M e m o r a n d u m

To: Interested Parties

From: Wendy Edde, Stormwater Program Manager

Subject: Stormwater Infrastructure Improvement Approaches (FY13-14 through FY31-32)

Date: April 3, 2014

Infrastructure Improvement Approaches

Prior to releasing the revised draft Stormwater Master Plan for full public review, the City is first inviting public comment on the following three alternative approaches for correcting problem drainage areas over the next twenty years. The City recently received its stormwater permit for use of underground injection controls in May 2013, and with that regulatory clarity that we have worked to obtain, we now have a wider range of tools available to address stormwater runoff quantity and quality issues than were available to us in 2006-2008 when the initial draft of the Master Plan was prepared. The purpose of this memorandum is to describe the three stormwater infrastructure improvement approaches.

Potential infrastructure needs were collected as part of the Master Planning effort. In 2010, the City prioritized known problem areas by means of a process used across the City's utilities (water, wastewater, and stormwater) based on the following evaluation criteria: customer satisfaction, environmental impacts, future growth, operation and maintenance efficiency/cost savings, public health and safety, regulatory compliance, and system reliability. The three approaches represent varying degrees of level of effort, all addressing the highest priority projects first, and combining some projects in the same drainage area where it made sense based on time and cost efficiencies. Each approach also includes an ongoing pipe repair program and spill risk abatement improvement program for underground drinking water protection not shown on the figures. A rate impact overview is included at the end for the utility as a whole, recognizing that the fewer capital improvement projects completed, the more intensive operation and maintenance pressures will be incurred. As infrastructure ages over the twenty year planning period, it is expected that additional facilities will reach their end of life as well. These approaches focus on correcting problems known at this time through the Master Planning efforts.

Approach 1
This approach seeks to mimic the level of effort for capital improvement projects that City Council set in 2007, accounting for inflationary considerations. At that time the stormwater service charge was primarily set up to address maintenance and regulatory needs and the capital funding reflects this. From FY13-14 through the planning period ending FY32-33, the Approach 1 map at the end of this document shows the projects and their drainage areas (minor and major) that can be expected to be addressed and the appendix entitled "Stormwater Infrastructure Improvement Projects Proposed for FY13-14 through FY32-33" provides a written summary of the projects in each of the different approaches.

Approach 2
Approach 2 anticipates a consistent improvement approach. The Approach 2 map and written project summaries, located at the end of this document in the appendices, depict the project drainage basins and projects where stormwater improvements would be made under this approach. With this approach the City will consistently perform infrastructure improvement projects, working to average one per year, including the pipe replacement and UIC quality upgrade programs that are not shown on the map.

Approach 3
Approach 3 sets as a goal to correct all the known (as of April 2011) problem areas within the 20 year planning period, recognizing that stormwater facilities will continue to fall into disrepair over the planning period as well. See the Appendices for a map showing the Approach 3 projects and the drainage basins that would be affected, along with a document providing a written summary of the projects in each of the different approaches.

The following table provides total cost information and the expected rate increases for each approach, showing ranges based on whether the City institutes smaller, more frequent increases (Gradual) or less frequent, larger step increases (Accelerated).

Table 1. Infrastructure Improvement Approach Summary Table

Infrastructure Improvement Approach	**Immediate Proposed Utility Rate Range ($/ERU)**		**Fiscal Year 2032-33 Proposed Utility Rate Range ($/ERU)**		**Twenty-year Capital Improvement Costs**
	Gradual	**Accelerated**	**Gradual**	**Accelerated**	
1	$4.20	$4.80	$6.37	$5.35	$11.4 Million
2	$4.36	$5.40	$6.11	$6.08	$17.0 Million
3	$4.36	$5.80	$6.80	$6.53	$25.2 Million

Frequently Asked Questions

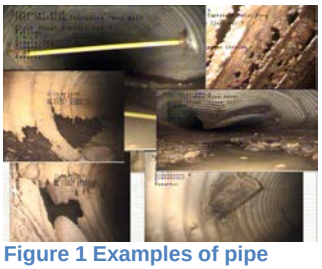


Figure 1 Examples of pipe infrastructure needs

What areas does the pipe replacement program cover?

The City first conducted a television inspection of its piped system to the river in 2010. The needs have been documented and the City has begun putting money aside for an ongoing pipe replacement program similar to those in the other utilities to address these needs. The program will start in the areas that drain to the river, as shown in the appendix (see Stormwater Pipe Replacement Program—Initial Focus Area).

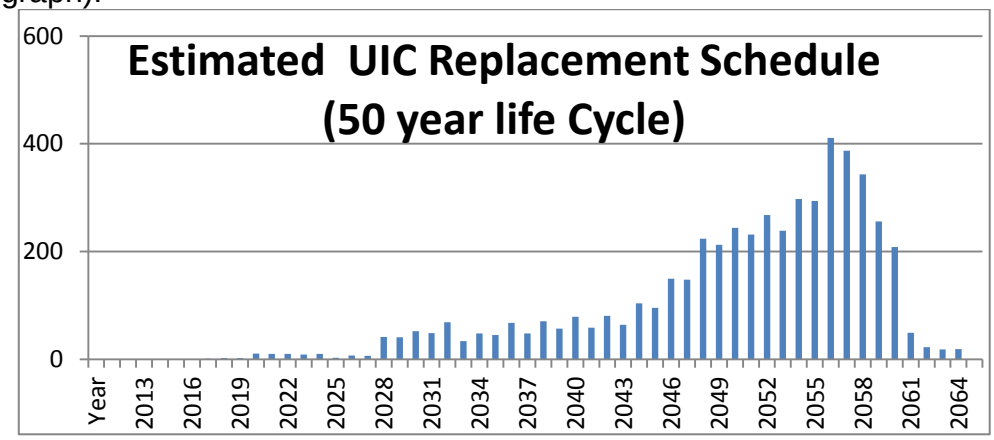
What areas does the UIC upgrade program cover?

The UIC water quality upgrade program seeks to provide enhancements to existing underground injection controls (UICs) to protect underground drinking water sources from spill threats. All citizens of Bend obtain at least some of their drinking water from the groundwater aquifers beneath the City—whether they have their own private well (100% groundwater), or are a customer of Avion (100%), Roats (100%), or the City of Bend (~50%). The UIC upgrade program will first focus on drill holes and then dry wells, and will focus on those located in wellhead protection areas first (see "Stormwater UIC Basemap with Drinking Water Wellhead Protection Zones" map in the appendix).

What are the typical lifespans of stormwater facilities?

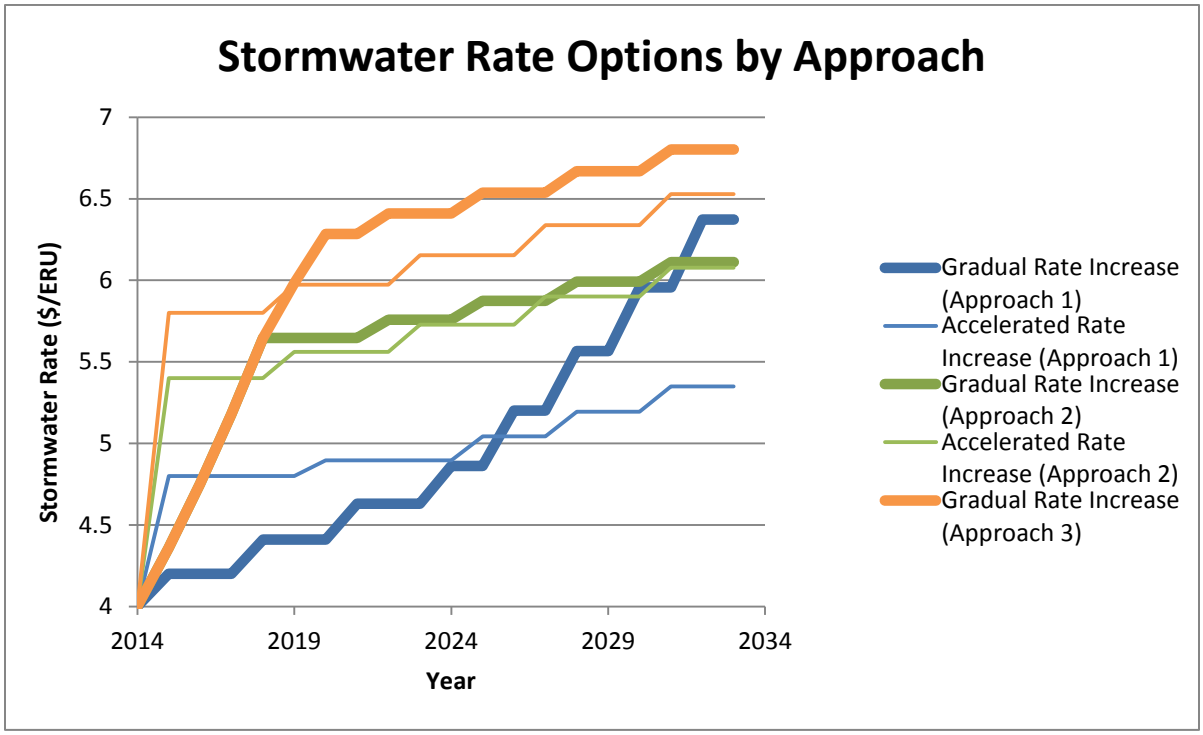
The expected lifespans of stormwater facilities are dependent on the type of facility, the location, the geology of the surrounding area, the care taken to protect the facility during construction, and the operation and maintenance regimen. Typical low impact development facilities can last 20-30 years, whereas regional detention and underground injection controls have a typical average lifespan of 10-50 years; stormwater pipe has a lifespan of 50-100 years.

Currently, the City mostly relies on UICs (dry wells and drill holes) with about 5,500 spread around the City. Given our best available data and assuming the high end 50-year lifespan, the City expects UIC replacement needs to increase over time (see graph).



What might each of these approaches mean for rates?

It is difficult to fully consider these options without considering what the impacts to overall stormwater utility rates may be. Rate changes will depend on how and when they are executed (consistently over time, early or infrequently, etc.). Fewer infrastructure improvements may mean more costs for operations and maintenance staff over time. The City Finance Department provided two scenarios for rate changes over time for each alternative approach—a gradual rate increases and an accelerated rate increase for each approach. Table 1, and the graphs below help depict what may be expected.



What does my stormwater service charge cover?

This is a common question. Please see the fact sheet "What Are Your Stormwater Fees Paying For" for an overview of how your fees are currently used. This fact sheet and additional information about the stormwater service charge is included on our website at:

http://www.bendoregon.gov/index.aspx?page=690

Figure 5 Third Street Underpass Project (2013)

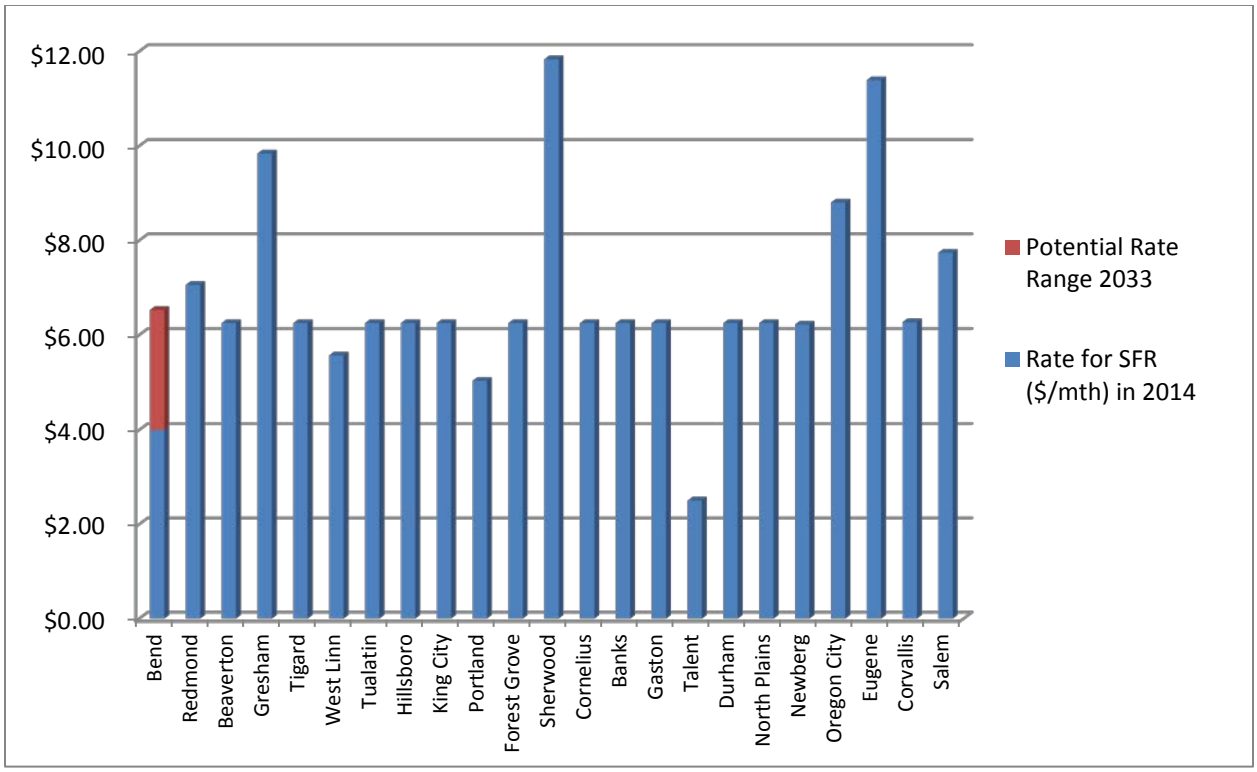
How does our stormwater service charge compare to other cities in Oregon?

Based on information available on municipal websites, the following table and graph shows year 2014 stormwater service charge rates for a typical single-family residence. For Bend, we also show in a separate color the Gradual Rate Increase Approach 3 amount in Year FY2032-33 to provide the range of expected rate change.

Table 2. Comparison of Stormwater Service Charges in Oregon (2014)

Community	Rate for SFR ($/mth) in 2014
Redmond	$7.06
Beaverton	$6.25
Gresham	$9.84
Tigard	$6.25
West Linn	$5.58
Tualatin	$6.25
Hillsboro	$6.25
King City	$6.25
Portland	$5.04
Forest Grove	$6.25
Sherwood	$11.83
Bend*	**$4.00**
Cornelius	$6.25
Banks	$6.25
Gaston	$6.25
Talent	$2.50
Durham	$6.25
North Plains	$6.25
Newberg	$6.22
Oregon City	$8.80
Eugene	$11.39
Corvallis	$6.27
Salem	$7.74

* Depending on the approach and type of rate increase (gradual or accelerated) the City decides upon, the City of Bend anticipated rate range in FY2032-33 will be between current and $7.53/ERU.



How will businesses be affected? What will the business community get for their additional contributions to the plan? How will the planned CIP projects reduce other costs for businesses?

In the long term, sound public infrastructure makes for an improved business environment. In the case of stormwater infrastructure, this means allowing improved access to and from businesses, and improved drinking water quality and river water quality that brings customers to the area. Many of the improvements take measures to protect our valuable groundwater aquifers that are used for drinking water by all citizens and visitors in Bend, a key component of Bend's stormwater program.

However, the infrastructure needs being considered in this revision are approximately 10 times less costly than those in the initial draft plan. In 2008-2010, anticipated infrastructure improvements needed to meet state and federal water quality requirements only were anticipated to be more than $150 Million. But as a result of the studies prescribed in the initial draft Master Plan and the work conducted with funds as a direct result of the Master Planning effort, the City has been able to negotiate its regulatory permit and tailor those protections based on sound scientific models and data analysis. As a result, the City and businesses within Bend that have underground injection controls are seeing direct cost savings resulting from the regulatory requirements that have been brought in line with the science. Today we are asking for input on capital improvement projects costing between $11.4 M and $25.2 M over a 20 year period, rather than as was presented at the 2009 public open house wherein the costs were of $172-$214 M over 20 years with the majority due in the first 10 years as the regulatory requirements that the City faced when the Master Plan was first drafted

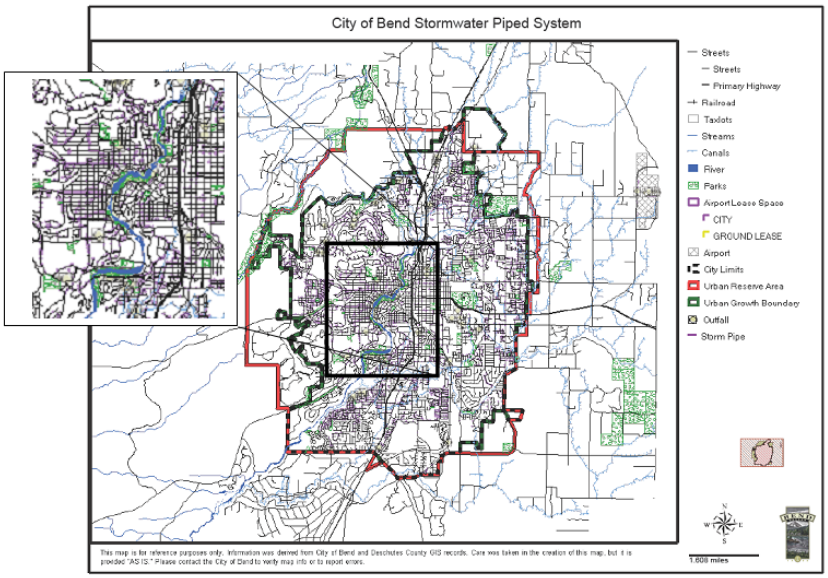
allowed only a 10 year period for compliance, and with fewer options to address solutions. The City is passing along these realized savings to the ratepayers.

How specific businesses will be affected is dependent on the business, the characteristics of their site infrastructure, the infrastructure approach taken, and the final rate structure (e.g. gradual versus accelerated modifications). With regards to rate increases, businesses and industrial properties typically have more impervious surface on their property than residential units, and therefore, pay higher stormwater fees. This is because the amount of impervious surface correlates well with other factors that influence the cost of our stormwater program such as: (1) more stormwater runoff generated (2) that comes offsite with higher erosive velocity, (3) on-site activities other than stormwater that can affect water quality (food waste, debris, chemical spills, fuel spills, etc.), (4) intensity of land use (potential to pollute), and so on. In Bend approximately half of the roughly 3,000 businesses have two or less equivalent residential units (ERUs); another 700 have three to five ERUs, and just under 50 have more than 100 ERUs. For businesses that exceed onsite City standards, the City has a stormwater service charge credit program for both stormwater quality and quality.

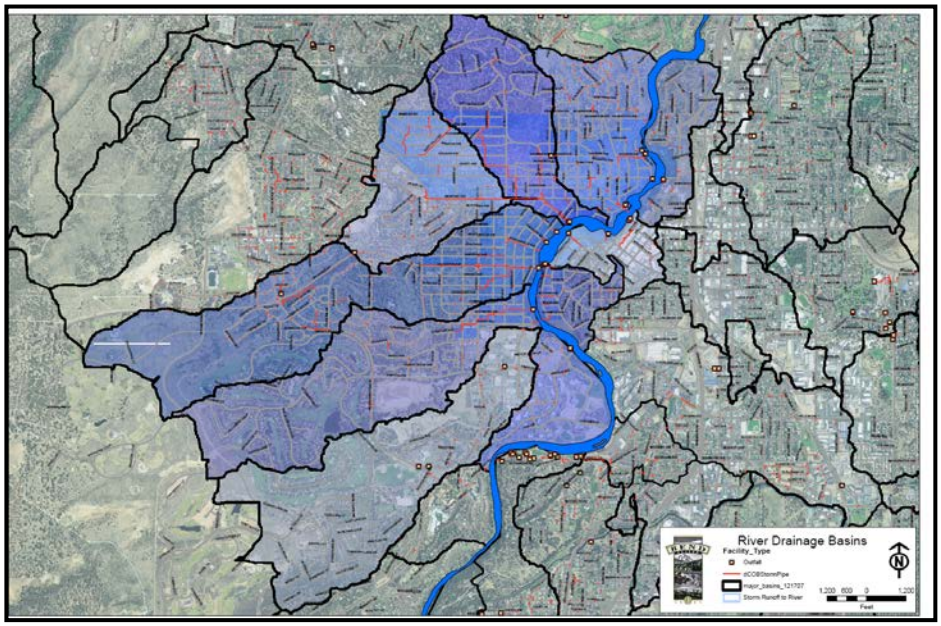
Appendices

Approach 1 Figure
Approach 2 Figure
Approach 3 Figure
Pipe Replacement Program—Initial Focus Area
UIC Program Retrofit Program: Stormwater UIC Basemap with Drinking Water Wellhead Protection Zones
Stormwater Infrastructure Improvement Projects Proposed for FY13-14 through FY32-33

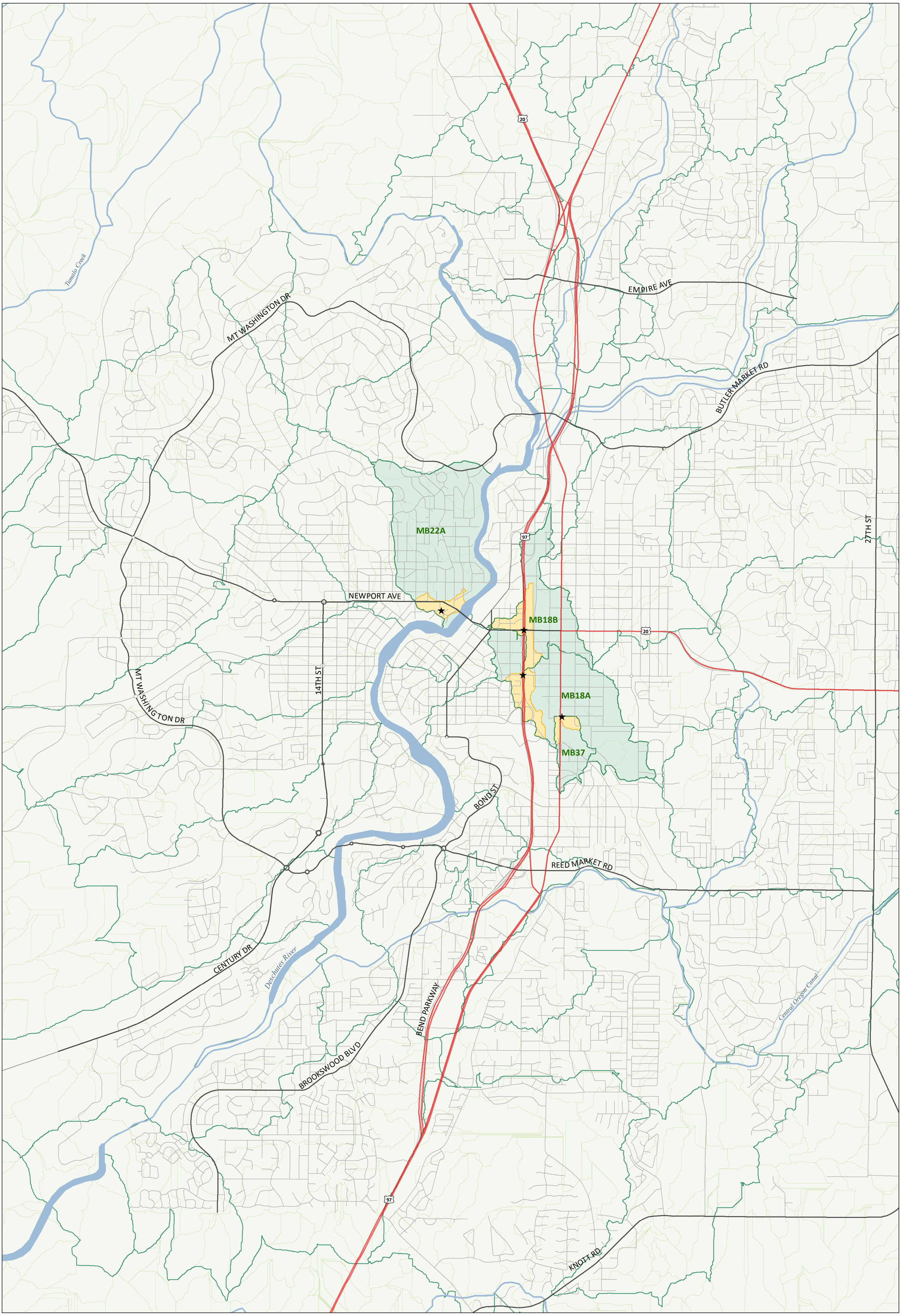
Stormwater Pipe Replacement Program—Initial Focus Area



General Area of City's Piped Municipal Separate Storm Sewer System to the River



Major Drainage Basins in Areas of City's Municipal Separate Storm Sewer System



0 0.25 0.5 1 Miles

N

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March 2014

Approach 1: Projects and Associated Major Basins and Subbasins

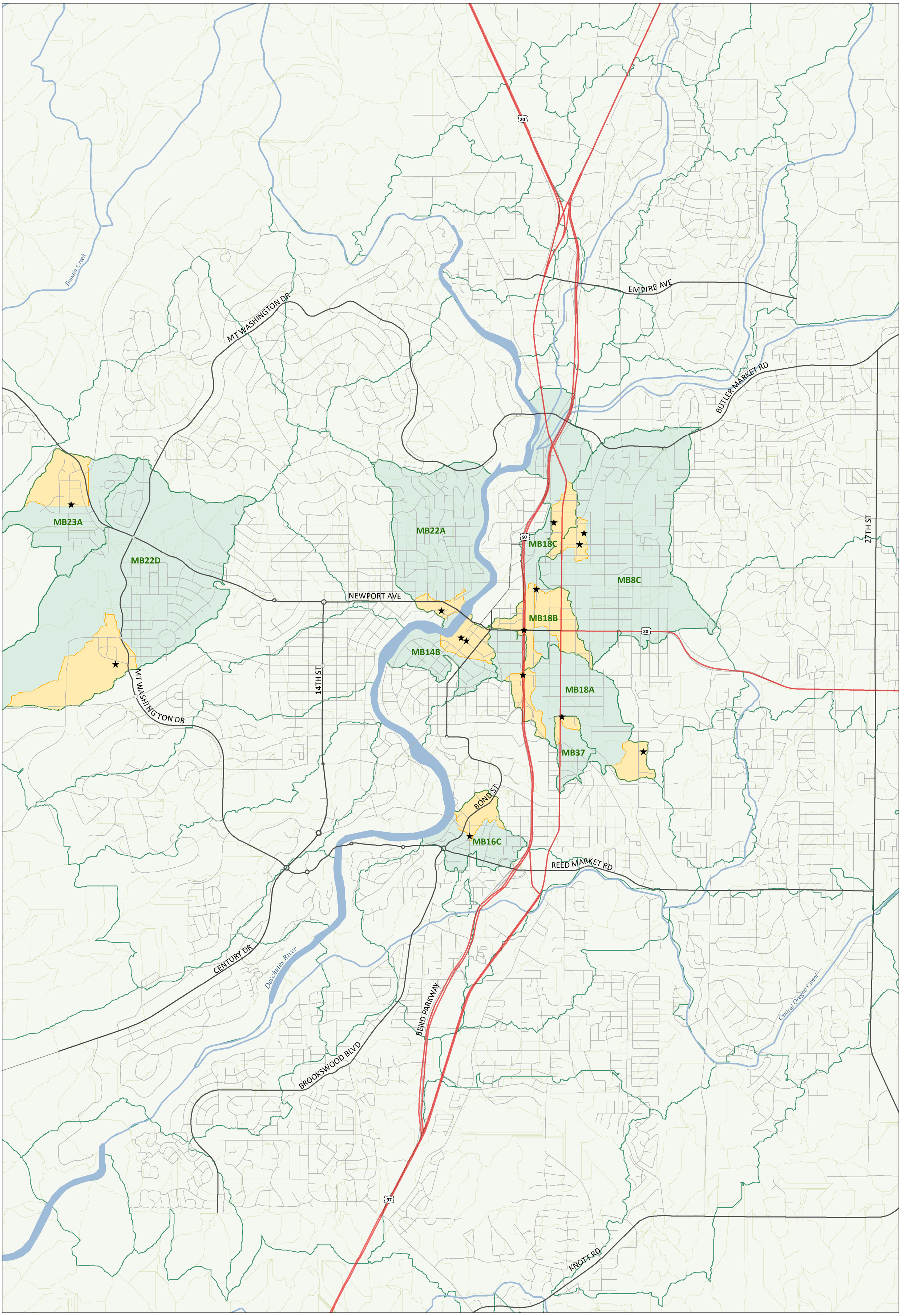
★ Approach 1 Projects

Subbasins

Subbasin that Contains a Project

Major Basins

Major Basin That Contains a Project



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★ Approach 2 Projects

Subbasins

Subbasin That Contains a Project

Major Basins

Major Basin That Contains a Project

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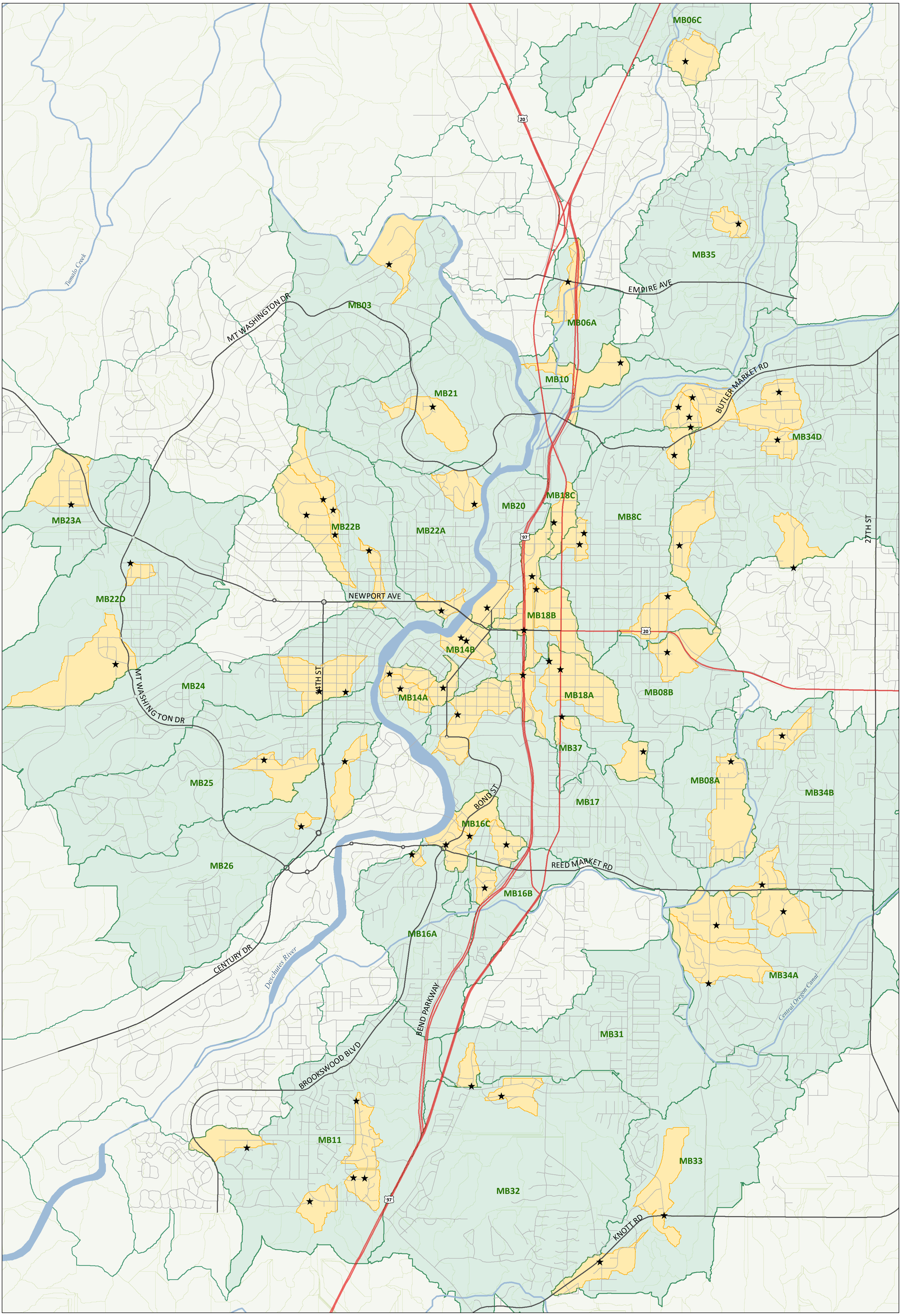
March 2014

Approach 2: Projects and Associated Major Basins and Subbasins



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★ Approach 3 Projects

Subbasin That Contains a Project

Subbasins

Major Basins

Major Basin That Contains a Project

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March 2014

Approach 3: Projects and Associated Major Basins and Subbasins

CITY OF BEND - STORMWATER SYSTEM BASEMAP

Public Works Department - Utility Division (March, 2014)

giscountyclip.SDE.State_Route
giscountyclip.SDE.City_Limit
giscountyclip.SDE.River_DOQ
Drinking Water Wells

dCOBStormFacility
FacilityType
Outfall

dCOB_UIC
DEQTypeCode
Storm Drywells
Storm Drillholes
dCOBStormPipe

DWPA 2011
TOT_ZONE
500' Buffer
1 Year
2 Year
5 Year
10 Year

0 0.1 0.2 0.4 0.6 0.8 Miles

Stormwater Infrastructure Improvement Projects
Proposed for FY13-14 through FY32-33

Approach(es)	Project Name	Description
1,2,3	Stormwater Master Plan	*Note: This project is underway and moving towards finalization using stormwater utility funds*. This project provides a plan for urban drainage services by identifying stormwater issues, evaluating the needs, and identifying potential solutions in a manner that informs the City for planning and budgetary purposes.
1,2,3	MB37 - Drainage Improvement Project 1	*Note: With existing utility funding, the City has completed the main construction phase and is currently moving towards final completion/approval.* This project acts to protect underground drinking water quality by improving drainage infiltration in the ~55 acre basin and replacing deep drill holes in a high spill risk area with a vault, pump station and pipe to a regional retention basin at the Colorado interchange. Additional health and safety benefits are realized by minimizing the number of times the Third Street railroad undercrossing, a major north-south thoroughfare is closed due to flooding.
1,2,3	MB22A - Pump Station Project	*Note: The City is in the construction phase of this utility-funded project.* This is the final phase of a 13-acre sub-drainage basin improvement that included development of an infiltration swale to protect water quality of the Deschutes River as part of a flooding control drainage improvement project for an area that was experiencing structure damage. This phase involves installing a pump station in a storm drainage vault.
1,2,3	Butte Drainage Improvement Plan	This project would develop a plan to improve stormwater management by considering strategies such as Low Impact Development, regional detention, dry wells, and stormwater piping based on site specific details such as topography, geology, groundwater information, and existing stormwater facilities. Project benefits include improved drainage, reduced flooding, enhanced water quality, drinking water protection, increased efficiency with operations and maintenance, and regulatory compliance.
1,2,3	MB18A - Drainage Improvement Project 1	This project seeks to improve drainage in a mainly commercial 257-acre drainage basin wherein flooding problems typically present in the Franklin Street underpass. The project involves a new pump station and a solution that integrates with that for the Greenwood underpass project (MB18B #1). The project will provide health and safety, and access

Approach(es)	Project Name	Description
		benefits by reducing the number of times this east-west undercrossing is closed due to flooding, providing improved access to the downtown and Third Street commercial areas along with residential access; and improve an antiquated drainage structure that poses safety problems for maintenance personnel.
1,2,3	MB18B - Drainage Improvement Project 1	This project seeks to improve drainage in a 133-acre drainage basin wherein flooding problems typically present in the Greenwood Avenue railroad underpass. The project will provide health and safety, and access benefits by reducing the number of times this east-west undercrossing is closed due to flooding.
1,2,3	UIC Facility Upgrade Program	The UIC water quality upgrade program seeks to provide enhancements to existing underground injection controls (UICs) to protect underground drinking water sources for all citizens from spill threats and stormwater pollutants. The UIC upgrade program will first focus on drill holes and then dry wells, and will focus on those located in wellhead protection areas as the highest priority.
1,2,3	Storm Drain Line Replacement Program	This project would upgrade existing storm drain lines throughout the City that are in various states of disrepair. Project benefits include reduced flooding and improved stormwater drainage. Initial work will focus on the piped municipal separate storm system that drains to the river.
2,3	MB23A - Drainage Improvement Project 1	This project would improve the stormwater drainage within the 208 acre drainage basin where problems present in the residential Shevlin Meadows subdivision by installing new drainage facilities in the underserved area. Project benefits include reduced flooding, and reduced property damage risk.
2,3	MB16C - Drainage Improvement Project 1	This project would design and construct two stormwater retention basins on City owned properties at SW Roosevelt Ave and SW McKinley Ave located within a 114-acre drainage basin to alleviate flooding that is exacerbated by the locate of the wall shielding the parkway that obstructs the normal north-west flow of the stormwater runoff in the residential neighborhoods. Project benefits include reduced flooding that results in property structure damage of multiple residences, enhanced water quality, and potentially neighborhood aesthetics/ safety.
2,3	MB14B - Drainage Improvement Project 1	This project would involve a new piped system including sedimentation manholes and

Approach(es)	Project Name	Description
		catch basins. The project would help address flooding problems near the downtown business district near Wall Street and Minnesota in the 120 acre drainage basin. Project benefits include reduced flooding and resulting property damage, improving access to businesses during precipitation events, and enhanced water quality protection improvements.
2,3	MB18C - Drainage Improvement Project 1	This project would include new drainage improvements to a mainly commercial/industrial basin with new drywells and with stormwater treatment along NE Thurston Ave near Second St. where problems present at a low point. The project would improve drainage in an impervious area where current drill holes do not properly function. Project benefits include reduced flooding, enhanced water quality, and drinking water protection (pre-treatment for UICs), along with operation and maintenance efficiency within the 146 acre drainage basin.
2,3	MB8C - Drainage Improvement Project 1	The project would involve regional stormwater drainage and treatment enhancements on NE Seward Ave. within a large mainly residential drainage area that is currently underserved. Project benefits include reduced flooding, reduced property damage, and increased efficiency of operations and maintenance.
2,3	MB18A - Drainage Improvement Project 2	This project, located in an industrial commercial area within a drinking water protection area would place a new culvert under SE Textron Drive to improve drainage in the 257 acre drainage basin. Project benefits include reducing flood risk in a manner that helps protect drinking water quality.
2,3	MB14B - Drainage Improvement Project 2	This source control project would install a new roof structure over existing dumpsters at a public facility on NW Brooks Ave to prevent runoff from coming into contact with pollutants in an area adjacent to the Deschutes River. Project benefits include water quality.
2,3	MB8C - Drainage Improvement Project 2	This project would install a new drywell along the 400 block of NE Revere Ave. where water currently partially blocks a busy road. Project benefits would include improved drainage and water quality, while protecting public safety.
2,3	MB22D - Drainage Improvement Project 1	This project would construct a new stormwater swale along the 500 block of NW York Drive to address problems that present at a sag in the 859 acre drainage. Project benefits would include stormwater drainage, enhanced water quality, and aesthetics

Approach(es)	Project Name	Description
		(roadway landscaping).
2,3	MB18B - Drainage Improvement Project 2	This project would replace an existing drill hole in an industrial/commercial area along 1st Street and include treatment to address a problem that presents in the 1400 block of 1st St. Project benefits include stormwater drainage in the 133 acre basin, drinking water protection, and increased operation and maintenance efficiency.
3	MB18A - Drainage Improvement Project 3	This project, located within a commercial/ industrial area, would replace an existing drill hole along the 700 block of 2nd Street and include treatment. Project benefits include stormwater drainage, drinking water protection, regulatory compliance, and increased operation and maintenance efficiency.
3	MB14A - Drainage Improvement Project 1	This project would construct a new drywell with treatment along the 700 block of NW Georgia Ave. where problems present in a 106 acre drainage basin. Project benefits include enhanced water quality and regulatory compliance as well as improved drainage and reduced flooding.
3	Drill Hole Conversion Projects (MB18B, MB18A, MB11, MB16A, MB8B, MB8C, MB32, MB34D, MB22B, MB33)	This collection of projects would replace several drill holes that have reached end of life with more reliable drainage facilities, and provide treatment along the following streets: 1st Street, 2nd Street, SW Granite Drive, Woodriver Drive, NE 3rd Street, NE 12th Street, Parr Lane, NE Waller Drive, NW Trenton Ave, NE Lotno Drive, NE Cordata Drive, Brosterhous Road, and SW McMullin Drive. Project benefits include stormwater drainage, drinking water protection, regulatory compliance, and increased operation and maintenance efficiency.
3	MB33 - Drainage Improvement Project 1	This project would construct a new stormwater swale along the 60600 block of Newcastle Drive where drainage problems present. Project benefits would include stormwater drainage improvements to protect public health and safety, enhanced water quality, and aesthetics (roadway landscaping) in the 666-acre basin.
3	MB26 - Drainage Improvement Project 1	This project would repair existing drywells along Yates Road. Project benefits include drinking water protection and drainage improvements.
3	MB11 - Drainage Improvement Project 1	This project, located in an 866-acre drainage basin, would install new curbing along the 19800 block Nugget Ave. to improve conveyance and prevent public runoff-related property damage. Project benefits would

Approach(es)	Project Name	Description
		include improved drainage conveyance and aesthetics (street improvements).
3	MB31 - Drainage Improvement Project 1	This project would construct new sedimentation manholes and new drywells along the 61100 block of Parrell Road where drainage problems present within a 574 acre drainage basin. Project benefits include reduced flooding and improved operations and maintenance efficiency.
3	MB34D - Drainage Improvement Project 1	This project would construct a new sedimentation manhole and new drywell at the intersection of NE Madison and NE Taylor Ct. to help address drainage issues within this 1,724-acre drainage basin. Project benefits include reduced flooding and enhanced water quality.
3	MB35 - Drainage Improvement Project 1	This project would construct a new drywell along Eastview Drive to help alleviate flooding issues that present in the 63200 block within the 705-acre drainage basin. Project benefits include improved drainage.
3	MB22B - Drainage Improvement Project 1	This project would stabilize banks at Awbrey Butte and install new catch basins in this residential area. Stabilizing banks will help prevent erosion, which has been plugging drill holes, causing flooding problems; and the catch basins will help improve conveyance and help protect against property damage. Project benefits include reducing erosion, improved drainage, and reduced flooding.
3	MB16C - Drainage Improvement Project 2	This project would install new curbs and grade SW Hill Street in the 900 block to improve conveyance and help prevent flooding. Project benefits include improved street drainage and conveyance within a 114-acre drainage basin.
3	MB34A - Drainage Improvement Project 1	This project located within a 799-acre drainage would incorporate conveyance improvements to protect against property damage and repair an existing drywell along Twin Lakes Loop where problems present in the 61500 block. Project benefits include improved drainage and enhanced water quality.
3	MC8C - Drainage Improvement Project 3	This project would construct a new stormwater swale along NE Jones Road where problems present in the 2600 block. Project benefits would include stormwater drainage, enhanced water quality, and improved aesthetics (roadway landscaping).
3	MB25 - Drainage Improvement Project 1	This project would construct a new catch basin and drainage facilities along the 1700 block of SW Forest Ridge Road where problems present in the 606 acre drainage. Project benefits include improved drainage,

Approach(es)	Project Name	Description
		enhanced water quality, and regulatory compliance.
3	MB06A - Drainage Improvement Project 1	This project would construct a new catch basin and stormwater swale along Nels Anderson Road where problems present in the 3200 block of the 149-acre drainage basin. Project benefits include improved drainage, enhanced water quality, aesthetics (landscaping), and regulatory requirements.
3	MB18B - Drainage Improvement Project 3	This project would install new dry wells with appropriate pretreatment in various locations in the area north of US 20 in between US 97 and US Business 97. These projects are designed to help alleviate problem areas that present in the 61600 block of Summer Shade Drive, the alley behind the 1200 block of NE 3rd, the 1100 block of NE Paula Drive, the 1500 block of NE Revere, the 300 block of SW Maricopa Drive and the 900 block of NE 11th. Project benefits include improved stormwater drainage and water quality.
3	MB18B - Drainage Improvement Project 4	This project would construct a new stormwater swale along Olney Ave. Project benefits would include stormwater drainage, enhanced water quality, reduced flooding, and aesthetics (roadway landscaping).
3	MB22B - Drainage Improvement Project 2	This project, located within a 375-acre drainage basin, would construct a new asphalt curb, expand the existing collection system along NW Iowa Ave. and improve connections to the existing system. Benefits include improved drainage and conveyance.
3	MB14A - Drainage Improvement Project 2	This project located in a106 acre drainage would construct a new catch basin and facility improvements to contain drainage and minimize impacts to the river along NW Congress Street for problems that present in the 100 block. Project benefits include improved stormwater drainage and regulatory compliance.
3	MB34D - Drainage Improvement Project 2	Located within a 1.24-acre drainage basin approximate to Pilot Butte, this project takes measures to improve stormwater conveyance and drainage issues in the drainage area along Neff Road between Juniper Middle School and the sag east of Purcell. The project benefits include conveyance and flooding relief.
3	MB11 - Drainage Improvement Project 2	This project, located within a 866-acre drainage basin, would construct a new catch basin and stormwater swale along Driftwood Lane where problems present. Project benefits would include stormwater drainage, enhanced water quality, regulatory

Approach(es)	Project Name	Description
		compliance, and aesthetics (roadway landscaping).
3	MB17 - Drainage Improvement Project 1	This project would improve stormwater drainage in the 500 block of NW Colorado Avenue in a currently underserved area within a 653-acre drainage basin where problems present at Colorado Avenue and Staats. Project benefits would include stormwater drainage and conveyance improvements.
3	MB34B - Drainage Improvement Project 1	This project located within a 773-acre drainage basin would construct new catch basins and new drywells or bioswales with treatment where problems present in the 1800 block of SE Arborwood, a residential area. Project benefits include reduced flooding, improved drainage, and enhanced water quality.
3	MB24 - Drainage Improvement Project 1	This project would connect the area around NW 14th and NW Davenport to an existing stormwater system. Project benefits include improved stormwater drainage and improved conveyance within a 773-acre drainage basin.
3	MB16B - Drainage Improvement Project 1	This project, located within 190-acre drainage basin, would construct new drainage controls along SW Hayes Ave. where problems present in the 0-100 block. Project benefits include improved stormwater drainage.
3	MB10 - Drainage Improvement Project 1	This project, located within a 910-acre drainage basin, would construct new drainage controls near the intersection of Murray Road and Boyd Acres Road where problems present in an industrial area. Project benefits include improved stormwater drainage conveyance and management, and reduced flooding.
3	MB11 - Drainage Improvement Project 3	This project, located with a 866-acre drainage would construct a new catch basin and an infiltration swale with treatment in an industrial area from Empire to south of Brinson including the 62800 block of Boyd Acres Road to help ensure the prevention of drainage from the public road from causing flooding on private property. Project benefits include improved stormwater drainage, enhanced water quality, and regulatory compliance.
3	MB34A - Drainage Improvement Project 2	This project located within a 799-acre drainage basin, would construct a new drywell and roadside bioswales along King Hezekiah Way. Project benefits include improved stormwater drainage and conveyance.
3	MB22A - Drainage Improvement Project 1	This project, located within a 319-acre drainage basin, seeks to improve drainage within the 2400 block of NW 1st Street where drainage problems present in an underserved

Approach(es)	Project Name	Description
		area. Project benefits include improved conveyance and flow control to prevent downhill erosion and property impacts.
3	MB22D - Drainage Improvement Project 2	This project, located within an 859-acre drainage basin, would construct a stormwater swale along NW Shields Drive in the 200 block where drainage problems present. Project benefits include improved drainage, reduced flooding, and enhanced water quality.
3	MB34D - Drainage Improvement Project 3	This project would replace an existing drill hole and provide treatment and additional drainage along NE Broken Bow Drive where problems present in the 2700 block. Project benefits include improved drainage and enhanced water quality.
3	MB34A - Drywell/Treatment Project 1	This project, located within a 799-acre drainage basin would construct a new driveway apron, sedimentation manhole, and drywell along West View Drive where drainage problems present in the 20900 block. Project benefits include improved stormwater drainage and enhanced drinking water quality protection.
3	MB06C - Drainage Improvement Project 1	This project, located within a 518-acre drainage basin, would construct new drainage improvements along Boyd Acres Road where problems present in the 63600 block. Project benefits include improved stormwater drainage and reduced flooding.
3	MB34D - Drainage Improvement Project 4	Within this 1,724-acre drainage basin, the project seeks to replace end-of-life facilities and improve drainage capacity where problems present in the 1200 block of NE Revere Ave. Project benefits include reduced flooding, property protection, and conveyance improvements.
3	MB14A - Drainage Improvement Project 3	This project, located within an 106-acre drainage basin, would improve drainage facilities through either construction of proper infiltration or drywell facilities with appropriate pretreatment or construct a new pump station with treatment vault near NW Hixon and NW Riverfront Street. Project benefits include improved stormwater drainage, enhanced water quality, and regulatory compliance.
3	MB16A - Drainage Improvement Project 1	This project, located within a 359-acre drainage basin, would construct new drainage controls and bank stabilization measures along SW Bond St. where problems present in the 800 block. Project benefits include improved stormwater drainage, enhanced water quality, and erosion prevention.
3	MB34B - Drainage Improvement Project 2	This project would construct new curbs, catch basins, and drywells with treatment along SE

Approach(es)	Project Name	Description
		Waco Drive where the problem presents in the 1900 block. Project benefits include improved drainage, conveyance, and enhanced water quality.
3	MB24 - Drainage Improvement Project 2	This project would install new catch basins to drain the area near NW 12th and NW Davenport and drain to an existing storm drain system. Project benefits include improved stormwater drainage and regulatory compliance.
3	MB20 - Drainage Improvement Project 1	This project located within a 176-acre drainage basin will improve drainage issues that present in the 300 block of NW Vermont Street. The project benefits include improved conveyance and drinking water quality protection.
3	MB03 - Drainage Improvement Project 1	This project, located in a 602-acre residential and recreational drainage basin, would improve the drainage around Awbrey Butte by improving conveyance and pretreatment (e.g. the pipe size) in accordance with recommendations to be refined in the Hillside Drainage Plan. Project benefits include reduced flooding and improved stormwater drainage and water quality benefits.
3	MB26 - Drainage Improvement Project 2	Located within a 694-acre drainage basin, this project would construct a new gravity stormwater collection system with treatment along SW Century Drive where problems present in the 200 block. Project benefits include reduced flooding, improved stormwater drainage, and enhanced water quality, and regulatory compliance.
3	MB8A - Drainage Improvement Project 1	Located within a 253-acre drainage basin, this project will improve drainage conveyance and collection issues within the 100 block of Windance Ct. to ensure public stormwater is handled onsite within this residential area. The benefits of this project include conveyance and drainage control improvements, and property protection.