FO	19542 ECHO LAKE PL N
10/27/2009	flood	SURFACE WATER	DURING THE LAST RAIN STORM WATER FOUNTAINED OUT OF THE CB AND FLOODED THE CUL-DE-SAC. THE CUST FELT INTO THE CB BUT DID NOT FEEL A BLOCKAGE SO IT MAY	20142 6TH PL NE

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
10/28/2009	Maintenance	SURFACE WATER	THE DITCH ACROSS THE STREE AND UP 100 FEET (NEAR MAIL BOXES AT STREET SIGN 181ST COURT) IS CLOGGED WITH LEAVES THAT ONE OF THE NEIGHBORS IS BLOWING FR	18021 12TH AVE NE
11/20/2009	Drainage	SURFACE WATER	THERE IS A LARGE PUDDLE THAT FORMS IN FRONT OF THEIR HOME FOR AT LEAST A QUARTER OF A BLOCK. NO ONE CAN PARK OR WALK DUE TO THE LARGE POND. CAN THE	1909 N 192ND ST
3/8/2010	Maintenance	SURFACE WATER	THE CULVERT IS MOSTLY FILLED AND THE DITCH HAS ALOT OF SILT	2520 NE 168TH ST
9/20/2010	drainage	SURFACE WATER	SURFACE WATER FROM CITY OF SHORELINE STREET (NE 196TH ST, BEHIND THE SUBJECT SITE) RUNNING OFF THE STREET AND ONTO CALLER'S PROPERTY	1508 NE 195TH ST
11/1/2010	Maintenance	SURFACE WATER	CLOGGED DRAINAGE PIPE IS CAUSING WATER TO COME UP IN THE DRIVEWAY.	17721 25TH AVE NE
3/8/2011	Maintenance	SURFACE WATER	CONSIDERABLE DEBRIS BLOCKING THE INFLOW TO THE CULVERT.	1231 NE 188TH ST
3/14/2011	Maintenance	SURFACE WATER	DRAINAGE IN FRONT OF GAS STATION IS BLOCKED, CAUSING FLOODING TO THEIR PARKING LOT - SITE ADDRESS: 1505 NE 205TH ST	1505 NE 205TH ST
3/15/2011	Flood	SURFACE WATER	*CALL TAKEN BY JILL (VISTA)* CUSTOMER REPORTS THAT HER HOME ABUTTS THE PARK WHERE RUNOFF IS FLOODING HER PROPERTY WITH 4-5"" OF STANDING WATER.	143 NE 193RD ST
5/23/2011	Maintenance	SURFACE WATER	STORM DRAIN / CATCH BASIN HAS A "SOCK" LEFT INSIDE IT, SOCK IS FULL OF DEBRIS AND NO CONSTRUCTION IN PRESENT AT THIS TIME.	20327 MERIDIAN AVE N
7/15/2011	other	ANY OUTSIDE AGENCY NOT LISTED	THERE IS A YELLOW STANDPIPE IN FRONT OF HIS HOUSE IT IS CURRENTLY GUSHING WATER.	20105 6TH AVE NE
11/9/2011	flood	SURFACE WATER	THE MCALEAR APPEARS TO BE BACKING UP AT THIS LOCATION BETWEEN 14TH AVE NE & 15TH AVE NE ON THE NORTH SIDE OF THE CONDO. THE CALLER OBSERVED IT FROM TH	19815 15TH AVE NE
11/14/2011	Other	SURFACE WATER	THE SITE OWNER HAS BUILT A BERM OF DEBRIS THAT BLOCKS THE GATE ACCESS.	1231 NE 184TH PL
11/23/2011	maintenance	SURFACE WATER	THERE IS A BLOCKED STROM DRAIN AT 20116 6TH AVE NE.IT IS FLOODING THE STREET.	20116 6TH AVE NE

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
3/19/2012	drainage	SURFACE WATER	Since 200th has recently been paved huge water puddles form in front of our driveway, then depending on the rain amount will drain down our driveway i	1632 N 200TH ST
3/27/2012	drainage	SURFACE WATER	Since 200th has recently been paved huge water puddles form in front of our driveway, then depending on the rain amount will drain down our driveway i	1632 N 200TH ST
6/11/2012	water quality	SURFACE WATER	NEIGHBOR (MS. WALKER)HEARD RUNNING WATER LAST NIGHT AND SAW SUDS FLOWING DOWN TO ECHO LAKE. THE MOTHER WAS WASHING CLOTHES. THIS MORNING SHE NOTICED	19525 STONE AVE N
8/27/2012	Other	SURFACE WATER	Pete Dwyer or Dunn Lumber just called to report that there is substantial water leaking on the west side of their store where the Aurora Project went	1108 N 185TH ST
10/19/2012	Maintenance	SURFACE WATER	THE CULVERT IN FRONT OF HER HOME IS CLOGGED. SHE WOULD LIKE IT CLEANED OUT. I EXPLAINED I HAD NO ONE HERE AT THE TIME. I WILL NEED TO	19828 6TH AVE NE
10/29/2012	Maintenance	SURFACE WATER	2:21pm: The resident of 1623 NE 199th Pl. called to request that two catch-basins on Lake Forest Drive nearest to her residence be added to the clean	1623 NE 199TH PL
11/19/2012	Maintenance	SURFACE WATER	THERE IS A CLOGGED DRAIN IN THEIR CUL DA SAC THAT IS CREATING A GIANT PUDDLE. THEY NEED SOMEONE TO CLEAR IT OUT. SHE SAID THEIR	19544 FOREST PARK DR NE
11/19/2012	Maintenance	SURFACE WATER	PLUGGED STORM DRAIN	19532 7TH AVE NE
11/19/2012	drainage	SURFACE WATER	FLOODING FROM PROPERTY NEXT DOOR.	1116 N 198TH ST
11/19/2012	flood	SURFACE WATER	WATER FLOODING HER BACKYARD POSSIBLY WILL FLOOD BASEMENT. THE WATER IS FLOWING OFF OF 202ND ST.	729 N 203RD ST
11/20/2012	other	SURFACE WATER	THE CUST LIVES NEAR THE 196TH ST DAM, SHE SAID THE WATER WAS QUITE HIGH.	1536 NE 196TH ST
12/3/2012	flood	SURFACE WATER	A resident on Echo Lake reported the lake level was rising and thought the outfall at the north end was plugged with debris.	19901 ASHWORTH AVE N
12/20/2012	Flood	SURFACE WATER	A representative of the YMCA called to report their basement garage was flooding again.	19290 AURORA AVE N
1/10/2013	Drainage	SURFACE WATER	THE STREET IN FRONT OF HER HOME HAS A LARGE PUDDLE IN FRONT OF HER DRIVEWAY AND MAILBOXES. THE STREET 25TH AVE NE BELONGS TO THE CITY. SHORELINE CAM	18061 25TH AVE NE

McAleer Creek Basin
Drainage Calls from GIS Database (2002 through 2014)

CALLDATE	Problem type	RESPONSIBLE	COMMENTS	ADDRESS
1/11/2013	Maintenance	SURFACE WATER	THE DITCH IN FRONT OF HIS HOME IS CLOGGED. EVERY TIME IT RAINS THE DITCH OVER FLOWS. HE WOULD LIKE US TO CLEAR THE DEBRIS IN THE DITCH. HE WILL NOT B	19548 BURKE AVE N
1/16/2013	drainage	SURFACE WATER	359317 - Perpetual mud puddle covers walking path	
2/4/2013	Maintenance	SURFACE WATER	PAULA BOOKER HAS NOTICED THAT THE 8-9INCH DIA HOLE IN THE VEGETATION STRIP IS STARTING TO OPEN AGAIN. WE FILLED IT UP LAST YEAR WITH DIRT AND GRAVEL.	2109 N 194TH ST
2/4/2013	Flood	SURFACE WATER	PAULA BOOKER SAYS THERE IS A RIVER THAT RUNS FROM MERIDIAN AVE N OVER HER NEIGHBORS DRIVEWAY INTO HER YARD AND FLOODS HER GARDENS WITH UP TO 5 INCHES	2109 N 194TH ST
4/23/2013	Drainage	SURFACE WATER	THEY HAVE HAD THEIR STORM DRAIN IN THE EAST PARKING LOT CLEARED. THE DRAIN STILL CONTINUED TO DRAIN SLOW SO THEY HAD THE CITY COME OUT ABOUT 10 YEARS	816 NE 190TH ST
6/3/2013	other	SURFACE WATER	I am writing to complain about a inoperable car that is parking in my condo parking lot. It has been there for one year and hasn't moved. It has colle	19523 FIRLANDS WAY N
6/11/2013	other	CODE ENFORCEMENT	MADE SITE VISIT AND THE ROOF DOWN SPOUT IS PIPED DIRECTLY TO STREET. tHERE IS S BUILDING PERMIT #117909.	819 NE 202ND ST

McAleer Creek Basin
C/W Requests

PROBLEMCODE	DESCRIPTION	PROBADDRESS	DATETIMEINIT
WATER QUALITY	Water Quality	19217 AURORA AVE N	8/22/2013 13:28
POOR DRAINAGE	Poor Drainage	1647 N 197TH PL	8/30/2013 8:16
POOR DRAINAGE	Poor Drainage	19544 FOREST PARK DR NE	9/5/2013 15:50
FLOODING	Flooding	19223 16TH AVE NE	9/13/2013 8:40
WATER QUALITY	Water Quality	19293 STONE AVE N	9/26/2013 15:33
FLOODING	Flooding	19004 12TH AVE NE	9/30/2013 9:25
FLOODING	Flooding	622 NE 200TH ST	9/30/2013 10:08
POOR DRAINAGE	Poor Drainage	20116 6TH AVE NE	9/30/2013 10:49
FLOODING	Flooding	1833 NE PERKINS WAY	9/30/2013 12:38
FLOODING	Flooding	1238 NE 187TH ST	10/3/2013 12:25
FLOODING	Flooding	1810 N 192ND ST	10/3/2013 14:40
POOR DRAINAGE	Poor Drainage	16925 25TH AVE NE	10/4/2013 8:19
POOR DRAINAGE	Poor Drainage	1644 NE PERKINS WAY	10/16/2013 13:52
MAINTENANCE	Maintenance	19428 AURORA AVE N	10/18/2013 9:32
LID REBATE PROGRAM	LID Rebate Program	19240 10TH AVE NE	10/29/2013 8:23
POOR DRAINAGE	Poor Drainage	20243 ASHWORTH PL N	11/6/2013 9:39
MAINTENANCE	Maintenance	20122 6TH AVE NE	11/12/2013 8:17
WATER QUALITY	Water Quality	19428 AURORA AVE N	11/26/2013 14:38
WATER QUALITY	Water Quality	19522 AURORA AVE N	12/16/2013 8:48
MAINTENANCE	Maintenance	19614 15TH AVE NE	12/17/2013 16:34
ADOPT A DRAIN	Adopt A Drain	17722 21ST PL NE	12/23/2013 10:48
ADOPT A DRAIN	Adopt A Drain	746 N 203RD ST	12/23/2013 13:18
WATER QUALITY	Water Quality	1220 NE 198TH ST	1/7/2014 9:41
FLOODING	Flooding	622 NE 200TH ST	1/8/2014 16:50
MAINTENANCE	Maintenance	605 NE 200TH ST	1/9/2014 8:03
MAINTENANCE	Maintenance	622 NE 200TH ST	1/13/2014 11:52
LID REBATE PROGRAM	LID Rebate Program	16335 27TH AVE NE	1/29/2014 14:57
WATER QUALITY	Water Quality	North City Elementary (Closed)	1/29/2014 16:38
POOR DRAINAGE	Poor Drainage	816 NE 190TH ST	1/30/2014 17:07
MAINTENANCE	Maintenance	20122 6TH AVE NE	2/18/2014 11:47
EROSION	Erosion/Sediment	19557 AURORA AVE N	2/19/2014 12:01
POOR DRAINAGE	Poor Drainage	19019 18TH AVE NE	2/19/2014 13:45
FLOODING	Flooding	1614 N 203RD PL	3/6/2014 8:31
FLOODING	Flooding	19537 MERIDIAN AVE N	3/10/2014 10:30
WATER QUALITY	Water Quality	1175 N 200TH ST	3/10/2014 10:50
FLOODING	Flooding	2113 NE 177TH ST	3/10/2014 12:01
LID REBATE PROGRAM	LID Rebate Program	328 NE 192ND ST	3/25/2014 9:18
LID REBATE PROGRAM	LID Rebate Program	1622 N 202ND PL	3/25/2014 9:19
EROSION	Erosion/Sediment	19532 12TH AVE NE	3/28/2014 14:17
MAINTENANCE	Maintenance	303 NE 194TH ST	4/7/2014 8:38
POOR DRAINAGE	Poor Drainage	1627 NE 190TH ST	4/15/2014 9:32

McAleer Creek Basin
C/W Requests

PROBLEMCODE	DESCRIPTION	PROBADDRESS	DATETIMEINIT
MAINTENANCE	Maintenance	18902 18TH AVE NE	5/2/2014 8:08
POOR DRAINAGE	Poor Drainage	19217 16TH AVE NE	5/6/2014 9:42
MAINTENANCE	Maintenance	18851 FIRLANDS WAY N	5/9/2014 9:46
OTHER PW/CRT	Other PW/CRT Related Issues	19020 WALLINGFORD AVE N	5/13/2014 13:41
OTHER PW/CRT	Other PW/CRT Related Issues	136 NE 194TH ST	5/13/2014 15:41
LID REBATE PROGRAM	LID Rebate Program	18851 FIRLANDS WAY N	5/21/2014 8:25
LID REBATE PROGRAM	LID Rebate Program	18023 10TH AVE NE	6/12/2014 12:58
FLOODING	Flooding	18006 25TH AVE NE	6/16/2014 11:07
POOR DRAINAGE	Poor Drainage	18820 AURORA AVE N	7/15/2014 14:45
FLOODING	Flooding		
POOR DRAINAGE	Poor Drainage		
POOR DRAINAGE	Poor Drainage		
WATER QUALITY	Water Quality		
POOR DRAINAGE	Poor Drainage		
POOR DRAINAGE	Poor Drainage		

McAleer Creek Basin Plan

Appendix D:

Water Quality Monitoring Data – Sites CB-1 and MC-1 McAleer Creek

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
CB-1	9/25/2001	10.7	13.5	99						6.96
CB-1	10/9/2001	11.01	11.4	2.86	7.91					6.74
CB-1	10/24/2001	10.94	10.9	0.26	7.92					11.39
CB-1	11/14/2001	10.13	11.5	17.45	7.06					65.12
CB-1	11/30/2001	10.15	9.2	0.74	7.38					51.72
CB-1	12/26/2001	11.36	7.8	0	7.83					12.74
CB-1	1/10/2002	11.84	8.9	0	7.52					32.76
CB-1	1/24/2002	12.87	7.8	1.96	7.68					15
CB-1	2/14/2002	11.17	8.5	0	7.7					16.78
CB-1	3/1/2002	11.86	7.6		7.67					16.07
CB-1	3/14/2002	10.91	8.5		7.65					19.97
CB-1	3/27/2002	11.83	9.2		7.7					13.61
CB-1	4/19/2002	10.93	9.6		7.63					14.18
CB-1	4/29/2002	11.52	13		8.17					10.88
CB-1	5/13/2002	11.81	10.9		7.82					8.87
CB-1	5/24/2002	11.56	11.4		7.91					7.23
CB-1	7/16/2002	9.8	16.2	8.2	7.96					6.07
CB-1	8/15/2002	9.64	16.8	4.2	8.24					5.2
CB-1	9/27/2002	9.64	14.3	3.46	8.02					5.92
CB-1	10/10/2002	9.94	12.1	5.7	7.93					5.74
CB-1	10/28/2002	10.41	11.5	2.02	7.92					5.95
CB-1	11/12/2002	9.4	11.6	2.4	7.62					13.9
CB-1	11/27/2002	9.88	9.6	3.4	7.64					10.85
CB-1	12/9/2002	11.42	8.5	2.45	7.76					7.08
CB-1	1/3/2003	10.71	9.6	3.15	7.43					47.61
CB-1	2/6/2003	10.77	9.1	8.5	7.66					13.44
CB-1	3/12/2003	11.1	9.7	33.9	7.46					28.88
CB-1	4/14/2003	11.32	10	4.31	7.53					16.45
CB-1	5/27/2003	11.11	11.7	3.65						7.36
CB-1	6/17/2003	11.29	13.6	2.8	8.21					6.79
CB-1	7/10/2003	8.73	17.6	5.4	8.7					6.95
CB-1	8/15/2003	9.77	14.7	2.33						4.41
CB-1	9/17/2003	10.62	13.3	1.42	7.93					7.09
CB-1	10/9/2003	10.23	13	1.4	7.99					6.26
CB-1	10/24/2003	9.89	12	1.15	7.3					34.78
CB-1	11/13/2003	9.91	10.2	1.39	7.64					5.43
CB-1	12/4/2003	10.74	8.7	1.02	7.23					14.27
CB-1	12/23/2003	11.28	8.3	1.33	7.08					10.75
CB-1	1/8/2004	10.31	6.1	10.29	6.91					45.37
CB-1	1/23/2004	10.16	8.6	5.34	7.06					11.97
CB-1	2/13/2004	10.76	8.9	1.67	7.76					9.72
CB-1	3/11/2004	10.27	10.4	4.53	7.92					10.03

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
CB-1	3/30/2004	10.84	10.8	2.1	7.91					10.12
CB-1	4/16/2004	11.36	12.8	3.2	8.14					6.13
CB-1	4/30/2004	10.3	12.3	1.7	7.65					5.65
CB-1	6/24/2004	10.63	14.4	8.31	7.68					4.82
CB-1	7/28/2004	9.14	15.5	3.88						3.75
CB-1	8/19/2004	9.12	15.5	3.96						4.36
CB-1	9/23/2004	9.18	13.1	1.78	8.05					7.75
CB-1	10/5/2004	10.15	12.8	4.78	7.88					8.65
CB-1	11/18/2004	10.08	10.3	5.94	7.8					10.77
CB-1	12/14/2004	9.98	10.1	2.02	7.5					32.08
CB-1	1/6/2005	10.41	7.3	4.28	7.85					9.07
CB-1	2/2/2005	11.46	10.4	2.32	7.88					7.93
CB-1	2/25/2005	12.02	8.4	1.88	7.84					6.69
CB-1	3/18/2005	11.94	9.1	1.84	7.88					7.22
CB-1	4/26/2005	11.35	13	6.54	8.19					9.4
CB-1	5/26/2005	10.25	16.2		7.83					7.43
CB-1	6/28/2005	9.13	14.1	8.08	7.6					6.05
CB-1	7/19/2005	10.29	14.2	10.31	7.81					4.85
CB-1	8/17/2005	8.16	14.7	10.08	7.29					3.53
CB-1	10/19/2005	9.48	12.9	4.35	7.51					3.49
CB-1	11/15/2005	9.89	9.5	2.37	7.55					10.91
CB-1	12/29/2005	10.7	9.3	4.1	7.33					32.46
CB-1	1/19/2006	10.65	9.1	7.38	7.43					24.88
CB-1	2/16/2006	11.62	7	2.16	7.8					10.56
CB-1	3/23/2006	10.27	9.6	1.47	7.78					9.37
CB-1	4/27/2006	11.19	11.5		7.71					7.19
CB-1	5/24/2006	9.64	13.3		7.87					7.19
CB-1	6/30/2006		13.9		7.67					4.5
CB-1	8/2/2006		15.4		7.93					4.35
CB-1	9/6/2006	8.8	13.6	2.3	7.69					4.42
CB-1	10/13/2006	11.11	11.6	1.5	7.66					11.5
CB-1	11/14/2006	11.42	9.6	0.95	7.25					40.68
CB-1	12/22/2006	10.51	8.3	0.8	7.33					31.34
CB-1	1/29/2007	11.6	6.4	1	7.58	0.0473	2.05	2.4	16	9.38
CB-1	2/26/2007	10.81	7.7	2.29	7.48	0.0478	1.94	3.5	310	12.8
CB-1	3/27/2007	10.36	9.1	1.1	7.55	0.0428	2.04	2.68	120	11.32
CB-1	4/24/2007	10.05	10.2	1.15	7.88	0.0375	1.94	2.4	81	5.92
CB-1	5/29/2007	9.43	10.4	1.8	7.53	0.0448	1.9	3.73	60	12.83
CB-1	6/26/2007	9.05	11.6	2.8	7.63	0.0494	1.95	4.2	37	11.03
CB-1	7/31/2007	8.62	13.6	1.7	7.86	0.0448	1.9	3	300	4.83
CB-1	8/28/2007	8.08	12.4	1.4	7.75	0.0464	1.92	2.3	220	16.91
CB-1	9/24/2007		11.4	8.3	7.64	0.0941	2.02	18.5	200	18.25

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
CB-1	10/30/2007	10.51	9.9	2	7.82	0.0375	1.87	2.42	50	9.56
CB-1	11/27/2007	11.07	7.7	2	7.73	0.0386	1.92	2.7	58	10.26
CB-1	12/18/2007	10.55	8	0.9	7.56	0.042	1.85	2.3	94	23.3
CB-1	1/22/2008	11.85	5.3	3.5	7.55	0.0546	2.06	5.2	69	12.62
CB-1	2/26/2008	11.54	7.8	2.2	7.67	0.0402	1.99	2.7	560	7.82
CB-1	3/24/2008	11.42	7.1	2	7.46	0.0378	1.87	2.6	400	16.91
CB-1	4/22/2008	12.18	7.8	1.4	7.49	0.0257	1.77	1.4	500	13.72
CB-1	5/27/2008	10.6	11.7	1.45	7.97	0.0419	1.87	2.8	240	5
CB-1	6/24/2008	10.4	11	1.2	7.78	0.0405	1.81	2.7	68	4.4
CB-1	7/22/2008	9.12	12.9	1.4	7.8	0.0444	1.9	3.6	150	4.93
CB-1	8/26/2008		13	1.2	7.68	0.0481	1.7	2.9	350	11.23
CB-1	9/23/2008	9.19	10.8	1.8	7.55	0.0446	1.89	3.03	68	7.47
CB-1	10/28/2008	9.38	9.5	1.3	7.32	0.0384	1.84	2.8	14	5.88
CB-1	11/25/2008	9.32	8.8	1.6	7.16	0.0368	1.84	2.1	22	8.73
CB-1	12/30/2008	9.75	6.8	2	6.77	0.043	2.05	3.1	91	27.35
CB-1	1/27/2009	10.15	6	3	7.07	0.0411	1.8	3.54	5	6.76
CB-1	2/17/2009	9.51	6.2	1.8	6.96	0.0357	2.04	2	23	8.16
CB-1	3/31/2009	8.4	8.1		6.83	0.0357	1.77	2.5	130	15.6
CB-1	4/28/2009	9.75	9.7	1.5	7.54	0.0319	1.82	2.6	52	6.89
CB-1	5/26/2009	10.08	11.8	1.5	7.79	0.0343	1.89	2.73	30	6.78
CB-1	6/23/2009	9.97	11.8	2	7.54	0.0457	1.98	2.9	52	4.19
CB-1	7/28/2009	9.06	14.7	2.3	7.45	0.0441	1.92	3.85	720	3.55
CB-1	8/25/2009	9.87	13.4	2.2	7.3	0.0453	1.85	3.8	210	3.76
CB-1	9/22/2009	9.96	12.4	1.6	7.71	0.042	1.83	4.1	170	5.52
CB-1	10/27/2009	9.12	10.3	2.4		0.041	2.05	1.35	60	19.5
CB-1	12/29/2009	10.64	5.9	1.7	7.99	0.0392	1.95	2.95	55	25.99
CB-1	1/26/2010	10.55	7.3	2.1	7.79	0.045	1.95	2.6	30	15.09
CB-1	2/22/2010	11.35	7	3.7	7.91	0.0435	1.97	4.07	29	11.12
CB-1	3/23/2010	10.36	11.2	2.4	8.02	0.0321	1.85	2.4	350	9.1
CB-1	4/27/2010	9.71	10.3	3.8	8.02	0.0546	1.66	5.6	1000	17.55
CB-1	5/25/2010	9.69	13.1	3	8.36	0.0363	1.88	2.89	54	6.09
CB-1	6/22/2010	9.4	11.8	1.9	8.32	0.0395	1.86	2.6	290	6.16
CB-1	7/27/2010	9.85	13.5	2.3	8.4	0.0447	1.89	4	320	4.23
CB-1	8/24/2010	9.5	14	3.2	8.43	0.05	1.61	2.77	210	4.44
CB-1	9/28/2010	9.41	14.4	2.3	8.27	0.0456	1.73	2.7	270	10.88
CB-1	10/26/2010	10.22	11.2	2.1	8.18	0.0374	1.74	2.3	190	11.62
CB-1	11/30/2010	10.47	9.4	5.3	7.91	0.0975	1.52	21.2	360	18.72
CB-1	12/28/2010	12.33	8.6	2.5	7.8	0.0407	1.72	2.8	7	26.09
CB-1	1/25/2011	10.43	9	3.1	8.22	0.0391	1.77	2.4	11	17.98
CB-1	2/22/2011	11.67	6.8	3.6	8.43	0.0345	1.79	3.6	23	16.26
CB-1	3/22/2011	11.8	9.2	1.7	8.06	0.0386	1.93	3.5	36	22.82
CB-1	4/26/2011	12.39	9.6	1.6	8.48	0.0326	1.87	1.8	76	12.43

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
CB-1	5/24/2011	12.33	12.5	1.7	8.35	0.0376	1.89	2.4	250	12.8
CB-1	6/28/2011	12.22	12.8	1.7	8.21	0.0427	1.93	2.7	64	7.19
CB-1	7/26/2011	10.03	13.5	2.5	8.05	0.0485	1.78	3.1	420	7.67
CB-1	8/23/2011	10.23	14.4	1.2	8.4	0.0414	1.94	2.68	580	4.75
CB-1	10/4/2011	9.71	12.5	3.2	8.62	0.0414	1.71	2.7	64	6.85
CB-1	10/25/2011	10.16	10.3	1.9	8.38	0.0373	1.84	2.6	430	8.4
CB-1	11/29/2011	10.57	8.5	1.26	8.09	0.0345	2.08	1.2	9	25.09
CB-1	12/20/2011	9.81	8.7	1.77	7.8	0.0331	1.91	1.73	56	7.6
CB-1	1/24/2012	13.16	6.7	35.68	7.71	0.0626	2	17.2	49	30.08
CB-1	3/27/2012	11.29	8.9	3.91	7.73	0.0408	1.86	4.3	42	11.59
CB-1	4/24/2012	11.08	10.6	1.84	7.93	0.0371	1.83	3.3	16	7.64
CB-1	5/22/2012	10.18	11.3	1.55	7.89	0.0386	1.9	3.5	37	9.91
CB-1	6/26/2012	8.69	12.3	2.2	7.75	0.0385	1.69	9.8	800	12.1
CB-1	7/24/2012		13.4	2.15	7.34	0.0373	1.84	2.8	160	7.61
CB-1	8/28/2012		13.8	2.66	8.16	0.0398	1.91	3.5	57	3.93
CB-1	9/25/2012		12.9	1.92	8.63	0.041	1.86	3.9	50	6.21
CB-1	10/23/2012	11.6	10.7	2.25	8.04	0.0487	1.97	2.6	68	10.56
CB-1	11/27/2012	11.87	8.6	1.67	7.48	0.0371	2	1.2	51	22.26
CB-1	12/18/2012	11.84	8.1	2.42	7.29	0.0428	1.81	1.8	40	37.67
CB-1	1/22/2013	12.57	6.7	1.87	7.65	0.0439	2.02	1.4	5	10.68
CB-1	2/26/2013	12.43	8.1	2.62	7.58	0.0485	1.93	4.4	14	9.59
CB-1	3/26/2013	11.58	8.8	2.01	7.41	0.0528	1.92	7.6	26	11.42
CB-1	4/23/2013	11.87	9.9	1.29	7.15	0.0336	1.77	2.7	14	13.68
CB-1	5/28/2013	10.88	12.2	0.91	7.31	0.0413	1.87	2.6	35	7.96
CB-1	6/25/2013	10.31	13.9	2.25	7.75		1.69	4.6	420	9.28
CB-1	7/23/2013	10.58	14.4	1.11	7.91	0.0388	1.81	2.6	50	3.92
CB-1	8/27/2013	9.93	14.8	0.81	7.65	0.0356	1.47	2.8	620	4.08
CB-1	9/25/2013	10.41	12.8	0.98	7.64	0.037	1.75	2	41	8.19
CB-1	10/22/2013	10.96	11.4	0.78	7.84	0.0444	1.86	2.4	22	5.8
MC-1	7/27/2001	8.7	14.8		7.84					
MC-1	9/11/2001	8.67	14.9		7.91					5.55
MC-1	9/26/2001	9.31	15.3	11.41	7.27					8.39
MC-1	10/9/2001	10.34	12.5	6.48	7.62					6.74
MC-1	10/11/2001	10.47	12.6	2.2	7.68					9.72
MC-1	10/24/2001	10.5	11.6	3.2	7.33					11.39
MC-1	11/14/2001	10.08	10.9	9.85	7.27					65.12
MC-1	11/30/2001	10.2	8.1	1.66	7.34					51.72
MC-1	12/12/2001	11.45	6.6	13.55	7.02					19.78
MC-1	12/26/2001	12.15	5.9	1.69	7.51					12.74
MC-1	1/10/2002	12.34	7.1		7.31					32.76

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
MC-1	1/31/2002	12.7	5.1	3.39	7.22					31
MC-1	2/14/2002	11.71	6.9		7.46					16.78
MC-1	3/1/2002	12.55	6.5		7.33					16.07
MC-1	3/14/2002	11.62	7.3		7.52					19.97
MC-1	3/27/2002	12.6	8.3		7.81					13.61
MC-1	4/3/2002	11.41	11.3							10.54
MC-1	4/18/2002	9.61	12.5		7.72					15.57
MC-1	4/29/2002	10.68	14.2		8.22					10.88
MC-1	5/13/2002	10.52	13		7.62					8.87
MC-1	5/22/2002	9.87	13.8		7.46					8.29
MC-1	6/25/2002	8.98	14.6		7.57					5.43
MC-1	7/16/2002	9.33	16.2	7.2	7.8					6.07
MC-1	8/15/2002	9.49	16	9.6	7.95					5.2
MC-1	9/27/2002	8.87	15.1	2.81	7.67					5.92
MC-1	10/10/2002	9.21	12.1	4.66	7.47					5.74
MC-1	10/21/2002	9.11	12.8	4.19	7.56					5.95
MC-1	11/12/2002	9.8	11.3	4	7.48					13.9
MC-1	11/27/2002	9.96	9.2	2.4	7.25					10.85
MC-1	12/9/2002	11.49	7.6	4.11	7.49					7.08
MC-1	1/3/2003	12.01	6.8	3.6	7.38					47.61
MC-1	2/6/2003	11.26	8	4.3	7.41					13.44
MC-1	3/12/2003	11.3	8.7	34	6.92					28.88
MC-1	4/14/2003	10.77	10.9	3.12	7.45					16.45
MC-1	5/8/2003	9.97	14.2	2.59						9.49
MC-1	6/17/2003	9.53	14.4	6.7	7.82					6.79
MC-1	7/10/2003	8.13	17.2	5.87	7.8					6.95
MC-1	8/15/2003	9.27	15	2.41						4.41
MC-1	9/17/2003	9.27	15.1	3.11	7.72					7.09
MC-1	10/9/2003	9.75	13.5	2	7.62					6.26
MC-1	10/24/2003	8.8	14.5	5.58	7.17					34.78
MC-1	11/13/2003	9.72	9.5	0.96	7.36					5.43
MC-1	12/4/2003	11.57	7.3	2.15	7.03					14.27
MC-1	12/22/2003	11.88	6.6	1.65	6.94					10.75
MC-1	1/8/2004	11.44	3.4	9.98	6.9					45.37
MC-1	1/23/2004	10.92	6.2	3.34	6.78					11.97
MC-1	2/13/2004	11.3	8.3	3.1	7.5					9.72
MC-1	3/11/2004	10.55	10.6	2.51	7.75					10.03
MC-1	3/30/2004	10.8	11.2	4	7.58					10.12
MC-1	4/16/2004	13	9.8	2.8	7.97					6.13
MC-1	4/29/2004	10.03	12.2	2.35	7.11					5.76
MC-1	6/17/2004	9.7	14.7							4.93
MC-1	6/28/2004	9.06	16.2		7.69					4.68

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
MC-1	7/28/2004	8.82	15.8	2.65						3.75
MC-1	8/19/2004	8.75	15.3	2.99						4.36
MC-1	9/23/2004	8.5	14.3	1.61	7.72					7.75
MC-1	10/5/2004	9.3	14.8	6.8	7.62					8.65
MC-1	11/18/2004	9.9	10	7.09	7.61					10.77
MC-1	12/14/2004	9.82	8.3	3.3	7.24					32.08
MC-1	1/6/2005	10.3	5.8	3.89	7.5					9.07
MC-1	2/2/2005	12.12	8.9	1.21	7.48					7.93
MC-1	2/25/2005	11.81	7.9	1.95	7.45					6.69
MC-1	3/18/2005	12.86	9.3	2.35	7.78					7.22
MC-1	4/21/2005	9.64	14.6	3.71	7.69					15.21
MC-1	5/26/2005	8.91	18.5		7.53					7.43
MC-1	6/28/2005	8.29	15.4	2.1	7.19					6.05
MC-1	7/19/2005	9.63	14	3.45	7.72					4.85
MC-1	8/17/2005	8.04	15.3	21.4	7.31					3.53
MC-1	10/19/2005	9.01	13.3	4.98	7.55					3.49
MC-1	11/8/2005	10.26	10.8		7.29					12.23
MC-1	12/29/2005	10.89	6.8	2.42	6.86					32.46
MC-1	1/19/2006	11.28	7.1	5.24	7.21					24.88
MC-1	2/16/2006	11.34	6.4	4.73	7.41					10.56
MC-1	3/23/2006	10.21	8.8	5.1	7.51					9.37
MC-1	4/21/2006	10.62	11.9	6.39	7.89					8.84
MC-1	5/24/2006	9.12	15.7		7.49					7.19
MC-1	6/30/2006		14.7		7.65					4.5
MC-1	8/2/2006		15.8		7.84					4.35
MC-1	9/6/2006	8.15	14.1	1.1	7.79					4.42
MC-1	10/13/2006	9.85	12.5	0.9	7.45					11.5
MC-1	11/14/2006	12.25	10	1.74	6.94					40.68
MC-1	12/22/2006	11.8	5.9	1.5	7.09					31.34
MC-1	1/29/2007	12.15	5.1	0.3	7.17	0.0473	2.05	2.4	16	9.38
MC-1	2/26/2007	11.31	6.9	1.4	7.26	0.0305	1.1	5.5	14	12.8
MC-1	3/27/2007	10.09	9.7	1.5	7.31	0.026	1.07	3.1	35	11.32
MC-1	4/24/2007	9.62	11.2	1.65	6.69	0.0355	1.61	5.7	15	5.92
MC-1	5/29/2007	8.98	13.2	1.9	7.61	0.0435	1.16	4.3	52	12.83
MC-1	6/26/2007	8.65	12.2	2.4	7.4	0.0473	1.55	3.1	350	11.03
MC-1	7/31/2007	8.63	14.3	1.89	7.37	0.0496	1.41	3.2	65	4.83
MC-1	8/28/2007	8.4	13.2	2.8	7.36	0.0763	1.69	3.4	120	16.91
MC-1	9/24/2007		14.4	6.2	7.69	0.0844	1.15	8.2	59	18.25
MC-1	10/30/2007	10.27	10.5	2.6	7.52	0.0386	0.996	2.7	56	9.56
MC-1	11/27/2007	10.96	7.4	1.8	7.59	0.0316	0.975	3.1	25	10.26
MC-1	12/18/2007	11.39	6.2	1.3	7.39	0.0425	1.02	6	330	23.3
MC-1	1/22/2008	12.85	4.2	2	7.35	0.0349	1.14	5	5	12.62

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
MC-1	2/26/2008	11.75	7.3	1.4	7.47	0.0257	1.27	2.7	5	7.82
MC-1	3/24/2008	11.69	7.8	1.8	7.35	0.029	0.856	7.1	15	16.91
MC-1	4/22/2008	11	9.3	1.6	7.34	0.0239	0.762	4.9	5	13.72
MC-1	5/27/2008	10.1	12.8	2.5	7.59	0.0567	1.49	4.5	210	5
MC-1	6/24/2008	10.02	12	1.1	7.86	0.0352	1.75	0.9	80	4.4
MC-1	7/22/2008	9.05	13.1	1.1	7.55	0.0408	1.7	2.7	52	4.93
MC-1	8/26/2008		18	1.5	7.65	0.0391	0.684	5.2	56	11.23
MC-1	9/23/2008	8.16	14.3	1.6	7.48	0.047	0.867	4.62	86	7.47
MC-1	10/28/2008	8.84	10.5	1	7.32	0.0452	1.25	3.7	60	5.88
MC-1	11/25/2008	9.34	9.1	2.2	7.17	0.0415	1.01	1.92	72	8.73
MC-1	12/30/2008	10.72	3.8	3.8	7.49	0.0549	0.912	4.4	31	27.35
MC-1	1/27/2009	10.46	5	1	6.32	0.0306	1.49	1.4	21	6.76
MC-1	2/17/2009	10.06	5.8	1.5	7.18	0.0293	1.26	1.6	18	8.16
MC-1	3/31/2009	9.05	7.7		7.25	0.0342	1.01	8.5	6	15.6
MC-1	4/28/2009	9.35	10.9	1.9	7.97	0.028	1.5	3.65	68	6.89
MC-1	5/26/2009	8.91	15.9	3	7.3	0.0354	1.09	8.9	78	6.78
MC-1	6/23/2009	9.48	12.5	1.2	7.64	0.0341	1.89	1.6	91	4.19
MC-1	7/28/2009	8.54	16	1.9	7.71	0.0324	1.95	2.45	170	3.55
MC-1	8/25/2009	9.55	14	1	6.15	0.0302	1.9	2.12	520	3.76
MC-1	9/22/2009	9.21	15.4	1.7	7.53	0.0337	1.1	3.2	50	5.52
MC-1	10/27/2009	8.43	10.8	3.5		0.0337	0.779	5.5	23	19.5
MC-1	12/29/2009	11.71	4.6	1.6	7.82	0.0305	1.14	1.9	4	25.99
MC-1	1/26/2010	11.63	6.4	1.7	7.64	0.0273	1.12	2	9	15.09
MC-1	2/22/2010	10.6	7.2	2.9	7.75	0.0208	1.22	2.7	5	11.12
MC-1	3/23/2010	10.61	11.4	2.6	8.21	0.0263	1.16	5.38	2	9.1
MC-1	4/27/2010	9.68	12.1	3.4	7.94	0.0348	1.05	7	72	17.55
MC-1	5/25/2010	8.99	13.3	1.9	8.1	0.0286	1.3	4.8	32	6.09
MC-1	6/22/2010	8.93	13.9	1.6	8.18	0.0262	1.17	2.8	190	6.16
MC-1	7/27/2010	8.94	14.7	1.2	8.3	0.0321	1.88	2.3	450	4.23
MC-1	8/24/2010	8.74	14.9	1.8	8.32	0.0262	1.53	2.4	370	4.44
MC-1	9/28/2010	8.26	17.1	3.3	7.91	0.0253	0.76	3.7	330	10.88
MC-1	10/26/2010	9.71	11.9	3	7.65	0.0276	0.849	3.6	59	11.62
MC-1	11/30/2010	10.79	7.3	4.9	7.7	0.0591	1.28	18.4	160	18.72
MC-1	12/28/2010	12.31	6.5	2.9	7.64	0.0294	1.07	2.5	49	26.09
MC-1	1/25/2011	11.16	6.9	3.1	7.63	0.0271	1.07	2.63	32	17.98
MC-1	2/22/2011	11.87	5.7	2.9	8.01	0.0233	1.06	4.1	7	16.26
MC-1	3/22/2011	11.57	8.9	3.2	7.52	0.0188	0.912	4.5	7	22.82
MC-1	4/26/2011	9.48	12.4	5.4	7.84	0.022	1.04	4.6	42	12.43
MC-1	5/24/2011	10.39	14.6	2.7	7.73	0.0237	0.972	4.8	17	12.8
MC-1	6/28/2011	10.5	16.3	2	7.68	0.0294	1.1	4.4	210	7.19
MC-1	7/26/2011	8.9	16.1	4.5	7.63	0.0349	1.17	7.2	560	7.67
MC-1	8/23/2011	9.2	15.2	2.1	7.77	0.0304	1.66	3.5	550	4.75

McAleer Creek Basin
Water Quality Data--Monitoring Locations CB-1 and MC-1

Site	Date	DO	Temp	Turb	pH	TP	TN	TSS	FC	Flow
MC-1	10/4/2011	9.02	14.3	2.3	7.09	0.0253	1.02	2.9	89	6.85
MC-1	10/25/2011	9.77	11.7	2.8	8.04	0.0228	0.991	2.7	280	8.4
MC-1	11/29/2011	10.45	7.4	3.01	7.49	0.0463	0.938	8.5	15	25.09
MC-1	12/20/2011	10.36	7.2	1.33	7.95	0.0305	1.43	1.5	23	7.6
MC-1	1/24/2012	14.39	4.1	13.89	7.45	0.0368	1.06	7.4	67	30.08
MC-1	3/27/2012	11.53	8.7	4.28	7.86	0.0251	1.07	5.5	17	11.59
MC-1	4/24/2012	10.32	13.2	6.07	7.92	0.0292	1.28	5.4	16	7.64
MC-1	5/22/2012	9.01	14.7	4.21	8	0.0269	1.01	6.3	54	9.91
MC-1	6/26/2012	7.66	16.2	2.46	7.86	0.0253	0.829	8.6	420	12.1
MC-1	7/24/2012		16.9	2.71	7.09	0.0212	0.87	4.4	70	7.61
MC-1	8/28/2012		14.4	1.76	8.03	0.0252	1.77	2.5	69	3.93
MC-1	9/25/2012		15.2	2.3	8.5	0.0234	1.05	3.7	29	6.21
MC-1	10/23/2012	11.08	11.8	2.07	7.59	0.0264	0.896	2.8	84	10.56
MC-1	11/27/2012	12.24	8.4	5.27	7.49	0.039	0.924	6	8	22.26
MC-1	12/18/2012	12.78	6.4	2.37	7.36	0.0303	0.877	2	59	37.67
MC-1	1/22/2013	13.54	4.9	1.62	7.78	0.0317	1.28	3	13	10.68
MC-1	2/26/2013	13.09	7	3.04	7.8	0.0288	1.27	4.2	4	9.59
MC-1	3/26/2013	12.48	9.7	1.41	7.64	0.025	1.1	3.1	32	11.42
MC-1	4/23/2013	11.51	11.7	3.29	7.28	0.0205	0.935	2.8	50	13.68
MC-1	5/28/2013	9.97	14.4	3.83	7.5	0.0332	1.2	5.3	24	7.96
MC-1	6/25/2013	9.53	16.2	7.59	7.8		1.3	12.8	390	9.28
MC-1	7/23/2013	9.87	15.5	2.1	7.91	0.0277	1.77	2.9	60	3.92
MC-1	8/27/2013	9.22	15.6	0.8	7.89	0.0281	1.72	2.6	73	4.08
MC-1	9/25/2013	9.79	15.1	2.17	7.76	0.025	1	3.6	62	8.19
MC-1	10/22/2013	10.61	11.5	2.12	7.78	0.0358	1.73	1.4	47	5.8

McAleer Creek Basin Plan

Appendix E:

McAleer Creek and Lyon Creek Basin Plan Public Meeting Summary

Memo

AltaTerra

To: Brian Landau, PE, LG, City of Shoreline
John Fetherstone, City of Shoreline

From: Erin Nelson, Altaterra Consulting LLC

CC: Tarelle Osborn, OCI

Date: 5/14/2014

Re: McAleer Creek and Lyon Creek Basin Plan Public Meeting Summary

---

A public meeting was held at Shoreline City Hall on the evening of May 13, 2014 to inform interested parties about the McAleer Creek and Lyon Creek basin plans and to solicit input on problem areas and concerns that should be addressed. Below is a summary of the meeting.

Time: 6 to 8 p.m.

City representatives:

- Brian Landau
- John Fetherstone
- Erin Nelson (consultant)

Number of attendees: 9 (sign-up sheet is attached)

Format:
An open house format was used for the public meeting, with display boards showing basin maps, planned activities, and schedule. An electronic survey (i-pad) was used to find out where meeting attendees live, and how they rank surface and stormwater issues. The survey was conducted anonymously. Comment cards and notes on the large basin map were utilized by attendees to describe their particular concerns in select locations and in general. A short powerpoint was also provided to those present.

Memo

Survey results:

Two questions were asked in the survey, and the following summary of responses were received:

What drainage basin do you live in?

25% reported Thornton Creek

25% reported Lyon/Ballinger Creek

12.5% reported “other”

37.55 reported McAleer/Echo Lake

Rank the surface water issues that are most important to you:

The table below summarizes the results.

Ranking	Water quality	Drainage /	Quality of aquatic	Condition of City's
1	4	2		2
2	2	3	1	2
3	1	1	5	1
4	1	2	2	3

Comments:

Comments received are attached. Additionally, comments written on the basin map are shown below.

Memo

AltaTerra

Memo

AltaTerra

To: John Featherstone, City of Shoreline

From: Erin Nelson, Altaterra Consulting LLC

CC: Tarelle Osborn, OCI

Date: 9/25/2014

Re: McAleer Creek and Lyon Creek Basin Plan Public Meeting Summary

---

A public meeting was held at Brugger's Bog Park on the evening of September 17, 2014 to inform interested parties about initial results from the McAleer Creek and Lyon Creek basin plans and to solicit input on projects and problems that may have been missed in the initial evaluation. Below is a summary of the meeting.

Time: 6 to 8 p.m.

City representatives:

- Brian Landau
- John Featherstone
- Erin Nelson (consultant)

Number of attendees: 13 (sign-up sheet is attached)

Format:

An open house format was used for the public meeting, with display boards showing basin problem areas, and proposed projects. Display boards are shown below.

Memo

Flooding along 25th Avenue NE

- Potentially under-sized culvert at 196th NE (border with Mountlake Terrace)
- Pipes in poor condition
- Flat terrain

High groundwater

- Limits infiltrative low impact development (LID) techniques
- Seeps cause local problems (e.g., basements, crawl space flooding, etc.)

CITY OF SHORELINE

Memo

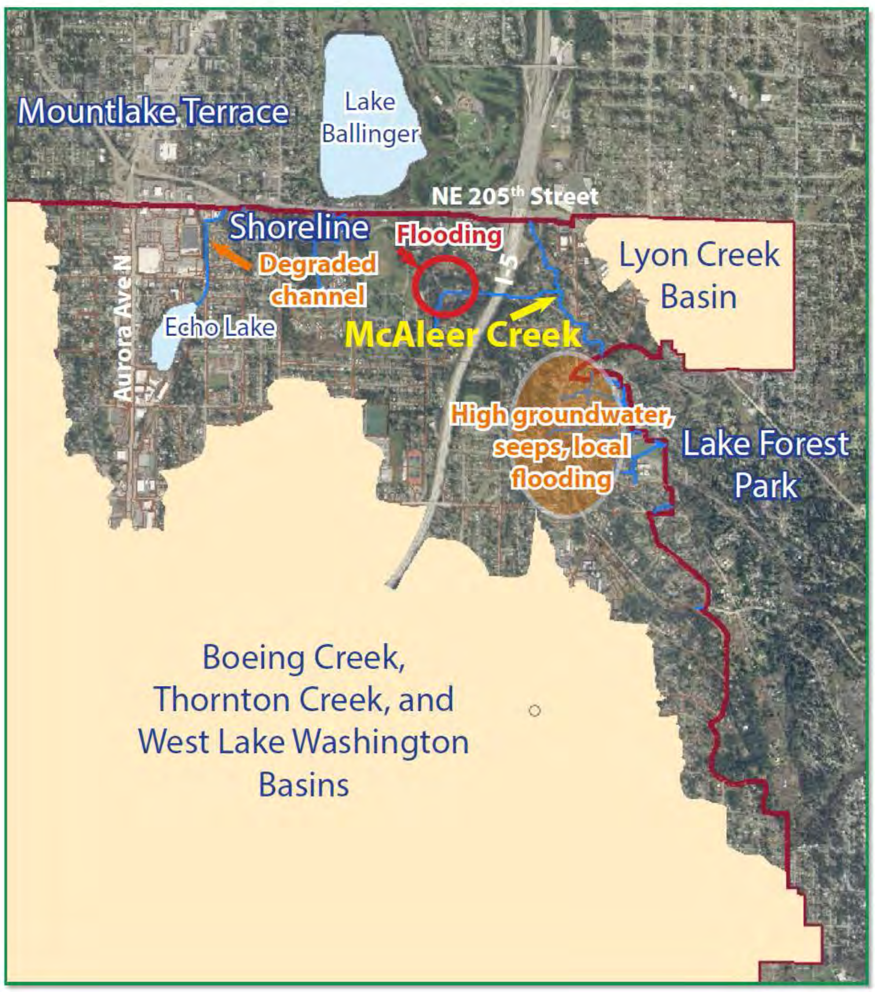
AltaTerra

Poor water quality in Echo Lake

- High phosphorus and temperature, low dissolved oxygen

High groundwater east of 15th Avenue NE

- Limits infiltrative low impact development techniques
- Seeps cause local problems (e.g., local flooding)

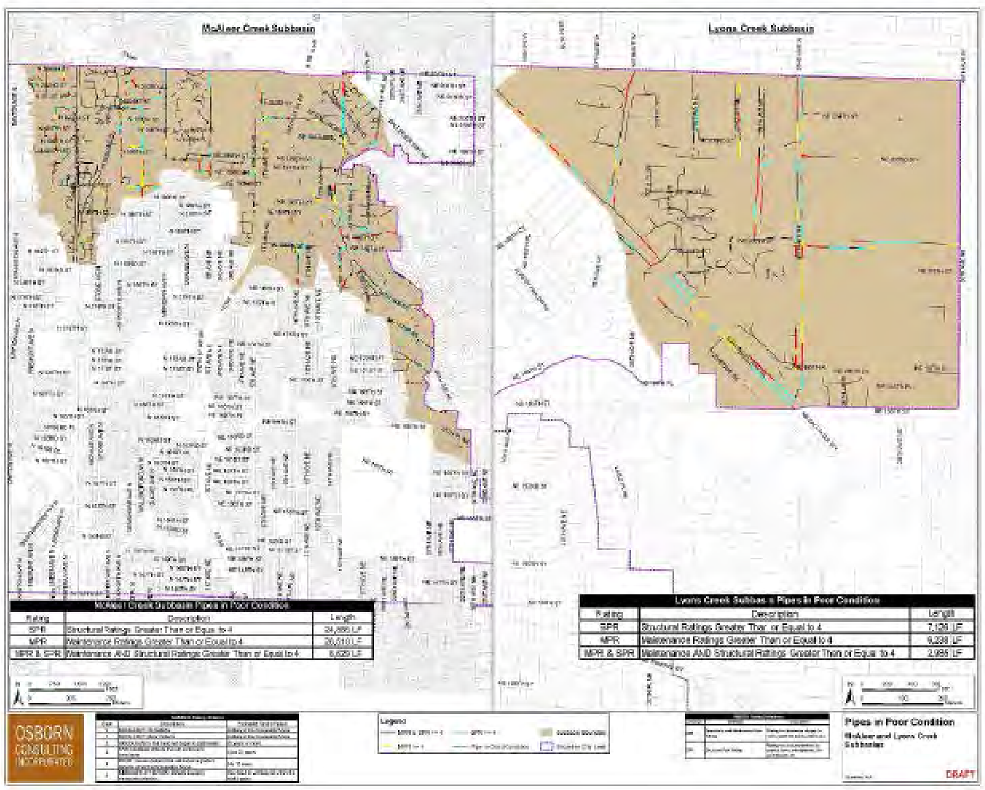


CITY OF SHORELINE

Memo

AltaTerra

McAleer Creek and Lyon Creek Basin Plans



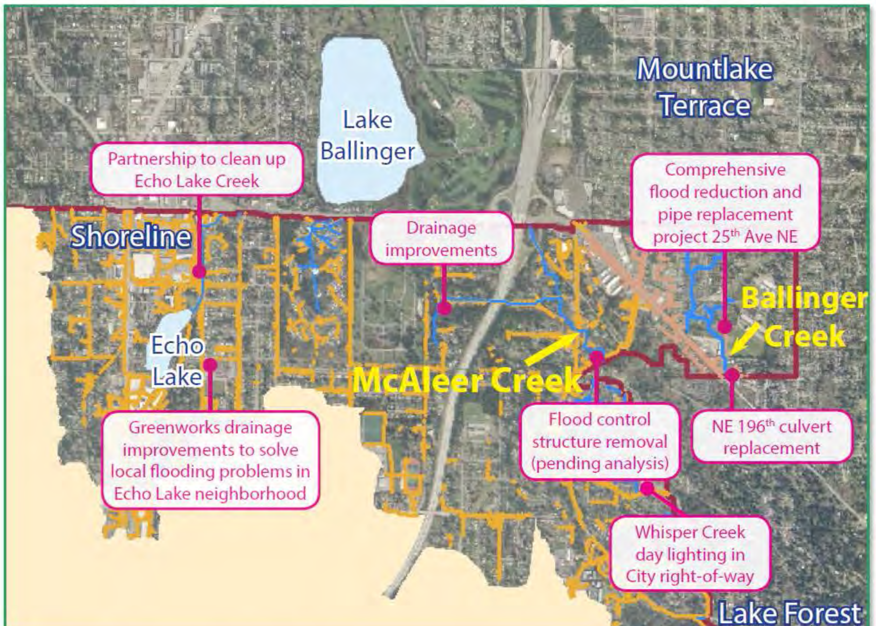
Pipes in Poor Condition

CITY OF SHORELINE

Memo

McAleer Creek and Lyon Creek Basin Plans

Preliminary Site-specific and Basin-wide Projects



Basin-wide Programmatic Projects

- Targeted, water-quality education for and outreach to commercial businesses in Echo Lake area
- Invasive plant removal and native revegetation in stream buffers
- Develop appropriate surface water management solutions (such as not allowing infiltrative LID techniques) in areas where seepage and flooding are current problems

Basin-wide Infrastructure Projects (locations to be determined):

- Pipe repair and replacement
- General pipe maintenance
- Construct new facilities or retrofit old stormwater facilities where stormwater treatment is lacking

Memo

AltaTerra

Survey:

An electronic survey (i-pad) was used to find out where what surface water issues are most important to the attendees, and what programs respondents would like to see initiated by the City. The survey was conducted anonymously. Results are shown in the table and graph below.

September 17, 2014 Public Meeting Survey Results

What basin do you have the greatest concern?	Rank the surface water issues you think are the biggest problem in the basin?	What is the most beneficial project or program the Shoreline Surface Water Utility should focus its efforts in this basin(s)?	Comments?
Lyon	Water quality,Flooding,Drainage, Pipe condition,Stream and wetland habitat		
Lyon	Pipe condition,Stream and wetland habitat,Water quality,Drainage,Flooding		
Lyon	Water quality,Flooding,Stream and wetland habitat,Drainage,Pipe condition	Water volume management flooding and improve water qualiy and create asustainable habitat for fisf and wildlife.	Thanks for providing this public forum.
Lyon	Drainage,Pipe condition,Water quality,Stream and wetland habitat,Flooding	I just moved here so i dont know this area yet	
McAleer	Water quality,Stream and wetland habitat,Flooding,Pipe condition,Drainage		
Both	Stream and wetland habitat,Water quality,Flooding,Drainage, Pipe condition		
Both	Flooding,Drainage,Water quality,Stream and wetland habitat,Pipe condition	Increase capacity in culverts	Good presentation
Both	Flooding,Stream and wetland habitat,Water quality,Drainage,Pipe condition	Develop surface water mgmt solutions, education of residents	

Memo

AltaTerra

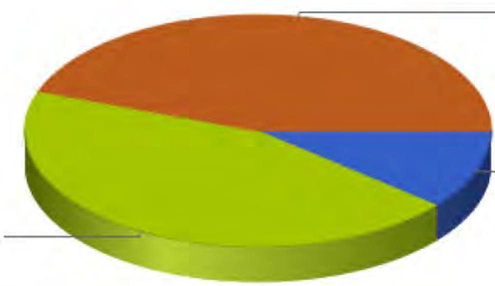
QuickTapSurvey

McAleer Creek and Lyon Creek (Ballinger Creek) Basin Plans Open House

Sep 17, 2014 to Sep 18, 2014

What basin do you have the greatest concern?

Results based on 9 responses to this question.



Rank the surface water issues you think are the biggest problem in the basin?

Results based on 9 responses to this question.

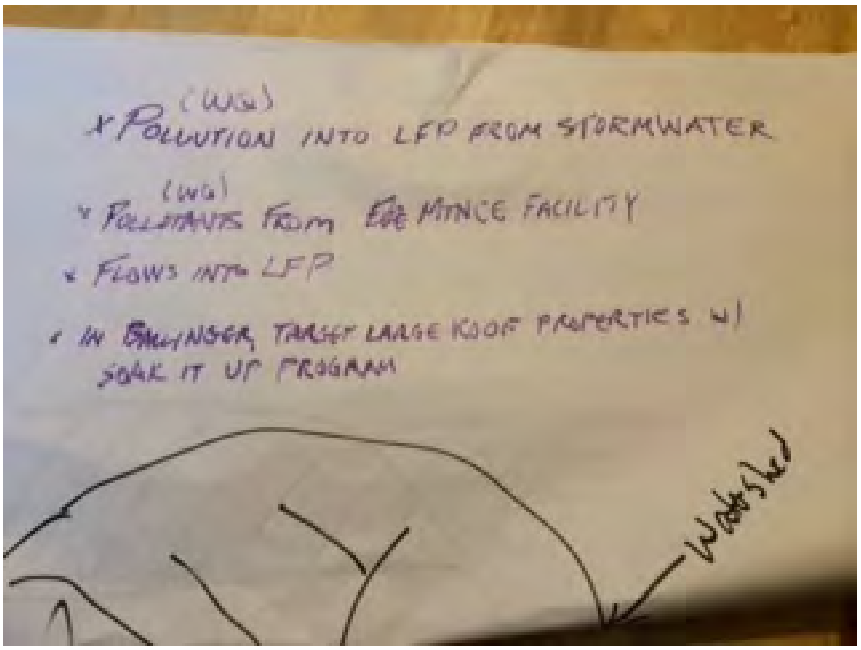
Ranking	Pipe condition	Drainage	Flooding	Stream and	Water quality
1	2	1	2	1	3
2	1	2	2	3	1
3		1	2	1	5
4	2	4		3	
5	4	1	3	1	

Comments:

Comments received included the following:

1. Concern about pollution originating in Shoreline (or Mountlake Terrace) and being transported downstream to Lake Forest Park.
2. Concern about pollutants entering stormwater from the former King County Maintenance Facility on 25th Avenue Northeast.
3. Concern about the volume of flows entering Lake Forest Park.

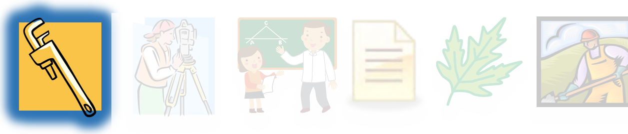
4. Ideas to mitigate flows in Ballinger Creek by encouraging installation of rain gardens---possibly targeting the "Soak it Up" program to residents with large roofs.



McAleer Creek Basin Plan

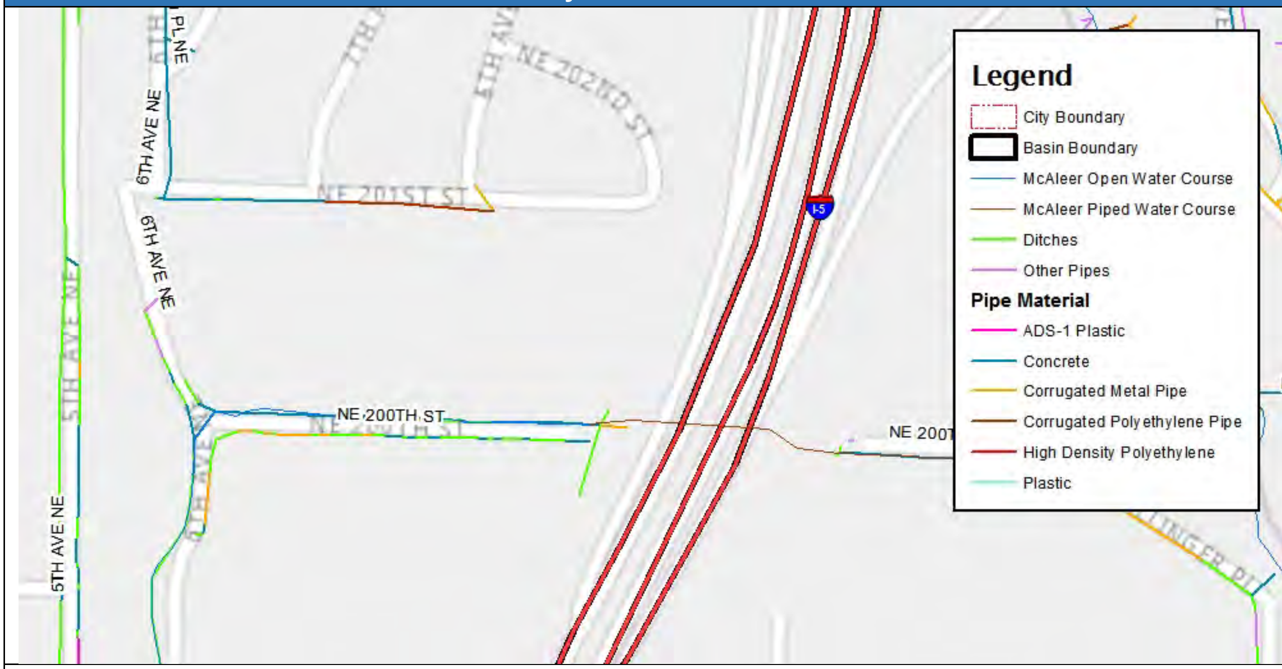
Appendix F:

McAleer Creek Basin Proposed Project Summary Sheets



Project ID:	MC-CIP-1
6th Avenue NE and NE 200th Street Flood Reduction Project(s)	
Preliminary Cost (2015 $): $340,100	

Project Location:



Description:

Flooding occurs at the intersection of 6th Avenue NE and NE 200th Street because the existing collection and conveyance system is overwhelmed. A half pipe carries flow down the hill from the south (6th Avenue NE) and then discharges into a structure that the City has recently upsized to a Type 2 catch basin. The structure is located where the grade flattens. The change in gradient combined with the open conveyance system (half pipe), which carries a lot of debris, causes the structure to clog and flood. This proposed CIP will improve the collection and conveyance along 6th Avenue NE to alleviate flooding.

Assumptions and Considerations:

The proposed project is a two-phase solution to address flooding. Phase I includes installation of a trash rack structure at the inlet of the driveway culvert SP-5111 (see schematic below) to collect debris before it can clog the pipe system at the intersection of 6th Avenue NE and NE 200th Street. Phase I also includes installing a bypass pipe at the new trash rack/structure (inlet of driveway culvert SP-5111) routing flows to an existing ditch on the east side of 6th Avenue. The existing pipe (SP-5112 at CB-6373) is significantly flatter than the half pipe ditch and pipe SP-5111. Therefore, Phase I includes upsizing the pipe diameter of SP-5112 (currently 18 inch diameter) to a 24-inch pipe, in conjunction with replacing CB-6373 (was a Type 1 CB) with a Type 2 CB, to alleviate flooding at the intersection by allowing more of the flow to remain in the pipe and structure and provide sediment storage. With the combination of trash rack to catch debris and the increased conveyance/sediment storage capacity with a larger pipe diameter, this proposed solution will mitigate flooding at 6th Avenue NE and NE 200th Street.

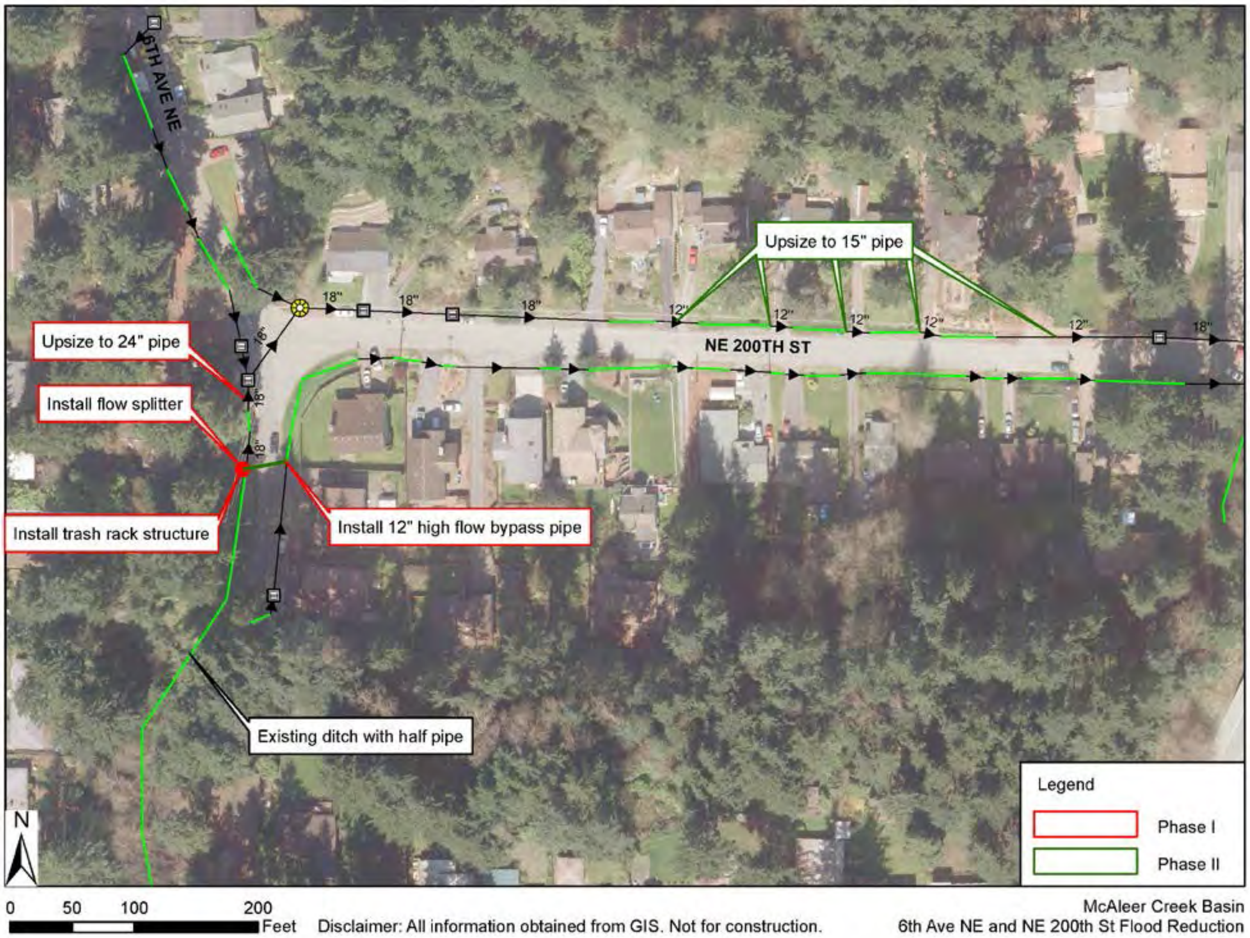
Phase II includes upsizing 12-inch diameter driveway culverts to at least 15-inch diameter (totaling 219 linear feet) if flooding persists at the site due to a constriction in the downstream pipes.

Basic sizing calculations were conducted to determine the appropriate pipe sizes to convey water and sediment for the 25-year flow between driveway culvert SP-5111 and the WSDOT culvert. Calculations indicated that pipe SP 5112 should be upsized to a 24-inch diameter pipe and that none of the existing driveway culverts are appropriately sized either.

Design considerations include:

1. This project is to be designed in conjunction with the City's replacement of CB-6373. This Type I catch basin was recently replaced with a Type 2 catch basin.
2. The project may be constructed by the City's O&M crews.
3. The cost estimate assumes traffic control at the intersection will be required, and is divided by phase.
4. It was assumed that pipe SP-5112 can be removed and replaced without removing the mature coniferous trees. This would likely require hand digging a portion of the trench around the tree roots. No cost for tree removal was included in the cost estimates.
5. Calculations were not completed to determine the portion of flow to be directed to the proposed 12-inch bypass pipe. In addition, capacity calculations were not completed on the downstream system (conveyance along the south side of NE 200th Street).

Schematic:


6TH AVE NE
NE 200TH ST
Upsize to 15" pipe
Upsize to 24" pipe
Install flow splitter
Install trash rack structure
Install 12" high flow bypass pipe
Existing ditch with half pipe
18"
12"
Legend
Phase I
Phase II
N
0 50 100 200 Feet
Disclaimer: All information obtained from GIS. Not for construction.
McAleer Creek Basin
6th Ave NE and NE 200th St Flood Reduction

Planning-level Cost Estimate:

6th Ave NE and NE 200th St. Flooding Improvements - Phase I: Upsize SP-5112

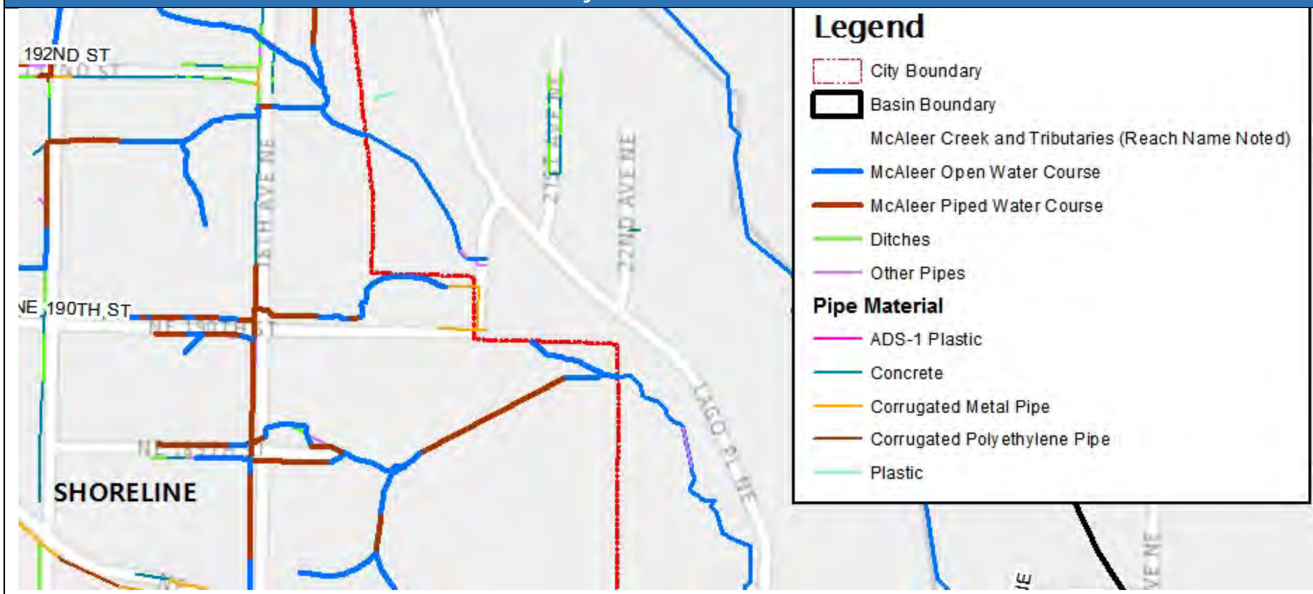
Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$3,670
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$5,150
Potholing	EA	$1,800	2	$3,600
Clearing & Grubbing	SY	$10	250	$2,500
Connect to Existing Drainage Structure	EA	$500	1	$500
Trash Rack Structure	EA	$5,000	1	$5,000
Flow Splitter	EA	$1,000	1	$1,000
Excavation, including haul	CY	$60	70	$4,200
Schedule A 12" Storm Sewer Pipe	LF	$86	45	$3,870
Schedule A 24" Storm Sewer Pipe	LF	$176	25	$4,400
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	20	$3,000
Roadway Restoration	SY	$550	20	$11,000
Planting and Bioengineered Restoration	SY	$100	250	$25,000
Subtotal				$73,390
Contractor overhead, profit, and mobilization			10%	$7,339
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$36,695
Subtotal Construction Costs				$117,424
City Staff Time			10%	$11,742.40
Administration and engineering design			20%	$23,484.80
Design Contingency			20%	$23,484.80
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$176,200**

Phase II: Upsize Downstream Pipes

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$2,600
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$3,600
Potholing	EA	$1,800	5	$9,000
Clearing & Grubbing	SY	$10	59	$590
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	31	$4,650
Connect to Existing Drainage Structure	EA	$500	1	$500
Schedule A 15" Storm Sewer Pipe	LF	$109	219	$23,871
Planting and Bioengineered Restoration	SY	$100	59	$5,900
Roadway Restoration	SY	$550	31	$17,050
Subtotal				$68,261
Contractor overhead, profit, and mobilization			10%	$6,826
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$34,131
Subtotal Construction Costs				$109,218
City Staff Time			10%	$10,921.76
Administration and engineering design			20%	$21,843.52
Design Contingency			20%	$21,843.52
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$163,900**

Project ID:	MC-CIP-2
NE 190th Street Flood Reduction	
Preliminary Cost (2015 $): $709,500	

Project Location:



Description:

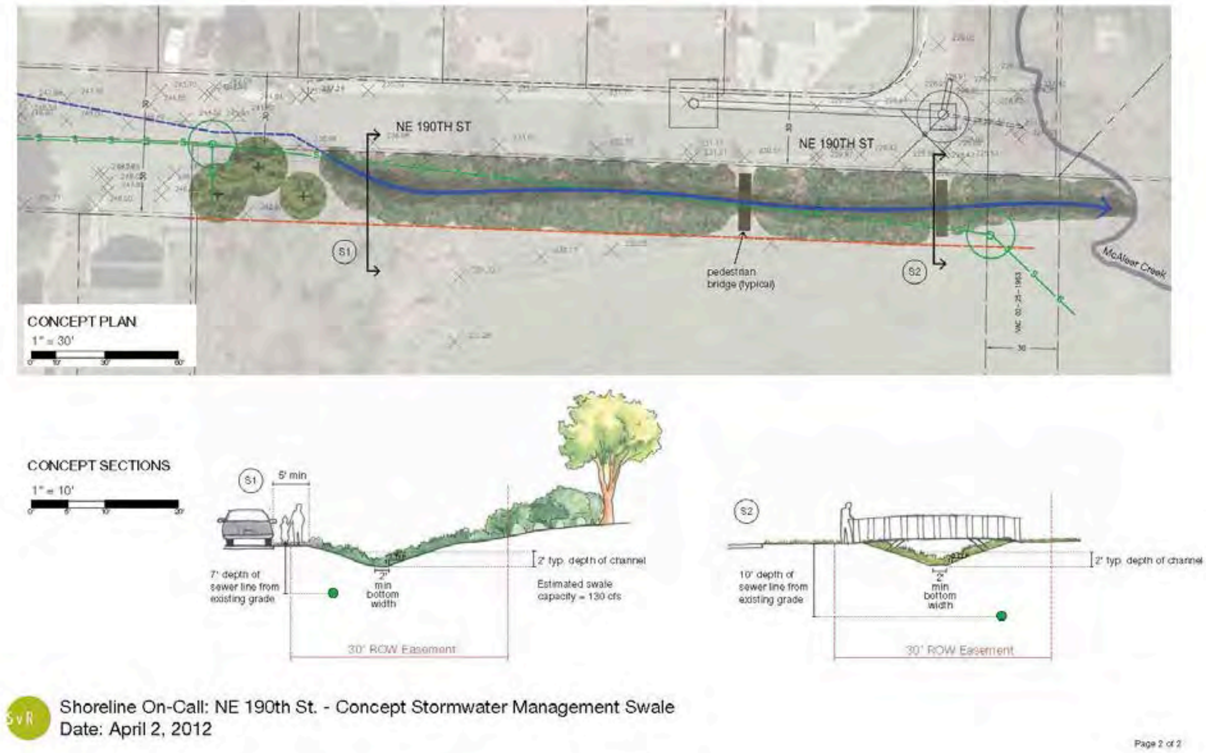
This project was developed to alleviate flooding at three homes along NE 190th Street. A conceptual design was completed by SvR Consulting (schematic provided below) to re-route flow from a tributary of Whisper Creek to a stormwater management swale along NE 190th Street, taking flow out of the backyards of homes where the flooding occurs and moving it into City right-of-way and a newly constructed stream channel on Shoreline school district property that re-connects with Whisper Creek. Assumptions and considerations shown below are based on the schematic provided by the City and SvR, and the cost estimate and design considerations should be considered preliminary. Hydrologic analysis, consultation with natural resource agencies and negotiations with property owners and the school district for necessary easements will be required to develop a more complete project and accurate cost estimate.

Assumptions and Considerations:

Design considerations include the following:

1. Environmental permitting, including Corps Permit, WDFW HPA, and SEPA, will be required because flow from an existing stream channel will be re-routed and a new stream channel will be re-constructed.
2. An existing sewer line is 7 feet below existing grade. Potholing may be required to confirm the location and depth of the sewer line.

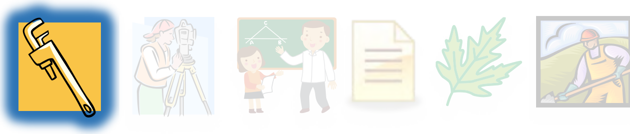
Schematic:



NE 190TH ST
NE 190TH ST
S1
S2
pedestrian bridge (typical)
McAleer Creek
CONCEPT PLAN
1" = 30'
CONCEPT SECTIONS
1" = 10'
S1
5' min
7' depth of sewer line from existing grade
2' min bottom width
2' typ. depth of channel
Estimated swale capacity = 130 cfs
30' ROW Easement
S2
10' depth of sewer line from existing grade
2' min bottom width
2' typ. depth of channel
30' ROW Easement
SvR
Shoreline On-Call: NE 190th St. - Concept Stormwater Management Swale
Date: April 2, 2012
Page 2 of 2

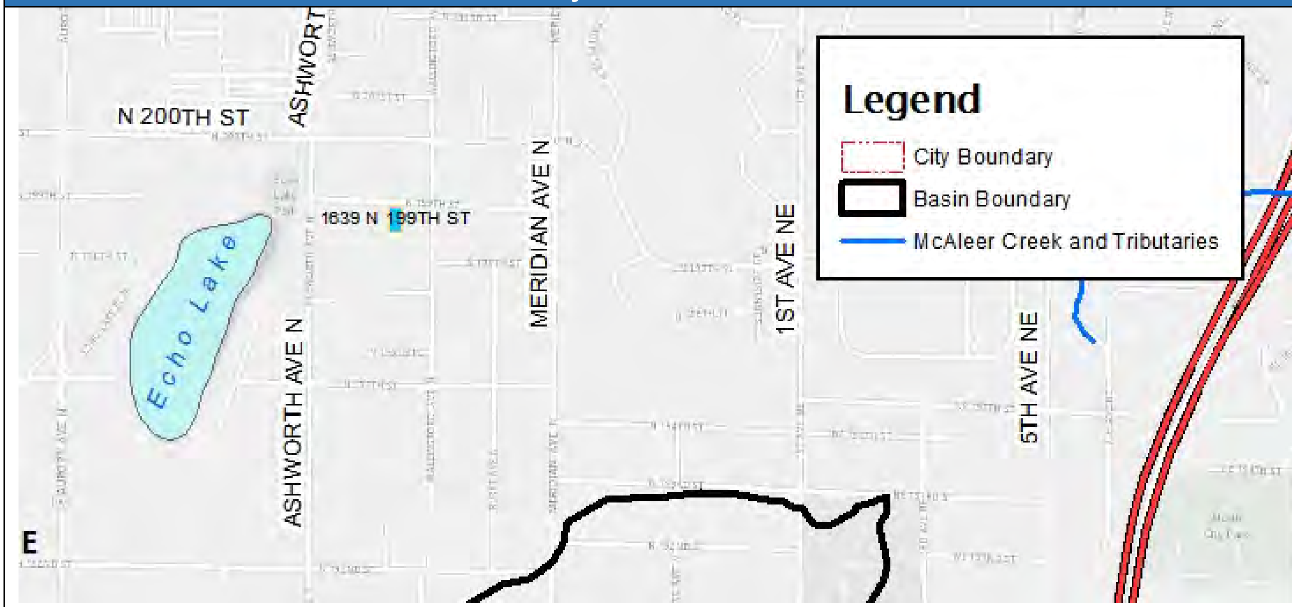
Planning-level Cost Estimate:

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$14,500
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$20,300
Clearing & Grubbing	SY	$10	1134	$11,340
Excavation Incl. Haul	CY	$60	252	$15,120
Gravel Bed Material	TON	$40	517	$20,680
Biofiltration Soil	CY	$70	252	$17,640
Geosynthetic Liner	SY	$7	554	$3,878
Pedestrian Bridge	LF	$1,200	60	$72,000
Planting and Bioengineered Restoration	SY	$100	1134	$113,400
Subtotal				$289,358
Contractor overhead, profit, and mobilization			10%	$28,936
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$144,679
Subtotal Construction Costs				$462,973
City Staff Time			10%	$46,297.28
Administration and engineering design			20%	$92,594.56
Design Contingency			20%	$92,594.56
Permitting				$15,000
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$709,500**



Project ID:	MC-CIP-3a
Greenworks: Bioretention at N 199th Street and Wallingford Avenue NE	
Preliminary Cost (2015 $): $396,800	

Project Location:



Description:

The proposed CIP includes constructing bioretention cells at North 199th St., just west of Wallingford Avenue North. This location was identified through the Greenworks program in the Surface Water Utility that identifies candidate locations for low impact development stormwater retrofit. This project addresses a ponding issue in from of house 1639 N. 199th Street. This project includes the following design assumptions:

- Wide ROW along the south side of North 199th Street would allow for new bioretention on the southern edge of the ROW while still allowing for a parking strip along the edge of pavement. There are multiple potential sites in front of and to either side of address 1639 North 199th Street. Bioretention cells would overflow and connect to existing storm drains via new lateral pipes and Type 1 catch basins. These facilities would probably not involve any work on the existing storm drain other than installing new lateral connections.

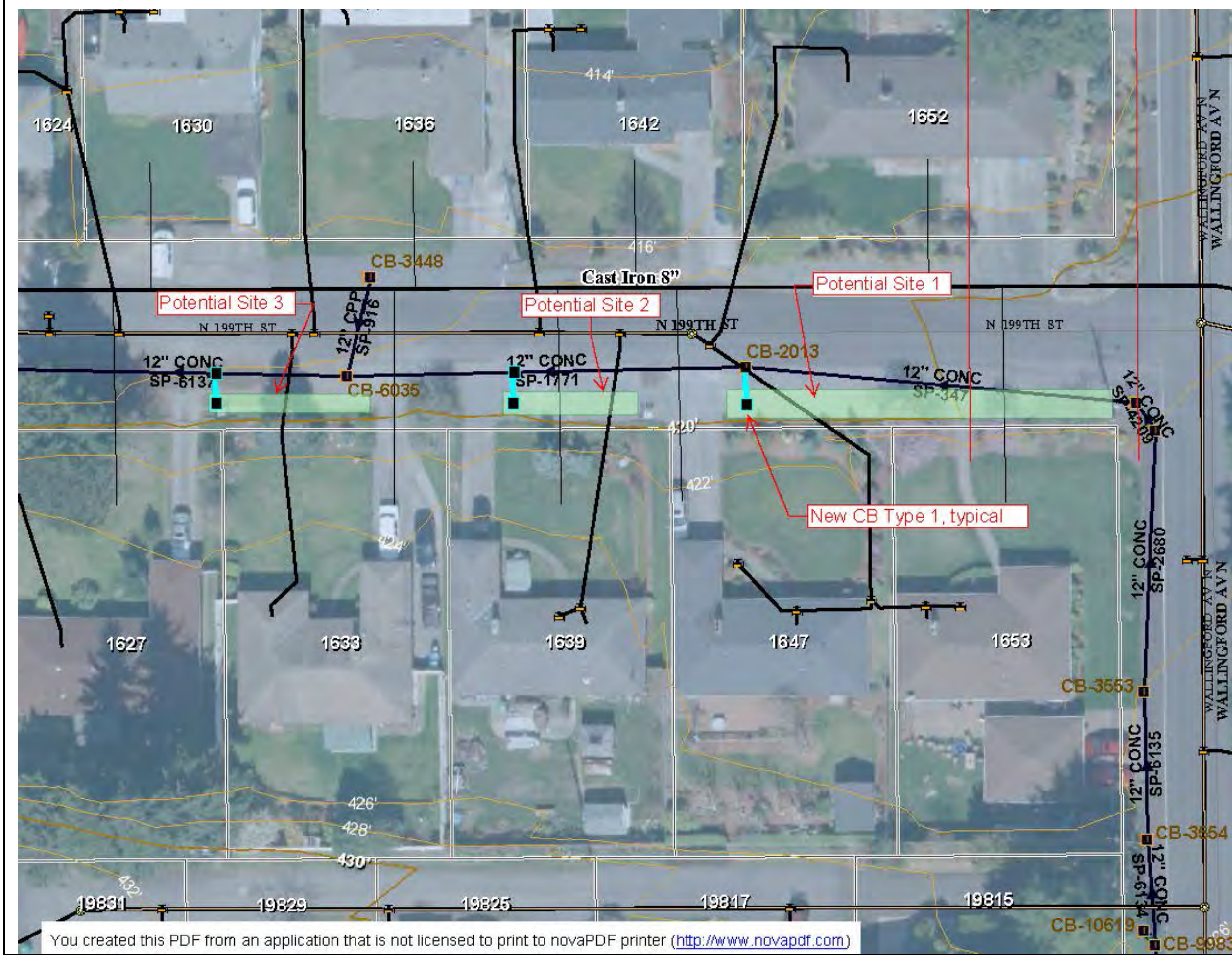
Assumptions and Considerations:

- This project includes installing three bioretention swales on the south side of North 199th Street east of the intersection with Wallingford Ave North. Each swale has a cross section with a 1.5-foot bottom width, 1-foot depth, and 3:1 side slopes. The three swales are situated between the driveways of houses 1627, 1633, 1639, 1647, and 1653 North 199th Street. The design also includes new CBs (Type 1) and pipes to connect to the existing storm drain line.

Design considerations include the following:

1) Coordination with neighbors will be required.
2) Potholing will be required to ensure there are no conflicts with other utilities.

Schematic:

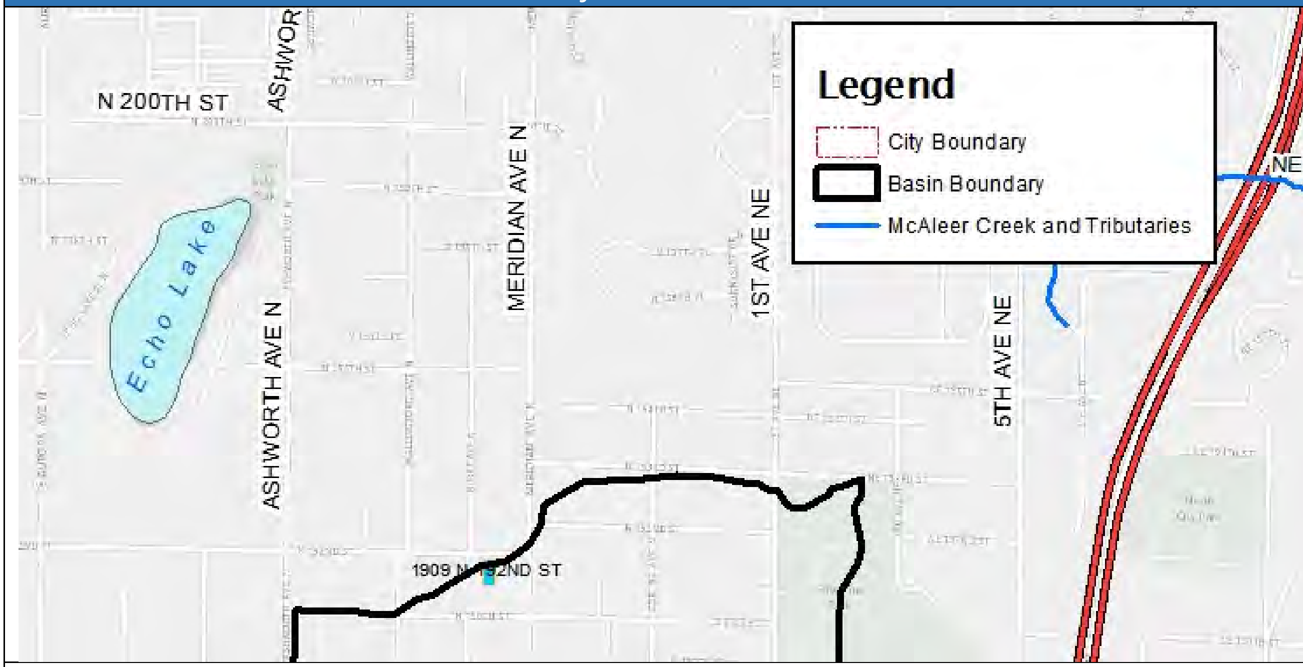


Planning-level Cost Estimate:

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$8,300
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$11,600
Potholing	EA	$1,800	4	$7,200
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	245	$36,750
Removal of Structures and Obstructions	LS	$2,000	4	$8,000
Excavation Incl. Haul	CY	$60	216	$12,960
Gravel Bed Material	TON	$40	443	$17,720
Biofiltration Soil	CY	$70	216	$15,120
Geosynthetic Liner	SY	$7	123	$861
Connect to Existing Drainage Structure	EA	$500	1	$500
Storm Drain Catch Basin or Manhole	EA	$4,000	5	$20,000
Schedule A 12" Storm Sewer Pipe	LF	$86	15	$1,290
Biofiltration Planting and Bioengineered Restoration	SY	$100	245	$24,500
Subtotal				$165,301
Contractor overhead, profit, and mobilization			10%	$16,530
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$82,651
Subtotal Construction Costs				$264,482
City Staff Time			10%	$26,448.16
Administration and engineering design			20%	$52,896.32
Design Contingency			20%	$52,896.32
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$396,800**

Project ID:	MC-CIP-3b
Greenworks: Bioretention at N 192nd Street and Burke Avenue NE	
Preliminary Cost (2015 $): $241,600	

Project Location:



Description:

This proposed CIP includes constructing bioretention cells at N 192nd Street, just east of Burke Avenue North. This location was identified through the Greenworks program in the Surface Water Utility that identifies candidate locations for low impact development stormwater retrofit. This project addresses surface water ponding in the area. This project includes the following design assumptions:

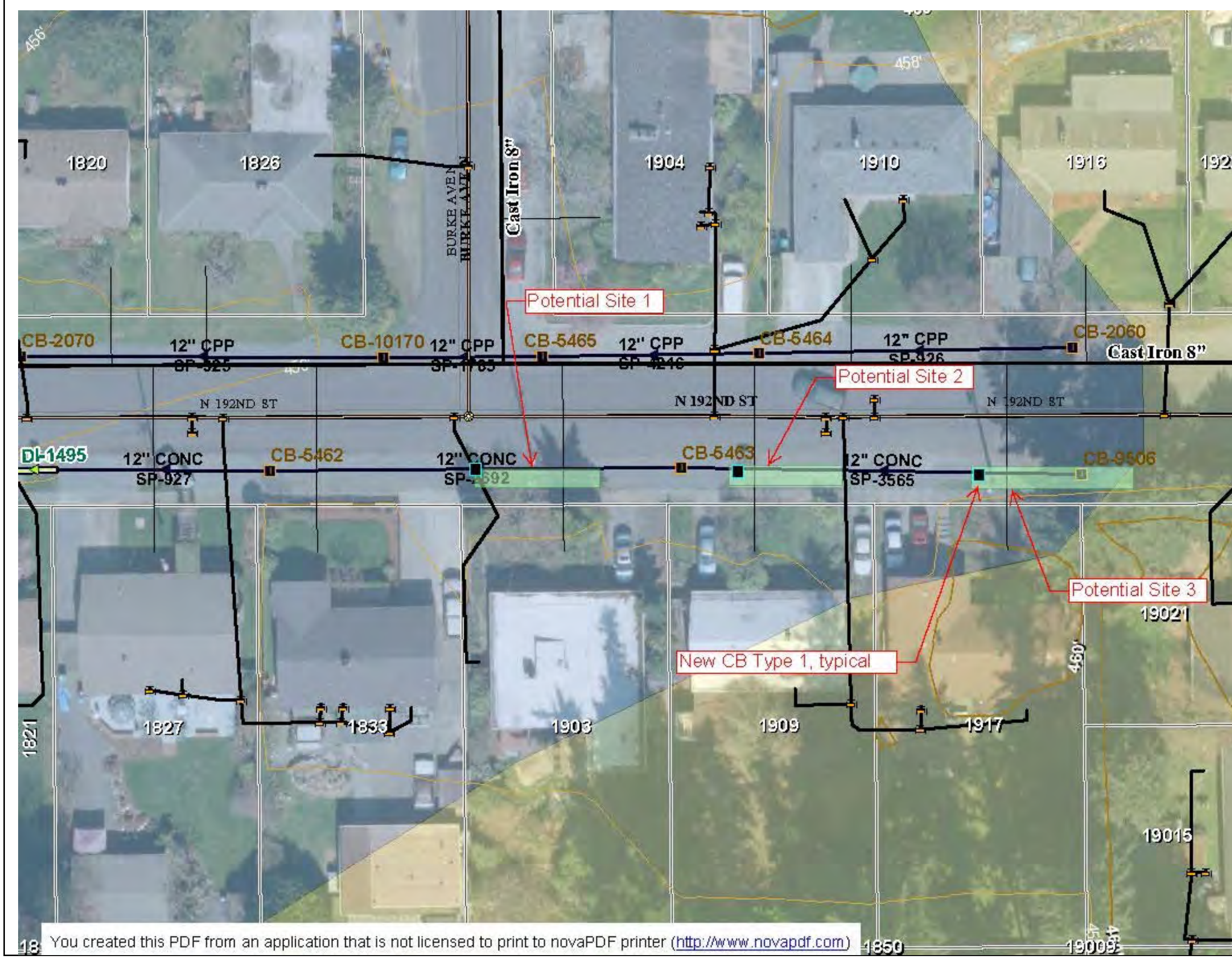
- At 1909 N 192nd Street, there is a potential conflict between street parking and bioretention.
- Coordination with neighbors will be required.
- This site is a possible candidate for Rainstore3 facility, if needed, to accommodate parking and infiltration.
- There are multiple potential sites in front of and to either side of 1909 N 192nd Street.
- Swales could effectively replace existing storm drain pipes within the existing footprint.
- The existing 12-inch concrete driveway culverts would remain between swales except where repair/replacement is required due to known poor structural condition.

Assumptions and Considerations:

The N 192nd Street CIP includes installing 3 bioretention swales on the south side of N 192nd Street at Burke Avenue North. Each swale has a typical cross section of 1-foot bottom width, 1-foot depth, and 3:1 side slopes. The 3 swales are situated at 1903, 1909, and 1917 North 192nd Street. The design calls for the bioretention swales to replace the existing storm drain pipes at each location. New catch basins (Type 1) would be installed to connect the swales to the existing storm drain line, and the existing line would be maintained to connect the swales.

- Design considerations include the following:
    1) Coordination with neighbors is required.
    2) Parking may be decreased due to installation of bioretention swales.
    3) Potholing will be required to ensure there are no conflicts with other utilities.

Schematic:

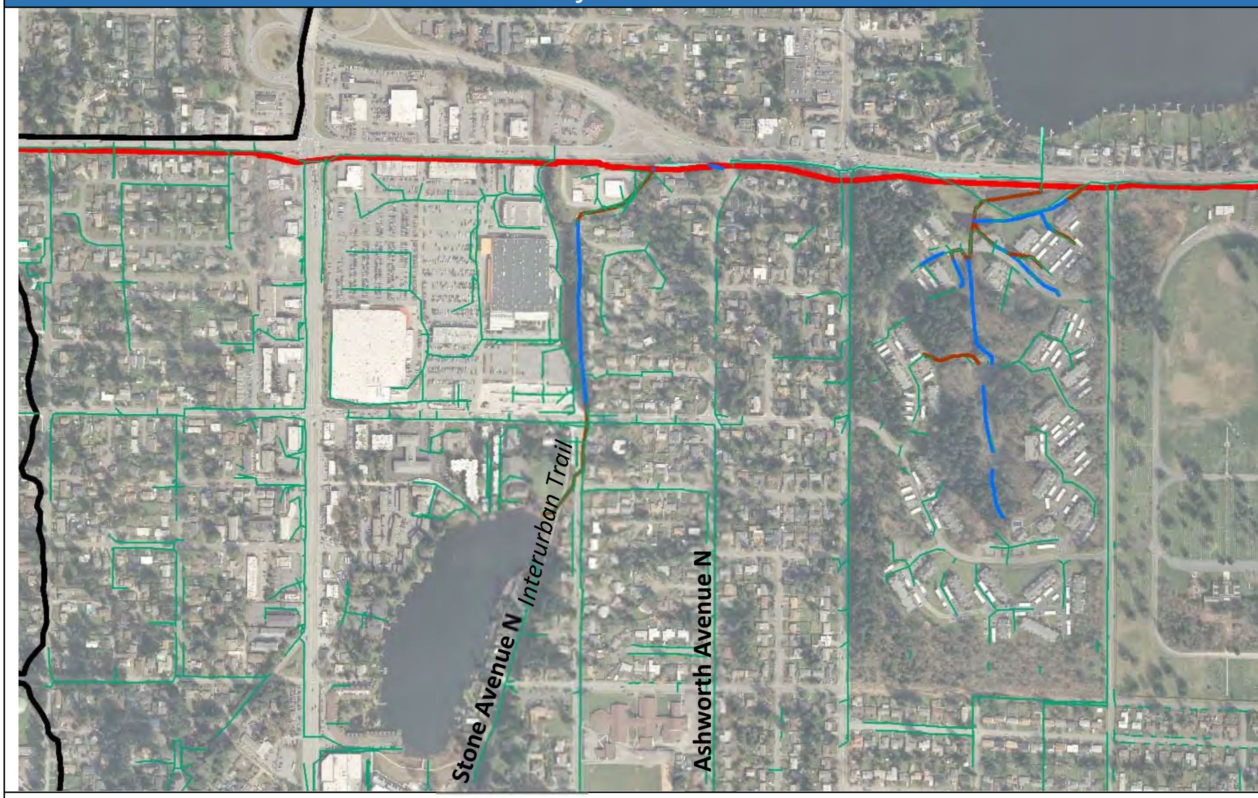


Planning-level Cost Estimate:

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$5,000
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$7,000
Potholing	EA	$1,800	4	$7,200
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	145	$21,750
Removal of Structures and Obstructions	LS	$2,000	3	$6,000
Excavation Incl. Haul	CY	$60	124	$7,440
Gravel Bed Material	TON	$40	255	$10,200
Biofiltration Soil	CY	$70	124	$8,680
Geosynthetic Liner	SY	$7	55	$385
Storm Drain Catch Basin or Manhole	EA	$4,000	3	$12,000
Biofiltration Planting and Bioengineered Restoration	SY	$100	145	$14,500
Subtotal				$100,655
Contractor overhead, profit, and mobilization			10%	$10,066
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$50,328
Subtotal Construction Costs				$161,048
City Staff Time			10%	$16,104.80
Administration and engineering design			20%	$32,209.60
Design Contingency			20%	$32,209.60
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$241,600**

Project ID:	MC-CIP-4
Echo Lake Biofiltration Swale	
Preliminary Cost (2015 $): $610,000	

Project Location:



Description:

Urban development has negatively impacted the water quality of Echo Lake. Therefore, Echo Lake has been identified as high priority for source control projects. The proposed CIP would retrofit the existing storm drain system to provide additional water quality treatment of runoff discharging into Echo Lake. The proposed retrofit entails installation of a biofiltration facility between Stone Ave N and Interurban Trail.

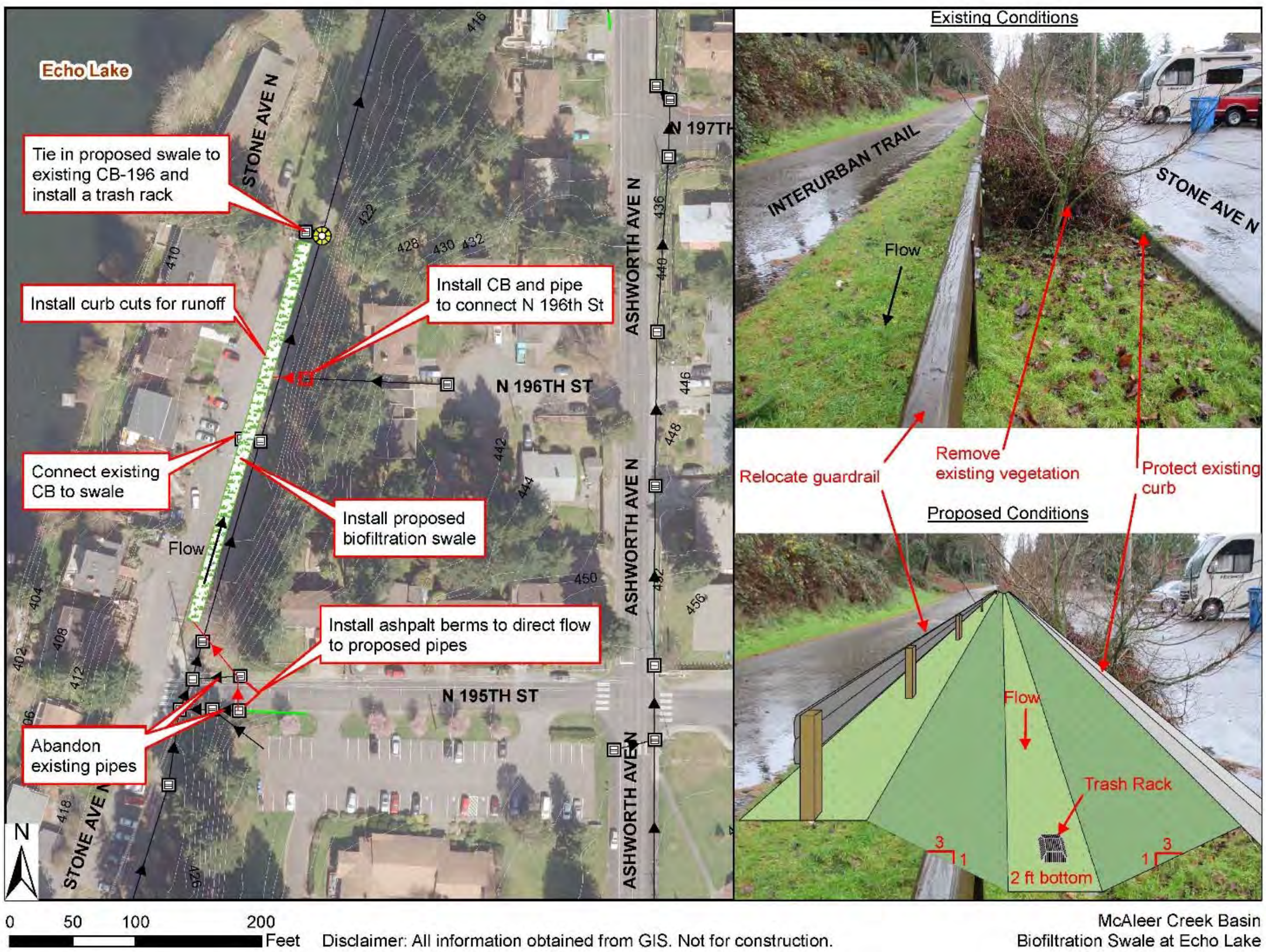
Assumptions and Considerations:

This project involves installation of a 300-LF biofiltration swale in the green planting strip between Stone Ave N and the Interurban Trail. Swale dimensions are 2-foot wide bottom, 1.5-foot deep, and side slopes of 3:1. The swale will treat nearly 1 acre of roadway runoff from N 195th Street, Stone Ave N, and N 196th Street. A new piped system is proposed on N 195th Street to capture runoff from both sides of the street. An additional pipe and catch basin are also proposed to tie the existing N 196th St system into the biofiltration swale. The swale will tie into the existing system along the Interurban Trail at CB-196, which outlets into Echo Lake. The biofiltration swale will provide 97 percent filtration, meeting the current 2012 Ecology water quality standard of 91 percent.

Design considerations include:

1. Since phosphorous is a targeted pollutant of Echo Lake, the media and compost used in the swale will need to be clearly specified during design to ensure that the proposed facility improves overall water quality, including phosphorus loading.
2. Coordination with Seattle City Light (SCL) will be required for work on the Interurban Trail. The cost estimate assume purchasing SCL property to install, access, and maintain the swale.
3. Coordination with neighbors along Stove Ave N may be required.
4. Water and sewer lines cross the storm drain lines on N 195th Street and Stone Ave N. According to GIS data, the sewer line is several feet below the existing storm drain lines. However, no elevation data for the water line is in the GIS data, so potholing will be required to determine any conflicts with the water line.
5. The existing guardrail will need to be relocated to allow for sufficient space for the swale.

Schematic:

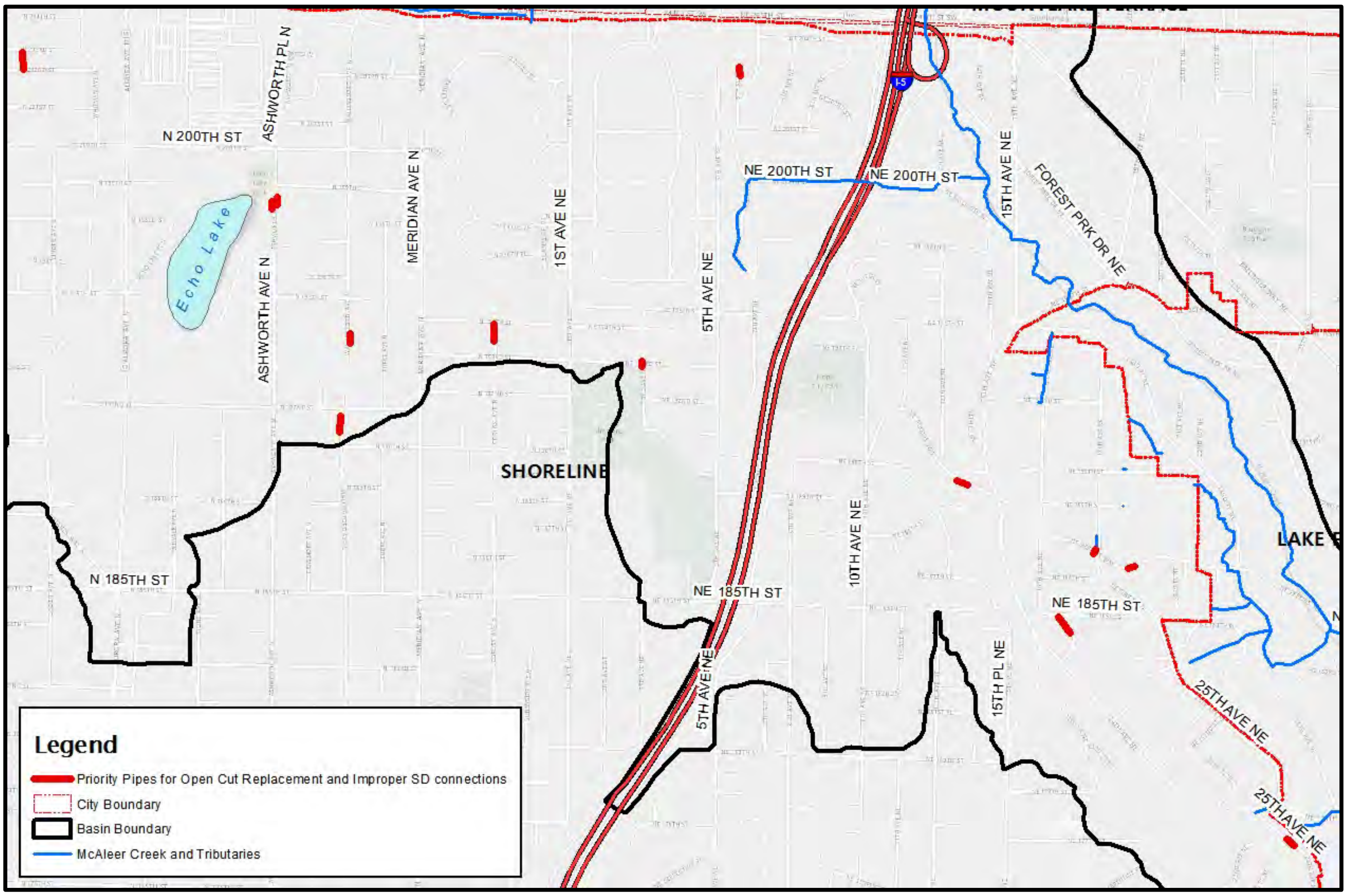


Planning-level Cost Estimate:

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$11,200
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$15,700
Potholing	EA	$1,800	3	$5,400
Clearing & Grubbing	SY	$10	395	$3,950
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	12	$1,800
Excavation Incl. Haul	CY	$60	441	$26,460
Gravel Bed Material	TON	$40	877	$35,080
Biofiltration Soil	CY	$70	734	$51,380
Geosynthetic Liner	SY	$7	384	$2,688
Connect to Existing Drainage Structure	EA	$500	5	$2,500
Storm Drain Catch Basin or Manhole	EA	$4,000	1	$4,000
Trash Rack Structure	EA	$5,000	1	$5,000
Underdrain Pipe 6"	LF	$29	300	$8,700
Schedule A 12" Storm Sewer Pipe	LF	$86	112	$9,632
Extruded Curb, HMA	LF	$14	30	$420
Biofiltration Planting and Bioengineered Restoration	SY	$100	395	$39,500
Roadway Restoration	SY	$550	12	$6,600
Subtotal				$223,910
Contractor overhead, profit, and mobilization			10%	$22,391
Washington State Sales Tax			9.5%	
Construction Contingency			50%	$111,955
Subtotal Construction Costs				$358,256
City Staff Time			10%	$35,825.60
Administration and engineering design			20%	$71,651.20
Design Contingency			20%	$71,651.20
Permitting				$0
Land acquisition and easements	SF	$20	3,630	$72,600
Total Project Cost				**$610,000**

Project ID:	MC-CIP-5
Priority Open-cut Pipe Replacement and Storm Drain Connections	
Preliminary Cost (2015 $): $1,112,200	

Project Locations:



Description:

This project would include upgrades and pipe replacement of stormwater pipes (Table 1 below) and structures (Table 2 below) throughout the McAleer Creek basin. The project would include multiple locations, but be advertised as one construction project. The bid items at each location would be very similar and would achieve economy of scale and ultimately lower bid pricing. The locations would include high-priority, open-cut pipe replacement (approximately 800 LF) and installation of storm structures summarized in order of priority in the tables below.

Table 1: Recommended Open Cut Pipe Replacement											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Notes
SP-15129	3.8	0	3.8	19	0	19	12	CMP	57.518	Hole with visible void in side of pipe (x2), hole in side of pipe (x3).	Pipe is located in the ROW of NE Perkins Way; site visit 10/15/14 identified as pipe repair CIP with high priority - private property driveway caving.
SP-132	1.58	1.17	1.44	19	7	26	12	CP	48.978	Pipe cleaned. Sediment in bottom of pipe (5% full for 26 ft), visible aggregate (20 ft), joint offset (very) large, camera unable to continue, inspect from other end. Visible aggregate (19 ft), joint angular medium, longitudinal cracks, debris in bottom of pipe (15% full), camera unable to continue.	Pipe is located in the intersection of NE 193rd St and 3rd Ave NE; site visit 10/15/14 identified pipe repair CIP.
SP-1600	2.33	2	2.25	7	2	9	12	CP	76.421	Under water, extreme sag. Pipe cleaned. Exposed aggregate entire length of pipe, joint angle medium, debris in pipe (5% full), camera unable to continue past angle in pipe. No access other manhole.	Pipe cleaned. Tie-in with CB 3958 is at an extreme adverse angle. Site visit 10/15/14 identified as pipe repair CIP.
SP-2971	5	0	5	10	0	10	12	PE	99.752	1st direction: deformation (50%); 2nd direction: deformation (90%) - unable to inspect middle section of pipe	Roughly half pipe not TV'd; site visit 10/15/14 identified as pipe repair CIP with high priority - there was a complete restriction of flow.
SP-785	2.7	5	2.79	62	5	67	12	CP	90.003	Visible aggregate entire length of pipe, joint separation medium, joint offset medium (x3), broken pipe at joint (looks more like a fracture close to failure at top of pipe), leaves and branches in pipe at inlet (80% full)	Pipe in ROW/shoulder of 25th Ave NE.
SP-5139	4.22	2	4	38	2	40	12	CP	180.28	Broken pipe (x3), hole with visible soil (x5), multiple fractures, deposits attached encrusted	Under 16th Ave NE
SP-9121	4.13	2.86	3.53	33	20	53	12	CP	66.104	Pipe cleaned. Deposits attached encrusted (x5), large hole with visible soil on side of pipe (x2), large rocks in pipe, camera unable to pass, survey from other end. Large joint offset, hole with visible soil in bottom of pipe (x2), hole in side of pipe, hole with visible void, hole with large rocks over the top, same spot where camera stopped at other end.	Remove large rocks and replace pipe. Pipe in ROW of Ashworth Ave N.
SP-8833	0	5	5	0	5	5	12	CMP	69.733	40% full of dirt (no video), needs more cleaning, lower end of pipe is crushed.	OCI added scores as no report or video was provided. Adjacent to SP-9121
SP-4705	3	2	2.92	33	2	35	12	CP	43.307	Aggregate visible (length of pipe), fracture (multiple), joint offset (large), sediment deposit	
SP-2676	3	2.93	2.94	6	44	50	12	CP	90.737	Pipe cleaned. Deposits (mud, rocks and debris) in bottom of pipe (10% to 15% full entire length of pipe), hole with visible soil and large void and deposits ingressed fine in side of pipe, roots at joints (not in report) joint offset medium, camera unable to complete inspection due to large amount of gravel in pipe.	Pipe is in ROW of Wallingford Ave N between 195th and 192nd. Site visit on 10/15/14 revealed possible damage by another utility (water?) and identified as pipe repair CIP
				Total Length Priority Pipes =					822.84		

Table 2: Improper Storm Drain Connection										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Problem	Notes
SP-6809	4.5	2.3	2.67	9	23	32	12	CP	Tap-in (x4, 2 active, 1 active/defective, 1 abandoned), roots at joint (fine for 10 LF), hole soil visible, root barrel (medium 20% for 15 LF), infiltration weeper (at joints for 110 LF), encrusted deposits (10% for 20 LF), fracture (multiple)	
SP-2690	3.5	3	3.33	7	3	10	12	CP	Tap break in (3), sag (10%+ full for 25 ft), dirt in bottom of pipe (15% full for 5 ft inside sag), gravel and rocks in bottom of pipe (not in report), broken pipe at joint with concrete protruding into pipe, repair patch at joint, but soil still visible.	
SP-2472	1	3	2	2	6	8	12	CP	Observed three locations with defective or intruding tap break (4-inch taps). Soil cave in observed at one of the broken 4-inch taps. Circumferential cracks observed around the 4-inch tap locations. Observed gap at last tap, pipe bedding material visible.	

CMP	Corrugated Metal Pipe
CP	Concrete Pipe
MPR	Maintenance Pipe Rating (sum of all rated maintenance defects)
MPRI	Maintenance Pipe Rating Index (average of all rated maintenance defects)
OPR	Overall Pipe Rating (sum of all rated structural and maintenance defects)
OPRI	Overall Pipe Rating Index (average of all rated structural and maintenance defects)
SPR	Structural Pipe Rating (sum of all rated structural defects)
SPRI	Structural Pipe Rating Index (average of all rated structural defects)

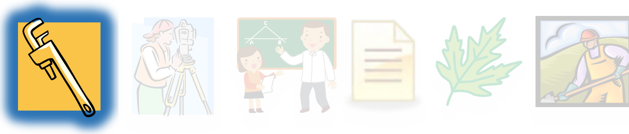
Planning-level Cost Estimates:

Open-cut Pipe Replacement (pipes listed in Table 1 above)

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$20,500
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$28,600
Potholing	EA	$1,800	10	$18,000
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	366	$54,900
Removal of Structures and Obstructions	LS	$2,000	2	$4,000
Connect to Existing Drainage Structure	EA	$500	20	$10,000
Schedule A 12" Storm Sewer Pipe	LF	$86	823	$70,778
Roadway Restoration	SY	550	366	$201,300
Subtotal				$408,578
Contractor overhead, profit, and mobilization			10%	$40,858
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$204,289
Subtotal Construction Costs				$653,725
City Staff Time			10%	$65,372.48
Administration and engineering design			20%	$130,744.96
Design Contingency			20%	$130,744.96
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$980,600**

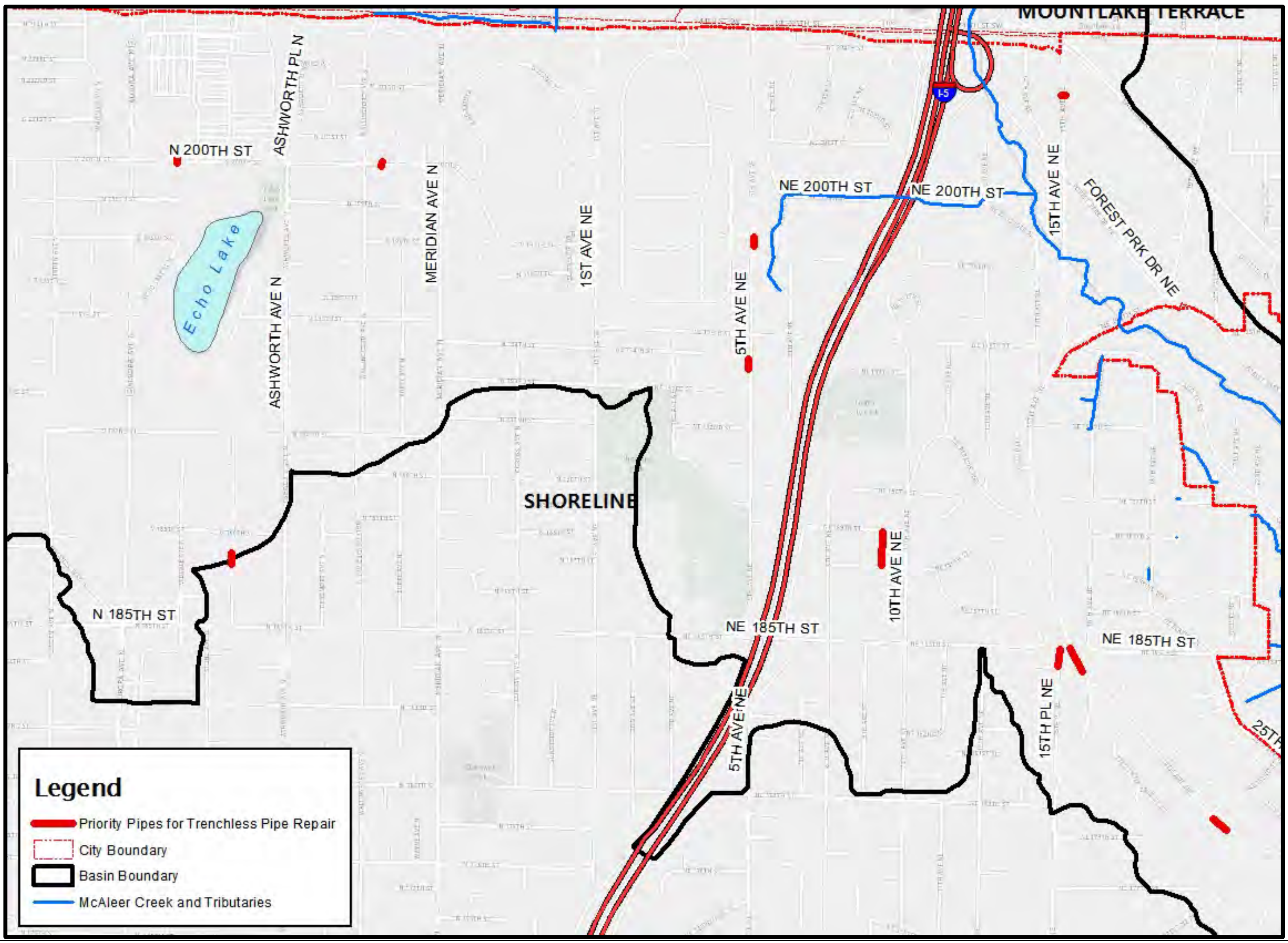
Improper Storm Drain Connection Repair (pipes listed in Table 2 above)

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$2,800
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$3,900
Potholing	EA	$1,800	10	$18,000
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	28	$4,200
Tee - 8"	EA	$1,000	10	$10,000
Roadway Restoration	SY	550	28	$15,400
Subtotal				$54,800
Contractor overhead, profit, and mobilization			10%	$5,480
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$27,400
Subtotal Construction Costs				$87,680
City Staff Time			10%	$8,768.00
Administration and engineering design			20%	$17,536.00
Design Contingency			20%	$17,536.00
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$131,600**



Project ID:	MC-CIP-6
Trenchless Pipe Repair	
Preliminary Cost (2015 $): $401,600	

Project Location:



Description:

This project would include pipe replacement of stormwater pipes listed in Table 1 (below), which entails replacing approximately 1,044 LF of stormwater pipe in the McAleer Creek basin using trenchless methods including slip-lining, cured in place pipe (CIPP), pipe bursting, and pipe reaming.

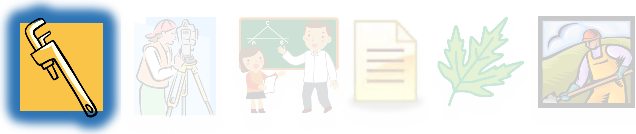
Table 1: Recommended Trenchless Pipe Repair											
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material		Problem	Notes
SP-6445	4.2	2.04	2.79	63	57	120	12	CMP	233.68	Pipe cleaned. Needs more cleaning. Three small holes with visible soil (corrosion), dirt, mud and rocks in bottom of pipe (10%+ full for 15 ft), camera unable to continue, inspect from other end. Gravel in bottom of pipe (10%-20% full entire length of pipe), small to large holes with visible soil (corrosion) entire length of pipe, fine roots in barrel of pipe (from hole), hole in side of pipe (not from corrosion) with visible soil, hole with visible soils and gasket (not from corrosion), camera unable to continue due to debris.	
SP-14371	3.32	0	3.32	63	0	63	18	CMP	143.58	Corrosion (full length of pipe), deformation/pipe bent at joint (x2), hole in side of pipe with soil visible, repair patch - hole covered with metal on outside of pipe, hole in bottom of pipe (corrosion at joint), large branch and board in catch basin (CB-11576)	
SP-1747	3.18	3	3.17	54	3	57	12	CP	91.572	Pipe cleaned. Exposed aggregate entire length of pipe, broken pipe at joint, hole with soil visible at joint, medium roots at joint protruding all the way across pipe, camera unable to pass, more large root balls at joints visible upstream	
SP-4699	4.33	0	4.33	26	0	26	12	CP	148.73	Exposed aggregate entire length of pipe, broken pipe at joint, broken pipe with soil visible (x2), broken pipe with visible void	
SP-2985	2.8	2	2.73	28	2	30	12	CMP	39.19	Corrosion damage (pinholes and rough surface) observed for 38 feet. Water 10% full for 8 feet from pipe sag. Unable to track last foot of pipe due to root debris but no pipe defects observed or documented.	
SP-5624	3	2	2.5	21	14	35	12	CMP	38.932	Pipe corrosion (full circumference of pipe) for 37 feet. Water 5% full. Fine sediment deposits 5% full for 30 feet. Fine roots growing through barrel.	
SP-7984	4	2.29	2.91	16	16	32	12	CP	292.2	Tap break in(?) with roots, broken soil visible (x4), tap break in, rocks and gravel in bottom of pipe, unable to finish because of tee	Add CB at tee
SP-3574	3	2	2.6	9	4	13	12	CP	82.149	needs more cleaning. Surface damage visible aggregate for 6 feet. Material change twice concrete to CMP then CMP to concrete. Gap observed between CP / CMP material change with observed soil washout into pipe. Fine sediment deposits 10% full for 10 feet (full length of CMP). Fine sediments do not appear to have been transported downstream of the CMP section. Camera unable to complete at second material change location/camera unable to move over concrete pipe wall.	The soil transport will eventually build up within the CMP section and then transport downstream.
SP-4234	1	1.5	1.4	1	6	7	12	CP	79.368	Water 25% full and gradually reducing to 10% full for 66 feet. Water level in catch basin above pipe invert. Tap break 4inch plastic corrugated pipe, complete blockage of soil. Rooted joints (fine) partially blocking pipe at three locations. Medium joint gap with soil visible beyond opening. Potential infiltration stains for 10 feet starting at the 74.7 ft mark which was not recorded in the report. Camera unable to complete 2 feet before pipe end.	
SP-6902	0	3.25	3.25	0	13	13	12	CP	38.688	msa due to roots. Small wandering root observed for 8 feet, which increases to medium root barrels partially blocking pipe 15% and a root ball barrel blocking pipe 75%. Camera unable to complete due to root mass.	
				Total Length Priority Pipes =					1044.5		

CMP Corrugated Metal Pipe
CP Concrete Pipe
MPR Maintenance Pipe Rating (sum of all rated maintenance defects)
MPRI Maintenance Pipe Rating Index (average of all rated maintenance defects)
OPR Overall Pipe Rating (sum of all rated structural and maintenance defects)
OPRI Overall Pipe Rating Index (average of all rated structural and maintenance defects)
SPR Structural Pipe Rating (sum of all rated structural defects)
SPRI Structural Pipe Rating Index (average of all rated structural defects)

Planning-level Cost Estimate:

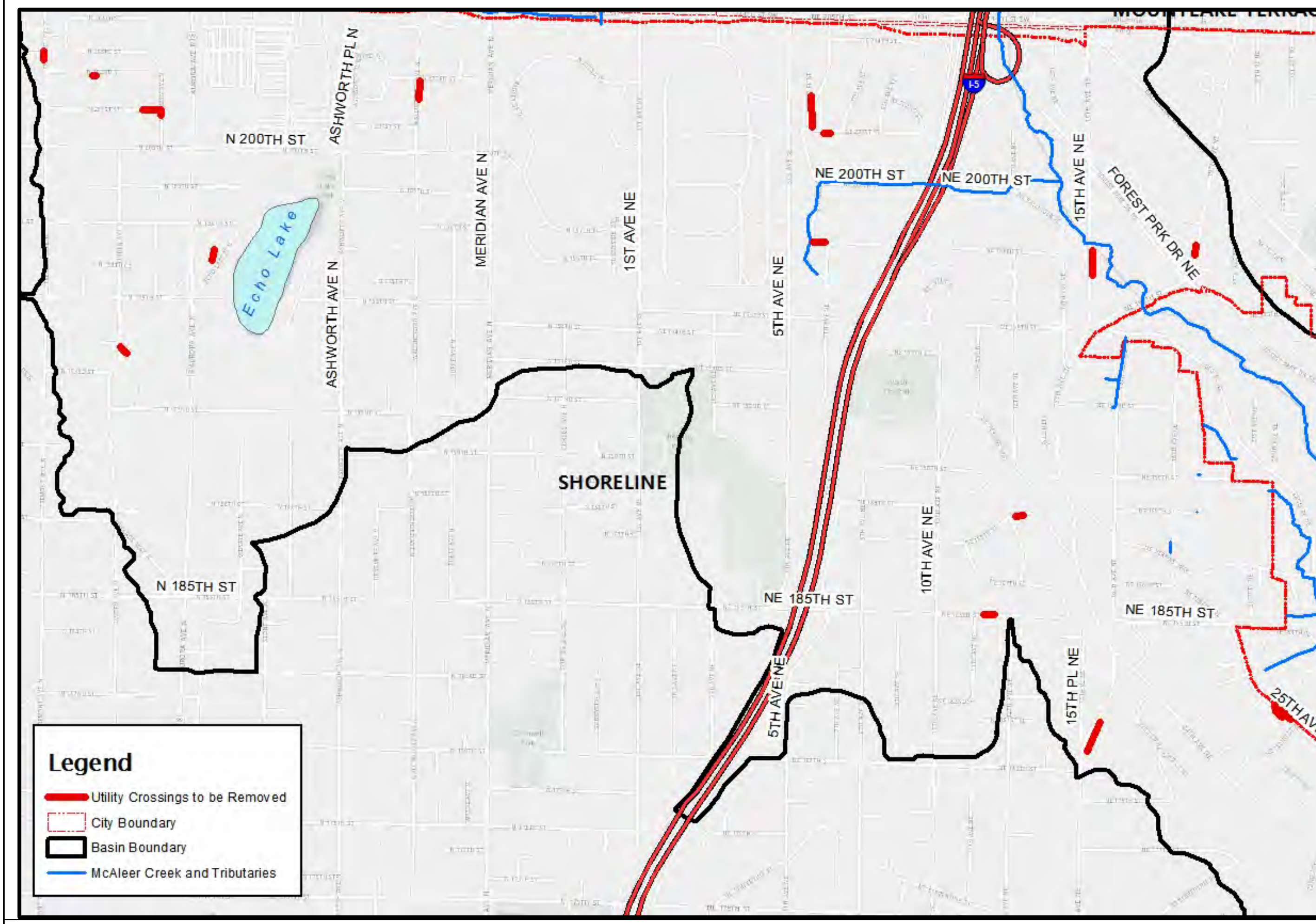
Trenchless Pipe Replacement (pipes listed in Table 1 above)

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$8,400
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$11,700
Potholing	EA	$1,800	2	$3,600
Removal of Structures and Obstructions	LS	$2,000	1	$2,000
Trenchless Pipe Replacement 12"	LF	$109	1045	$113,905
Trenchless Pipe Replacement 18"	LF	$189	144	$27,216
Subtotal				$167,321
Contractor overhead, profit, and mobilization			10%	$16,732
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$83,661
Subtotal Construction Costs				$267,714
City Staff Time			10%	$26,771.36
Administration and engineering design			20%	$53,542.72
Design Contingency			20%	$53,542.72
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$401,600**



Project ID:	MC-CIP-7
Remove Utility Crossings	
Preliminary Cost (2015 $): $13,260 (City staff)	

Project Location:



Description:

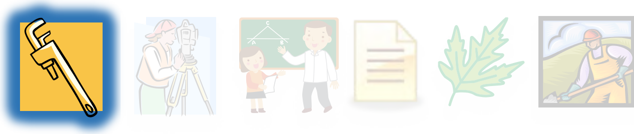
This project involves City staff time to coordinate with other utilities on removing their lines and repairing the storm drains that have been damaged as a result of improper crossings. Table 1 (below) lists the affected pipes and types of problems. The City was notified of suspected gas line crossings when identified in the condition assessment so that coordination with the gas company could begin immediately.

Table 1: Illicit Utility Crossing										
Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Problem	Notes
SP-2551	3.5	3.33	3.4	7	10	17	12	CP	Joint offset large, electrical conduit or gas line of some sort through pipe, paused for cleaning. Pipe cleaned. Hole at joint with visible void, rocks and debris in pipe (25% full), camera unable to pass.	
SP-10783	5	2.67	4	20	8	28	12	CMP	Mud in bottom of pipe, storm debris in pipe, mud in bottom of pipe (15 ft) - camera unable to continue. Pipe cleaned, gas line (yellow) bored through pipe revealed (along with hole with visible soil). Also, another service line (blue) through the pipe with a hole and soil visible (water?)	
SP-1635	1.5	0	1.5	3	0	3	12	CP	Pipe cleaned. Pipe 15% full of water, weird structure with pipe going though it, camera unable to pass, inspect from other end. Joint offset medium, sag (20% full for 5 ft), joint offset large, unable to reach weird structure.	
SP-6175	5	3	8	10	9	19	12	PE	Concrete pipe at upstream end (70 ft), deposits in bottom of pipe (20% full for 8 ft), gas line through pipe (20% of pipe blocked), pipe broken with visible soil and roots where gas line punches through pipe, concrete chunk resting on gas line. Camera unable to continue. Inspect from other end. PE pipe for 85 ft, then material changes from PE to CP, stop at gas pipe, inspection complete.	
SP-4261	4	2.33	3	8	7	15	12	CP	needs more cleaning and has a gas line through pipe. Fine (with clumps) sediment deposits 10% full for 7 feet. Small hole with visible gravel beyond hole. Fine sediment deposits 5% full for 5 feet. 40% pipe damage at illicit pipe connection (~2 to 3-inch gas line). Camera unable to continue due to pipe damage and gas pipe line obstruction.	
SP-5137	0	4	4	0	12	12	12	PE	1st direction: intruding utility; 2nd direction: sediment deposit	
SP-6877	3	2	2.25	6	12	18	12	CP	Pipe cleaned, needs more cleaning. Exposed aggregate entire length of pipe, dirt and debris in bottom of pipe (15% full for 4 ft), camera unable to pass debris (Possible gas line through pipe covered by debris?), inspect from other end. Fine roots at joints (12 ft), mud and rocks in bottom of pipe (5%+ full for 42 ft), camera unable to pass debris, inspection not complete.	Thorough cleaning required to determine if it is a gas line stopping debris in pipe, gas line needs to be removed via open cut.
SP-4251	5	1.67	3.33	15	5	20	12	CMP	Deformed (25%), hole soil visible (x2) because of coaxial cable through top of pipe (25 LF), fine roots	
SP-4300	0	5	5	0	10	10	12	CP	Cables through pipe and continue on down the pipe - camera unable to continue	
SP-3420	3.18	1.67	2.95	54	5	59	12	CP	Surface damage, aggregate visible recorded for full length of pipe. Fine (small) rooted joints at two locations partially blocking pipe (<5%). Water 10% full from pipe sag for 78 feet. Bottom section of pipe broken with visible soil beyond break at first break. Second break with visible soil beyond break associated with two illicit pipe connections. Patch repair (mesh and concrete) observed at 45.1 ft mark. Water 5% full for last 15 feet.	Water in last 15 feet was not included in the report. Two repair locations potential.
SP-2512	0	3	3	0	120	120	36	CMP	Sediment (15% for 95 LF), intruding utility	
SP-6886	0	2.9	2.9	0	29	29	12	PE	1st direction: sediment (20% for 15 LF), intruding utility (waterline); 2nd direction: sediment (10% for 25 LF)	
SP-9275	5	5	5	5	5	10	12	CMP	Utility through pipe near top, hole soil visible	
SP-4315	3	2	2.33	3	4	7	12	CP	Crack (multiple), pipe in line, encrusted deposit - unable to pass pipe in line	Unknown utility
SP-4435	1	2	1.67	1	4	5	12	CP	Small (1"?) pipe within pipe at bottom, leaves, joint offset (medium)	Unknown utility
SP-4243	0	2.6	2.6	0	13	13	12	CP	Tap break in, drop in pipe, unknown thing protruding into pipe - camera unable to continue to unknown discharge point. Pipe cleaned and reinspected 2 months later. Debris in bottom of pipe (5% full for 12 ft), tap break in (stormwater), tap break in (unknown - odd looking steel thing protruding all the way through pipe), drop in pipe, camera unable to continue.	Site visit 10/15/14, unsure what object protruding in pipe is, but it was discussed to see if it is possible to re-route the pipe.
SP-6808	2	2	2	2	2	4	12	CMP	Gravel, illegal connection blocking pipe	

CMP	Corrugated Metal Pipe
CP	Concrete Pipe
MPR	Maintenance Pipe Rating (sum of all rated maintenance defects)
MPRI	Maintenance Pipe Rating Index (average of all rated maintenance defects)
OPR	Overall Pipe Rating (sum of all rated structural and maintenance defects)
OPRI	Overall Pipe Rating Index (average of all rated structural and maintenance defects)
PE	Polyethylene
RCP	Reinforced Concrete Pipe
SPR	Structural Pipe Rating (sum of all rated structural defects)
SPRI	Structural Pipe Rating Index (average of all rated structural defects)

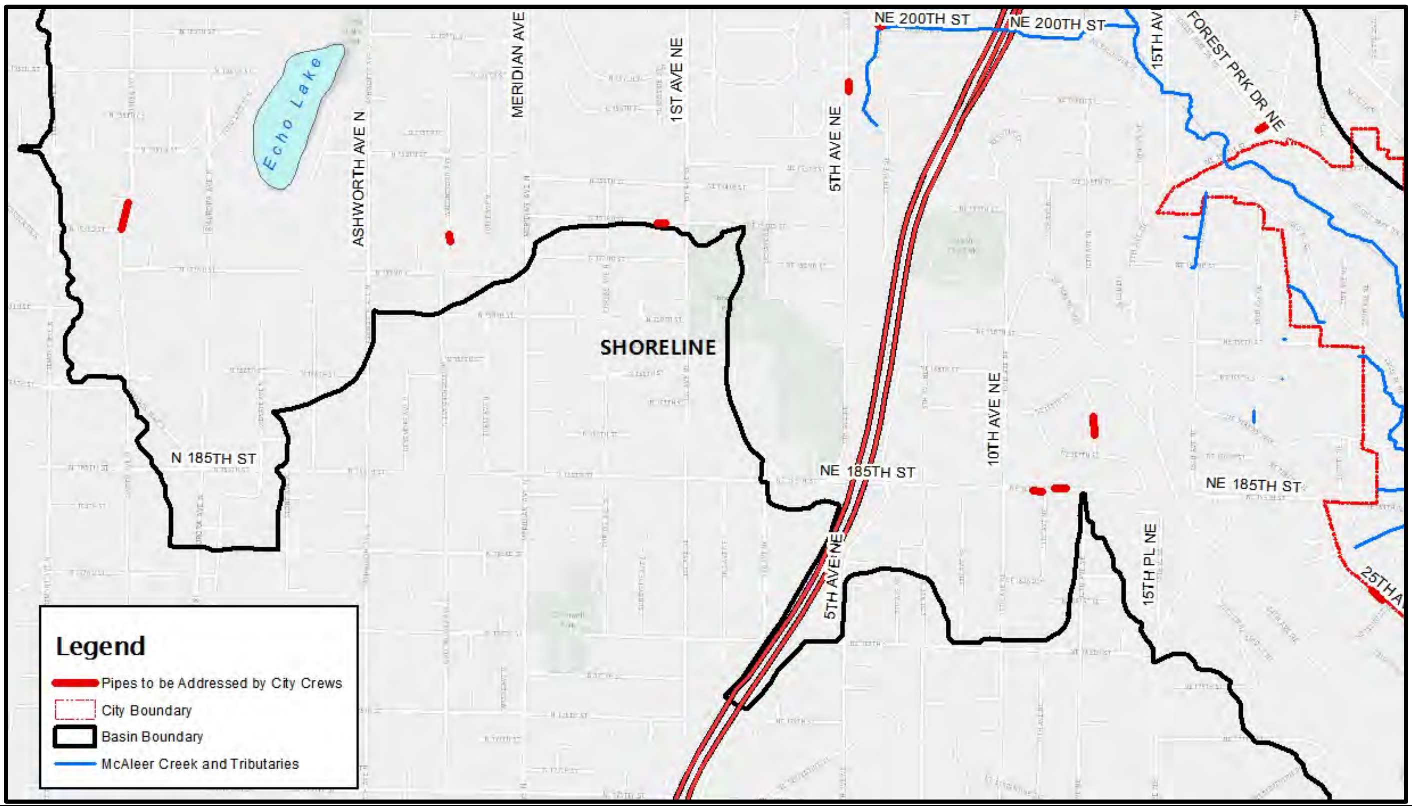
Planning-level Cost Estimate:

Task	Description	Hours	Rate	Total
1	Contact Utility Companies	34	$ 100.00	$ 3,400.00
2	Coordinate Utility Work	34	$ 100.00	$ 3,400.00
3	Check that work was completed	34	$ 100.00	$ 3,400.00
			Subtotal	$ 10,200.00
			Contingency (30%)	$ 3,060.00
			TOTAL	$ 13,260.00



Project ID:	MC-CIP-8
Operational Pipe Replacement and Repair by City Crews	
Preliminary Cost (2015 $): Not estimated	

Project Location:



Description:

This project involves pipe replacement or repair by City O&M staff. Table 1 (below) lists the affected pipes and types of problems.

Table 1: Pipes Recommended for Operations and Maintenance (O&M)

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diam.	Material	Length	Problem	Notes
SP-152	3.14	1.83	2.75	44	11	55	12	CP	218.54	Pipe cleaned. Gravel in bottom of pipe (10% full for 16 ft), fine roots at joint, deposits in bottom of pipe (10% full for 10 ft), camera unable to get past rock, inspect from other end. Exposed aggregate (65 ft), broken pie with visible soil, camera unable to continue past broken pieces of pipe.	
SP-3421	3	2	2.62	24	10	34	12	CP	116.36	Exposed aggregate entire length of pipe, dirt in bottom of pipe (5% full for 15 ft), fine roots at joint, pipe appears to be capped with asphalt? 100% full of asphalt. Camera unable to pass. Inspect from other end. Pipe 15% full of water, dirt and debris in bottom of pipe (20% full for 4 ft - to "capped" point), pipe appears to be capped with asphalt (100% full).	Google street view shows 4 mailboxes at the approximate spot where the pipe is blocked. Site visit 10/15/14 identified as spot repair CIP (O&M).
SP-12532	3.8	2	3.5	19	2	21	18	RCP	72.46	Cracks (multiplex4), broken pipe (2), encrusted deposits at joint	
SP-6681	4.2	2	3.83	21	2	23	12	CP	80.68	Repair patch (steel) with cracks at joint (multiple), encrusted deposits, broken soil visible (x3, large rocks protruding through pipe), crack (multiple)	Site visit 10/15/14 identified as spot repair CIP (O&M).
SP-15098	2.67	2.2	2.45	16	11	27	12	CP	150.47	1st report: Fine deposits first foot from CB 15098, broken pipe at joint with visible void, fine deposits ingressed at joint, pipe changes from 12 in CP to 4" PE, unable to continue in 4" pipe, deposits at transition. 2nd report: Pipe cleaned. Circumferential crack, medium roots at joint, joint offset medium, deposits in bottom of pipe (10% full for 3 ft), exposed aggregate (15 ft), fine roots, pipe then changes from 12 in CP to 8 in PE, camera unable to continue.	
SP-6857	2.75	3	2.8	11	3	14	12	CP	66.83	Rocks in pipe, camera unable to pass, inspect from other end (no scores for first portion of pipe). Hole with visible void at medium joint separation, joint offset large, hole with plastic liner protruding (attempted repair?), asphalt chunks in pipe, camera unable to complete inspection.	Site visit 10/15/14 identified as spot repair CIP (O&M).
SP-2551	3.5	3.33	3.4	7	10	17	12	CP	91.32	Joint offset large, electrical conduit or gas line of some sort through pipe, paused for cleaning. Pipe cleaned. Hole at joint with visible void, rocks and debris in pipe (25% full), camera unable to pass.	
SP-5095	5	2	2.43	5	12	17	12	CP	77.15	needs more cleaning. Fine (clumpy) sediment debris 10% full for 31 feet. Surface damage with visible aggregate observed. Pipe dent (deformity) observed at 31.3 ft mark partially blocking flow (40%). Two small diameter (~1-inch) observed penetrating sidewall - intruding pipes do not fully cross pipe cross section. Camera unable to continue due to pipe deformity, however, it appears that fine sediment deposits continues through end of pipe.	
SP-15100	5	2	2.6	5	8	13	12	CP	57.10	Broken (soil visible), sediment (5-10% length of pipe) - unable to continue due to debris	
SP-3556	5	2	3.5	5	2	7	12	CP	56.33	Pipe cleaned. Rock protruding 5% into pipe at joint with visible roots (roots not in report), hole in side of pipe with large visible void.	Pipe is in ROW of Wallingford Ave N between 195th and 192nd; site visit 10/15/14 identified as spot repair CIP (O&M).
SP-3378	1	3	2.5	1	9	10	12	CP	37.51	Fine roots at joint, dirt in bottom of pipe (10% full for 6+ ft), camera unable to continue past dirt, inspect from other end. Joint angular medium (change in slope - reverse slope), dirt in bottom of pipe (10% full), camera unable to pass dirt, needs more cleaning.	Reverse slope

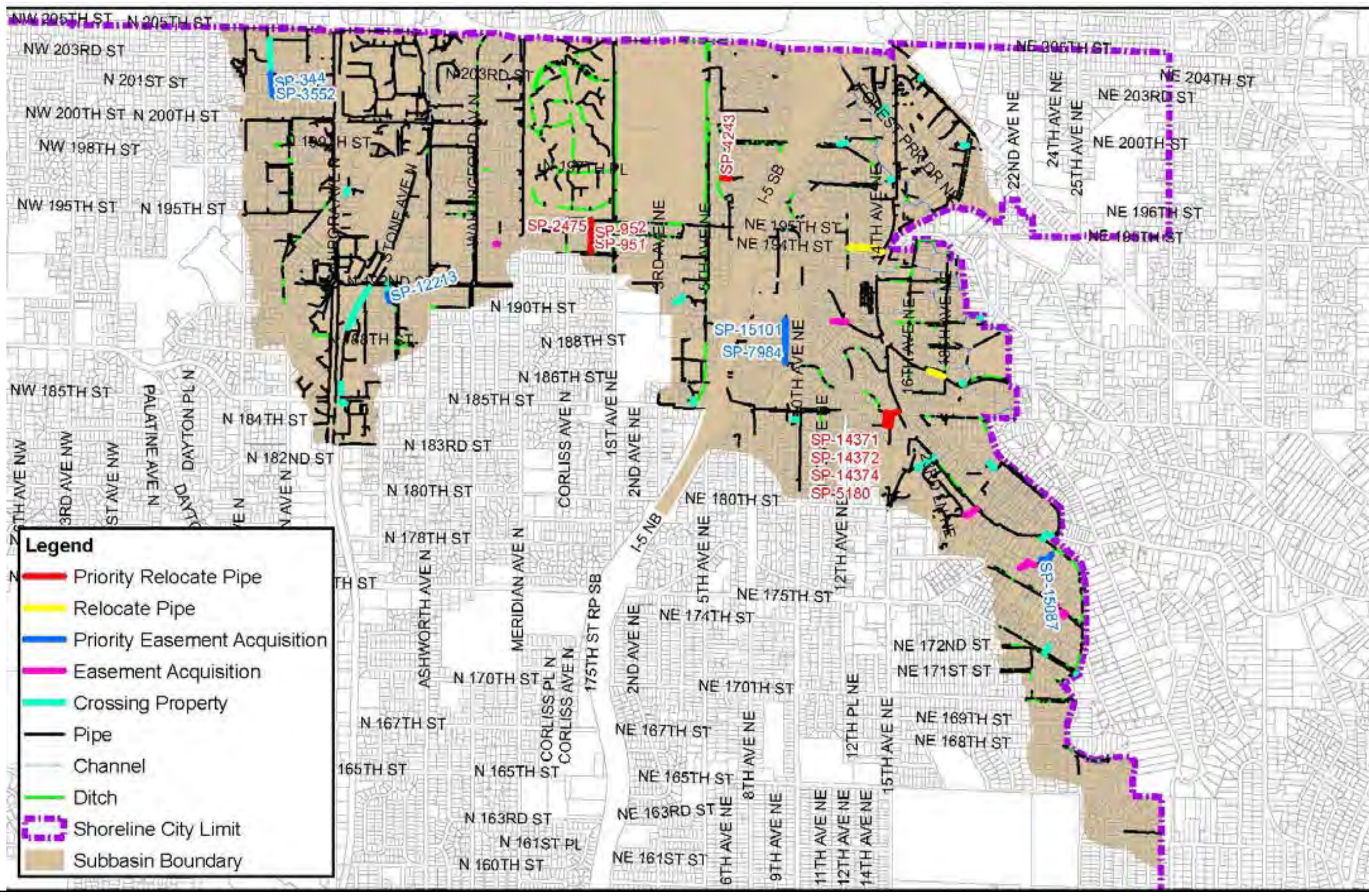
CP	Concrete Pipe
MPR	Maintenance Pipe Rating (sum of all rated maintenance defects)
MPRI	Maintenance Pipe Rating Index (average of all rated maintenance defects)
OPR	Overall Pipe Rating (sum of all rated structural and maintenance defects)
OPRI	Overall Pipe Rating Index (average of all rated structural and maintenance defects)
RCP	Reinforced Concrete Pipe
SPR	Structural Pipe Rating (sum of all rated structural defects)
SPRI	Structural Pipe Rating Index (average of all rated structural defects)

Planning-level Cost Estimate:

Not provided. Cost to be determined.

Project ID:	MC-CIP-9
Abandon Pipes and Relocate to ROW	
Preliminary Cost (2015 $): $1,716,400	

Project Location:



Description:

This project proposes to relocate 3 piped systems from private property to City-owned ROW. Below is a summary of the priority piped systems proposed for relocation and their proposed routes.

Relocate Priority 1

Pipes SP-14371, SP-14372, SP-14374, and SP-5180 cross private property lines multiple times near a city-owned parcel between NE 185th Street, NE 184th Place, and 15th Avenue NE. The proposed solution includes abandoning pipes SP-14374 and SP-5180, rerouting flow to a new pipe from catch basin CB-9160 to catch basin CB-5722. Currently, pipes SP-14371 and SP-14372 intersect on private property, then SP-14372 crosses another private property line. These pipes will be replaced, as they received poor ratings during the condition assessment, and a new catch basin installed within the ROW. Installation of the catch basin should be in such a way as to allow SP-14372 to cross only one property line. An easement will need to be purchased for SP-14372 as there is no feasible reroute.

Relocate Priority 2

An existing system spans three private properties from N 193rd Street to 195th Street between Corliss Ave N and 1st Avenue NE, via pipes SP-951, SP-952, and SP-2475. Stormdrain systems are present on both sides of 1st Avenue NE, flowing in the direction of the pipes on private property. This relocation proposal is to abandon pipes SP-951 and SP-952 and re-route flow east along N 193rd Street to tie into the system on the west side of 1st Avenue NE. The existing system on the north side of N 193rd Street will be replaced with the new piped system to 1st Avenue NE. Pipe SP-2475 will also be abandoned and flow will be re-routed east to the system on 1st Avenue NE. New catch basins will need to be installed on 1st Avenue NE.

Relocate Priority 3

Pipe SP-4243 connects NE 198th Street and 6th Avenue NE. The pipe is on private property, on a steep slope, and has an unknown object blocking flow. Rather than flowing through private property, the proposed solution re-routes SP-4243 south along 7th Avenue NE to connect to the existing storm drainage system at the intersection with 6th Avenue NE.

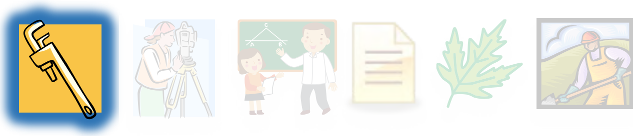
Table 1: Pipes Recommended for Relocation to Right of Way

Project	Asset ID	Diam.	Material	Length	Problem	Notes
Relocate 1	SP-14371	18	CMP	143.58	Corrosion (full length of pipe), deformation/pipe bent at joint (x2), hole in side of pipe with soil visible, repair patch - hole covered with metal on outside of pipe, hole in bottom of pipe (corrosion at joint), large branch and board in catch basin (CB-11576)	Mostly within ROW. CB is on property line. May want to replace with SP-14272.
	SP-14374	12	CP	142.12	Joint separation (medium)	Reroute as part of repair/replacement of SP-14371 & SP-14372
	SP-5180	12	CP	70.64	sealing grout intruding into pipe, camera unable to pass	Pipe passes through corner of private property. Easement not really needed, but could reroute as part of adjacent reroute/repair/replacement.
	SP-14372	24	RCP	81.60	Visible aggregate entire length of pipe, large hole with sandbag? plastic patch? bulging into top of pipe	Connects pipe network through 2 properties. Unable to reroute. Need easement. When pipe is replaced, replace on one property and obtain easement.
Relocate 2	SP-2475	12	CP	144.51	no access to bottom cb, needs more cleaning. Fine wet sediment deposits (muddy), 15% full for 14+feet. Camera unable to continue due to deposits.	Pipe needs to be cleaned. CB's are both within ROW and Powerline easement.
	SP-951	12	CP	254.81	Gravel and rocks in bottom of pipe (15-20% full for 13 ft), longitudinal fracture, broken pipe, large rock in pipe, camera unable to pass, inspect from other end. Tap break in (stormwater x2), mud, dirt, rocks and debris in pipe (15 % full for 15+ ft), camera unable to pass, inspection not complete.	Site visit 10/15/14, possible re-route to avoid private property. Partial ROE granted.
	SP-952	12	CP	27.93	Fine sediment deposits 10% full and 20% full for 5 feet. Pipe appears to slope up and down at pipe ingress then slope up at the pipe egress.	May need to do some adjustment on this pipe to improve flows and discourage sediment buildup.
Relocate 3	SP-4243	12	CP	105.96	Tap break in, drop in pipe, unknown thing protruding into pipe - camera unable to continue to unknown discharge point. Pipe cleaned and reinspected 2 months later. Debris in bottom of pipe (5% full for 12 ft), tap break in (stormwater), tap break in (unknown - odd looking steel thing protruding all the way through pipe), drop in pipe, camera unable to continue.	Site visit 10/15/14, unsure what object protruding in pipe is, but it was discussed to see if it is possible to re-route the pipe.

CMP Corrugated Metal Pipe
CP Concrete Pipe
RCP Reinforced Concrete Pipe

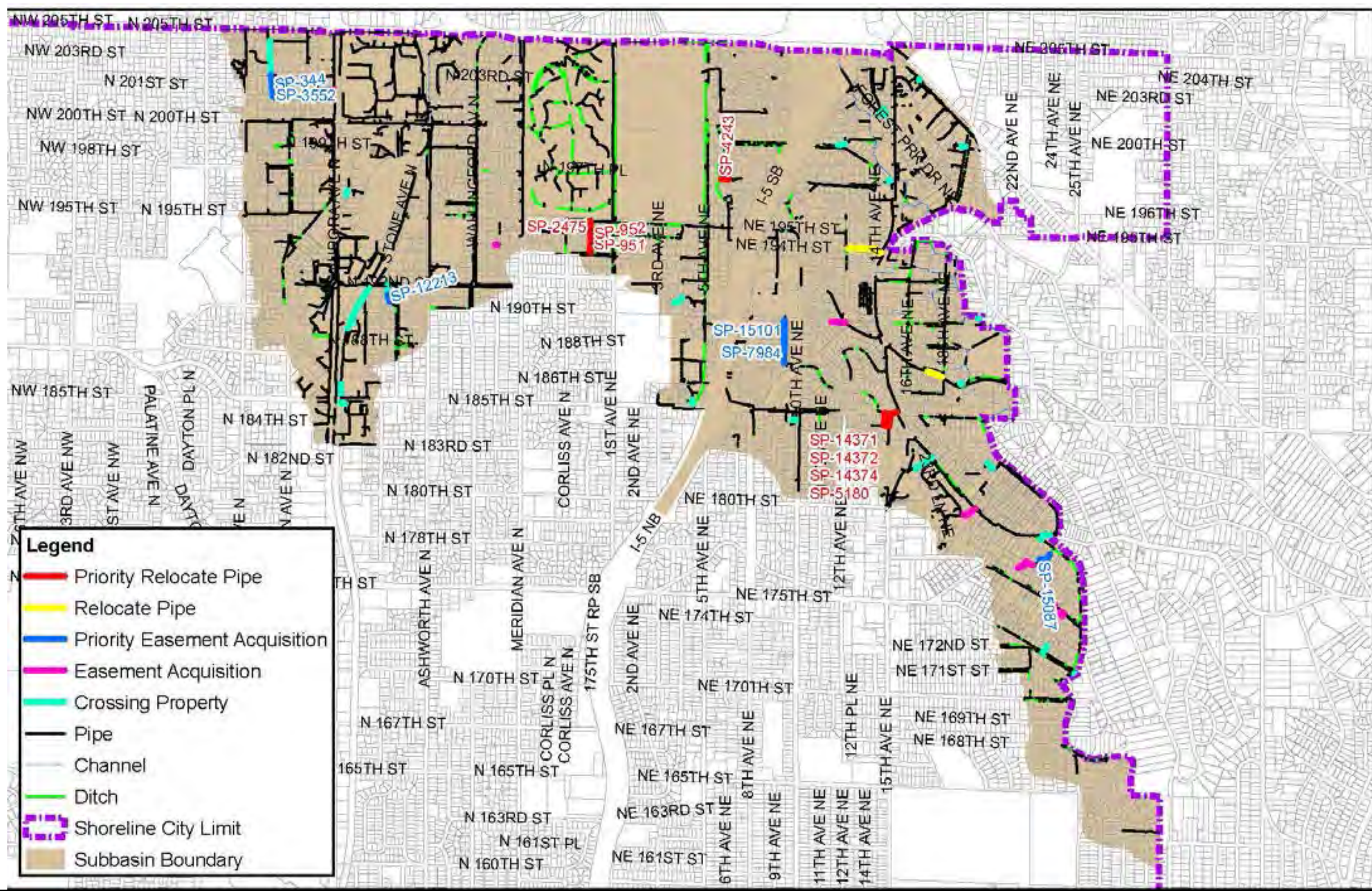
Planning-level Cost Estimate:

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$32,700
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$45,700
Potholing	EA	$1,800	8	$14,400
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	600	$90,000
Removal of Structures and Obstructions	LS	$2,000	1	$2,000
Connect to Existing Drainage Structure	EA	$500	8	$4,000
Storm Drain Catch Basin or Manhole	EA	$4,000	4	$16,000
Schedule A 12" Storm Sewer Pipe	LF	$86	945	$81,270
Schedule A 18" Storm Sewer Pipe	LF	$131	145	$18,995
Schedule A 24" Storm Sewer Pipe	LF	$176	95	$16,720
Roadway Restoration	SY	550	600	$330,000
Subtotal				$652,285
Contractor overhead, profit, and mobilization			10%	$65,229
Washington State Sales Tax			9.5%	$61,967
Construction Contingency			50%	$326,143
Subtotal Construction Costs				$1,105,623
City Staff Time			10%	$110,562.31
Administration and engineering design			20%	$221,124.62
Design Contingency			20%	$221,124.62
Permitting				$0
Land acquisition and easements	SF	$5	11,590	$57,950
Total Project Cost				**$1,716,400**



Project ID:	MC-CIP-9a
Abandon Pipes and Relocate to ROW	
Preliminary Cost (2015 $): Not estimated	

Project Location:



Description:

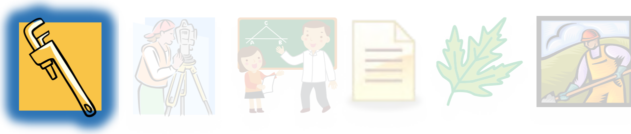
This project is to evaluate possible future pipe relocations for the pipes listed in Table 1. These pipes were identified as candidates for possible relocation, however, no current problems were noted, and therefore they were not ranked as high priority.

Table 1: Pipes Recommended for Relocation to Right of Way						
Project	Asset ID	Diam.	Material	Length	Problem	Notes
Possible Future Relocate	SP-5559	24	CMP	211.91	1st direction: Repair patch (x2), collapse from top of pipe; 2nd direction: deformation	Only need repair at collapse, repair patches in good condition. Site visit 10/15/14 identified pipe as monitoring CIP. Pipe crosses through frontage/corners of 4 private properties. Replace entire pipe in ROW.
	SP-10698	12	PE	33.32	No problems. On private property.	Reroute
	SP-10699	12	PE	10.21	No problems. On private property.	Reroute
	SP-10700			49.00	On private property	Reroute
	SP-10701	12	PE	39.00	On private property	Reroute
	SP-10702	12	PE	81.56	On private property	Reroute
	SP-10703	12	PE	104.44	No problems. On private property.	Reroute
	SP-10704	12	PE	85.56	No problems. On private property.	Reroute
	SP-2508	12	CMP	71.82	wood and pine needles in bottom of pipe (10% full)	Pipe passes through corner of private property. Reroute as part of adjacent reroute project.

CMP Corrugated Metal Pipe
PE Polyethylene Pipe

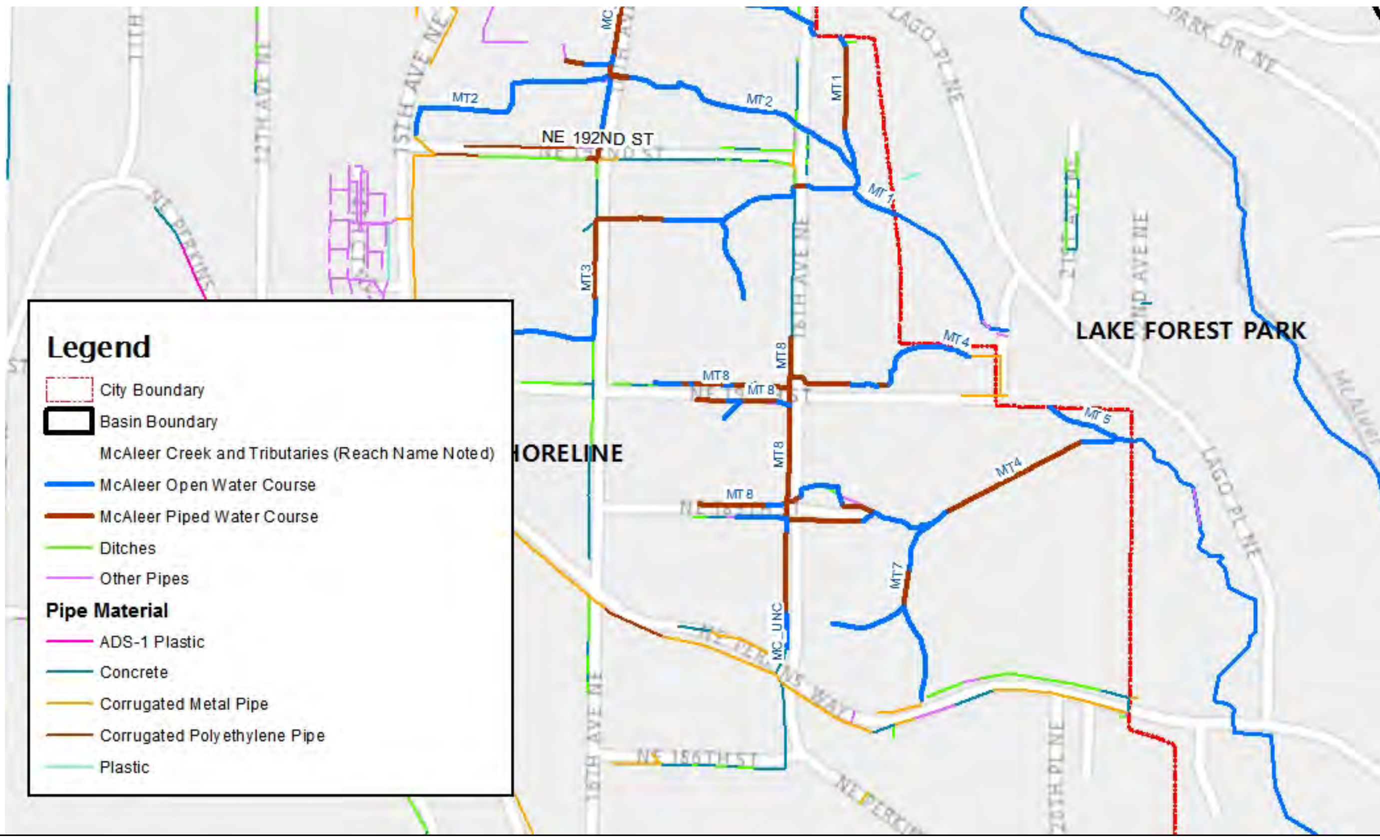
Planning-level Cost Estimate:

To be determined.



Project ID:	MC-CIP-10
NE 192nd Street Ditch Improvements	
Preliminary Cost (2015 $): Not estimated	

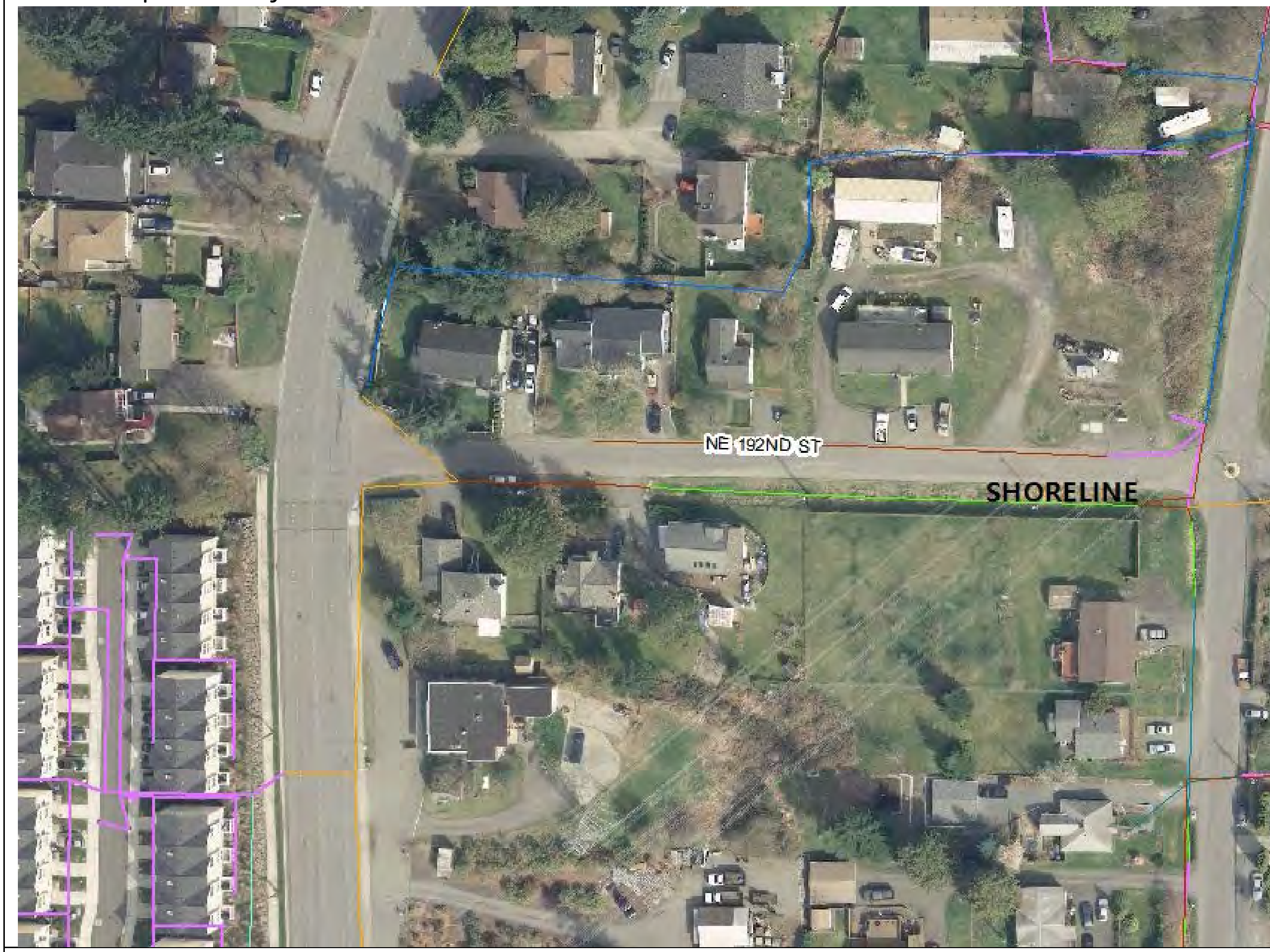
Project Location:



Description:

This project addresses a ditch with on-going erosion problems on the south side of NE 192nd Street. The ditch has a large contributing drainage area, is very steep, and has a history of erosion and sedimentation issues associated with high energy open conveyance systems such as this one. Previously installed energy dissipation filled in with sediment. The City recently excavated the ditch to restore the previous configuration; however, a long-term solution is needed to prevent future erosion in the ditch.

Close-up of Project Site:

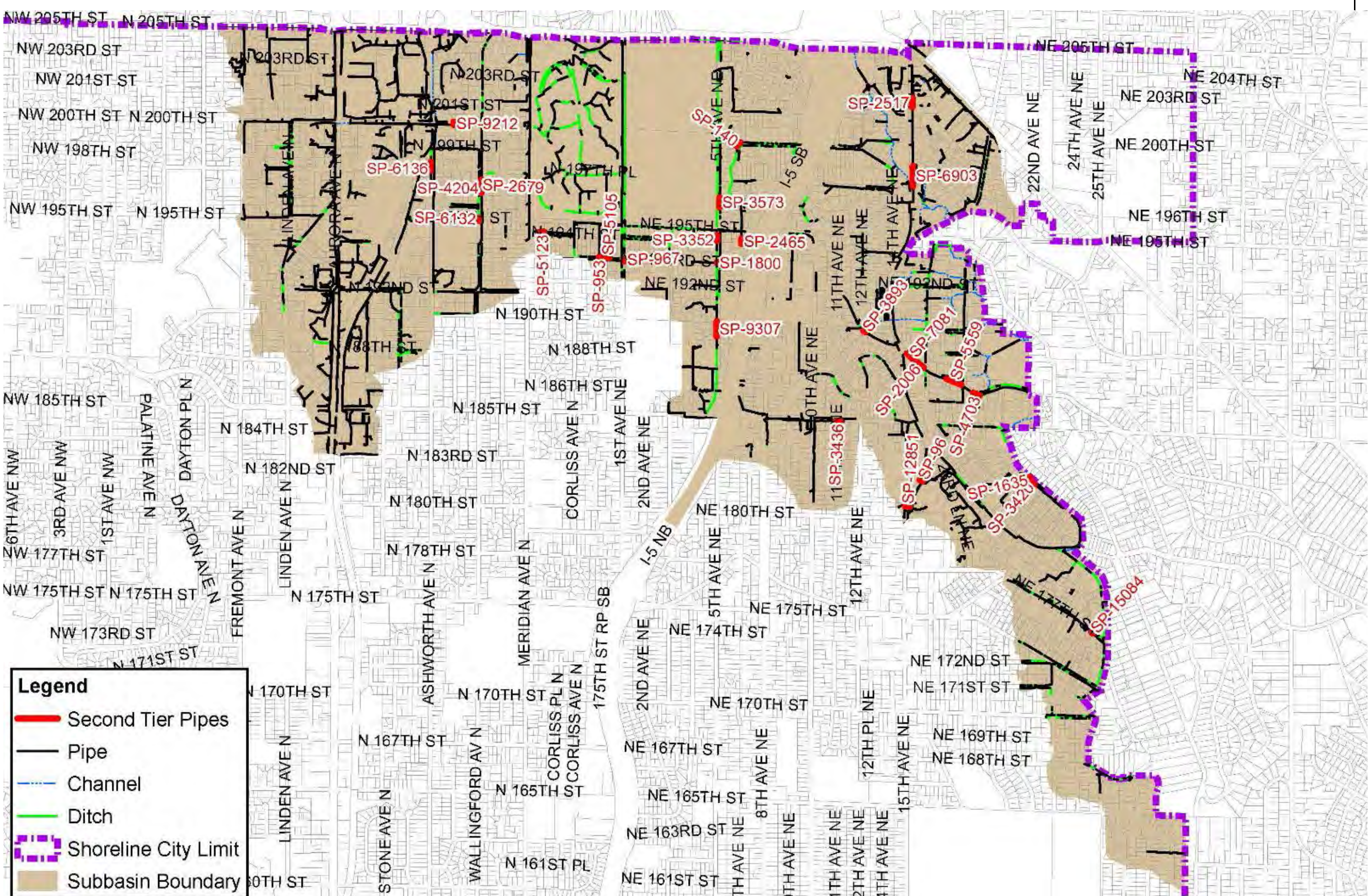


Planning-level Cost Estimate:

to be determined

Project ID:	MC-CIP-11
Second Tier Pipe Repair	
Preliminary Cost (2015 $): $5,151,500	

Project Location:



Description:

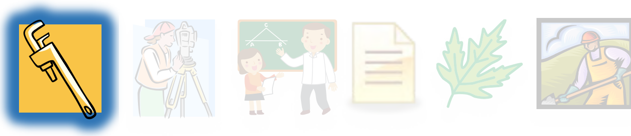
Pipes that did not fall into a category that warranted priority pipe repair by open cut or trenchless technologies, yet have received a poor SPR were included in this category. Structural deficiencies in this category include pipes that have fractures, holes, or minor deformities. It is recommended that the City place these pipes on a “to be repaired” list to ensure the pipe does not fail before the next assessment period. Nearly 6,000 linear feet of pipe fit into this category.

Planning Level Cost Estimate:

McAleer Creek Basin Stormwater Conveyance				
Open Cut - Second Tier				
Item	**Unit**	**Unit Cost**	**Quantity**	**Cost**
Water Pollution/Erosion Control	%	5%		$82,400
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$115,300
Potholing	EA	$1,800	28	$50,400
Remove Road, Curb & Gutter, and Sidewalk	SY	$150	1518	$227,700
Removal of Structures and Obstructions	LS	$2,000	6	$12,000
Connect to Existing Drainage Structure	EA	$500	56	$28,000
Schedule A 12" Storm Sewer Pipe	LF	$86	3134	$269,524
Schedule A 15" Storm Sewer Pipe	LF	$109	106	$11,554
Schedule A 18" Storm Sewer Pipe	LF	$131	175	$22,925
Roadway Restoration	SY	550	1518	$834,900
Subtotal				$1,655,203
Contractor overhead, profit, and mobilization			10%	$165,520
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$827,602
Subtotal Construction Costs				$2,648,325
City Staff Time			10%	$264,832.48
Administration and engineering design			20%	$529,664.96
Design Contingency			20%	$529,664.96
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$3,972,500**

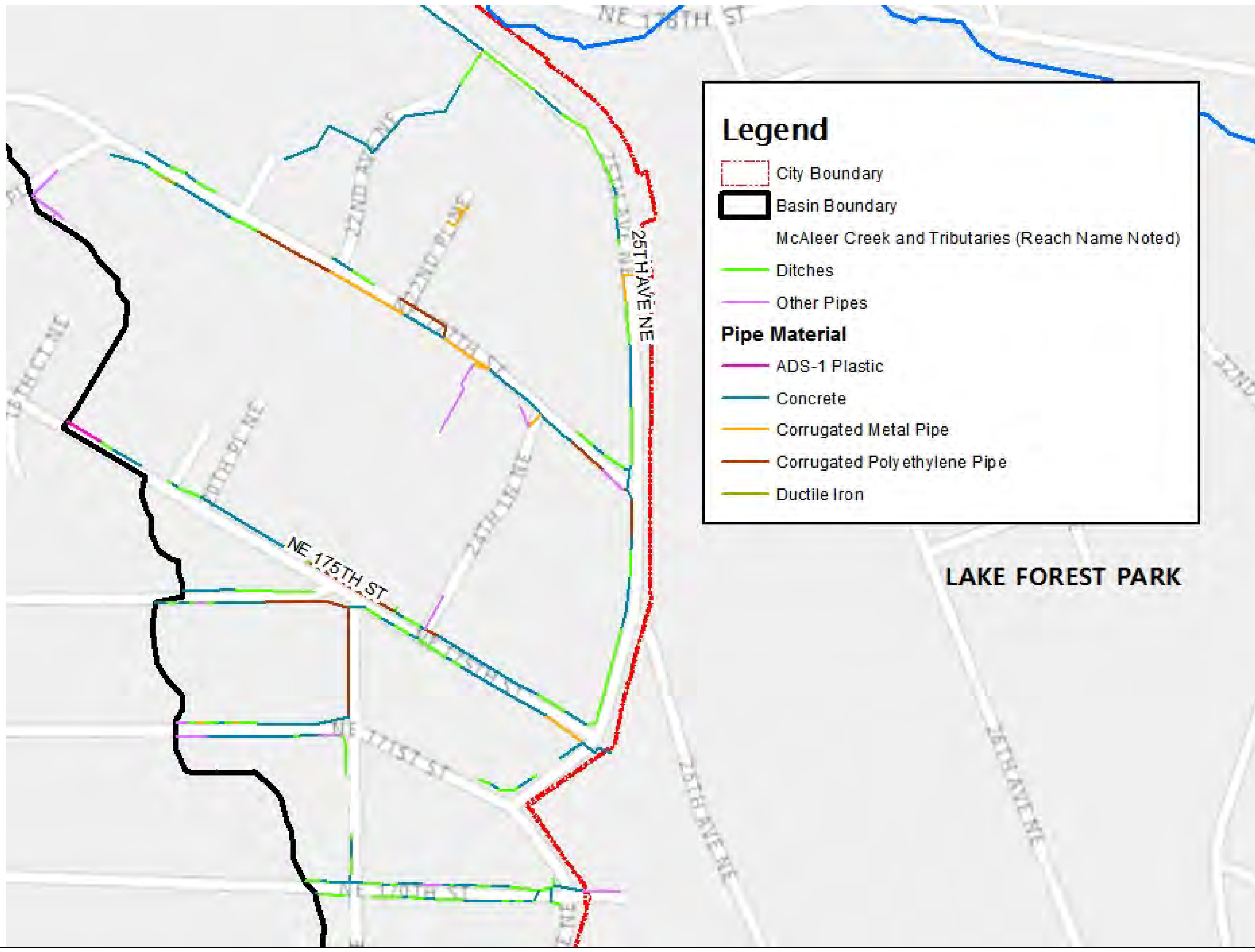
Trenchless - Second Tier

Item	Unit	Unit Cost	Quantity	Cost
Water Pollution/Erosion Control	%	5%		$24,200
SPCC Plan	LS	$500	1	$500
Traffic Control	%	7%		$33,900
Potholing	EA	$1,800	6	$10,800
Removal of Structures and Obstructions	LS	$2,000	2	$4,000
Trenchless Pipe Replacement 12"	LF	$109	1326	$144,534
Trenchless Pipe Replacement 18"	LF	$189	703	$132,867
Trenchless Pipe Replacement 24"	LF	$269	522	$140,418
Subtotal				$491,219
Contractor overhead, profit, and mobilization			10%	$49,122
Washington State Sales Tax			9.5%	$0
Construction Contingency			50%	$245,610
Subtotal Construction Costs				$785,950
City Staff Time			10%	$78,595.04
Administration and engineering design			20%	$157,190.08
Design Contingency			20%	$157,190.08
Permitting				$0
Land acquisition and easements	SF	$5	0	$0
Total Project Cost				**$1,179,000**



Project ID:	MC-CIP-12
25th Avenue NE Ditch Improvements	
Preliminary Cost (2015 $): Not estimated	

Project Location:

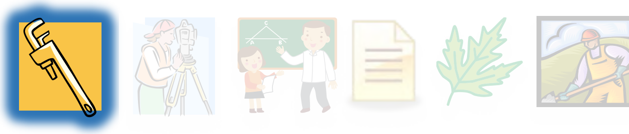


Description:

This project involves evaluation of integrated alternatives for managing drainage, conveyance and road and slope stability issues within limited right-of-way on 25th Avenue NE at the City's eastern border with Lake Forest Park. The current half-pipe ditch and culvert system is failing and is on the City's hot-spot list to check before, during and after heavy rain events.

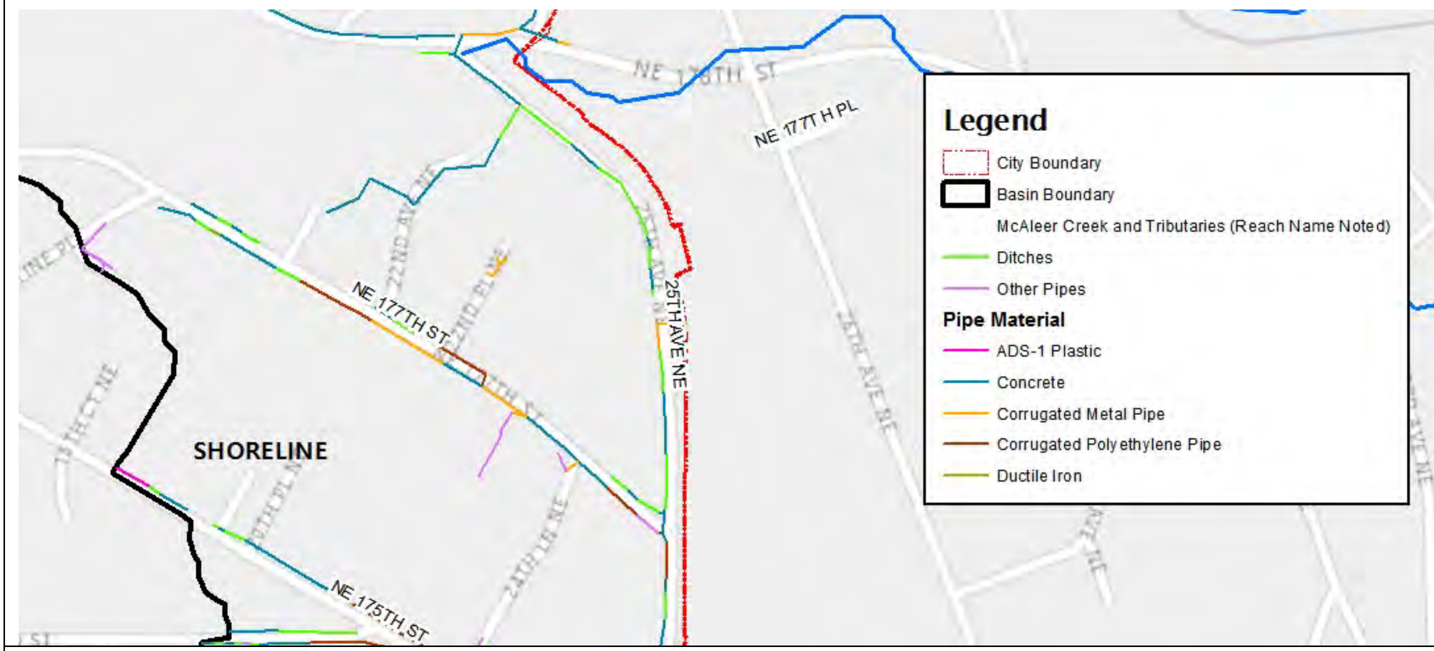
Planning-level Cost Estimate:

to be determined



Project ID:	MC-CIP-13
NE 177th Street Drainage Improvements	
Preliminary Cost (2015 $): Not estimated	

Project Location:



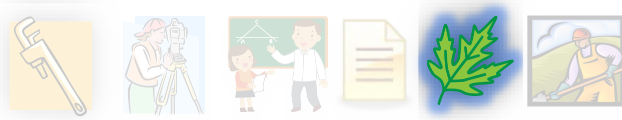
Description:

This project involves evaluation of existing infrastructure along the north side of NE 177th Street in the vicinity of 21st Place NE and 22nd Place NE to develop alternatives for new collection and conveyance infrastructure to connect to the existing stormwater system and relieve drainage issues on private property that result from lack of formal infrastructure in this area.

Close-up of Project Location:

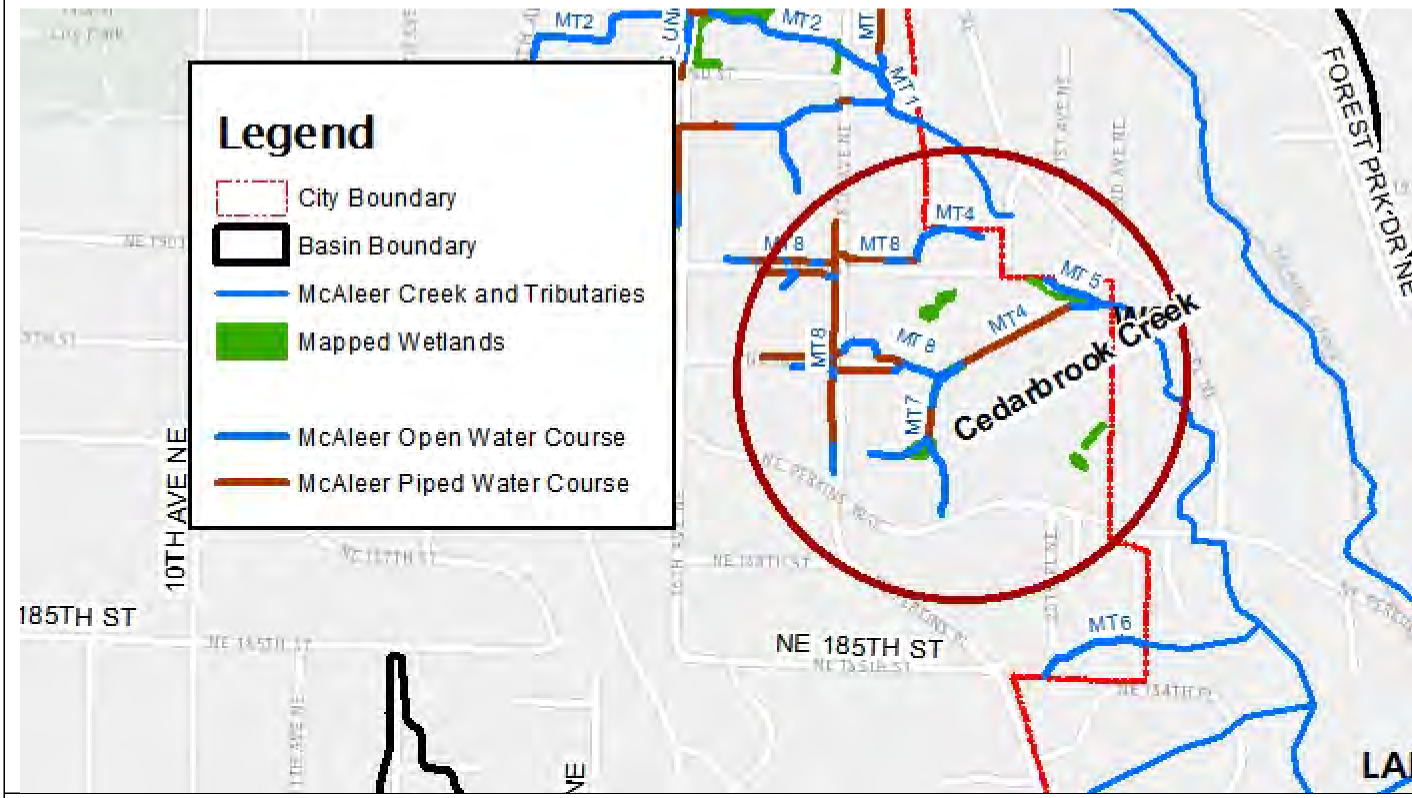
Planning-level Cost Estimate:

to be determined



Project ID:	MC-Hab-1
Daylight Cedarbrook Creek	
Preliminary Cost (2015 $): Not estimated	

Project Locations:



Description:

This project involves removing Cedarbrook Creek from the pipe that currently conveys its flow across the Cedarbrook School property to the confluence of Whisper Creek. The school property is currently owned by the Shoreline School District and is leased by a private school. The District has previously expressed interest in selling the property and the City has expressed interest in acquiring the property for a park, but its future for either a school or a park is uncertain. Currently, it is used as a park by the neighborhood, and there is an interest in the restoration of Cedarbrook Creek by the community. A conceptual design and associated costs were not developed for this project, as the City does not own the property, however, this project is listed as a potential future CIP so that it could be further developed should acquisition, funding or some other motivation to do this project occur.

Design considerations would include future use of the property, including the field, re-establishment and connection to perimeter wetlands (see close-up of project location photo below), environmental permitting, property ownership, and community desires.

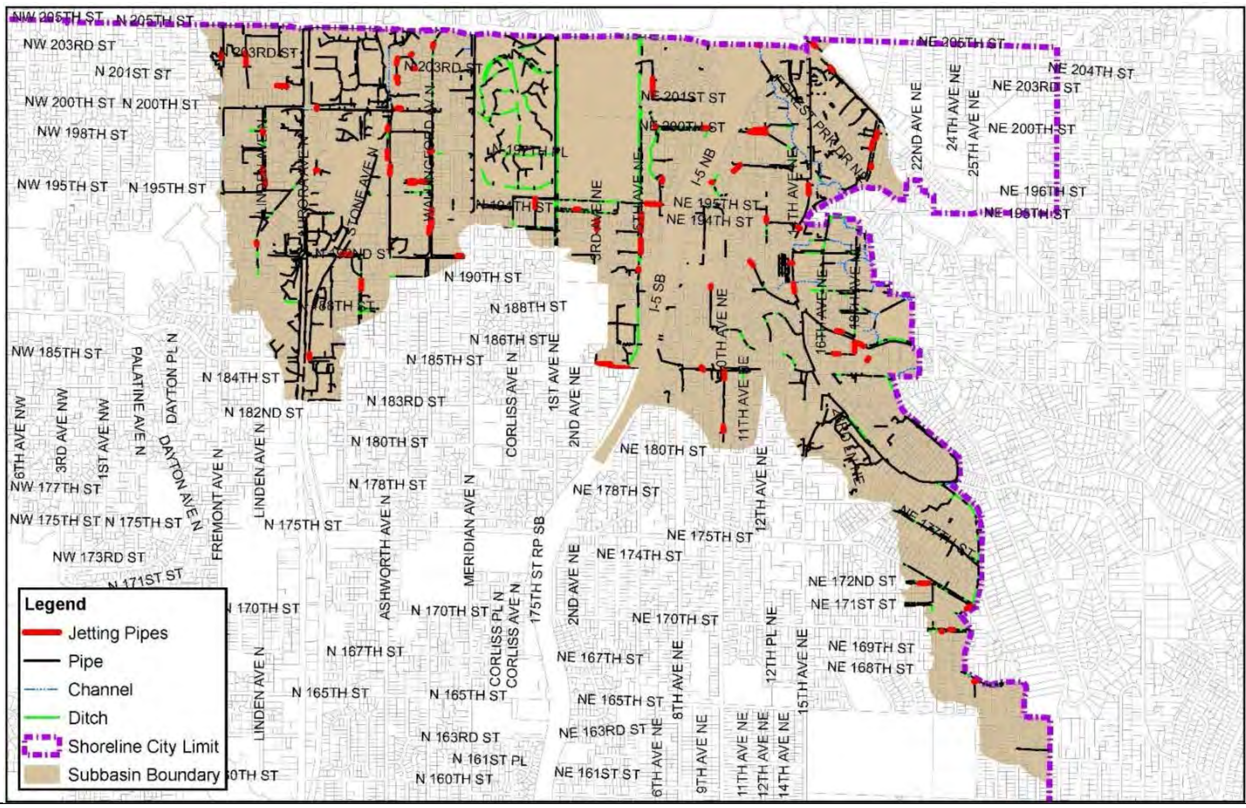
Project Location Close-up:

Planning-level Cost Estimate:

to be determined

Project ID:	MC-Main-1
Maintenance Modifications	
Preliminary Cost (2015 $): $146,000	

Project Location:



Description:

This project addresses pipes that had a poor MPR (≥ 5) and were identified as being in need of further maintenance, including additional pipe jetting to remove sediment and debris. Several pipes in the condition assessment were completely blocked by obstacles other than sediment (e.g., brick structures or basketballs), which need to be removed to ensure pipe functionality. Table 1 (below) lists pipes recommended for pipe jetting or increased maintenance. These pipes may also need to be potentially replaced in the future if the frequent sedimentation is due to inadequate design.

Table 1: Pipes Recommended for Jetting or Increased Maintenance

Asset ID	SPRI	MPRI	OPRI	SPR	MPR	OPR	Diameter	Material	Length (feet)
SP-4959	0	2.08	2.08	0	50	50	12	CMP	134.95
SP-9844	0	2.17	2.17	0	50	50	12	CP	101.93
SP-6801	0	2.14	2.14	0	45	45	12	CP	141.96
SP-6482	0	2.47	2.47	0	37	37	12	CMP	85.32
SP-8925	0	2.62	2.62	0	34	34	18	CMP	109.17
SP-4272	0	2.21	2.21	0	31	31	18	RCP	145.43

SP-786	4	2.07	2.39	12	31	43	12	CP	77.50
SP-123	0	2	2	0	32	32	12	CP	82.79
SP-9832	0	2.45	2.45	0	27	27	12	CP	72.94
SP-6886	0	2.9	2.9	0	29	29	12	PE	81.30
SP-9017	5	3	3.36	10	27	37	24	CMP	50.87
SP-3558	0	2	2	0	28	28	12	PE	123.14
SP-2482	0	1.92	1.92	0	23	23	12	CP	61.46
SP-5300	0	2	2	0	26	26	12	CP	93.44
SP-9288	2	2.5	2.45	2	25	27	24	RCP	67.28
SP-4266	0	3	3	0	24	24	12	CP	38.32
SP-2395	0	2.33	2.33	0	21	21	12	CP	88.98
SP-3568	0	2.09	2.09	0	23	23	12	CP	80.66
SP-6809	4.5	2.3	2.67	9	23	32	12	CP	147.33
SP-6837	0	2.88	2.88	0	23	23	12	CP	83.94
SP-3351	3.25	2.86	3	13	20	43	12	CP	207.09
SP-6831	3.5	2.57	2.78	7	18	25	12	CP	80.16
SP-5083	5	2.83	3.14	5	17	22	12	CP	101.31
SP-5946	2.67	2.5	2.56	8	15	23	12	CP	157.31
SP-616	3	2.6	2.83	21	13	34	12	CMP	38.74
SP-6872	0	3	3	0	12	12	12	CP	39.27
SP-6877	3	2	2.25	6	12	18	12	CP	278.14
SP-3390	0	2.6	2.6	0	13	13	12	CP	36.29
SP-4200	0	2.8	2.8	0	14	14	12	CP	33.56
SP-6919	0	2	2	0	12	12	12	CMP	42.66
SP-9058	2.5	2.33	2.4	10	14	24	12	CP	93.24
SP-9088	0	2	2	0	12	12	36	CMP	66.84
SP-2664	5	3	3.67	10	12	22	12	CMP	142.93
SP-474	0	2.5	2.5	0	10	10	12	CP	86.67
SP-1616	2.92	1.5	2.47	38	9	47	12	CP	63.19
SP-4270	2.14	2.25	2.18	15	9	24	12	CP	99.55
SP-1603	3	1.75	2.55	21	7	28	12	RCP	130.22
SP-6908	2	2	2	2	8	10	12	CP	150.40
SP-15135	3	1.33	2.09	15	8	23	12	CP	273.40
SP-2932	3.06	2.25	2.97	95	9	104	12	CP	139.52
SP-5117	0	3	3	0	9	9	12	CP	32.33
SP-10783	5	2.67	4	20	8	28	12	CMP	166.52
SP-155	5	2.67	3.25	5	8	13	12	CP	74.29
SP-7043	3	2.67	2.96	75	8	83	12	CP	139.57
SP-792	0	4	4	0	8	8	12	CP	22.65
SP-13117	0	5	5	0	5	5			175.40
SP-2529	0	2	2	0	6	6	12	CP	56.26
SP-2537	0	5	5	0	5	5	12	CP	144.06
SP-2688	3	2.33	2.83	27	7	34	12	CP	47.69

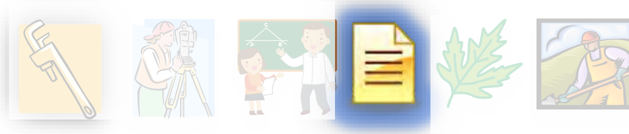
SP-1769	3.6	2.33	3.13	18	7	25	12	CP	71.90
SP-1773	3	2	2.77	30	6	36	12	CMP	115.90
SP-2475	0	3	3	0	6	6	12	CP	144.51
SP-2483	0	3	3	0	3	3	12	CMP	41.83
SP-4321	0	4	4	0	4	4	12	CP	61.03
SP-6167	0	3	3	0	6	6	18	RCP	77.72
SP-6850	0	1.67	1.67	0	5	5	12	CP	55.99
SP-6854	0	5	5	0	5	5	12	CP	27.38
SP-15104	0	1.67	1.67	0	5	5	12	CP	146.34
SP-2514	0	2.5	2.5	0	5	5	12	CP	63.13
SP-5927	3	3	3	9	3	12	12	CP	215.71
SP-6142	2.38	5	2.67	19	5	24	12	CP	51.17
SP-758	0	4	4	0	4	4	12	CP	61.04
SP-9048	3	2	2.5	6	4	10	18	CP	89.01
SP-1630	5	3	4.6	20	3	23	12	CP	17.00
SP-1782	3	4	3.05	60	4	64	12	CP	24.44
SP-2687	3	5	3.18	30	5	35	12	CP	87.50
SP-3803	5	3	4.89	85	3	88	12	CMP	99.12
SP-5961	1	3	2	1	3	4	12	CP	46.04
SP-9014	0	3	3	0	3	3	12	CP	54.90
SP-915	0	5	5	0	5	5	12	CP	42.28
SP-943	0	4	4	0	4	4	18	RCP	137.64
SP-1806	0	1.5	1.5	0	3	3	12	CP	57.71
SP-5928	2.98	2	2.96	164	2	166	12	CP	293.62
SP-5976	5	0	5	5	0	5	12	CMP	41.76
SP-7695	3	4	3.33	6	4	10	18	CMP	36.68
SP-926	0	2	2	0	4	4	12	PE	98.79
SP-1781	2	2	2	2	2	4	12	CP	26.43
								Total length:	**7274.54**

Note: Problem descriptions are not included on the table of pipes that require maintenance; however, descriptions are provided in the Condition Assessment Memorandum (Appendix B).

CMP Corrugated Metal Pipe
CP Concrete Pipe
LF Linear feet
MPR Maintenance Pipe Rating (sum of all rated maintenance defects)
MPRI Maintenance Pipe Rating Index (average of all rated maintenance defects)
OPRI Overall Pipe Rating Index (average of all rated structural and maintenance defects)
OPR Overall Pipe Rating (sum of all rated structural and maintenance defects)
PE Polyethylene
RCP Reinforced Concrete Pipe
SPR Structural Pipe Rating (sum of all rated structural defects)
SPRI Structural Pipe Rating Index (average of all rated structural defects)

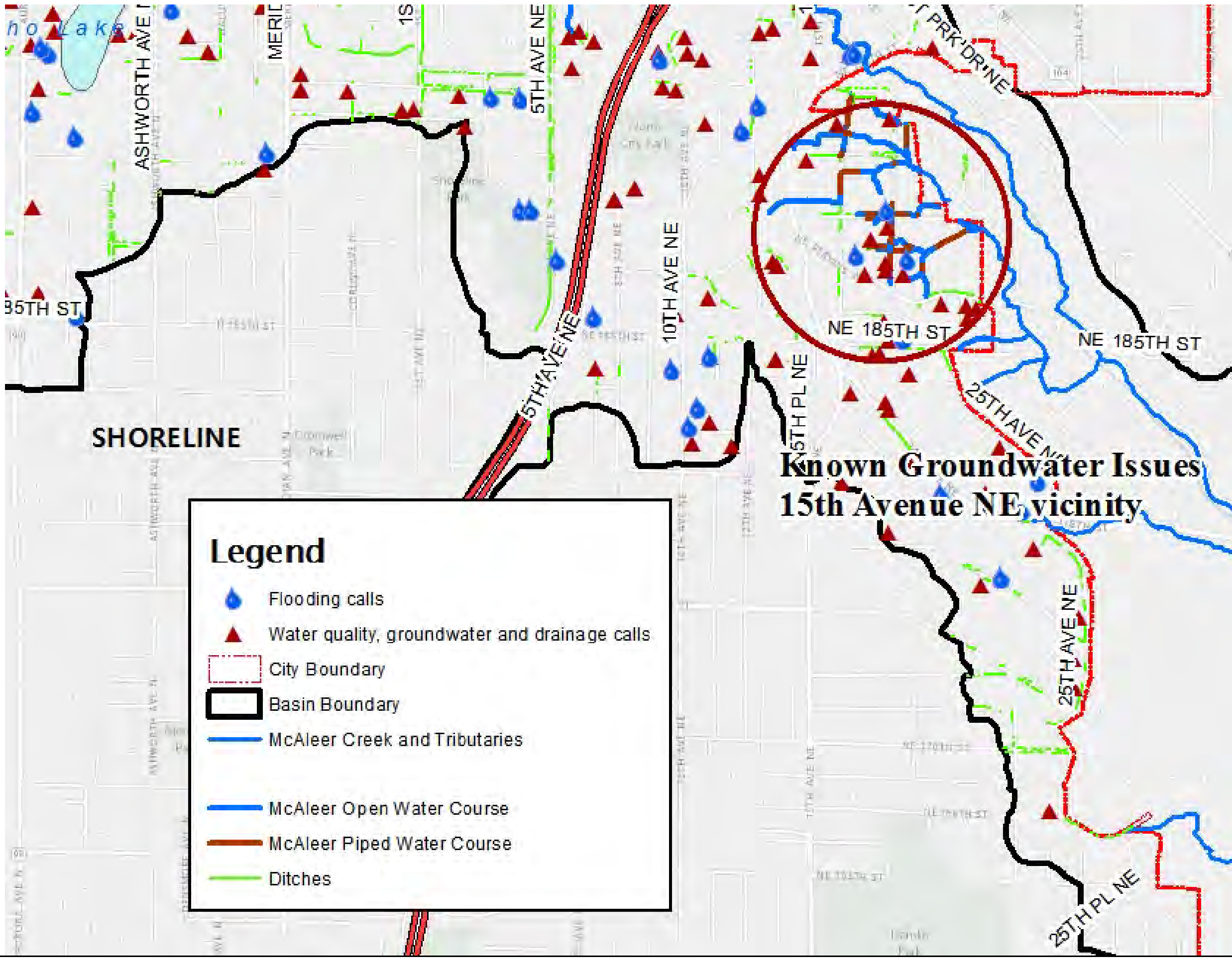
Planning-level Cost Estimate:

The estimated cost of cleaning or maintenance is estimated to be approximately $146,000 (assumes approximately 7,300 LF of pipe).



Project ID:	MC-Pol-1
Groundwater Study	
Preliminary Cost (2015 $): $70,200	

Project Locations:



Description:

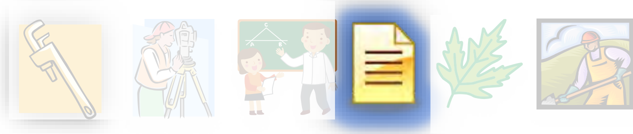
This city-wide groundwater study would further evaluate existing drainage issues due to shallow groundwater, including those identified in the McAleer Creek basin, and recommend alternative surface water management approaches in these areas, including the appropriate use of infiltrative stormwater management techniques such as low impact development options, and open- or closed-conveyance systems in these areas.

This project was identified as a result of flooding and drainage issues in the vicinity of 15th Avenue NE between NE 185th and NE 195th where seepage and shallow groundwater appears to be problematic. The streams that drain the hillslopes near 15th Avenue NE originate from groundwater seeps and springs and it is very difficult to manage the groundwater component of the surface water drainage issue. A network of small ditches, pipes, and streams has formed naturally and also been constructed over the years to direct water away from homes, but the system does get overwhelmed at times and this contributes to localized flooding. Many wetlands are present where the grade flattens out (and the flooding occurs), indicating poor drainage conditions in general. As low impact development techniques, particularly shallow infiltration, become the preferred and commonly used (and required unless proven to be infeasible) stormwater management technique in the city and the region, the City should take care to ensure that existing problems are exacerbated by use of this technique. This is one such area that shallow infiltration should be limited.

This project involves a review of drainage complaints and discussions with City staff to identify locations where shallow groundwater is problematic for surface water management across the City, followed by a review of available geologic information (borehole and geotechnical data) to understand the subsurface conditions that may contribute to seepage and shallow groundwater. This data would be used to develop of an overlay map of where infiltration should not be allowed, so as to not exacerbate the current problems, and alternative stormwater management techniques would be recommended for these conditions. Select subsurface investigation and field validation and development of a map that can be used by City planning and development review staff and meet Ecology's criteria for the definition of infeasibility would also be developed.

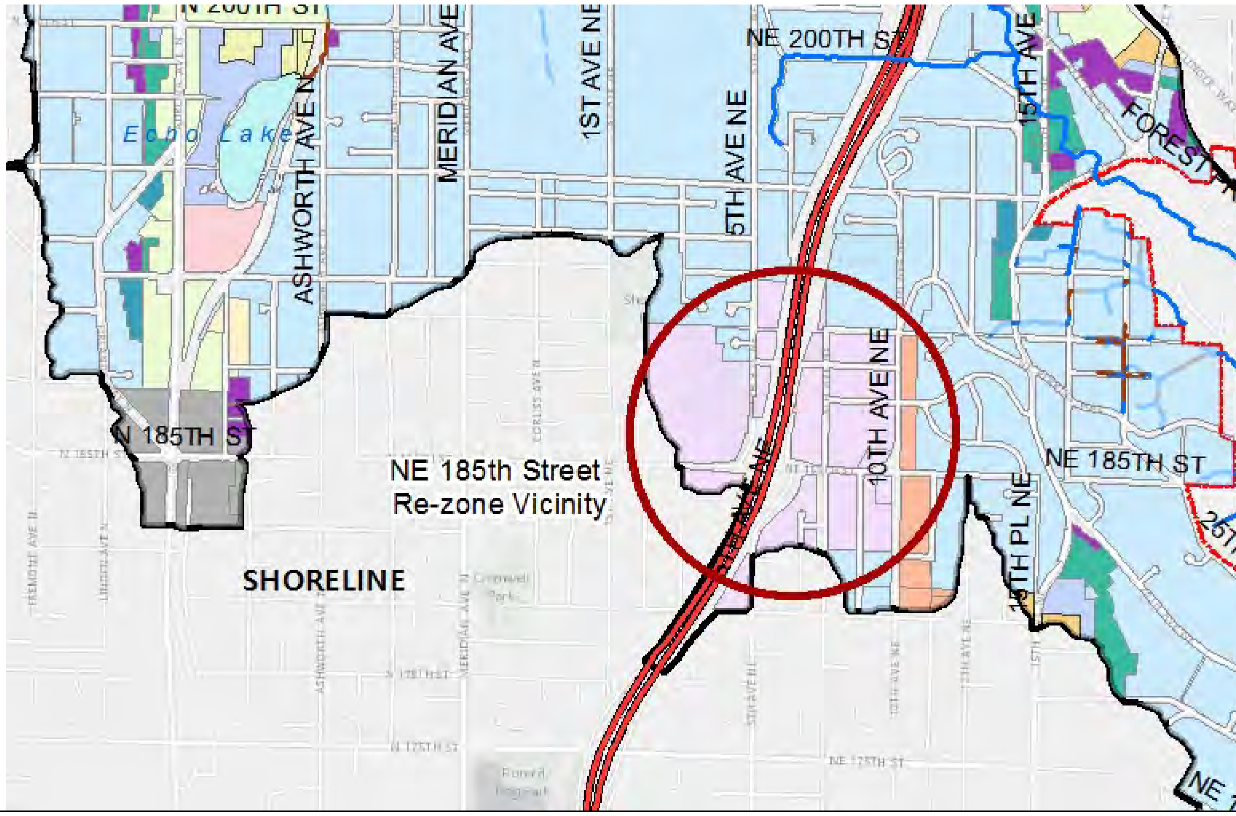
Planning-level Cost Estimate:

Task	Description	Total
1	Review Available Data	$ 6,000.00
2	Geotechnical borings & field verification	$ 30,000.00
3	Prepare Map	$ 12,000.00
4	Overlay (staff time)	$ 6,000.00
	Subtotal	$ 54,000.00
	Contingency (30%)	$ 16,200.00
	TOTAL	$ 70,200.00



Project ID:	MC-Pol-2
NE 185th Street Station Subarea Stormwater Study	
Preliminary Cost (2015 $): $10,400	

Project Locations:



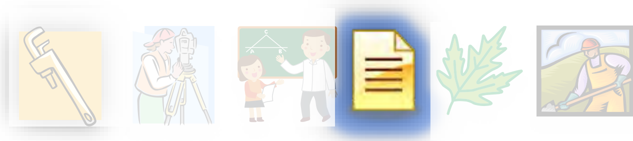
Description:

Sound Transit's North Link Light Rail line will run through the City of Shoreline along the east side of Interstate 5, including a station at NE 185th Street. The City has adopted a major rezone to allow for higher density redevelopment for the NE 185th Street Station Subarea typically extending to a half-mile radius from the station. This project is to analyze existing condition of the public stormwater system in this area and recommend future upgrades needed to accommodate anticipated growth. There is small area of overlap in the NE 185th Street Subarea and the McAleer Creek basin, and the portion of the basin that occupies the Subarea is lacking infrastructure of sufficient capacity and functionality to accommodate future growth. There are on-going drainage issues in the topographic low point east of Interstate 5 in this Subarea, as well as deteriorating pipes that need to be upgraded. Pipe replacement and drainage solutions should be planned and coordinated closely with the overall goals for this Subarea. The 185TH Street Subarea should be evaluated for groundwater conditions and any related potential stormwater management impacts.

This project is for City stormwater staff to work with City planning staff in the development of stormwater management goals and strategies that will solve existing drainage issues, prevent future problems, and accommodate the growth that is expected.

Planning-level Cost Estimate:

Task	Description	Staff Hours	Staff Rate	Total
1	Meet with City staff regarding NE 185th Subarea	40	$ 100.00	$ 4,000.00
2	Coordinate with staff on NE 185th Street improvements	40	$ 100.00	$ 4,000.00
			Subtotal	$ 8,000.00
			Contingency (30%)	$ 2,400.00
			TOTAL	$ 10,400.00



Project ID:	MC-Pol-3
Evaluate Lateral Stormwater Connections	
Preliminary Cost (2015 $): $29,120	

Description:

There are over seventy lateral stormwater connections that have been improperly connected to the City's stormwater pipes and these connections have damaged the main pipes in most cases, resulting in openings where sediment is exposed and can enter the pipes. Many of the pipes with lateral connections also had debris build up to the point that the condition assessment video camera was unable to continue with the inspection of the pipe beyond the connection. Whereas most of the connections were assumed to be stormwater connections, at least one piped connection was made of steel and the type of connection was unknown. Additionally, at least one connection was discharging water on the day of the video inspection during dry weather.

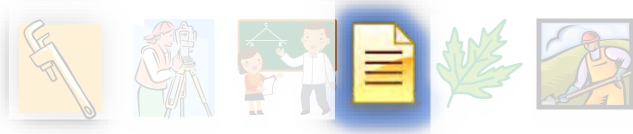
It has been recommended that several of the connections be repaired by installing a structure to connect the two pipes in conjunction with other high priority open-cut pipe repairs (MC-CIP-5a). However, the remainder of the improper connections identified in the condition assessment are not associated with pipes that require immediate repair or replacement by open-cut techniques for which a structure could be installed. The cost for the City to install over seventy new structures such that the lateral lines are properly connected to the City's stormwater system would likely be over $1 million and possibly close to $2 million, depending on the type of technique that would be needed, and the repairs necessary to the damaged pipes.

This programmatic project is to evaluate options for how to handle lateral stormwater connections including:

- Mapping locations—knowing the type, size and location of these connections since they are part of the City's stormwater system.
- Eliminating illicit discharges---investigating those connections that could be discharging non-stormwater to the City's system (i.e., pipes that enter the City's system from non-residential properties, pipes discharging during dry weather, and pipes with non-typical stormwater pipe materials)
- Improving connections—evaluating the best techniques for fixing the pipe connections, whether it include adding a structure or using in-situ techniques. Cost estimate assumes 72 connections in McAleer Creek basin are reviewed to determine best technique.
- Improving new connections---evaluate process by which residents and businesses connect to the stormwater system, and determine if improvements need to be made to minimize improper connections.

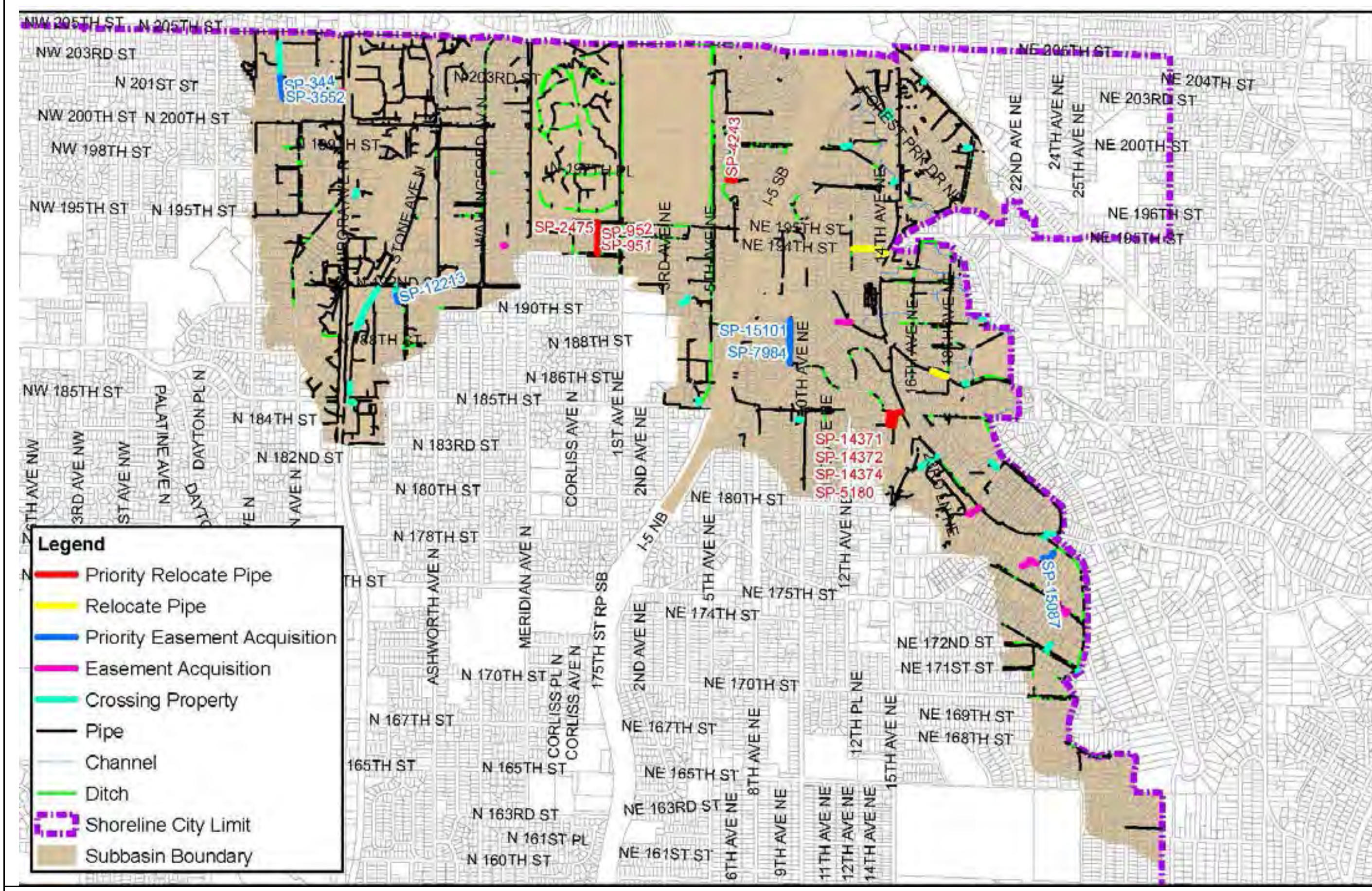
Planning-level Cost Estimate:

Task	Description	Staff Hours	Staff Rate ($100/hr)	Total
1	Evaluate how to map lateral connections	20	$ 100.00	$ 2,000.00
2	Investigate potential illicit discharges	20	$ 100.00	$ 2,000.00
3	Improving existing connections	144	$ 100.00	$ 14,400.00
4	Improving process for new connections	40	$ 100.00	$ 4,000.00
			Subtotal	$ 22,400.00
			Contingency (30%)	$ 6,720.00
			TOTAL	$ 29,120.00



Project ID:	MC-Pol-4
Evaluate Easement Acquisition	
Preliminary Cost (2015 $): $16,900 per easement	

Project Locations:



Description:

This project involves taking steps to either move stormwater pipes off private property and into public right-of-way, or acquire drainage easements so that those pipes can be more easily maintained by City staff. Table 1 lists pipes located on private property for which easements are recommended, in order of priority. Table 2 lists additional pipes that cross private properties for which easements might be appropriate. It is assumed that City staff would review options, make contact with property owners and take the legal steps necessary to acquire the easements. An estimated cost associated with doing that work is provided below.

Table 1: Pipes Crossing Private Property and Recommended for Easement Acquisition						
Project	Asset ID	Diam.	Material	Length	Problem	Notes
Easement 1	SP-15087	12	CP	106.02	No problems	Obtain easement for SP-15087 and SP-15381
Easement 2	SP-15101	12	CP	298.12	Tap in, gravel in bottom of pipe (10% for 30 LF) - unable to continue due to debris	Reroute not possible. Needs Easement
	SP-7984	12	CP	292.20	Tap break in(?) with roots, broken soil visible (x4), tap break in, rocks and gravel in bottom of pipe, unable to finish because of tee	Add CB at tee. Where does this go??? No reroute possible.
Easement 3	SP-12213	12	CP	100.76	roots at joint (x2), gravel in bottom of pipe (4 ft)	Obtain Easement. Second half of pipe run (SP-12214) already has easement.
Easement 4	SP-3552	18	CMP	22.50	Fine deposits in bottom of pipe (blocking 15%+, camera unable to continue), appears to be an unmentioned and unrated tap break in downstream (pipe protruding, large metal pieces protruding)	Appears to be an illicit connection downstream of where the camera is forced to stop due to debris. ROE granted. Downstream pipes already have easements. Need easement for SP-344 too.
Other Pipes Requiring Easement Acquisition	SP-15088	12	CP	90.89	Infiltration weep at joint, circumferential cracks 1 ft from CB 11584.	Adjacent to ingress/eagress easement. Obtain drainage easement for SP-15142 and SP-6040
	SP-6040	12	CP	109.73	Encrusted deposits at joints (10% for 30 LF)	Reroute on ROW not feasible. Obtain Easement for SP-15088 and SP-15142
	SP-2689	12	CP	30.39	deposits attached encrusted (x2), deposits settled compacted filling 75% or more of the pipe 27 ft in. UNKNOWN OUTFALL LOCATION	locate outfall location. Easement needed. Pipe discharges on private property.
	SP-7747	12	CP	149.23	Fine roots at joints (15 ft), 1/2 in tree root with cracks in pipe, camera unable to pass, pause for cleaning, line cleaned, only able to get an additional 15 ft before encountering long 1/2 in tree root, camera unable to continue again. More large roots visible farther up pipe, along with a material change from CP to CMP and possibly a bend.	Roots very very bad! Trenchless after cutting roots probably won't work with material change and bend. CIP? Conveys drainage from large multi building apartment complex down a steep slope. No reroute feasible. Need easement.
	SP-7746			37.28	On private property	Conveys drainage from large multi building apartment complex down a steep slope. No reroute feasible.
	SP-15099	12	CP	189.22	Multiple longitudinal cracks on sides of pipe for entire 4 feet of pipe segment, with active 4" tap break-in (stormwater)	Section of pipe with illicit connection needs to be replaced. Inspection stops short of CB, why? Pipe is adjacent to street ROW. Obtain easement for now, but when pipe replaced, then relocate a few feet north.
	SP-7372	18	CMP	59.64	On private property	Conveys drainage from neighborhood through commercial/retail parking lot to Aurora. No reasonable reroute. Need easement all the way to Aurora (includes SP-8783, 7375, 7374, 7371, and 7377)
	SP-9296	12	CMP	42.22	Sediment (20% for 30 LF)	Conveys drainage from a detention tank on a private residence. ROE granted. Obtain easement for TK-191 too.
	SP-9309	12	CMP	40.27	12" pipe goes to 8" pipe, dead end? Control structure?	Pipe conveys drainage from a house behind a house to the pipe network. ROE granted. Looks like 8 inch pipe from back house to 42 inch detention tank. Detention tank drains to 8 inch/12 inch pipe before discharging into pipe network? Control Structure? Also obtain easement for TK-100, SP-8822 and SP-8985

Table 2: Pipes Crossing Private Property					
Asset ID	Diam.	Material	Length	Problem	Notes
SP-10477			50.30	On private property	Picking up drainage on one commercial property (A Place for Kids Early Childhood Academy).
SP-11362	24		64.39	On private property	Picking up drainage on commercial property (Bartells, etc @ 185th & Aurora)
SP-11410			35.32	On private property	Sky Nursery
SP-11411	12	PE	141.22	On private property	Seattle City Light (from Sky Nursery)
SP-12214	12	CP	131.98	Pipe cleaned. Gravel in bottom of pipe at outlet end, tap break in - stormwater? (Not in report!), debris in bottom 40% of pipe, camera unable to continue.	Open cut to relocate illicit connection. Already has a drainage easement
SP-12472			2.42	On private property	Seattle City Light (from Sky Nursery)
SP-12493			47.07	On private property	Shoreline Stadium parking lot
SP-12819			99.74	On private property	On private road (22nd Pl NE @ NE 75th St), within and ingress and egress easement.
SP-13091			89.04	On private property	Apartment complex
SP-13092			61.08	On private property	Apartment complex
SP-13093			72.61	On private property	Apartment complex
SP-13331			58.01	On private property	From commercial property
SP-15131	12	CMP	32.00	Pipe 10% full of water, gravel in bottom of pipe (10% full for 5 ft), bend in pipe, camera unable to continue, upstream CB unknown.	Looks like pipe bends and continues down driveway of 1820 NE Perkins Way. Pipe might be coming from private residence 1820 NE Perkins Way.
SP-1688	18	CMP	97.99	Gravel in pipe (10')	Pipe passes through corner of private property.
SP-2486	12	CP	122.91	On private property	Within Ingress and Egress Easement.
SP-2521	12	CMP	40.28	On private property	Apartment complex
SP-2561	12	CMP	103.76	large hole in side of pipe repaired with CMP piece, no metal intruding into pipe.	Pipe passes through corner of private property.
SP-2591	18	CP	58.80	intruding sealing grout at joints, fine deposits ingressed at joint	Pipe is in ROW, but CB is on property line.
SP-3232	12	CMP	81.39	Tap-in, pipe half full with water	Is water because of tap-in? Pipe connects natural drainage channel to pipe network. Looks to be filled in and constructed by homeowner. Pipe is under sport court. Easement needed. ROE NOT granted. Pipe discharges outside Shoreline City Limits
SP-4282	12	CMP	16.61	Material change (CMP to PVC)	From commercial property (Schucks, Precision Tune, Budget Glass)
SP-5295	12	PE	276.62	On private property	Already has drainage easement.
SP-5967	12	CP	66.51	Sediment (10% for 10 LF to 100%, completely blocked) - unable to pass, jetting will not help. Upstream manhole not known. Pipe cleaned. Dirt, rocks, roots & debris in pipe (10-30% full for 4+ft, camera unable to continue, pipe completely blocked upstream.	Pipe completely blocked with debris. Upstream end is unknown, on private property (19522 Echo Lake Pl NE), and at the top of the stormwater system in the area. Pipe collects drainage from a small apartment complex.
SP-6809	12	CP	147.33	Tap-in (x4, 2 active, 1 active/defective, 1 abandoned), roots at joint (fine for 10 LF), hole soil visible, root barrel (medium 20% for 15 LF), infiltration weeper (at joints for 110 LF), encrusted deposits (10% for 20 LF), fracture (multiple)	Check to see if there is a sag. Already has drainage easement.
SP-776	12	CP	35.49	Pipe completely blocked by a basketball, Rockstar can, and illicit connection protruding though top of pipe. Camera unable to continue. No survey from other end.	Hard to tell what kind of connection with basketball in the way, probably stormwater. Pipe crosses over Shoreline City Limits into private property in Lake Forest Park.
SP-7810	12	CP	279.30	On private property	Drainage from apartment complex. No reroute feasible.
SP-8452	12	PE	112.57	On private property	Seattle City Light (from Sky Nursery)
SP-9642			134.16	On private property	Seattle City Light (in front of Dunn Lumber)
SP-9647	12	PE	119.19	On private property	Seattle City Light (from Sky Nursery)
SP-9648	12	PE	237.87	On private property	Seattle City Light (from Sky Nursery)
SP-9844	12	CP	101.93	Infiltration weeper with encrusted deposits (length of pipe), tap-in, rocks and sediment for 30 LF (filling 50% of pipe) - unable to pass	Pipe passes through corner of private property. If pipe is ever replaced, it could be rerouted around corner.

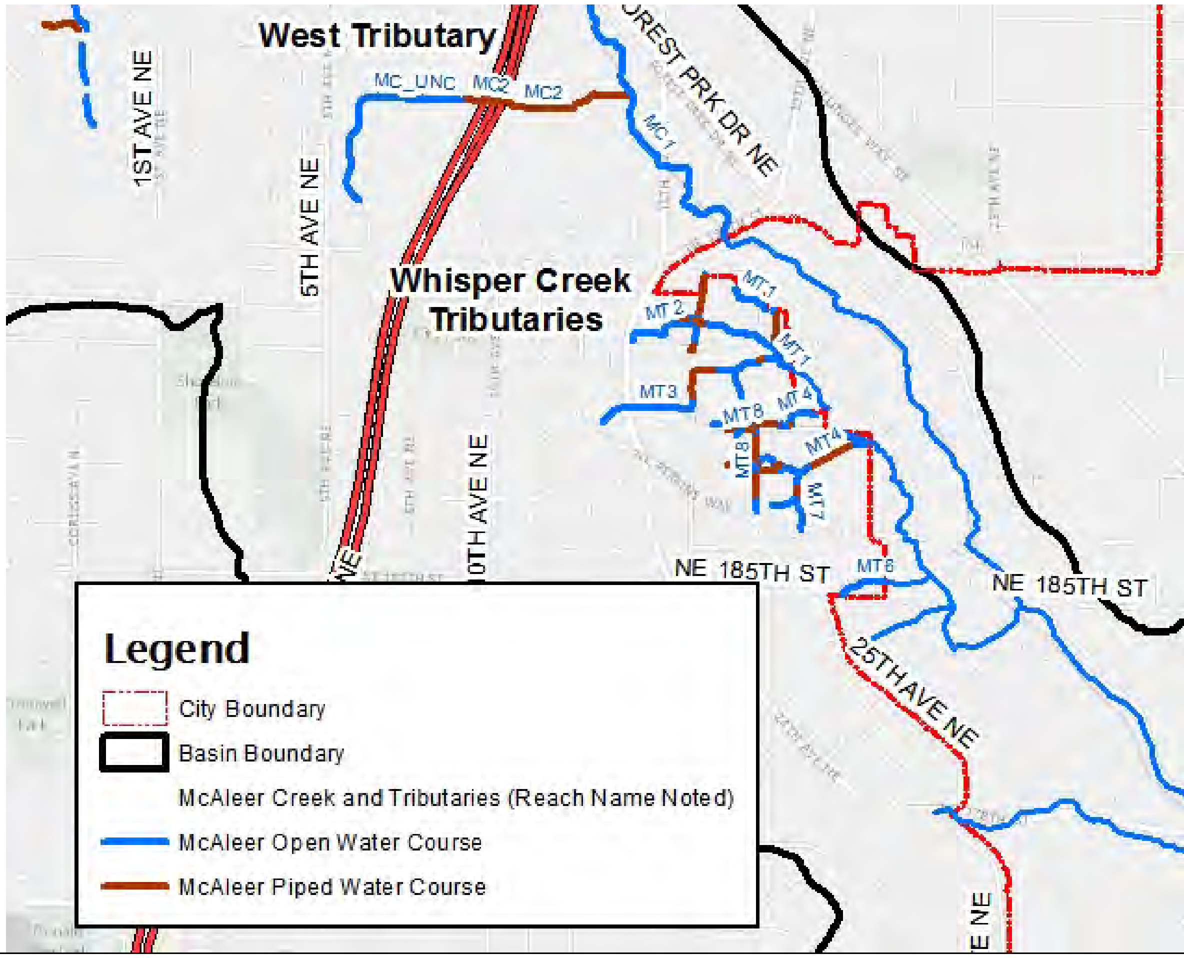
Planning-level Cost Estimate:

The cost estimate below is for staff time to acquire a new easement, including boundary survey. Cost of easement is not included.

Task	Description	Hours	Rate	Total
1	Investigate Easement Options	20	$ 100.00	$ 2,000.00
2	Survey	0		$ 3,000.00
3	Staff time/legal	80	$ 100.00	$ 8,000.00
			Subtotal	$ 13,000.00
			Contingency (30%)	$ 3,900.00
			TOTAL	$ 16,900.00

Project ID:	MC-Pol-5
Evaluation of Stream Designations	
Preliminary Cost (2015 $): $21,060	

Project Locations:



Description:

Several streams walked or otherwise qualitatively assessed for this basin plan were identified as potentially having an inaccurate stream designation according to SMC 20.40.470. Two areas in particular warrant a quantitative review of channel dimensions, fish usage, and stormwater inputs to determine whether individual channels should be reclassified. These include:

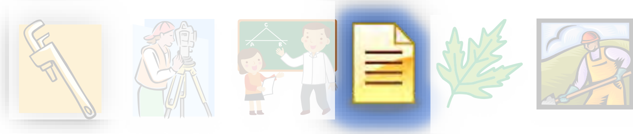
- West Tributary, west of Interstate 5
- Whisper Creek tributaries

In addition to evaluation of whether a reclassification should occur, or whether the channel in question should even be designated as a stream, the implications of a potential change should be considered before any changes are made and planning staff should be consulted.

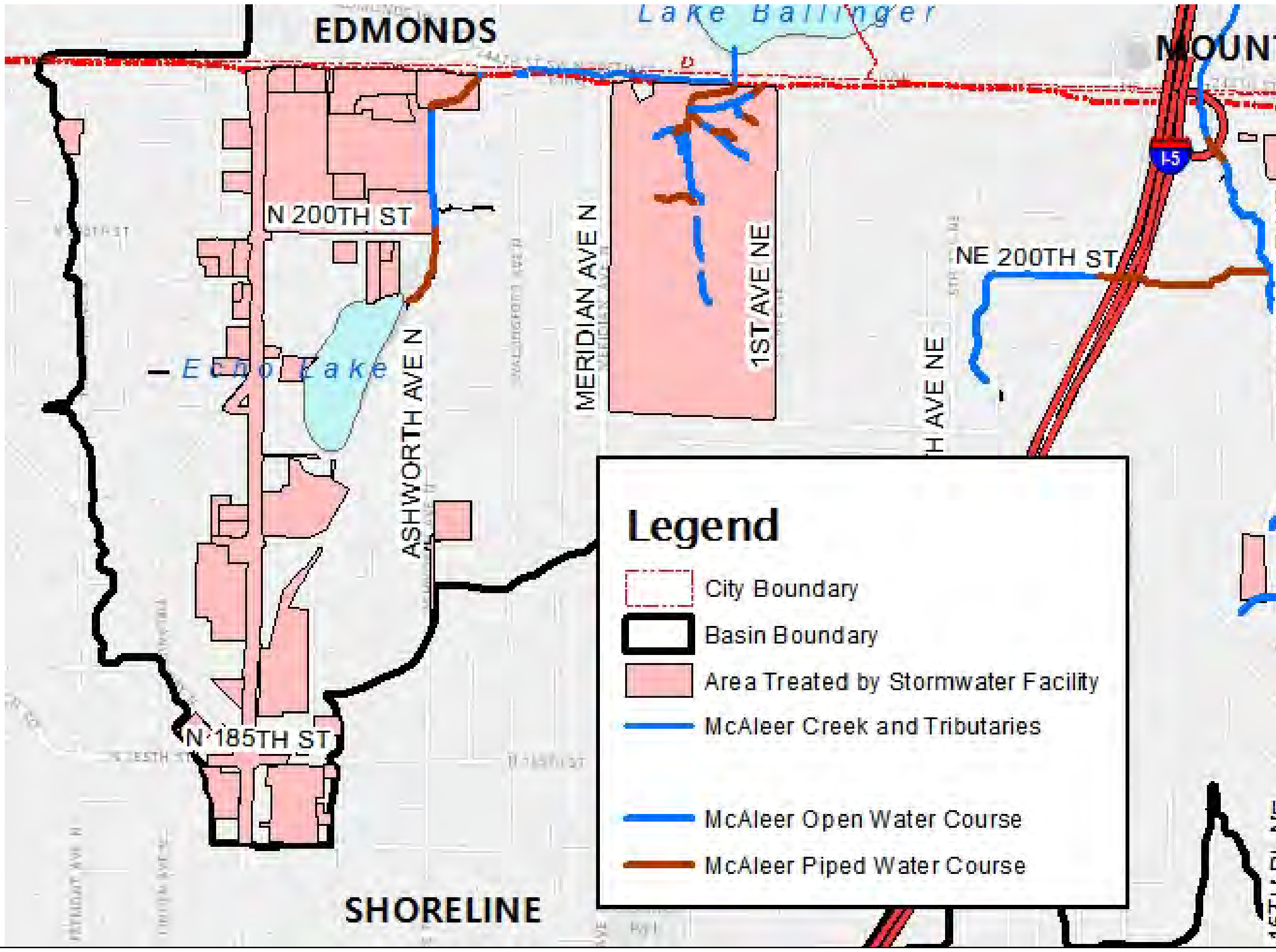
Planning-level Cost Estimate:

Task	Description	Staff Hours	Staff Rate	Total
1	Stream channel measurements	8	$ 100.00	$ 800.00
2	Electrofishing, historical fish usage on select streams (Whisper Creek only)			$ 10,000.00
3	Review of drainage network, stormwater inputs, and flows to channels	24	$ 100.00	$ 2,400.00
4	Develop list of recommended changes and reasons based on quantitative measurements (fish use and/or channel widths)	10	$ 100.00	$ 1,000.00
5	Coordination with planning for recommended changes	20	$ 100.00	$ 2,000.00
			Subtotal	$ 16,200.00
			Contingency (30%)	$ 4,860.00
			TOTAL	$ 21,060.00

Project ID:	MC-Pol-6
Echo Lake Water Quality Improvement Study	
Preliminary Cost (2015 $): $13,000	



Project Locations:



Description:

Echo Lake is the City's only natural lake. Land use surrounding the lake is a mix of private and public with multifamily residential complexes located on the south and west, a city park and swimming beach on the north (Echo Lake Park), and single family residences and the Interurban Trail on the east. Residents have indicated ongoing water quality concerns, as well as importance to residents and organizations such as the Echo Lake Neighborhood Association, it could be worthwhile for the City to undertake a study which (1) assesses of Echo Lake's current health and trending conditions, especially with regard water quality; (2) analyzes likely sources of water quality issues; and (3) makes specific recommendations to stabilize and improve the lake's water quality. Examples of potential recommendations may include:

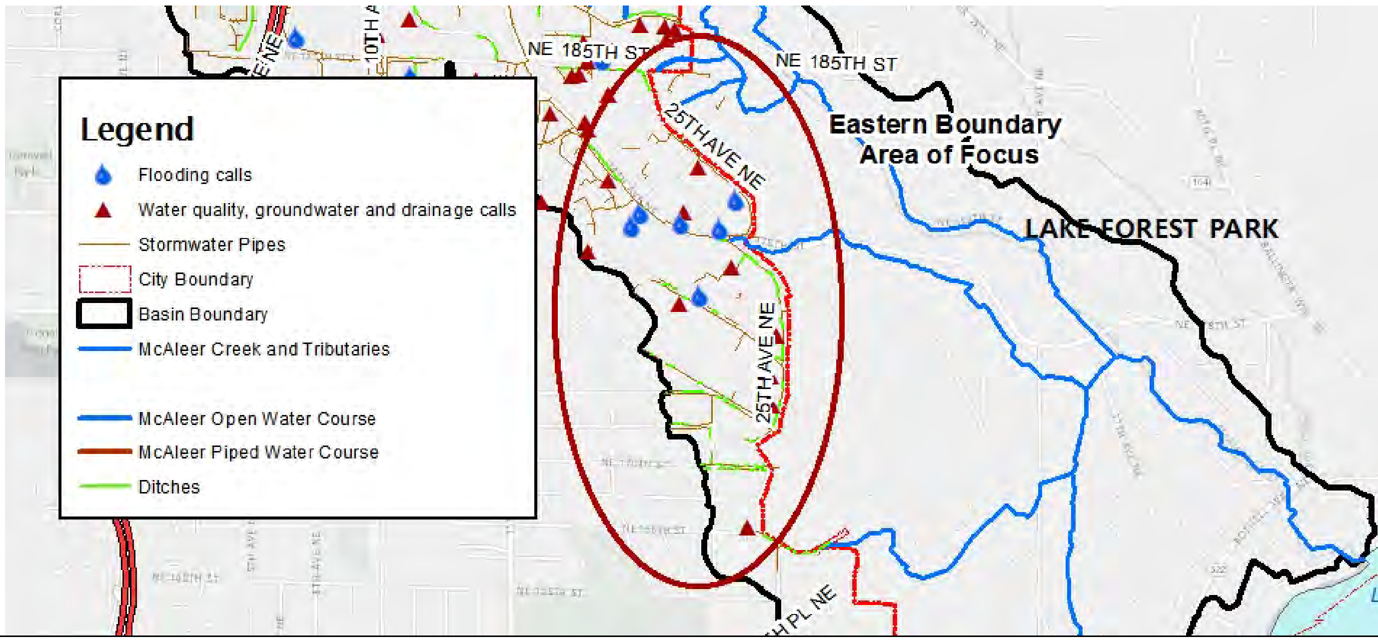
- Higher priority given to Greenworks candidate sites within the Echo Lake watershed.
- Incentives to encourage additional WQ enhancements within the Echo Lake watershed.
- Other programmatic efforts to reduce influent nutrient loading for nitrogen and phosphorus.

Planning-level Cost Estimate:

Task	Description	Staff Hours	Total
1	Comprehensive review and analysis of available water quality data	30	$ 3,000.00
2	programs that would be applicable to Echo Lake, and identification of new incentives specific to Echo Lake neighborhood.	20	$ 2,000.00
3	Prepare summary report of analysis and recommendations.	50	$ 5,000.00
		Subtotal	$ 10,000.00
		Contingency (30%)	$ 3,000.00
		TOTAL	$ 13,000.00

Project ID:	MC-Pol-7
Eastern Boundary Drainage Systems Study	
Preliminary Cost (2015 $): $39,000	

Project Locations:



Description:

Much of the City of Shoreline's eastern boundary with Lake Forest Park runs roughly along the western edge of the McAleer Creek ravine. Accordingly, there are numerous City drainage systems of various sizes and conditions which flow eastward towards McAleer Creek across this boundary. Many of these eastward drainage connections were originally informal or under-designed, or have since become overwhelmed, failed, or fallen into disrepair. This purpose of this study is to locate and assess all such exiting storm drain systems in the vicinity of the City's eastern boundary, identify current problems or potential future problematic situations, and recommend potential solutions – including system improvements and/or coordination efforts with Lake Forest Park and private property owners.

Planning-level Cost Estimate:

Task	Description	Total
1	Review Available Data & Field Reconnaissance	$ 6,000.00
2	Develop General Recommendations for Problems	$ 6,000.00
3	Prepare Conceptual Designs for up to 5 problem areas	$ 18,000.00
	Subtotal	$ 30,000.00
	Contingency (30%)	$ 9,000.00
	TOTAL	$ 39,000.00