Programmatic Action & Equipment Summary Sheets

Programmatic Action Summary Sheets

Programmatic actions are recommended program strategies to address Utility goals through means other than capital construction projects. Programmatic actions were identified through City Council and Director priorities, staff interviews, regulatory requirements, and challenges and opportunities identified during this planning process. The programmatic actions summarized in this appendix are categorized by the Utility goal addressed and prioritized by staff according to whether the action is needed to fulfill regulatory requirements, is needed for other critical work program efforts, or is identified as a Council priority. Planning level cost estimates for each action, including estimates of one-time and annual staff resource needs, one-time and annual consultant or contractor resource needs, and other direct costs are provided in the project summary sheets. The table below lists programmatic actions recommended including staffing needs, estimated costs, priority (indicated by color, green= high, yellow = medium, red = low) and status. If contractors (or consultants) are used in lieu of Surface Water Staff, the assumed hourly rate is $200 multiplied by the estimated hours assigned to Surface Water Staff. The project summary sheets show the level of effort for staff resources or consultants.

Utility Goal		Action Number	Description	Surface Water and GIS Staff Resources Needed (FTEs)		Estimated Contractor or Equipment Costs	
				One-time	Annual	One-time	Annual
Infrastructure		Infr-05	Evaluate Capital Facility Charges	0	0.01	0	$3,000
Infrastructure		Infr-08	Evaluate Aging Stormwater Facilities	0.69	0	0	0
Infrastructure		Infr-10	85th Street Station Area Stormwater Design Support	0	0.07	0	0
Infrastructure		Infr-15	Development Opportunity Fund				$75,000
Infrastructure		Infr-16	Aging Pipe Plan	0.31	0.03		
Habitat		Hab-01	Urban Forestry and Stormwater	0.12	0	0	0

Utility Goal		Action Number	Description	Surface Water and GIS Staff Resources Needed (FTEs)		Estimated Contractor or Equipment Costs	
				One-time	Annual	One-time	Annual
Water Quality		WQ-01	Mutual Benefits for Parks and Surface Water	0.18	0	0	0
Water Quality		WQ-02	6PPD Quinone	0	0.11	0	0
Water Quality		WQ-07	NPDES Permit Gap Analysis	0	0.06	0	0
Infrastructure Equipment		2022-01	CCTV Camera and Crawler			$55,000	
Infrastructure Equipment		2022-03	Hook Lift Asphalt Hot Box			$180,000	
Infrastructure		Infr-01	Stormwater Outfalls	0.35	0	0	0
Infrastructure		Infr-02	Land Acquisition Prioritization	0.12	0	0	0
Infrastructure		Infr-03	Minor Development Evaluation	0.38	0	0	0
Infrastructure		Infr-04	Hydrologic Monitoring Program	0.19	0.27	$30,000	$5,000
Infrastructure		Infr-06	CKC Review	0.37	0.07	$50,000	0
Infrastructure		Infr-07	Improve Stormwater System Continuity	0.86	0	$100,000	0
Infrastructure		Infr-09	Strategy for Repair and Replacement of Piped Streams	0.52	0	0	0
Infrastructure		Infr-11	Basin Pipe Capacity Analysis	0	0.65	0	0
Infrastructure		Infr-12	Trenchless Pipe Repair Program	0	0.29	0	$300,000

Utility Goal		Action Number	Description	Surface Water and GIS Staff Resources Needed (FTEs)		Estimated Contractor or Equipment Costs	
				One-time	Annual	One-time	Annual
Infrastructure		Infr-13	Closed Circuit Television (CCTV) Pipe Inspection	0	2.0	$500,000	0
Infrastructure		Infr-14	In-house Completion of Small CIP Projects	0	0.15	0	$50,000
Habitat		Hab-04	Wetland and Stream Restoration	0.34	0	0	0
Water Quality		WQ-03	Streets for Retrofit	0.22	0	0	0
Water Quality		WQ-08	NPDES and Other Surface Water Training	0.38	0	$3,000	0
Water Quality		WQ-09	Illicit Discharge Detection and Elimination (IDDE) Program Augmentation	0	1.2	$400,000	0
Water Quality		WQ-10	Source Control Program	0	0.9	0	0
Habitat		Hab-02	Streamside and Lakeside Recognition Program	0.19	0.17	0	$10,000
Habitat		Hab-03	On-Call Critical Area Determination Support Services	0	0.01	0	$10,000
Habitat		Hab-05	Juanita Creek near Windsor Vista Park Restoration Plan	0.05	0	$242,000	0
Water Quality		WQ-04	Sewer Connection System Incentives	0.13	0.19	0	$80,000

Utility Goal	Action Number	Description	Surface Water and GIS Staff Resources Needed (FTEs)		Estimated Contractor or Equipment Costs	
			One-time	Annual	One-time	Annual
Water Quality	WQ-05	Public/Private Retrofit Opportunities	0.22	0	0	0
Water Quality	WQ-06	Geotechnical Map Update	0.16	0	$85,100	0
Water Quality	WQ-11	Juanita Beach Water Quality	0.1		$33,400	
Infrastructure Equipment	2022-02	Skid Steer			$300,000	
Infrastructure Equipment	2022-04	Hook Lift Concrete Mixer			$175,000	
Total			5.88	6.18	$2,153,500	$533,000

Infrastructure Projects

Programmatic Action Infr-01

Stormwater Outfalls

Infrastructure

Example map showing stormwater outfalls (orange lines) to Lake Washington.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time
Parks and Community Services	
Planning	
OBJECTIVE	
Improve maintenance and operations of stormwater outfalls in Lake Washington.	
STATUS	**PRIORITY**
NEW	Medium
LEVEL OF EFFORT (FTE) *OR*	**CONSULTANT COST**
0.35 (One-time SW Staff)	$114,000.00
0.03 (One-time Parks Staff)	
0.03 (One-time Planning Staff)	
0.03 (One-time Legal Staff)	

DELIVERABLES

- Technical memorandum describing analysis and recommendations.
- Matrix and map of stormwater outfalls.
- List of priority outfalls for upgrades.

Project Description

This project recommends conducting a review of existing stormwater outfalls to Lake Washington to identify if there are opportunities for capacity upgrades to accommodate additional flow and if ownership/maintenance agreements should be pursued for outfalls located on private property.

Project Rationale

Development and redevelopment in the northwest part of Kirkland in the annexation area is affected by lack of stormwater conveyance infrastructure capacity. New development and redevelopment must tie into existing stormwater outfalls that are at times undersized and located on private property. Acquiring property and or constructing new stormwater outfalls could be a significant cost and permitting hurdle to the City or stormwater requirement hurdle for a private entity. This action would review all existing stormwater outfalls for potential capacity and prioritize upgrades (including replacement or parallel pipes or capacity) to provide additional flow capacity for future development.

Most of the outfalls in the northern part of the City are located on private property; it is unclear whether the City has maintenance easements

in place for each of these pipes. The condition of nearly all outfalls to Lake Washington has been assessed and all but one are in good condition, based on a review of closed-circuit television (CCTV) scores. The City does not have a program for maintaining, repairing, replacing, or upgrading stormwater conveyance on private property and may not have the authority to do so even if it is in the public interest. This action would identify and inventory all key outfalls; assess ownership, easements, and maintenance or replacement rights held by the City; and develop a priority program for easement or property acquisition. In addition, City policy for work on private property should be assessed. A policy is currently being developed around city easements; when and where to obtain stormwater easements for maintenance.

Anticipated Elements

Key elements of this project include:

1. Conduct an inventory of all outfalls to Lake Washington and review City easement data, including where agreements are in place for City maintenance of City-owned pipes on private property, and legal responsibilities of city and/or property owners.
    a. Determine and prioritize if easements should be acquired for operation, maintenance, and replacement.
2. Evaluate development and redevelopment trends to determine where increased capacity should be evaluated.
    a. Review outfalls for capacity, develop options and approaches, and prioritize outfalls for capacity upgrades. Coordinate with Parks and Community Services to determine if there are opportunities to partner for outfall upgrades and shoreline parks acquisition.
    b. Identify the need and location for potential new outfalls.
3. Prioritize top 10 outfalls for potential upgrade and develop planning level cost estimates for top 3 priorities.
4. Evaluate a cost-recovery program to allow individual developers to contribute to new pipe capacity and facilitate or accelerate upgrades.

Expected Outcome

The expected outcome of this project is a priority list of stormwater outfalls to focus upgrades and planning level cost estimates for up to 3 of the top priority outfalls.

Deliverables

- Memorandum describing analysis of stormwater outfalls, recommendations, cost recovery analysis, and planning level cost estimates for up to top 3 priority outfalls.
- List and map of stormwater outfalls in Lake Washington that includes property ownership, easement, and maintenance agreement data.

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	90	0.056	$10,800.00		$10,800.00				
1	Research ownership and easement data for up to 25 parcels. Create list of where easements are in place.	150	0.09	$18,000.00	$	$18,000.00		$	$	$
2	Evaluate development and redevelopment trends. Determine where increased capacity is needed and potential for cost recovery.	120	0.075	$14,400.00	$	$14,400.00		$	$	$
3	Prioritize outfalls for potential upgrade or new locations. Assume 10 outfalls. Develop planning level cost estimates for 3 outfalls.	150	0.09	$18,000.00	$	$18,000.00		$	$	$
4	Technical memorandum with prioritized list of outfalls and analysis of potential cost recovery for construction of new outfalls or upgraded pipes for additional capacity.	60	0.0375	$7,200.00	$	$4,800.00		$	$	$

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
5	Coordination with Parks and Community Planning for potential shoreline park acquisition.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
6	Coordination with Planning for preliminary permitting.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
7	Legal Support for ease-ments and potential cost recovery.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	690	0.43	$33,120.00	$	$	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	690	0.431			
TOTAL	690	0.431			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	570		$114,000.00	$	$114,000.00
TOTAL			$114,000.00	$	$114,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	570	0.35
Planning Staff	40	0.03
Legal Support	40	0.03
Parks and Community Services Staff	40	0.03

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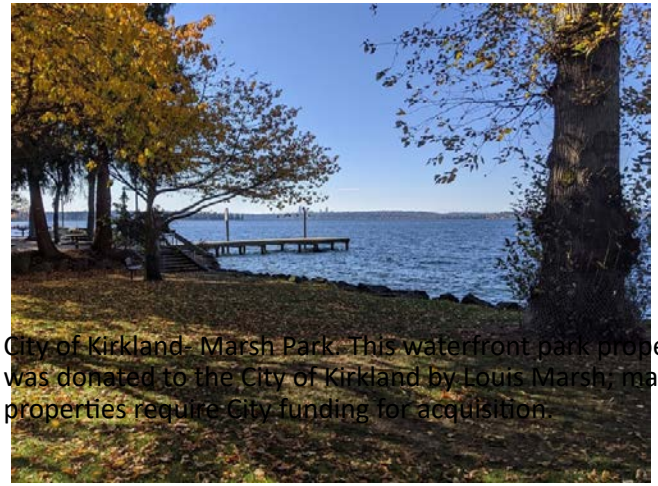
Programmatic Action Infr-02

Land Acquisition Prioritization

Infrastructure



City of Kirkland- Marsh Park. This waterfront park property was donated to the City of Kirkland by Louis Marsh; many properties require City funding for acquisition.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Parks and Community Services	One-time
OBJECTIVE	
Develop surface water prioritization goals for property acquisition.	
STATUS	**PRIORITY**
AUGMENTATION	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.12 (One-time SW Staff) 0.05 (One-time PCS staff)	$39,200.00
DELIVERABLES	
• List of short-, medium-, and long-term priorities for property acquisition. • Matrix of land acquisition decision criteria. • Recommendations for property acquisition fund stability.	

Project Description

This project recommends developing a policy for how land acquisition funds are prioritized to meet City needs and determining whether program funds need to be increased.

Project Rationale

The 2014 Surface Water Master Plan included a programmatic action to develop a property acquisition policy and prepare a priority property acquisition map. This project was delayed due to other priorities and was not completed.

The programmatic action recommended in 2014 (Property Acquisition and Priority Map- CW-24) is still relevant today. However, this effort should be re-focused around the short-, medium-, and long-term prioritization of fund use and secondarily, whether the fund should be increased to meet the City objectives.

Several of the programmatic actions in this plan involve potential partnership opportunities with parks to acquire property for stormwater retrofit, restoration, and/or public recreation purposes. These include:

WQ-01- Parks and Stormwater Retrofit

Hab-04- Wetland and Stream Restoration Priorities

Infr-01- Stormwater Outfalls

Prioritizing property acquisition funding around the City's objectives will help establish necessary funding levels and strategies for growing the funds.

An additional element to this project is to develop criteria for land acquisition decisions, such as:

- Cost of land vs. benefit of intended use.
- Scarcity of available property in the area of need.
- Property liabilities.
- Value of property for other uses besides the intended use.
- Accessibility to the public

Anticipated Elements

Key elements of this project include:

1. Coordinating with staff from Public Works and Parks and Community Services to prioritize short-, medium-, and long-term land acquisition priorities. For instance, property is needed in many areas for stormwater retrofit. Short-term goals may be to prioritize property acquisition that meets retrofit needs. Longer-term property acquisition goals could be for habitat benefits.
2. Develop matrix of criteria to be considered when land acquisition decisions need to be made.
3. Evaluating the fund balance sheet to determine gaps in property acquisition funding compared to desired goals and needs.
4. Identifying and recommend opportunities to accelerate fund growth, if needed, to meet needs.

Expected Outcome

The expected outcome of this project is a list of goals for property acquisition and estimated funding needs.

Deliverables

- List of short-, medium- and long-term priorities for property acquisition funds based on anticipated surface water needs and capital projects.
- Matrix of land acquisition decision criteria.
- Recommendations for account stability and/or growth.

Planning Level Cost Estimate

Table 1. Cost detail

		City Staff					Consultant/Contractor Staff			
Task	Description	Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	36	0.0225	$4,320.00		$4,320.00				
1	Coordination and development of priorities and decision criteria matrix.	80	0.05	$9,600.00	$	$9,600.00		$	$	$

2	Evaluate property acquisition fund.	40	0.025	$4,800.00	$	$2,400.00		$	$	$
3	Alternatives to accelerate fund growth.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
4	Coordination with Parks and Community Services	80	0.05	$9,600.00	$	$9,600.00		$	$	$
	Total	276	0.1725	$33,120.00	$	$33,120.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	276	0.1725			
TOTAL	276	0.1725			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	196		$39,200.00	$	$39,200.00
TOTAL			$39,200.00	$	$39,200.00

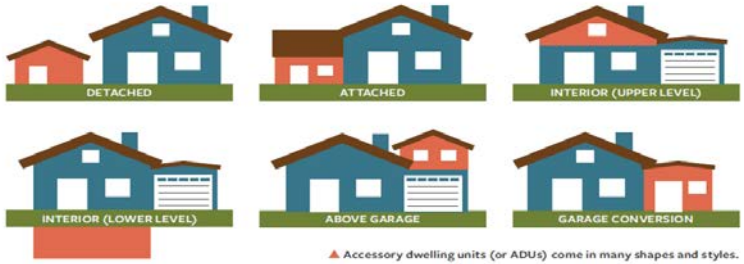
Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	196	0.12
Parks and Community Services Staff	80	0.05

Programmatic Action Infr-03

Minor Development Evaluation

Infrastructure



Examples of minor development from City of Redlands, CA.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Planning	One-time
OBJECTIVE	
Identification of potential surface water implications associated zoning code changes and recommendations for mitigation.	
STATUS	**PRIORITY**
NEW	Medium
LEVEL OF EFFORT (FTE) *OR*	**CONSULTANT COST**
0.38 (One-time SW Staff) 0.06 (One-time GIS Staff) 0.03 (One-time Planning Staff)	$143,800.00
DELIVERABLES	
• GIS coverage of existing impervious coverage vs. maximum allowable for all drainage basins. • Map and spreadsheet documenting potential unmitigated impervious surfaces in up to 2 drainage basins. • Summary memorandum of analytical results and recommendations.	

Project Description

This project recommends evaluation of potential development and redevelopment against current city zoning code policies that could potentially result in cumulative impacts to the City's stormwater infrastructure.

Project Rationale

Zoning codes can result in unintended consequences for stormwater management depending on how they are implemented. Allowing Incremental impervious surfaces to be constructed on residential lots without flow control could result in the need for additional pipe capacity in certain areas or result in impacts to streams and fish habitat, depending on neighborhood development and redevelopment trends.

A development and redevelopment analysis was previously conducted in 2014 to identify parcels that were under-developed relative to current zoning and had the potential to sub-divide. This analysis would update the 2014 analysis and include a review of what could be expected if individual parcels were to build out to their maximum allowable impervious surface and what potential effects might result for the stormwater system.

As impervious surfaces are added with minor construction below thresholds required for construction of stormwater flow control facilities, additional flow will be incrementally added to Kirkland's stormwater system. Minor development is not subjected to the Kirkland Surface Water Capital Facility Charge if the primary residence is already connected to the public storm system, so no funds are collected to offset potential future impacts.

The potential cumulative stormwater system impacts from minor development on individual lots to maximum impervious surface coverage is not known and may depend on how many parcels add impervious surfaces and within which subbasins the development occurs.

Anticipated Elements

This programmatic action is anticipated to include the following:

1. Compare baseline existing impervious surface to allowable lot coverage for all drainage basins.
2. Conduct GIS analysis of developable properties in one or two drainage basins that have the potential to add impervious surface.
    a. Conduct spreadsheet analysis of potential increases (built-out conditions) and potentially un-mitigated impervious area for up to two sub-basins.
    b. Evaluate whether cumulative impacts necessitate additional analysis, such as hydraulic modeling, to determine potential impacts to stormwater system.
3. Review zoning code for changes that could impact or increase impervious surface and potentially result in increased flow to the City's storm-water system without mitigation.
4. Develop alternatives for mitigating potential cumulative stormwater impacts, if any are identified, including:
    a. Collection of CFCs to offset impacts and contribute toward infrastructure improvements.
    b. Modification of thresholds for added impervious surfaces.
    c. Removal of impervious surfaces in other areas to offset impacts (see Programmatic Action WQ-03 Streets for Retrofit).
    d. Regional facilities.

Expected Outcome

The expected outcome of this is a report that documents the basin-specific evaluation, results of redevelopment and development analysis, ba-sin-specific evaluation, potential cumulative impacts to the stormwater system, and mitigation alternatives.

Deliverables

- GIS coverage of baseline impervious surface vs. allowable lot coverage.
- Map and documentation of built out conditions and potential un-mitigated impervious surface impacts in up to two drainage basins.
- Summary of analytical results documenting potential stormwater system impacts from un-mitigated impervious surfaces, alternatives for stormwater mitigation, and recommendations.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	99	0.062	$11,880.00		$11,880.00				
1	Conduct baseline GIS analysis of impervious surface coverage vs. maximum allowable for all drainage basins.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
2	Conduct GIS analysis of developable property relative to potential for minor construction (2 basins).	200	0.125	$24,000.00	$	$24,000.00		$	$	$
3	Review zoning code.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
4	Develop alternatives to mitigate potential cumulative impacts.	200	0.125	$24,000.00	$	$24,000.00		$	$	$
6	Document results.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
7	Planning Coordination.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	759	0.474	$91,080.00	$	$91,080.00	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	759	0.474			
TOTAL	759	0.474			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water and GIS Staff)	719		$143,800.00	$ -	$143,800.00
TOTAL			$143,800.00	$ -	$143,800.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	619	0.39
GIS Staff	100	0.06
Planning Staff	40	0.03

Programmatic Action Infr-04

Remote sensors will be used to monitor flow. Do not try this at home or work.

Hydrologic Monitoring Program

Infrastructure and Habitat

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going
OBJECTIVE	
Collect data to support needed surface water analyses.	
STATUS	**PRIORITY**
New	Medium
LEVEL OF EFFORT (FTES) OR	**CONSULTANT COST**
0.19 (One-time SW Staff)	$59,800 One-time
0.27 (Annual SW staff)	$87,400 Annual
$30,000 (One-time equipment)	$30,000 (One-time equipment)
$5,000 Annual equipment)	$5,000 Annual equipment)

DELIVERABLES

- Gauge installation.
- Standard Operating Procedures and dashboard.

Project Description

This project recommends development of a flow monitoring program that focuses on flow measurements in streams that have no gauges and storm-water systems that require data to support capital projects.

Project Rationale

Capital projects are being designed and constructed in different parts of the city where there is not sufficient flow information to calibrate models to inform project designs. This project will focus on implementing long-term collection of flow data at five locations; two streams, and three stormwater systems where data will support prioritized capital projects. Flow monitoring will provide data to support hydraulic analysis of stormwater systems in areas that are experiencing flooding, fish passable culvert designs, and instream habitat efforts, resulting in better capital project solutions.

Rainfall stations recently installed in the city, along with collected flow monitoring data will be used as inputs to hydraulic models to describe discrete flooding problems that occur or develop relationships between rainfall and measured runoff patterns. In addition, knowledge of flow patterns and trends in streams will assist with maintenance and operations response during large events. Alarms could be installed on any gauges based on triggered flows to alert crews of situations that need their attention.

Anticipated Elements

Key elements of this project include:

1. Identification of data needs.
    a. Where is monitoring needed to support current or potential future capital projects?
    b. Data quality objectives, methods, and procedures.
2. Prioritize up to five initial locations (2 streams, and 3 stormwater systems) where flow monitoring equipment will be installed.
3. Identify staffing requirements and skills for installation, operations and maintenance, and data management.
    a. Alternative staffing resources for the programmatic action include:
        i. Internal staffing – operations and maintenance staff, environmental analyst, or a combination.
        ii. Consultant conducts installation and/or long-term monitoring and data management (city could also take over monitoring and data management after installation).
        iii. Partner with King County (for stream locations) to add additional stations to their program.
4. Develop standard operating procedures for flow monitoring data collection and management and elements to display on a public-facing dashboard.
5. Implement monitoring program.

Expected Outcome

The expected outcome of this project is (1) a map and list of locations where data is needed to inform current or future capital projects (i.e., flooding, habitat, infrastructure, etc.), (2) installation of flow monitoring equipment at top 5 priority locations, and (3) standard operating procedures for collection of data and dashboard display.

Deliverables

Deliverables for this project include:

1. Installed gauges at five locations.
2. Standard operating procedures for data collection and management, including dashboard.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time Costs										
PM	Admin	39	0.024	$4,680.00		$4,680.00				
1	Identify Data Needs, data quality objectives, and methods, and prioritize locations.	60	0.0375	$7,200.00	$	$7,200.00		$	$	$

2	Install equipment at top 5 locations.	200	0.125	$24,000.00	$30,000.00	$54,000.00		$	$	$
	Total One-time	299	0.19	$35,880.00	$30,000.00	$65,880.00				
Annual Costs										
PM	Admin	57	0.035	$6,840.00	$	$6,840.00		$	$	$
3	Data download, review, and management	300	0.187	$36,000.00	$	$36,000.00		$	$	$
4	Develop standard operating procedures, and data dashboard.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
5	Maintenance				$5,000.00	$5,000.00		$	$	$
	Total Annual	437	0.27	$52,440.00	$5,000.00	$57,440.00	0	$	$	$

Table 2. Cost Assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

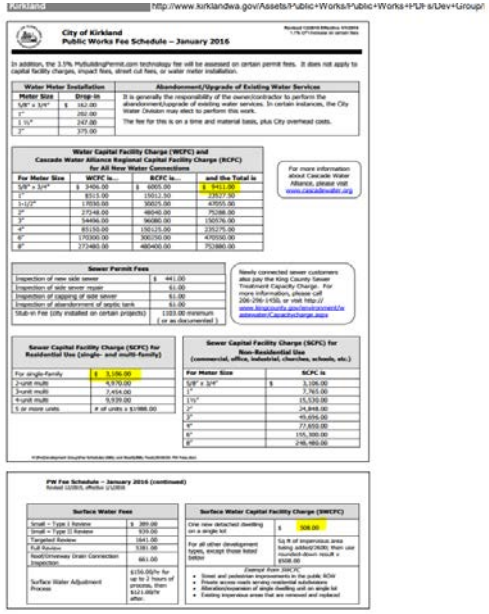
Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
One-time					
City					
City Staff	299	0.186			
TOTAL	299	0.186			
Consultant or Contractor					
OR Consultant or Contractor Only			$ 59,800.00	$30,000.00	$ 89,800.00
TOTAL			$ 59,800.00	$30,000.00	$ 89,800.00
Annual					
City					
City Staff	437	0.273			
TOTAL	437	0.273			
Consultant or Contractor					
OR Consultant or Contractor Only			$ 87,400.00	$5,000.00	$ 92,400.00
TOTAL			$ 87,400.00	$5,000.00	$ 92,400.00

Table 4. Staff Summary

City Staff Distribution	One-time		Annual	
	Hours	FTE	Hours	FTE
Surface Water Staff	299	0.19	437	0.27

Programmatic Action Infr-05


City of Kirkland
Public Works Fee Schedule – January 2016

Example Kirkland Public Works Fee Schedule

Evaluate Capital Facility Charges

Infrastructure

DEPARTMENTS	FREQUENCY
Public Works	Bi-annual
OBJECTIVE	
Ensure Kirkland collects appropriate fees to fund capital facility improvements.	
STATUS	**PRIORITY**
NEW	High
LEVEL OF EFFORT (FTES) *AND*	**CONSULTANT COST**
0.04 FTE (Surface Water Staff, assuming 3 CFC review cycles)	$18,000.00 (for 3 CFC review cycles)

DELIVERABLES

- Memorandum describing analysis, results, and recommendations.

Project Description

This project recommends evaluation and update of Kirkland's stormwater capital facility charges on a bi-annual basis.

Project Rationale

In a benchmarking analysis conducted for this Plan, it was noted that Kirkland's capital facilities charges appear to be significantly less than neighboring jurisdictions and similar-sized jurisdictions in other areas of western Washington. Kirkland has not updated their CFCs for many years despite higher costs to the city for infrastructure that serves new development.

Comprehensive CFC evaluation of all Utility CFCs will be completed in 2022 – 2023, however, frequent review is recommended to ensure that CFCs keep pace with development and economic factors.

Anticipated Elements

Key elements of this project include:

1. Financial analysis and review of existing capital facility rates for the stormwater utility.
2. Evaluate alternative CFC rate structures that will provide different levels of capital funding for infrastructure needs and compare to other jurisdictions for benchmarking comparison.
3. Recommend preferred CFC rates.

Expected Outcome

The expected outcome of this project is a financial analysis and on-going review of Kirkland CFCs for the Surface Water Utility, and a recommended update to CFCs, including timeline for implementation.

Deliverables

- Memo describing analysis, results, and recommendations for the CFC study.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	9	0.005	$1,080.00		$1,080.00				
1	Staff time to implement contract, share results, and recommend adoption, assuming 3 cycles of analysis during planning period.	60	0.03	$7,200.00	$	$7,200.00		$	$	$
2	Financial analysis of CFCs, assumes three cycles of review.							$	$	$18,000.00
	Total	69	0.04	$8,280.00	$	$8,280.00	0	$18,000.00	$	$18,000.00

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	69	0.04			
TOTAL	69	0.04			
Consultant or Contractor					
OR Consultant or Contractor Only			$ 18,000.00	$ -	$ 18,000.00
TOTAL			$ 18,000.00	$ -	$ 18,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	69	0.04

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Programmatic Action Infr-06

Snippet of CKC trail corridor map from CKC Master Plan.

CKC Review

Infrastructure

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time and On-going
Transportation	
OBJECTIVE	
Identify CKC stormwater needs and opportunities for collaboration in advance of project design and implementation.	
STATUS	**PRIORITY**
AUGMENT	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.37 FTE (One-time SW Staff) plus	$117,300.00 One-time plus
$50,000 Geotechnical Analysis	$50,000.00 Geotechnical Analysis
0.025 FTE (Annual/on-going Transportation Staff)	$24,200.00 Annual/on-going
0.07 FTE (Annual/on-going SW Staff)	
DELIVERABLES	
• Table of short, medium, and long-term Surface Water needs on CKC. • Up to 3 conceptual designs and planning level cost estimates.	

Project Description

This project recommends review of the Cross Kirkland Corridor Master Plan for surface water projects and/or needs related to potential future uses and development of conceptual surface water projects.

Project Rationale

The Cross Kirkland Corridor (CKC) is a 5.75 mile section of the Eastside Rail Corridor that was acquired by the city in 2012. This trail, which is in the heart of Kirkland, will eventually be developed into the vision that the city has for it in the CKC Master Plan, as funding is allocated. It is one of the Council's 2022 priority work items to develop options for updating and funding implementation of the CKC Master Plan. As a linear feature, the CKC crosses surface water features throughout the city, many of which will require crossing improvements to be constructed with trail upgrades. Additionally, the trail corridor presents a potential opportunity for surface water education and outreach, as well as small stormwater capital retrofit projects that could be designed and implemented during trail construction.

Anticipated Elements

Key elements of this project include:

1. Reviewing the CKC Master Plan for stream crossings and wetland encroachments
2. Identifying design elements in the CKC Master Plan for surface water opportunities, such as:
    a. Shared open spaces for potential retrofit, habitat benefits, or stormwater parks
    b. Stormwater retrofit needs (incorporating water quality design work completed as part of NPDES capacity grant)
    c. Preparing standard sections and details for stormwater and drainage management, and stream restoration
    d. Educational opportunities (i.e., signage, kiosks)
3. Coordination with transportation and City Manager on CKC ideas, projects, and funding.
4. Develop conceptual design alternatives and planning level cost estimates for up to 3 surface water projects within the CKC corridor.
    1. Conduct geotechnical analysis to support conceptual designs.

Expected Outcome

The expected outcome of this project is (1) a list of short- (1 -year), medium- (2 – 6 year), and long-term (>6 year) surface water needs anticipated for proposed CKC action items, (2) a list of opportunities to meet some surface water goals that could be provided through CKC implementation, and (3) conceptual designs and planning level cost estimates for up to 3 priority surface water improvements.

Deliverables

- Table and associated location map of potential short-, medium, and long-term surface water needs associated with identified CKC projects and opportunities to address stormwater needs along the corridor.
- Up to 3 conceptual designs and planning level cost estimates for surface water improvements.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time Costs										
PM	Admin	76.5	0.047	$9,180.00		$9,180.00				
1	Review CKC Plan.	30	0.018	$3,600.00	$	$3,600.00		$	$	$

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
2	Identify surface water needs and opportunities. Focus on design elements in Plan and stormwater needs adjacent to CKC.	200	0.125	$24,000.00	$	$24,000.00		$	$	$
3	Coordinate with transportation for ideas and funding.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
4	Develop 3 conceptual design plans and planning level cost estimates.	240	0.15	$28,800.00	$	$28,800.00		$	$	$
5	Geotechnical analysis. Assume 5 borings.				$50,000.00	$50,000.00		$	$	$
	Total One-time	586.5	0.37	$70,380.00	$50,000.00	$120,380.00				
Annual costs										
PM	Admin	21	0.013	$2,520.00		$2,520.00				
5	On-going coordination	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
6	Transportation coordination	40	0.025	$4,800.00		$4,800.00		$	$	$
	Total Annual	161	0.10	$19,320.00		$19,320.00				

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
One-time					
City					
City Staff	586.5	0.37		$50,000.00	$50,000.00
Consultant or Contractor					
TOTAL	586.5	0.37		$50,000.00	$50,000.00
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	586.5		$117,300.00	$50,000.00	$167,300.00
TOTAL			$117,300.00	$50,000.00	$167,300.00
Annual					
City					
City Staff	161	0.1			
Consultant or Contractor					
TOTAL	161	0.1			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	121		$24,200.00		$24,200.00
TOTAL			$24,200.00		$24,200.00

Table 4. Staff summary

	One-time		Annual	
City Staff Distribution	**Hours**	**FTE**	**Hours**	**FTE**
Surface Water	586.5	0.37	121	0.07
Transportation Planning			40	0.03

Programmatic Action Infr-07

Improve Stormwater System Continuity

Infrastructure

Example of pipe that could potentially be moved to right-of-way.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time

OBJECTIVE

Prioritized plan and conceptual designs for conveyance system improvements where formal system is lacking.

STATUS	PRIORITY
NEW	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.86 (Surface Water Staff)	$276,000.00
$100,000 Geotechnical Analysis	$100,000.00 Geotechnical Analysis

DELIVERABLES

- Map of conveyance system needs.
- Prioritized list of conveyance improvements.
- Hydraulic modeling.
- Geotechnical analysis.
- Up to 10 conceptual designs and cost estimates.

Project Description

This project recommends stormwater system planning in locations that lack formal stormwater conveyance, pipe capacity is undersized, or system improvements are needed.

Project Rationale

Stormwater infrastructure gaps were identified in this Surface Water Master Plan, including areas where stormwater pipes terminate without a formal outfall or appropriate place for water to go, and areas where there is no formal infrastructure. This programmatic action is needed for system planning and prioritization of new stormwater infrastructure where there are system gaps.

It is expected that this project will be on-going and analysis and prioritization will be continually updated as the program matures and infrastructure is constructed.

Anticipated Elements

Key elements of this project include:

1. Identify locations where formal infrastructure is lacking or system dead-ends.
2. Field verify GIS identified “System to Nowhere” locations.
3. Develop prioritization criteria and rank locations for new infrastructure
4. For top 10 prioritized locations:
    a. Delineate basin draining to gap areas
    b. Consider design alternatives
    c. Determine if project can be completed in-house or if CIP is needed
    d. Conduct hydrologic modeling in support of design alternatives
    e. Conduct geotechnical analysis in support of design alternatives
5. Develop conceptual design and planning level cost estimates

Expected Outcome

The expected outcome of this programmatic project is a strategy for on-going implementation for construction of new stormwater conveyance infrastructure.

Deliverables

- Map of conveyance system gaps and identified needs.
- Prioritized list of improvements and CIP identification.
- Up to 10 conceptual plans and planning level cost estimates for system improvements in the top prioritized areas.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	180	0.1125	$21,600.00		$21,600.00				
1	Confirm “System to Nowhere” GIS map. Add appropriate attributes needed for prioritization, if necessary.	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
2	Field verify GIS “System to Nowhere” locations (assume 70 locations)	80	0.05	$9,600.00	$	$9,600.00		$	$	$

3	Develop prioritization criteria and prioritize top 10 locations.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
4	Conduct hydraulic modeling. Hydraulic modeling and technical analysis to support pipe sizing for system gaps.	400	0.25	$48,000.00	$	$48,000.00		$	$	$
5	Geotechnical analyses, per location, assuming 10 locations.				$100,000.00	$100,000.00		$	$	$
6	Conceptual design development and planning level costs.	600	0.375	$72,000.00	$	$72,000.00		$	$	$
	Total	1380	0.8625	$165,600	$100,000.00	$265,600.00	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	1380	0.8625		$100,000.00	$100,000.00
TOTAL	1380	0.8625		$100,000.00	$100,000.00
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	1380		$ 276,000.00	$100,000.00	$ 376,000.00
TOTAL			$ 276,000.00	$100,000.00	$ 376,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	1380	0.86

Programmatic Action Infr-08

Evaluate Aging Stormwater Facilities

Infrastructure

Example King County Stormwater Pond. Kirkland inherited stormwater facilities from King County when the city annexed Finn Hill and other areas to the north.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time

OBJECTIVE
Develop plan for replacing or improving aging stormwater facilities.

STATUS	PRIORITY
NEW	High

LEVEL OF EFFORT (FTES) ***OR***	CONSULTANT COST
General: 0.21 FTE (One-time SW)	General: $67,000
Phase 1: 0.32 FTE (One-time SW)	Phase 1: $104,000
Phase 2: 0.16 FTE (One-time SW staff)	Phase 2: $51,000

DELIVERABLES

- GIS coverages with facility ages.
- Memorandum documenting evaluation of aging facilities and schedule for replacement.
- Facility assessments of top 10 ranked stormwater facilities needing replacement.
- Memorandum documenting evaluation results and recommendation.

Project Description

This project recommends (1) developing a plan to replace the city's aging stormwater facilities based on where they are in their estimated lifespan, and (2) evaluating the City's older stormwater facilities for upgrades, repairs and repurposing to improve water quality and flow control benefits.

Project Rationale

This project is separated into two phases; Phase 1 will identify aging facilities based on lifecycle and develop a plan for replacement and Phase 2 will focus on older facilities that aren't necessarily ready for replacement but can be improved in other ways.

Phase 1- Aging Stormwater Facilities

One of the principles of asset management is to understand the life cycle of assets so that repairs and replacement can be planned, and risk of failure can be minimized. Stormwater facilities generally have long lifecycles, if maintained properly. According to a 2014 study by the National Academy of Sciences (Long-Term Performance and Life-Cycle Costs of Stormwater Best Management Practices, NCHRP Report 792) , bioretention facilities, detention ponds, and sand filters have life spans up to 75 or 80 years, and are only limited by the pipe material longevity. Vegetated swales have shorter life spans, limited by sediment accumulation.

Most of Kirkland's stormwater facilities are not near the end of their lifespans, based on the average lifecycle for the types of facilities owned and operated by the city. However, there are some in the northern part of the city that are close to 50 years old, nearing their useful lifespan, and may also be in poor condition. Developing a plan for how and when older facilities are replaced will help the Utility budget for these eventual needs. Additionally, the city may wish to take some older facilities out of service sooner to achieve current stormwater management goals.

Older stormwater facilities were built under design criteria that is now outdated and these facilities are less effective at meeting the city's stormwater management goals. Because of this, it may be desirable for the city to upgrade underperforming stormwater facilities or replace them before useful lifespans have been expended.

The goal of this project is to conduct an evaluation of public stormwater facilities constructed before 1980 to determine approximate current value in terms of costs and benefits to the Utility and stormwater system. There are many publicly available stormwater BMP calculators that could be used to estimate stormwater facility value by inputting factors such as land value, maintenance costs, and depreciated value of assets that make up the facility. Additionally, costs to construct new stormwater treatment facilities can be estimated using these same calculators to estimate replacement costs in the year that replacement is expected.

It is expected that the city's entire publicly-owned stormwater facility inventory (over 800 facilities) will eventually be evaluated on a life-cycle cost basis and recommendations will be made for future repairs and/or replacement, however, this phase of the project just focuses on the oldest facilities first to estimate potential replacement or major upgrades that are going to be expected in the next 10 to 20 years.

Phase 2- Evaluate Vintage Facilities for Improvements

The facilities that fall under this programmatic action are older, but not quite nearing their useful lifespans. However, many of these facilities were built under design criteria that is now outdated and these facilities are less effective at meeting the city's stormwater management goals.

The goal of this phase of the project is to conduct an evaluation of public stormwater facilities constructed before 2000 for potential opportunities. Since there are a large number of stormwater facilities in the City's stormwater inventory that likely meet this age criteria, the list will need to be culled down further so that meaningful recommendations can be developed for a fewer number of facilities that have the greatest need.

Anticipated Elements

Key elements of this project are described below:

Pre-project tasks:

1. Fill age data gaps in stormwater facility inventory through review of as-builts, or proxy ages assigned based on age of adjacent development or other methodology.
2. Develop GIS coverage of city-owned stormwater facilities constructed before 1980 (Phase 1).
3. Develop GIS coverage of city-owned stormwater facilities constructed between 1980 and 2000 (Phase 2).
4. Identify expected lifecycle cost for each facility type (tank, vault, UIC wells, etc.).

These GIS coverages will be used for Phases 1 and 2.

Phase 1:

1. Conduct lifecycle cost analysis of pre-1980 facilities and estimated cost of replacement (present value in the estimated year of replacement).
2. Prioritize stormwater facilities for replacement based on lifecycle cost and age.
5. Conduct facility assessments of the top ranked stormwater facilities to determine condition and adjust schedule for repairs and/or replacement.
    a. Assess current flow control and/or water quality treatment functionality.
6. Develop long-term estimated replacement schedule.
7. Document results of analysis in memorandum.

Phase 2:

1. Using inventory of facilities constructed between 1980 and 2000, filter dataset to stormwater facilities that are most likely to need upgrades, repairs, or repurposing, including, but not limited to:
    a. Facility types that generally cost the city more to inspect and maintain.
    b. Facilities that are located on parcels owned by the city, outside of right-of-way.
    c. Areas where there is a high density of stormwater facilities.
    d. Facilities located in identified stormwater retrofit areas.
    e. Facilities located in areas with high infiltration potential.
2. Conduct field visits and evaluate the filtered list of vintage stormwater facilities for opportunities, including but not limited to the following:
    a. Opportunity for re-purposing (i.e., convert ponds to vaults so that surface area of property can be used for something else) to achieve multiple city goals, such as pocket parks.
    b. Opportunity to consolidate multiple facilities in the same vicinity into a larger, more effective facility.
    c. Opportunities to convert above-ground treatment to infiltration.
    d. Opportunities to consolidate with other projects that are focused on retrofitting untreated areas.
3. Develop list of highest priority opportunities for upgrades or repurposing.
4. Document results in a technical memorandum.

Expected Outcome

The expected outcome of this programmatic project are:

1. A long-term schedule and estimated resource needs for the replacement of the city's oldest stormwater facilities.
2. Prioritized list of potential actions for to improve vintage (pre-2000) stormwater facilities.

Deliverables

- Memorandum describing results of evaluation and list of facilities that will need to be replaced first, based on assumed lifespan and/or condition.
- Facility assessment checklists for highest ranked stormwater facilities needing replacement.
- Memorandum describing results of evaluation and prioritized list of potential actions.

Planning Level Cost Estimate

Table 1. General Tasks detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	43.5	0.027	$5,220.00		$5,220.00				
1	Fill age data gaps	120	0.0725	$14,400.00	$	$14,400.00		$	$	$
2	GIS inventory of City's oldest facilities	130	0.081	$15,600.00	$	$15,600.00		$	$	$
3	Identify expected lifecycle for each facility type (tank, vault, UIC wells, etc.)	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	333.5	0.208	$40,020.00	$	$	0	$	$	$

Table 2. Phase 1 Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	67.5	0.042	$8,100.00		$8,100.00				
1	Lifecycle cost analysis of existing facilities and proposed replace-ments & prioritization.	300	0.1875	$36,000.00	$	$36,000.00		$	$	$
2	Facility assessments of top ranked facilities. Assume 10 facilities.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
3	Develop long-term replacement schedule for oldest facilities.	30	0.025	$3,600.00	$	$4,800.00		$	$	$
4	Technical memorandum and recommendations.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	517.5	0.323	$62,100.00	$	$	0	$	$	$

Table 3. Phase 2 Task details

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	33	0.021	$3,960.00		$3,960.00				
1	Filter list of facilities to high priority criteria for potential repair or repurposing.	60	0.0375	$7,200.00	$	$7,200.00		$	$	$
2	Evaluate opportunities for repurposing, conduct field visits. Assumed up to 10 facilities.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
3	Document results and develop prioritized list of potential actions.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
	Total	253	0.158	$30,360.00	$	$	0	$	$	$

Table 4. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 5. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
General Tasks	333.5	0.21			
Phase 1	517.5	0.32			
Phase 2	253	0.16			
TOTAL	1104	0.69			
Consultant or Contractor (in lieu of Surface Water Staff)					
General Tasks	333.5		$ 67,000.00	$	$ 67,000.00
Phase 1	517.5		$104,000.00		$104,000.00
Phase 2	252		$51,000.00		$51,000.00
TOTAL	1104		$222,000.00	$	$222,000.00

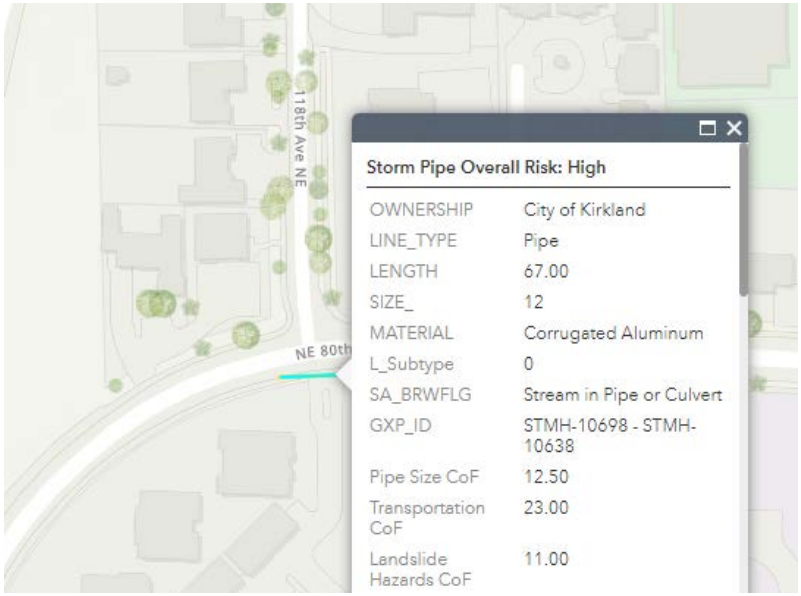
Table 6. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff- General Tasks	333.5	0.21
Surface Water Staff- Phase 1	517.5	0.32
Surface Water Staff- Phase 2	253	0.16

Programmatic Action Infr-09

Strategy for Repair and Replacement of Piped Streams

Infrastructure



The pipe evaluation tool created for the Surface Water Master Plan identified streams in pipes and their overall risks. This programmatic action will develop a strategy for how to manage repairs and replacement.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time

OBJECTIVE

Strategy for repair and replacement of piped streams.

STATUS	PRIORITY
NEW	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.52 (One-time Surface Water staff)	$165,600.00

DELIVERABLES

- Table and map of high-risk pipes conveying streams.
- Memorandum describing strategy.
- CCTV of high-risk pipes.
- Stakeholder outreach.

Project Description

This project recommends developing a strategy for repair and/or replacement of piped streams.

Project Rationale

Over 1,000 pipe segments are shown to convey streams in the City of Kirkland. Of these eight pipes with known structural issues that were identified as high risk in the pipe evaluation tool developed for the Surface Water Master Plan. These eight pipes are also on the city's aging and failing infrastructure list or identified as unmaintainable.

Piped streams are challenging to maintain; greater levels of planning and coordination are required due to potential flow bypass or fish screening needs. When maintenance is no longer an option and the infrastructure requires replacement, considerations for daylighting may be necessary to comply with environmental regulations and permits.

This programmatic project is needed to develop a strategy and plan for eventually replacing or daylighting pipes that convey streams.

Anticipated Elements

Key elements of this project include:

1. Stakeholder engagement with WDFW and Tribes to negotiate mitigation for repair/maintenance in other locations.
2. Determine the quantity and type of streams in pipes. Create table of piped stream data.
    a. How many pipe segments convey streams?
    b. What types of streams are conveyed? Perennial, ephemeral, groundwater-fed?
3. Evaluate number and type of potential pipes conveying streams that will require repair or replacement in the next 20 years
    c. Use pipe evaluation tool to identify high risk pipes
    d. Review CCTV data for pipe segments.
    e. Conduct CCTV as needed
    f. Field verify condition of streams upstream and downstream of high risk piped streams.
4. Develop strategy for repair or replacement of pipes conveying streams or potential daylighting of streams.
    g. Develop process for assessment and repair including:
        i. bypass
        ii. permitting
    h. Develop criteria for consideration of daylighting
        i. Fish use
        ii. Habitat potential
        iii. Built environment
5. Document results in a technical memorandum.

Expected Outcome

The expected outcome of this programmatic project is to have a process in place for repairing and replacing pipes that convey streams.

Deliverables

- Summary table and map of high-risk pipes that convey streams that may require repair or replacement in the next 20 years.
- Memorandum documenting strategies.

Level of Effort (FTEs)

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	108	0.0675	$12,960.00		$12,960.00				
1	Create table of piped streams to evaluate magnitude of issue. Evaluate types of streams in pipes, risk of pipes, and locations.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
2	Identify high-risk pipes and field verify conditions. Assume 20 pipes, includes review of CCTV.	240	0.15	$28,800.00	$	$28,800.00		$	$	$
3	Conduct CCTV condition assessment of high-risk pipes. Assume 20 pipes, including data processing and review.	160	0.1	$19,200.00	$	$19,200.00		$	$	$
4	Conduct stakeholder engagement with tribes and WDFW.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
5	Develop strategy for repair and replacement and consideration for daylighting	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
6	Document results	40	0.025	$	$	$4,800.00		$	$	$
	Total	828	0.5175	$99,360.00	$	$99,360.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	828	0.5175			
TOTAL	828	0.5175			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	828		$ 165,600.00	$ -	$ 165,600.00
TOTAL			$ 165,600.00	$ -	$ 165,600.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	828	0.52

Programmatic Action Infr-10

85th Street Station Area Stormwater Design Support

Infrastructure

The 85th Street Station Area Plan will result in new stormwater infrastructure. Successful integration will require design, evaluation, and involvement of surface water staff.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	Annual

OBJECTIVE

Support stormwater design and environmental strategies in 85th Street Station Area Plan

STATUS	PRIORITY
NEW	High
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.07 (Annual Surface Water staff)	$23,000.00

DELIVERABLES

- None.

Project Description

This project recommends providing support in the design, review, and evaluation process for stormwater improvements associated with the 85th Street Station Area Plan.

Project Rationale

The 85th Street Station Area Plan includes environmental strategies associated with the preliminary alternative selection including on-site stormwater and tree canopy improvements and low impact development along 120th Ave NE, and stormwater improvements at the WSDOT I-405 interchange.

Surface water staff should be involved in the selection and evaluation of surface water components of the design to ensure city goals are met, new infrastructure integrates seamlessly with existing and planned stormwater infrastructure in the neighborhood, and the city is poised to maintain and operate new facilities in cooperation with other partner agencies.

In an November 2021 joint City Council and Planning Commission Study Session, staff were given direction to develop a “bold vision for open space, parks and green infrastructure…..” This programmatic project is to allocate time and resources needed for staff to participate in project planning, design, and evaluation.

Anticipated Elements

Key elements of this project include:

1. Review of documents and materials prepared for Final 85th Station Area Plan.
2. Provide input on proposed stormwater design concepts, zoning changes, and comprehensive plan amendments that impact surface and stormwater.
3. Provide input on complementary retrofit and other stormwater infrastructure improvements that could be coordinated with identified infrastructure improvements in the Final Plan or in the implementation of the plan.

Expected Outcome

The expected outcome of this programmatic project is to have surface water staff dedicated to the 85th Station Area Plan team to ensure seamless integration of new stormwater infrastructure.

Deliverables

- None identified. Annual staff time to review, participate, and provide input on design, evaluation, and vision for stormwater infrastructure in the 85th Street Subarea.

Level of Effort (FTEs)

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	15	0.009	$1,800.00		$1,800.00				
1	Review materials and participation in monthly planning sessions and conduct further planning as needed.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
	Total	115	0.072	$13,800.00	$	$13,800.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	115	0.072			
TOTAL	115	0.072			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	115		$23,000.00	$ -	$23,000.00
TOTAL			$23,000.00	$ -	$23,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	115	0.07

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Programmatic Action Infr-11

Basin Pipe Capacity Analysis

Flooding

Moss Bay is an example drainage basin encompassing the Downtown area that is a priority for pipe capacity analysis.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going

OBJECTIVE

Identify and plan for potential system upgrades to address current system issues and future impacts due to climate change

STATUS	PRIORITY
NEW	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.65 (Surface Water staff)- first basin	$207,000.00 First basin

DELIVERABLES

- Design Memorandum

Project Description

This project recommends conducting hydrologic and hydraulic analysis of priority drainage basins and stormwater pipe networks to identify potential pipe capacity upgrades to address historic and current flooding issues and potential increased flooding frequency due to proposed development that may not fully address stormwater management.

Project Rationale

It is important for the Surface Water Utility to be proactive in the identification of stormwater system needs and potential upgrades so that system improvements can be incorporated into design plans for new development and redevelopment. This project will help reduce delays because pipe capacities are known in advance and engineers will have better information to ensure infrastructure installed will meet future needs.

Other Programmatic Projects are focused on stormwater system improvements (Programmatic Action Infr-01) where a formal system is lacking, or where there are opportunities to improve stormwater outfalls in Lake Washington (Programmatic Action Inf-01).

Priority basins may be selected by flooding concerns or through a redevelopment analysis that indicates that future development will cause additional capacity issues for the stormwater system.

Anticipated Elements

Key elements of this project include:

1. Conduct document and data review to prioritize basins
    a. Review CIP for upcoming work design that will benefit from analysis
    b. Evaluate if Neighborhood Safety Projects require new conveyance
    c. Review development and redevelopment analysis for 2035 Comprehensive Plan for locations of proposed future development
    d. Evaluate collector streets associated with above that may result in increased flow from projects
2. Select priority basin for pipe capacity analysis.
3. Gather existing information for selected basin needed for model development including:
    a. GIS data of system characteristics
    b. Base mapping data such as land characteristics (soils, topography, impervious surfaces, etc.)
    c. Rain gauge data
    d. Field verification of critical junctures
4. Conduct data gap analysis. Verify data suitability and collect additional data, if needed.
5. Developing hydraulic model using a modeling platform such as PC-SWMM or equivalent.
    a. Develop meteorological inputs including rainfall, evapotranspiration, etc.
    b. Develop hydrologic data input simulations
    c. Develop hydraulic inputs (i.e., system network)
6. Conduct system flow monitoring to calibrate the model.
7. Compare modeled scenario to known, documented flooding.
8. Develop a range of alternatives for system improvements in a matrix that includes but is not limited to:
    a. length and type of pipe upgrade,
    b. expected improvement (current and future conditions),
    c. cost, and
    d. other considerations such as permitting, or development code changes to require upgrades.
9. Design memorandum that recommends a preferred system alternative.

Expected Outcome

The expected outcome of this programmatic project is a preferred system alternative for a selected basin's stormwater pipe network. It is expected that this process is repeatable for multiple priority basins. The level of effort below is assumed for one priority basin.

Deliverables

- Design memorandum documenting analysis, alternatives evaluation, and recommendation for preferred alternative

Level of Effort (FTEs)

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/Consultant
PM	Admin	135	0.084	$16,200.00		$16,200.00				
1	Data gathering, review, gap analysis, and select priority basin.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
2	Hydraulic model development. Assume 1 hour per basin acre for modeling costs. 500 acres assumed.	500	0.3125	$60,000.00	$	$60,000.00		$	$	$
3	System flow monitoring. Flow monitoring cost is assumed under a separate Programmatic Action—Hydrologic Monitoring Program. This assumes time to incorporate that data into the model for calibration.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
4	Model alternative scenarios.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
5	Document results and preferred alternative.	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
Total		1035	0.65	$124,200.00	$	$124,200.00	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	1035	0.65			
TOTAL	1035	0.65			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	1035		$ 207,000.00	$ -	$ 207,000.00
TOTAL			$ 207,000.00	$ -	$ 207,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	1035	0.65

Programmatic Action Infr-12

Example of CIPP from tdtplumbing.com.

Trenchless Pipe Repair Program

Infrastructure

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going
OBJECTIVE	
Conduct trenchless pipe repair to address aging and failing pipes.	
STATUS	**PRIORITY**
New	Medium
LEVEL OF EFFORT (FTES) OR	**CONTRACTOR COST**
0.06 (Annual Capital Project Engineering Staff) 0.23 (Annual SW O&M Staff)	$380,200 Annual
$300,000 Contractor Cost	
DELIVERABLES	
• Rehabilitation of up to 1,200 linear feet of aging and failing stormwater pipe.	

Project Description

This project recommends implementing cured in place pipe (CIPP) trenchless technology to extend the life of aging and failing stormwater pipes.

Project Rationale

The City has several thousand linear feet of stormwater pipe that need repair and are on the aging and failing pipe list. Many of these pipes may be eligible for CIPP techniques. Resources need to be allocated to a trenchless pipe repair program for it to be successful. Contractor or in-house resources are both potential options for achieving desired outcomes.

Anticipated Elements

Key elements of this project include:

1. Identify pipes in the aging pipe plan (Programmatic Action Infr-16) that are appropriate for CIPP repair.
2. Allocate annual budget for trenchless pipe repair (assume $300,000 annually for purposes of this programmatic project action and estimate, to be updated based on outcome).
3. Develop annual program based budget allocated.
    a. Confirm length of pipe that can be lined for budget allocated. For purposes of this project, assume 1,200 linear feet.
    b. Develop scope of work for contractor, including review of CCTV videos to confirm pipes are appropriate for CIPP technique, type of curing (i.e. UV or thermal), and need for odor control and/or odor response plans.
    c. Determine which group (Surface Water Engineering or CIP) will manage the contractor. For purposes of this programmatic action,

surface water engineering group is assumed.

4. Prioritize up to 1,200 linear feet of pipe in the same neighborhood or general vicinity for the CIPP pilot program.
5. Clean and CCTV selected pipes in advance of CIPP lining. Surface Water Maintenance and Operations will conduct this work.
    a. All pipes must be clean prior to lining. Cleaning is assumed to be 12 labor hours for the entire project.
    b. CCTV is assumed to be 20 labor hours for the entire project.
    c. CIPP contractor will review videos to confirm pipes are appropriate for CIPP or recommend repairs to be made by maintenance in advance of CIPP.
6. Maintenance will make repairs on pipes where required in advance of CIPP. For purposes of this programmatic action, it is assumed that 40% will require repairs. Assume 5 spot repairs at $8,000/each.
7. Evaluate annual outcomes and adjust as resources and aging pipe needs are addressed.

Expected Outcome

The expected outcome of this project is (1) continued allocation of funding for trenchless pipe repair for aging and failing infrastructure, (2) implementation of a repair program for up to 1200 linear feet of rehabilitated stormwater pipes that are on the aging and failing list with trenchless technologies, and (3) data to inform potential future approaches for trenchless pipe repair in Kirkland, including continuation of outside contracts or investing in staff and resources to conduct trenchless pipe repair work in-house.

Deliverables

Deliverables for this project include:

1. Up to 1200 linear feet of CIPP rehabilitated pipe.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
Annual Costs										
PM	Admin	61	0.038	$7,326.00		$7,326.00				
1	Manage and contract CIPP vendor, scope, and budget, and identify pipes for CIPP from aging pipe plan (Infr-16).	40	0.025	$4,800.00	$300,000.00	$304,800.00		$	$	$
2	Clean and CCTV up to 1200 LF of pipes.	32	0.02	$3,840.00		$3,840.00		$	$	$
3	Repair up to 5 locations.	335	0.21	$40,200.00		$40,200.00		$	$	$
	Total Annual	468	0.29	$56,166.00	$300,000.00	$356,166.00				

Table 2. Cost Assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
Annual					
City					
City Staff	468	0.29		$ 300,000.00	$ 300,000.00
TOTAL	468	0.29		$ 300,000.00	$ 300,000.00
Consultant or Contractor (in lieu of Surface Water and Capital Project Engineering Staff minus admin.)					
	401		$ 80,200.00	$ 300,000.00	$ 380,200.00
TOTAL			$ 80,200.00	$ 300,000.00	$ 380,200.00

Table 4. Staff Summary

City Staff Distribution	One-time	
	Hours	FTE
Capital Project Engineering Staff	101	0.19
Surface Water O&M Staff	367	0.23

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Programmatic Action Infr-13

Example of pipe image from Kirkland CCTV camera.

Closed Circuit Television (CCTV) Pipe Inspection

Infrastructure

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going
OBJECTIVE	
Expand CCTV program to complete inspections of full stormwater pipe inventory and continue at recommended frequency.	
STATUS	**PRIORITY**
Augmentation	Medium
LEVEL OF EFFORT (FTES)	
2.0 (Annual SW O&M Staff) $500,000.00 (One-time CCTV Truck)	
DELIVERABLES	
• Annual condition assessment of up to 20% of stormwater pipe inventory.	

Project Description

This project recommends purchasing an additional CCTV truck and staffing resources to operate the truck to increase the amount of the stormwater pipe inventory that is evaluated on an annual basis, making the other stormwater CCTV truck available for overlay work, checking pipes after repairs have been made, and other repair and replacement and investigative activities.

Project Rationale

The City purchased a new CCTV truck in 2015 for stormwater use. The truck is in use continuously, and it has been helpful to assess pipes in advance of street pavement overlay (approximately 20% of the truck usage is for this task), service requests to investigate drainage complaints or follow-up on repairs made by contractors, and to conduct infrastructure condition assessment. The 2014 Surface Water Master Plan recommended assessing 10% of the stormwater system on an annual basis to complete the full system inventory in a 10-year timeframe. The CCTV truck has achieved this 10% linear footage goal per year. However, because many of the pipes require repeat assessments due to problematic conditions, to date, approximately 26% of the total length of stormwater pipes have been assessed (unique assessments). The City's new pipe criticality tool developed during this Plan (see Section X), uses CCTV data to determine the pipe's likelihood of failure which is a component of risk, along with consequence of failure. The intent to inspect the entire system is not being met because of competing needs for the truck and repeat inspections. An additional truck with crew would allow the City to complete the assessment of the stormwater pipes not yet evaluated, and continue monitoring pipes on frequencies recommended by NASSCO (National Association of Sewer Service Companies).

There are approximately 420 miles of stormwater pipes in the City's inventory and approximately 75% have not been assessed. A CCTV truck dedicated to completing condition assessment of the un-assessed pipe could finish the assessment in 4 years, assuming 1,200 linear feet of inspection per day. Once completed, this truck would be available to continuously re-assess the system on an on-going basis every 5-years, assessing approximately 20% of the system per year. The other CCTV truck would remain available for overlay work, investigative inspections, and follow-up repairs.

By having a better understanding of asset condition, the City can better prepare for repairs and replacement of aging and failing infrastructure.

Anticipated Elements

Key elements of this project include:

1. Purchase CCTV truck (estimated $500,000 in 2022 dollars)
2. Allocate staff resources to operate CCTV truck and accomplish work. One senior Utility worker and one Utility worker needed.
3. Utilize new CCTV truck to assess remaining un-assessed stormwater inventory and continue condition assessment of entire inventory on a 5-year frequency (20% of the system per year).

Expected Outcome

The expected outcome of this project is (1) condition assessment data for entire stormwater pipe inventory to better prepare for repair and replacement of aging and failing pipes, and (2) ability to continue condition assessment program on the recommended NASSCO frequency (every 5-years).

Deliverables

Deliverables for this project include:

1. Condition assessment of up to 20% of the stormwater pipe system inventory, annually.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time Costs										
1	Purchase CCTV Truck				$500,000.00	$500,000.00		$	$	
Annual Costs										
2	Senior Utility Worker	1600	1.0	$130,000.00				$		$
3	Utility Worker	1600	1.0	$110,000.00						
	Total One-time	3200	2.0	$240,000.00		$500,000.00				

Table 2. Cost Assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
Annual					
City					
City Staff	3200	2.0			
TOTAL	3200	2.0			
One-time					
CCTV Truck				$ 500,000.00	$ 500,000.00
TOTAL				$ 500,000.00	$ 500,000.00

Table 4. Staff Summary

City Staff Distribution	Annual	
	Hours	FTE
Surface Water O&M Staff	3200	2.0

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Programmatic Action Infr-14

In-house Completion of Small CIP Projects

Infrastructure

Photo of underground utility replacement. ASCE library.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going

OBJECTIVE

Implement in-house delivery of small stormwater CIP projects to reduce costs and expedite repair and replacement schedule for aging and failing stormwater pipes.

STATUS	PRIORITY
New	Medium

LEVEL OF EFFORT (FTES) AND CONSTRUCTION COST

0.12 (Annual SW Engineering Staff)

0.3 (Annual SW O&M Staff)

0.06 (Annual Streets and Grounds Staff)

$50,000.00 Construction Costs (2 pipes annually)

DELIVERABLES

- Replacement of up to two small drainage issues / flooding problems, annually.

Project Description

This project recommends utilizing internal stormwater engineering and operations and maintenance resources to fix small drainage issues and flooding problems as part of an on-going program, based on the successful outcome of the recent 14th Avenue West Pipe Installation pilot project.

Project Rationale

The City has several thousand linear feet of stormwater pipe that are in need of repair or replacement, as well as stormwater systems needing minor design modifications to resolve flooding issues. Many of these pipes have the potential to be designed and constructed by City crews because they are relatively small projects with simple engineered solutions. A pilot program was completed in 2021 using City engineers and City maintenance crews to replace a stormwater pipe on the aging and failing pipe list on 14th Avenue West. The project was very successful. Staff from the Surface Water Division, Streets and Grounds Maintenance Division, and Storm Maintenance and Operations Division, as well as individuals within the Planning and Building Department coordinated and contributed to the successful design and construction of the project. The construction cost was just under $25,000.

Anticipated Elements

Key elements of this project include:

1. Identify and prioritize projects that are good candidates for in-house replacement, including pipes likely to have simple engineering solutions, and straightforward construction.
2. Allocate up to $50,000 for materials per year to replace 2 aging and failing pipes, and staff resources for planning, design, community outreach, and construction.
3. Conduct necessary project component for each pipe replacement, project feasibility, design and community outreach including:
    a. Preliminary Mapping and Modeling (Surface Water Engineering Staff)
    b. Stormwater Engineering Feasibility Analysis (Surface Water Engineering)
        i. Critical areas review
        ii. Utility conflicts
        iii. Other feasibility issues
    c. Operations Feasibility Analysis (Surface Water Operations and Maintenance)
        i. Equipment needs and space constraints
        ii. Staffing needs and training (i.e., confined space requirements)
        iii. Traffic control
    d. Streets and Grounds Maintenance Feasibility Analysis (Streets and Grounds)
        i. Project restoration needs
        ii. Long-term maintenance requirements
    e. Project Design (Surface Water Engineering Staff)
    f. Public Engagement (Surface Water Engineering Outreach Staff)
4. Project Construction, Inspection, and Post-Construction Monitoring (Surface Water Operations and Maintenance Staff and Streets and Grounds Staff)

Expected Outcome

The expected outcome of this project is the ability to move pipes off the aging and failing list at a faster pace by designing and constructing smaller projects in-house. This project assumes that existing staff will have bandwidth to complete identified elements. If staff time is not available, additional budget will be needed.

Deliverables

Deliverables for this project include:

1. Up to 2 aging and failing stormwater pipes replaced annually.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time Costs										
PM	Admin	78.6	0.05	$9,432.00		$9,432.00				
1	Identify and prioritize aging and failing pipes that are good candidates for in-house design and construction.	20	0.0125	$2,400.00	$ -	$2,400.00		$	$	
2	Allocate $50,000 for materials for in-house pipe replacement for 2 projects.				$50,000.00	$50,000.00				
3	Project feasibility, design, and outreach. Assume 2 projects.	138	0.09	$16,560.00		$16,560.00				
4	Project Construction, Inspection, and Post-Construction Monitoring. Assume 2 projects.	524	0.32	$62,880.00		$62,880.00				
	Total Annual	760.6	0.47	$91,272.00	$50,000.00	$141,272.00				

Table 2. Cost Assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
Annual					
City					
City Staff	760.6	0.47		$50,000.00	
TOTAL	760.6	0.47		$50,000.00	$50,000.00

Table 4. Staff Summary

City Staff Distribution	Annual	
	Hours	FTE
Surface Water Engineering Staff	188.6	0.12
Surface Water O&M Staff	448	0.28
Streets and Grounds Staff	104	0.06

Programmatic Action Infr-15

Development Opportunity Fund

Infrastructure

Kirkland Catch Basin Grate

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	Annual

OBJECTIVE

Create a fund to partner with development community on opportunities to replace aging City stormwater infrastructure when private development projects impact City ROW.

STATUS	PRIORITY
NEW	High

COST

$150,000.00 (funding for two years)

DELIVERABLES

- Develop annual fund
- Annual report

Project Description

This project recommends the creation of a Development Opportunity Fund. This fund will be used to acquire stormwater infrastructure materials (pipes, catch basins, maintenance holes, grates, etc.) and labor for developers to install City infrastructure within the project limits of the development.

Project Rationale

Development and redevelopment are occurring at a rapid pace in Kirkland. Occasionally development is proposed in a location that intersects with stormwater infrastructure in poor condition. If the proposed development's project limits include the infrastructure in poor condition, there is often an opportunity to utilize this construction activity to replace the aging infrastructure. Capitalizing on these opportunities creates efficiencies for the City by preventing the need to construct the replacement through a capital project or the maintenance division.

Anticipated Elements

Key elements of this project include:

1. Create Development Opportunity Fund. Use the streets opportunity fund within the development budget as an example.

2. Formalize policy for use of funds.
    a. Consider using the aging and failing layer and/or the pipe criticality tool to determine which pipes should be prioritized with this money.
    b. Identify who will be responsible for purchasing materials and if paying for labor, how that will be calculated.
3. Implement program. Include an annual report to document what pipes were replaced through this program and if additional funding is needed in future years.

Expected Outcome

The expected outcome of this project is a fund that will have an annual budget of $75,000 ($150,000 per budget cycle) to allow for the purchase of materials or reimbursement that will improve the stormwater system through private construction installation of City infrastructure. It is expected that this fund will be evaluated for renewal and on-going funding during the bi-annual budget cycle.

Deliverables

- Development Opportunity Fund for $150,000 each budget cycle ($75,000 annually)
- Annual report summarizing pipes replaced through this opportunity fund.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
Annual costs										
1	Create Opportunity Fund (two years funding)				$ 150,000.00			$	$	$
	Total Bi-Annual				$ 150,000.00		0	$	$	$

Programmatic Action Infr-16

CCTV rover entering stormwater pipe for condition inspection.

Aging Pipe Plan

Infrastructure

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time
OBJECTIVE	
Develop plan for replacing or improving aging pipes.	
STATUS	**PRIORITY**
NEW	High
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
Phase 1 & 2: 0.31 FTE (One-time SW)	Phase 1&2: $100,100 (One-time)
Phase 2: 0.029 FTE (Annual SW)	Phase 2: $9,200 (Annual)
DELIVERABLES	
• Plan to complete condition of pipes. • Long-term plan for repair and replacement of aging pipes.	

Project Description

This project recommends developing a long-term plan to repair and replace the city's aging pipes based on their condition and risk, including identification of budget and staff or equipment needs.

Project Rationale

The City operates and maintains over 200 miles of city-owned stormwater pipe of varying ages, materials, and condition. Less than 50% of the pipes have been inspected with closed-circuit television (CCTV). The rest of the pipe conditions are unknown. This Plan developed a pipe evaluation tool using existing CCTV data with known condition ratings and other factors to assess pipe risk so that the City could prioritize the highest risk pipes for repairs, replacement, or condition assessment.

Over 100 pipes were identified as being extreme or high risk based on poor condition ratings and high potential impacts (consequence of failure) to nearby critical infrastructure, transportation routes, homes, or natural resources if these pipes were to break. Another 2000 pipes are in locations where there are high potential impacts of failure, but the condition of the pipes are unknown. These pipes need inspection.

One of the principles of asset management is understanding the condition of assets so that repair and replacement can be planned and risk of failure can be minimized. The City can develop a plan for repairing and replacing pipes before understanding the full scope of what is needed, howev-

er, the plan will need to be refined as inspection data is collected. During the planning process and development of the pipe evaluation tool, eight extreme risk pipes were identified. Table 1 lists the pipe identification numbers and Figures 1 through 8 show pipe defects for these extreme risk pipes identified during condition assessment.

Table 1. List of Extreme Risk Pipes (as identified in the pipe evaluation tool).

Pipe Identification	Diameter (inches)	Material	Length (feet)
STMH-10750 - STMH-10637	18	Corrugated metal	198
STMH-10503 - STMH-10396	18	Corrugated metal	180
STMH-11585 - STMH-11300	24	Corrugated metal	302
STMH-5367 - STMH-5229	18	Corrugated metal	203
STMH-27554 - STMH-27916	18	Corrugated metal	65
STMH-11317 - STMH-11352	18	Reinforced concrete	235
STMH-12242 - STMH-11998	24	Corrugated metal	260
STMH-37393 - STMH-6084	12	Plain concrete	152

Figure 1. Screenshots of pipe STMH- 10750 - STMH - 10637 corrosion and root mass.

Figure 2. Screenshot of pipe STMH- 10503 - STMH - 10396 deformity.

Figure 3. Screenshot of pipe STMH- 11585- STMH- 11300 large deformity.

Figure 4. Screenshots of pipe STMH- 5367 - STMH - 5229 joint separation and deformities.

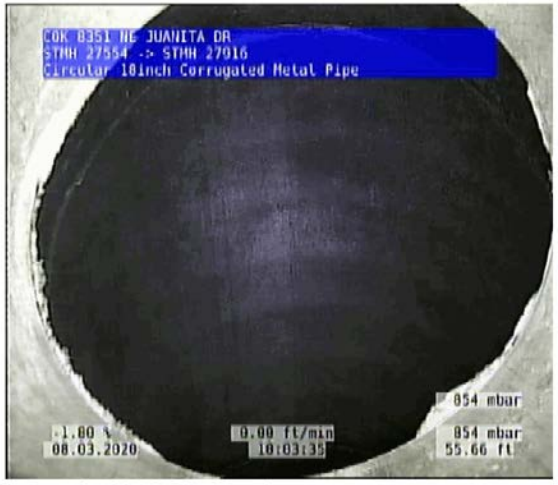


Figure 5. Screenshot of pipe 27554 - STMH 27916. Pipe drops vertical.

Figure 6. Screenshot of pipe STMH 11317- STMH - 11352 longitudinal fractures.

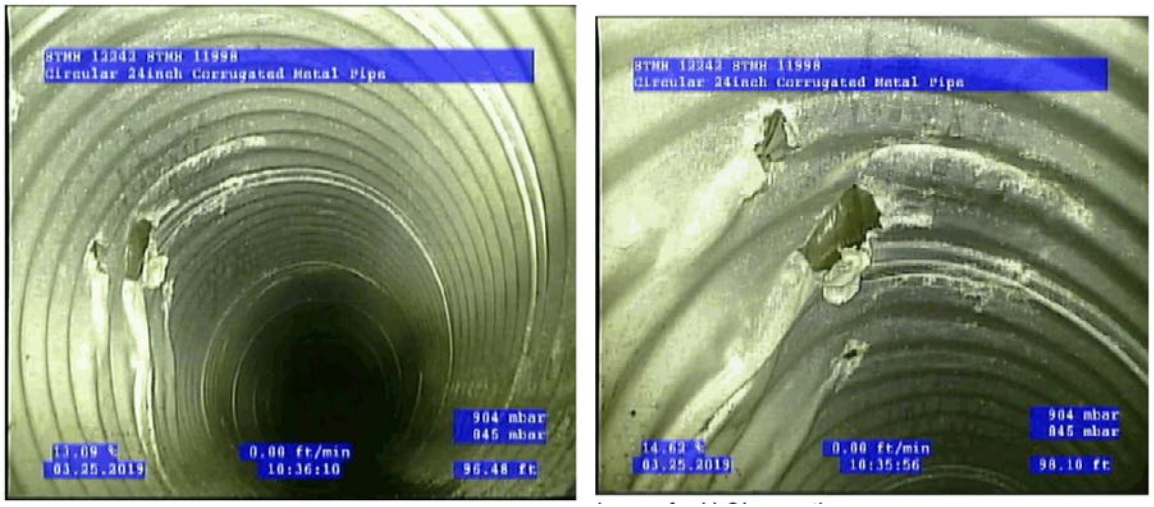


Figure 7. Screenshots of pipe STMH - 12242 - STMH - 11998 defects

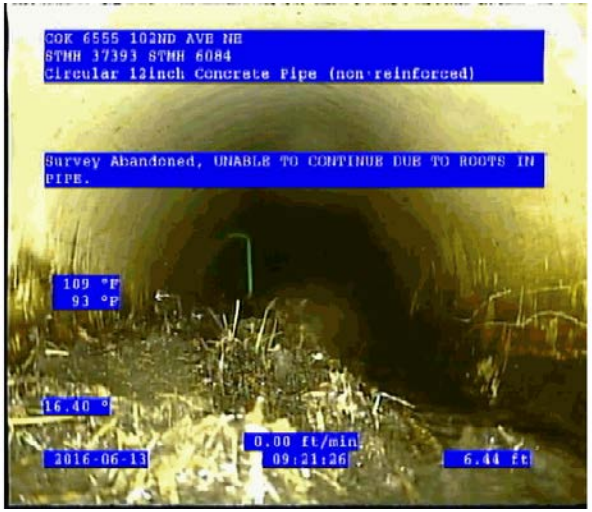


Figure 8. Screenshot of pipe STMH 37393 - STMH - 6084 excessive roots.

This project is broken into two phases that can run in parallel. Completion of the first phase will be necessary to revise and update the long-term plan and budgetary needs for pipe repairs and replacement

Phase 1: Pipe inspection

- Complete inspection of the full stormwater pipe inventory so the City can understand what types of repairs and replacement will be needed in the coming years. This phase is complementary to programmatic action Infr-13 CCTV Pipe Inspection, which recommends annual condition assessment of up to 20% of the stormwater pipe inventory using City staff. An alternative to using City staff would be to hire a contractor for the pipe inspection work

Phase 2: Long-term Plan for Pipe Repair and Replacement

- Determine the types of repairs and/or replacement that will be needed (i.e., trenchless pipe repair, open-cut, spot repairs, etc.), and how the work can best be done (i.e., contractors or in-house).
- Prioritize repair and replacement activities based on pipe risk (using the pipe evaluation tool).
- Identify budget and scheduling needs for the aging pipe program.

Anticipated Elements

Key elements of this project are described below:

Phase 1: Pipe Inspection

1. Identify pipes that have no condition data and need inspection by CCTV. This phase is complementary to programmatic action Infr-13 CCTV Pipe Inspection, which recommends annual condition assessment of up to 20% of the stormwater pipe inventory using City staff. An alternative to using City staff would be to hire a contractor for the pipe inspection work.
    a. Use pipe evaluation tool to prioritize and schedule CCTV activities for pipes that have highest estimated consequences of failure first.
    b. Map location, lengths, and diameters of pipes into logical geographic areas for in-house or contractor CCTV activities.
    c. Evaluate costs and benefits of using in-house or contractors to complete pipe inspection activities.

   d. Develop a plan for completing CCTV, including estimated budget and schedule to complete this work.
2. Develop post-processing plan for pipe condition data, including video review, input of data into GIS-based pipe evaluation tool for risk calculation, validation of results, and assessment of repair or replacement work based on condition and pipe risk.
   a. Determine staffing or contractor needs for this body of work, including budget and schedule.

Phase 2: Long-term Plan for Pipe Repair and Replacement

The City can begin a long-term plan for pipe repair and replacement using existing condition data and pipe risk for the pipes that are known to be in poor repair. As condition assessment is completed for the rest of the inventory, prioritized pipes for repair can be updated, and budget needs may need to be updated as well as the full scope of repairs and replacement is understood.

1. Validate pipes with poor condition ratings. Review pipe videos and determine the types of repairs and/or replacement that is needed.
   a. Categorize pipe repairs into types (i.e., trenchless, open-cut, spot repairs, maintenance) and priorities based on severity of deficiency and risk.
2. Estimate cost per linear foot for each type of repair and program out total cost of known pipe needs.
3. Evaluate costs and benefits of alternative pipe repair delivery scenarios including using in-house crews or contractors. Two programmatic actions (Infr-12 Trenchless Pipe Repair Program and Infr-14 In-house Completion of Small CIP Projects) are potential complementary projects that could be activated in concert with this programmatic action.
4. Develop preliminary long-term estimated replacement schedule using existing known condition data and assuming similar percentages of poor condition pipes for the remaining un-assessed inventory.
5. Identify budget and schedule for long-term repair and replacement, including estimate of number of high priority pipe projects to be completed annually.
6. Document long-term plan including condition inventory, alternative repair and replacement scenarios, estimated costs, evaluation of alternative delivery, and prioritized planned actions.
7. Update plan annually, as new pipe condition data is available and progress is made on repairs.

Expected Outcome

The expected outcome of this programmatic project are:

1. A plan for completing CCTV inspection of all city-owned stormwater pipes
2. A plan for long-term repairs and replacement of aging stormwater pipes.

Deliverables

- Plan to complete condition assessment of pipes, including post-processing of the data.
- Pipe repair and replacement plan.

Table 2. General Tasks detail

Task	Description Labor Hours	City Staff FTE	Labor Cost	Direct Costs	Subtotal City	Consultant/Contractor Staff Labor Hours	Labor Cost	Direct Costs	Subtotal Contrac-tor/Con-sultant
One-time Costs									
PM	Admin	10.5	0.006	$1,260.00	$1,260.00				
Phase I: Pipe Inspection									
1	Identify pipes with no condition data and map locations.	30	0.018	$3,600.00	$3,600.00			$	$
2	Evaluate costs vs. benefits of in-house vs. contractor labor.	40	0.025	$4,800.00	$4,800.00			$	$
3	Develop plan for completing CCTV in-spection.	40	0.025	$4,800.00	$4,800.00				
Phase 2: Long-term Plan for Pipe Repair and Replacement									
1	Validate pipes with poor condition ratings	120	0.075	$14,400.00	$14,400.00				
2	Estimate costs per linear foot for repairs	20	0.0125	$2,400.00	$2,400.00				
3	Evaluate costs vs. benefits of alternative delivery methods	40	0.025	$4,800.00	$4,800.00				
4	Develop preliminary repair and replace-ment schedule.	80	0.05	$9,600.00	$9,600.00				
5	Develop long-term budget estimates.	40	0.025	$4,800.00	$4,800.00				
6	Plan documentation	80	0.05	$9,600.00	$9,600.00				
	Total	500.5	0.31	$60,060.00	$60,060.00			$	$
Annual Costs Phase 2: Long-term Plan for Pipe Repair and Replacement									

Task	Description Labor Hours	City Staff FTE	Labor Cost	Direct Costs	Subtotal City	Consultant/Contractor Staff Labor Hours	Labor Cost	Direct Costs	Subtotal Contrac-tor/Con-sultant
PM	Admin	6	0.003	$720.00					
1	Update plan with new data	40	0.025	$4,800.00					
	Total	46	0.028	$5,520.00	$5,520.00				

Table 3. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 4. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City One-time					
Phase 1 and 2	500.5	0.31			
TOTAL	500.5	0.31			
City Annual					
Phase 2	46	0.029			
TOTAL	46	0.029			
OR Consultant or Contractor One-time					
Phase 1 and 2	500.5		$100,100.00		$100,100.00
TOTAL			$100,100.00	$ -	$100,100.00
Consultant or Contractor Annual					
Phase 2	46		$9,200.00		$9,200.00
TOTAL			$9,200.00		$9,200.00

Table 5. Staff summary

	Hours		FTE	
City Staff Distribution	**One-time**	**Annual**	**One-time**	**Annual**
Surface Water Staff	500.5	46	0.31	0.029

Habitat Projects

Programmatic Action Hab-01

Urban Forestry and Stormwater Habitat

City staff planting trees on City project.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Parks and Community Planning Planning	One-time
OBJECTIVE	
Clarify the benefits of tree canopy and urban forest retention for stormwater management.	
STATUS	**PRIORITY**
Augmentation	High
LEVEL OF EFFORT (STAFF FTES) *OR*	**CONSULTANT COST**
0.12 (SW Staff) 0.03 (Planning Staff) 0.03 (Parks and Community Planning Staff)	$47,200.00
DELIVERABLES	
• Summary document. • Policy and funding recommendation to Council.	

Project Description

This project recommends reading the literature review conducted by the Center for Watershed Protection on the effects of urban trees and urban forests on stormwater runoff reduction, water quality improvement, and habitat benefits, interviewing local jurisdictions about their approach to urban forestry for stormwater management, reviewing studies that quantify benefits of trees for stormwater (such as iTree), and using the results to formulate a program that meets Kirkland's needs.

Project Rationale

The City developed an Urban Forest Strategic Management Plan in 2013 and has been completing action items identified in its Six Year Work Plan (2013 - 2019), and adopted a new 2021 - 2026 Work Plan . A new urban forestry work plan is being developed for the next six years that includes several action items related to the Surface Water Program or funded by the program. An Environmental Program Coordinator position is partially funded by the Surface Water Fund with responsibilities to implement the Urban Forest Strategic Management Plan. This position resides in the Planning Department. This project will help clarify the alignment of surface water benefits and the City's priorities for sustainable urban forest management.

Anticipated Elements

Key elements of this project include the following:

1. Reading available literature from the Center for Watershed Protection and other sources to understand the current state of knowledge on the effects of urban forests on stormwater reduction and management.
2. Interview local jurisdictions to understand their approach to urban forestry and stormwater management. Review of urban forestry delivery programs in other jurisdictions may be useful to evaluate alternative funding strategies and policies around urban forestry and stormwater. Ecology's Structural Stormwater Controls (SSC) Policy Committee is considering credits for trees and forestry that may be applicable for the future NPDES Phase II municipal permit.
3. Evaluate current City urban forestry strategies under the lens of surface and stormwater benefits to determine if current practices should be augmented, discontinued, or continued as-is.
    a. Current urban forestry related programs include: (1) tree rebate program (Surface Water Program), (2) Kirkland development code (tree retention, tree removal) (Planning), (3) street tree inventory and maintenance (Public Works), (4) Green Kirkland Partnership restoration of natural areas (Parks and Community Services).
4. Document the findings of the literature review and jurisdictional review.
    a. The findings will be used to determine if there are valuable program elements to apply to gain return on surface water fund investments.
5. Develop policy recommendation.

Expected Outcome

The expected outcome of this project is a funding and policy recommendation to Council.

Deliverables

Deliverables for this project include the following:

1. Document summarizing the elements of Kirkland's Urban Forestry program that relate to surface and stormwater management.
2. Policy recommendation for urban forestry.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	36	0.0225	$4,320.00		$4,320.00				
1	Literature Review	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
2	Review of Other Jurisdictional Programs and direct contact	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
3	Evaluate Kirkland Program through lens of most recent research	40	0.025	$4,800.00	$	$4,800.00		$	$	$

4	Document results	40	0.025	$4,800.00	$	$4,800.00		$	$	$
5	Coordination with Parks and Community Planning	40	0.025	$4,800.00	$	$4,800.00		$	$	$
6	Coordination with Planning	40	0.025	$4,800.00	$	$4,800.00		$	$	$
7	Policy recommendations	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	276	0.1725	$33,120.00	$	$33,120.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	276	0.1725			
TOTAL	276	0.1725			
Consultant or Contractor					
OR Consultant or Contractor Only	236		$ 47,200.00	$	$ 47,200.00
TOTAL			$ 47,200.00	$	$ 47,200.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	236	0.12
Planning Staff	40	0.03
Parks and Community Services Staff	40	0.03

Programmatic Action Hab-02

Streamside and Lakeside Recognition Program

Habitat

Photo from Snohomish County Lakewise Program (from Snohomish County website).

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Planning	One-time and Annual
OBJECTIVE	
Better stewardship and engagement with private property owners that will provide habitat benefits for City watersheds.	
STATUS	**PRIORITY**
NEW	Low
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.19 (One-time Environmental Program Coordinator) 0.17 (Annual Environmental Program Coordinator) $10,000 (Annual Materials)	$59,800.00 (One-time) $55,200.00 (Annual) $10,000.00 (Annual Materials)
DELIVERABLES	
• Materials for on-line and print distribution. • Performance metrics. • Web content. • Signs.	

Project Description

This project recommends developing a program to recognize private homeowners and/or businesses that take steps to care for their streamside or lakeshore property in a manner that is ecologically sustainable and contributes to improvement of aquatic natural resources.

Project Rationale

There are City parks located on much of Kirkland's Lake Washington shoreline; however, most of the City's stream corridors and some of the larger lakes, such as Forbes Lake, are bordered by private parcels. The City has limited ability to influence or manage how individuals care for their streamside or lakeshore properties, except if development is proposed or permits are needed. One way to encourage property owners to take actions to improve ecological value is to provide guidance for sustainable landscaping appropriate for riparian areas, and to recognize homeowners that meet criteria for being good stewards of their ecologically sensitive environments.

Anticipated Elements

The program is intended to encourage water-side landowners to protect existing quality habitat, enhance or restore impacted landscapes, and commit to long-term sustainable practices and stewardship. Some elements of this project are already in place, including on-line resources for native

landscaping, natural yard care, and tree planting. Additional elements could be fashioned off programs already in place in other jurisdictions including the LakeWise Program in Snohomish County or Washington Department of Fish and Wildlife's Habitat at Home Program (formerly Backyard Wildlife Sanctuary Program).

The Snohomish County and WDFW Program's provide property owners recognition in the form of signage that indicates their property has met the requirements of the program and the property owner is a participant that agrees to maintain their landscape to continue meeting the criteria.

This program may be administered by the Environmental Program Coordinator in the Planning Department, depending on designated roles and responsibilities for the Environmental Program Coordinator position. Kirkland Zoning Code (KZC) 90.35 provides a process and goals for voluntary restoration work; this program would support and build on that code that is administered by Planning. The Environmental Program Coordinator could enlist Green Kirkland Partnership volunteers as ambassadors of the program . It is envisioned that regardless of how or where the program is administered, the lead entity would share outreach materials and resources from regional entities that share similar goals, such as the King Conservation District.

It is anticipated that there is a one-time registration with periodic renewals, so that as properties turn-over or interests change, owners can recommit to the program and refresh their interest.

The anticipate elements for this project include:

1. Researching other similar programs in other jurisdictions.
2. Developing new materials or augmenting existing resource materials for on-line or print distribution.
3. Developing web-based content for program advertisement.
4. Developing program goals, performance metrics, and criteria for program participation.
5. Program administration including maintaining website, fielding questions, providing technical assistance, and producing and distributing signs.

Expected Outcome

The expected outcome of this programmatic project is increased native landscapes and improved stewardship of habitat in riparian areas in Kirkland's shoreline environments adjacent to streams and lakes.

Deliverables

Deliverables for this project include the following:

1. Materials for on-line and print distribution.
2. Performance metrics such as participation goals and habitat metrics (i.e. acres of different habitat types in program).
3. Web content for program.
4. Signs.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time Costs										
PM	Admin	39	0.024	$4,680.00		$4,680.00				
1	Research similar programs in other jurisdictions	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
2	Augment existing City resource materials for on-line and print distribution	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
3	Develop web-based content for program advertisement	40	0.025	$4,800.00	$	$4,800.00		$	$	$
4	Develop criteria for participa-tion and signage for distribu-tion. Program planning and development	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
	Total One-time	299	0.187	$35,880.00		$35,880.00				
Annual costs										
PM	Admin	36	0.022	$4,320.00		$4,320.00				
5	Administer program	240	0.15	$28,800.00	$	$28,800.00		$	$	$
	Materials				$ 10,000.00	$ 10,000.00		$	$	$
	Total Annual	276	0.1725	$33,120.00	$ 10,000.00	$43,120.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
One-time					
City					
City Staff	299	0.19			
Consultant or Contractor					
TOTAL	299	0.19			
Consultant or Contractor					
OR Consultant or Contractor Only	299		$59,800.00	$ -	$59,800.00
TOTAL	299		$59,800.00	$ -	$59,800.00
Annual					
City					
City Staff	276	0.17		$10,000.00	$10,000.00
Consultant or Contractor					
TOTAL	276	0.17		$10,000.00	$10,000.00
Consultant or Contractor					
OR Consultant or Contractor Only	276		$55,200.00	$10,000.00	$65,200.00
TOTAL	276		$55,200.00	$10,000.00	$65,200.00

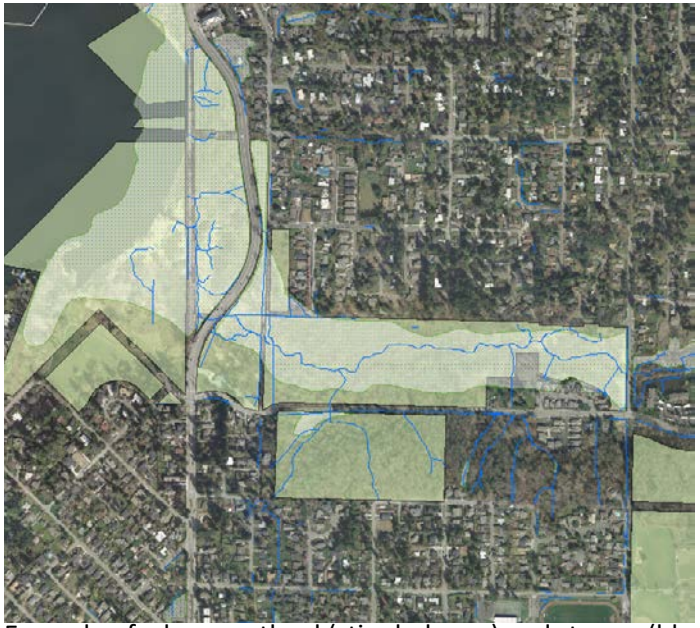
Table 4. Staff summary

City Staff Distribution	Hours	FTE
Environmental Program Coordinator (Planning)-One-time	299	0.19
Environmental Program Coordinator (Planning)-Annual	276	0.17

Programmatic Action Hab-03

On-Call-Critical Area Determination Support Services

Habitat



Example of where wetland (stippled area) and stream (blue line) delineation and typing would occur on City parcels (green blocks).

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Planning	On-going/Annual

OBJECTIVE

Provide on-call support, as-needed, for critical areas determinations necessary for surface and stormwater projects.

STATUS	PRIORITY
New	Low
LEVEL OF EFFORT (FTES) *AND*	**CONSULTANT COST**
0.01 (Surface Water Staff)	$10,000.00

DELIVERABLES

- Critical Areas Technical Memoranda, as needed.

Project Description

This project recommends creating an on-call contract with a consulting firm to provide critical areas determination support for surface and stormwater projects.

Project Rationale

The City's Planning and Building Department maintains the GIS wetland and stream inventory and updates it as needed in conjunction with comprehensively planning. Mapped wetland and stream conditions and classifications are not always consistent with field characteristics, or site specific enough to answer project-related questions in the vicinity of these natural resources. Site specific critical areas studies, include wetland delineations, stream typing, and geotechnical analyses are needed for many projects to identify impacts, regulatory issues, and mitigation requirements.

An on-call critical areas support contract that provides and additional $10K/year to the technical services contract ($,9.5K/year) will support city staff in the ability to complete surface and stormwater maintenance projects and smaller capital projects in a timely manner.

Anticipated Elements

The key element of this project is increasing funding to the existing technical services fund by $10K per year. The technical services fund would be raised to $19.5K per year.

Expected Outcomes

Critical areas review and determinations for up to two projects per year. Depending on the type of need, the review could consist of third-party review of work completed by city staff, or independent consultant determination.

Deliverables

The deliverables expected for this programmatic action include:

- Critical areas determination technical memorandum.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	3	0.002	$360.00		$360.00				
1	On-call contract and management	20	0.0125	$2,400.00	$ -	$2,400.00		$10,000.00	$ -	$ -
	Total	23	0.014	$2,760.00	$ -	$2,760.00	0	$10,000.00	$ -	$ -

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	23	0.014			
TOTAL	23	0.014			
Consultant or Contractor					
AND Consultant			$ 10,000.00	$ -	$ 10,000.00
TOTAL			$ 10,000.00	$ -	$ 10,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	23	0.01

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Programmatic Action Hab-04

Wetland and Stream Restoration

Habitat

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going, per watershed cost shown.
OBJECTIVE	
Prioritize wetland and stream restoration opportunities to improve habitat.	
STATUS	**PRIORITY**
New	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.34 FTE (Surface Water Staff, per watershed)	$110,400.00 per watershed

DELIVERABLES

- Watershed prioritization list
- Project prioritization list (one watershed)
- Conceptual restoration plan and cost estimate for up to 3 sites

Project Description

This project recommends prioritizing wetlands and stream reaches for habitat preservation or restoration.

Project Rationale

This project includes identifying locations to focus restoration efforts where the greatest ecological uplift can be achieved. This programmatic project will available data to prioritize watershed and natural resources (streams and wetlands) within the high priority basins for restoration.

Anticipated Elements

It is anticipated that this programmatic action will be implemented for one watershed at a time, starting with the highest priority watersheds with the most natural resources and/or the highest quality natural resources. Within each selected watershed, opportunities for preservation and restoration of high-quality natural resources will be identified and prioritized, including but not limited to:

- Land acquisition;
- Technical assistance to property owners;
- Adding parcel holds to condition development on properties that need restoration;
- Community-based restoration activities (i.e., vegetation management); and
- In-stream restoration projects.

Criteria will be developed to prioritize resources for restoration, that may include ecological functions provided, degree of degradation, or opportunities to meet other City goals. The highest priority projects will be developed into conceptual restoration plans and associated planning level cost estimates will be developed so that these projects can be programmed into the City's capital improvement program.

The following project elements are anticipated:

1. Prioritize watersheds to be evaluated for restoration.
2. Pick top watershed to focus initial efforts.
3. For top watershed:
    a. Review data for natural resources
    b. Develop prioritization criteria for restoration (prioritization criteria will be used in subsequent watershed analyses), including:
        i. Quality of natural resources
        ii. Ecological functions preserved or restored
        iii. Degree of degradation
        iv. Complementary benefits
    c. Prioritize and rank top opportunities
    d. Develop conceptual restoration plans and cost estimates for up to 3 projects.

Expected Outcomes

Prioritized list of natural resource restoration projects on city-owned properties and up to 3 restoration plans.

Deliverables

The deliverables expected for this programmatic action include:

- Prioritized list of watersheds for future restoration planning.
- Review of natural resources and potential restoration plans/projects for top priority watershed.
- Up to 3 conceptual restoration designs and planning level cost estimates.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	72	0.045	$8,640.00		$8,640.00				
1	Develop prioritization criteria, prioritize watersheds, and pick top watershed	20	0.0125	$2,400.00	$	$2,400.00		$	$	$

2	Review natural resources data, develop criteria for prioritizing top areas to focus restoration efforts, and prioritize top areas.	160	0.1	$19,200.00	$	$19,200.00		$	$	$
3	Develop conceptual restoration plans for up to 3 projects/areas.	300	0.1875	$36,000.00	$	$36,000.00		$	$	$
	Total	552	0.345	$66,240.00	$	$	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	552	0.345			
TOTAL	552	0.345			
Consultant or Contractor					
OR Consultant or Contractor Only			$ 110,400.00		$ 110,400.00
TOTAL			$ 110,400.00		$ 110,400.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	552	0.345

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Programmatic Action Hab-05

Juanita Creek near Windsor Vista Park Restoration Plan

Habitat

Photo A10 –Fine Sediment Aggradation, Immediately Upstream of Location of 1990's Windsor Vista Stream Restoration Project (Looking DS)

July 2020 photo upstream of 1990s Windsor Vista Stream Restoration showing fine sediment aggradation.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Parks and Community Services	One-time
OBJECTIVE	
Restore Windsor Vista reach of Juanita Creek.	
STATUS	**PRIORITY**
NEW	Low
LEVEL OF EFFORT (FTES) *AND*	**CONSULTANT COST**
0.05 (Surface Water Staff) 0.03 (Planning and Community Services Staff)	$242,000.00
DELIVERABLES	
• Restoration Plan and preliminary project layouts and cost estimates	

Project Description

This project recommends developing a restoration plan for Juanita Creek through Windsor Vista Park.

Project Rationale

Juanita creek in the vicinity of Windsor Vista Park and the surrounding neighborhood is degraded. Parts of the 1700-ft reach is incised, banks are actively being undercut, and fine sediment aggradation is occurring in other lower gradient sections where grade control was previously installed in an older restoration project in the 1990s.

This project was identified by the Windsor Vista community. Together with other projects identified along this stream corridor, the Windsor Vista restoration project will be part of a suite of habitat-focused projects that once completed will provide improvements for salmonids. Other projects include:

- I-405 culvert replacement
- Habitat improvements upstream of I-405 culvert replacement
- High Woodlands upland stormwater retrofit improvements
- NE 141th Street culvert replacement downstream of Windsor Vista reach

The goal for this project is to develop a stream restoration design that will improve habitat conditions and channel stability within the Windsor Vista reach and be compatible with the upstream and downstream culvert replacement and habitat restoration projects.

Restoration would be implemented only after the I-405 culvert is replaced.

Anticipated Elements

Key elements of this project include:

1. Review historic topographic survey and as needed, conduct additional topographic survey of stream reach, if necessary, including the following:
    a. Juanita creek thalweg (deepest part).
    b. Ordinary high water mark.
    c. Top and toe of bank.
    d. Significant trees in the riparian area.
    e. Large woody debris, pools, armored banks, concrete or other large material in the channel.
    f. Spot elevations throughout project area.
2. Review survey and identified locations for public versus private ownership. Focus projects in areas of public ownership. If priority locations are private, contact owners for easements and permission to access for additional planning.
3. Conduct geotechnical investigation (test pits or hand bore holes) to support restoration design.
4. Develop up to 3 conceptual design alternatives for channel and riparian restoration, including floodplain restoration/enhancement.
5. Hydraulic modeling in support of conceptual design alternatives.
6. Conduct community and stakeholder outreach.
7. Document results in a technical memorandum.

Expected Outcome

The expected outcome of this programmatic project is selection of a preferred restoration design alternative and planning level cost estimate for the Windsor Vista reach in Juanita Creek.

Deliverables

- Memorandum including alternative analysis, conceptual designs, preferred alternatives and planning level cost estimates.

Planning Level Cost Estimate (Consultant assumed)

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/Consultant
PM	Admin	135	0.084	$16,200.00		$16,200.00				
1	Topographic survey.							$	$8,000.00	$8,000.00
2	Preliminary Geotechnical investigation.							$	$30,000.00	$30,000.00
3	Outreach and Engagement.						300	$60,000.00	$	$60,000.00
4	Develop preliminary design concepts.						200	$40,000.00	$	$40,000.00
5	Hydrologic and hydraulic modeling.						100	$20,000.00	$	$20,000.00
6	Finalize preferred designs for 3 alternatives and develop planning level cost estimates.						300	$60,000.00	$	$60,000.00
7	Document results in a memorandum.						120	$24,000.00	$	$24,000.00
	Total	135	0.08	$16,200.00		$16,200.00	0	$204,000.00	$38,000.00	$242,000.00

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	135	0.08			
TOTAL	135	0.08			
Consultant or Contractor					
AND Consultant or Contractor Only			$ 204,000.00	$ 38,000.00	$ 242,000.00
TOTAL			$ 204,000.00	$ 38,000.00	$ 242,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	90	0.05
Parks and Community Planning Staff	45	0.03

Water Quality Projects

Programmatic Action WQ-01

Rendering of 132nd Square Park improvements and stormwater retrofit (from Kirkland Patch, October 13, 2021)

Mutual Benefits for Parks and Surface Water

Water Quality

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Parks and Community Services (PCS)	One-time
OBJECTIVE	
Identify WIN-WIN Opportunities for parks and water quality	
STATUS	**PRIORITY**
NEW	High
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.15 (One-time SW Staff) 0.03 (One-time PCS staff) 0.03 (One-time GIS staff)	$56,400.00

DELIVERABLES

- Technical memorandum describing results of analysis including:
  1. Map and list of prioritized parks for retrofit.
  2. Map of stormwater retrofit needs relative to park gaps.

Project Description

This project recommends conducting an analysis of mutually beneficial parks objectives and surface water program objectives to identify site-specific opportunities for project partnerships. Examples include (1) potential stormwater retrofit with planned field upgrades or other park improvements, and (2) pocket park opportunities in subbasins where stormwater retrofit is prioritized.

Project Rationale

One of the biggest barriers to stormwater retrofit is the location, availability, and cost of land to build new facilities to treat stormwater run-off. Citing facilities on existing park properties or acquiring property that can provide new City Park spaces *and* stormwater treatment is a more effective use of limited land resources.

Public Works and Parks are collaborating on a major stormwater retrofit project that includes park improvements at 132nd Square Park. Additionally, Spinney Homestead Park has been identified as a stormwater retrofit location that can be constructed jointly with potential park improvements. As the Parks, Recreation, and Open Space (PROS) Plan gets updated, this programmatic action represents an opportunity to consider how stormwater objectives could be incorporated into planned park improvements when feasible, where stormwater objectives can be incorporated into existing parks where retrofit is needed, and where new park sites and stormwater retrofit needs can be coordinated.

Anticipated Elements

Key elements of the stormwater retrofit facilities in parks evaluation includes:

1. Conducting a GIS analysis of existing parks relative to mutually desirable characteristics for shared improvements, such as:

    a. Priorities for field improvements, such as conversion from grass to turf.
    b. Parks that have a high chance of redevelopment due to community priorities.
    c. Lack of existing stormwater treatment in neighborhoods adjacent to parks.
    d. Infiltration characteristics.
    e. Drainage and conveyance characteristics.
    f. Available space for stormwater facilities.

2. Evaluating parkland gap and open space needs overlain with gaps relative to stormwater retrofit priorities. These could be targeted locations for property acquisition that serve multiple City needs. The 2015 PROS Plan identified eight parkland gap areas. The updated PROS plan will be available in spring 2022.

3. Documenting results in a memorandum that includes maps of prioritized parks for stormwater retrofit and references GIS coverages.

Expected Outcome

The expected outcome of this programmatic project is to have a map and list of parks identified for potential stormwater retrofit, and a map of locations where stormwater retrofit needs overlap park gaps. Locations may be prioritized into high, medium, and low categories based on treatment goals, watershed priority, or park priorities.

Deliverables

Deliverables for this project are anticipated to include:

1. Technical memorandum summarizing results, including the following:
    a. Map and prioritized list of parks identified for retrofit.
    b. Map of locations where stormwater retrofit needs overlap park gaps.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	42	0.026	$5,040.00		$5,040.00				
1	GIS evaluation of existing parks for Surface Water retrofit	80	0.05	$9,600.00	$ -	$9,600.00		$	$	$

2	GIS overlay of park gaps relative to surface water retrofit needs	80	0.05	$9,600.00	$ -	$9,600.00		$	$	$
3	Memo documenting results	40	0.025	$4,800.00	$ -	$4,800.00		$	$	$
4	Parks staff coordination to align priorities	40	0.025	$4,800.00	$ -	$4,800.00		$	$	$
5	GIS staff involvement to conduct analyses	40	0.025	$4,800.00	$ -	$4,800.00		$	$	$
	Total	322	0.201	$33,600.00	$ -	$33,600.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	322	0.201			
TOTAL	322	0.201			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water and GIS Staff)	282		$56,400.00	$	$56,400.00
TOTAL			$56,400.00	$	$56,400.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	242	0.15
GIS Staff	40	0.03
Parks and Community Planning Staff	40	0.03

Programmatic Action WQ-02

Dying Coho Salmon. Photo credit: Kathy Peter, Puget Sound Institute.

6PPD-quinone

Water Quality

DEPARTMENTS	FREQUENCY
Public works/Surface Water Transportation	Annual
OBJECTIVE	
Develop strategy for managing new information surrounding 6ppd-quinone.	
STATUS	**PRIORITY**
NEW	High
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.11 (Annual SW Staff) 0.03 (Annual Transportation staff)	$35,240.00
DELIVERABLES	
• Summary of research. • Meeting notes from regional working groups. • Interim strategy.	

Project Description

This project recommends developing a strategy for managing known and emerging information about 6PPD-quinone, a byproduct of a chemical used in tires that causes pre-spawn mortality in coho salmon and may be detrimental to other salmonid species as well. Research is ongoing on multiple fronts to (1) identify alternatives for 6PPD-quinone in the tire industry, (2) how 6PPD-quinone breaks down in the environment, (3) methods for removal from stormwater, and (4) biological impacts on fish.

Project Rationale

As regulatory agencies consider impacts of 6PPD-quinone, some have implemented added requirements for stormwater runoff treatment from transportation projects that drain to streams with salmonids. This is occurring without a complete understanding if existing available stormwater management solutions are deficient to address 6PPD- quinone in stormwater runoff. The City will benefit from (1) keeping abreast of the current research, (2) establishing an approach for design and construction of transportation projects that could impact surface waters and be subject to additional requirements from regulatory agencies.

Anticipated Elements

Key elements of this project include the following:

1. Designate a staff person to be responsible for tracking 6PPD-quinone research and regulations.
2. Tracking the status of available research on 6PPD-quinone that is intended to understand the fate, transport, and biological implications of this chemical in the environment.

3. Participating in regional workgroups to strategize stormwater solutions, policy decisions, and regulatory changes. As stormwater solutions are identified through research, Kirkland could contribute to the body of knowledge by testing new technologies and monitoring results.
4. Developing an interim strategy for managing 6PPD-quinone on Kirkland's transportation projects by adopting WSDOT's approach or using an alternative strategy.

In the most recent update of Washington State Department of Transportation (WSDOT) Biological Assessment Preparation Manual (WSDOT September 2021), WSDOT acknowledges the emerging research related to 6PPD-quinone and the challenges for designing projects and predicting stormwater treatment outcomes when not much is known about effectiveness of various stormwater BMPs on 6PPD-quinone removal. WSDOT currently uses its Western Washington Highway Runoff Dilution and Loading Stormwater Model (HI RUN Model) to calculate modeled changes of dissolved copper and dissolved zinc directed to receiving waters as a proxy for other chemicals of concern, including 6PPD-quinone. National Marine Fisheries Service (NMFS) may require using polyaromatic hydrocarbons (PAHs) as a surrogate, likely leading to bioretention/rain gardens or other Technology Assessment Protocol-Ecology (TAPE) approved media filtration as a preferred BMP (WSDOT and Shannon & Wilson, October 2021).

As more research is conducted and alternative methods are identified, WSDOT will update their procedures. An element of this project will be to review and adopt WSDOT's approach or a similar approach for interim stormwater management procedures until more guidance is available. This could include a list of questions of things to consider on new transportation projects such as:

1. What are the stormwater pathways to receiving waters?
2. Are fish (and what species) are known or anticipated to be present in the receiving water?
3. Are there any opportunities to minimize pollution-generating surfaces on the project (i.e., physical barrier between travel lane and bike lane)?
4. Are there opportunities for bioretention or media filtration facilities to capture and treat stormwater from the project?

The city could also consider evaluating roadway segments for the potential to produce 6PPD-quinone using proxy criteria such as traffic volume to prioritize where water quality treatment might be added above what is required for project stormwater mitigation. The City already uses these criteria, along with feasibility and cost to prioritize and fund additional water quality treatment where it will provide the greatest benefits.

Expected Outcome

The expected outcome of this programmatic project is to have a designated staff person responsible for keeping up to date with new information on 6PPD-quinone and to develop a strategy for managing stormwater on transportation projects that drain to potentially affected receiving waters in the most efficient way possible.

Deliverables

Deliverables for this project include the following:

1. Summary of 6PPD-quinone research, updated annually.
2. Meeting notes from regional working groups.
3. Interim written strategy for managing 6PPD-quinone on Kirkland transportation projects including:
    a. Project questionnaire
    b. Map of high traffic volume roads expected to have high concentrations of 6PPD-quinone.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	28.2	0.0176	$3,384.00		$3,384.00				
1	Research 6PPD-quinone	36	0.0125	$4,320.00	$	$4,320.00		$	$	$
2	Participate in regional working groups	72	0.045	$8,640.00	$	$8,640.00		$	$	$
3	Develop interim strategy and update as needed	40	0.025	$4,800.00	$ -	$4,800.00		$	$	$
4	Transportation coordination	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	216.2	216.2	$22,560.00	$ -	$22,560.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	216.2	0.14			
TOTAL	216.2	0.14			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	176.2		$35,240.00	$	$35,240.00
TOTAL	176.2		$35,240.00	$	$35,240.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	176.2	0.11
Transportation Staff	40	0.03

Programmatic Action WQ-03

Streets for Retrofit

Water Quality

Example of north-end opportunity for (1) SW retrofit, or (2) street narrowing on neighborhood access road (max. width = 28 ft).

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Transportation Planning	One-time
OBJECTIVE	
Prioritize un-used ROW for stormwater retrofit	
STATUS	**PRIORITY**
NEW	Medium
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.22 (One-time SW Staff) 0.08 (One-time Transportation Staff) 0.05 (One-time Development review Staff)	$70,400.00
DELIVERABLES	
• Decision matrix for where street standards or retrofit should be focused. • List of locations where right-of-way should be considered for future opportunities. • Conceptual design for pilot project.	

Project Description

This project recommends conducting a review of street widths in existing right-of-way to assess width reduction to reduce stormwater impacts and/or use available right-of-way for potential stormwater treatment. The results of this review will be used to identify locations where stormwater projects could be coordinated with neighborhood safety programs or where there are opportunities to narrow existing streets that are wider than standards.

Project Rationale

Some areas of the city, including the northern part that was most recently annexed, include many street cross-sections that are wider than the existing City's standards. New developments often extend streets with the same wide cross-sections, rather than build to allowable standards (e.g.,

narrower street widths) so that the roads in an area are consistent in width. Impervious surfaces contribute to stormwater runoff with road surfaces being a source of pollution-generating stormwater runoff, and Best Available Science indicates that reduced pavements are an effective approach to reducing stormwater impacts. Reduced pavement width requirements are consistent with code and reduction of existing impervious surface can also be included in retrofitting strategies.

In addition, unused right-of-way on streets that are wider than existing standards presents an opportunity for stormwater treatment. The width, slope, condition, and infiltration capability can all be determined, mapped, and assessed to determine if right-of-way is available for stormwater run-off retrofitting.

Anticipated Elements

Key elements of this project include:

1. Conduct a GIS analysis of street standards relative to existing pavement to determine the preferred pavement width and potential for excess pavement (or unused right-of-way) that can be removed. A screen to identify total needed right-of-way and determine potential usable excess right-of-way will be made.
2. Develop matrix of streets with excess right-of-way against factors that would be ideal for future narrowing (curb-to-curb or installation of medians) or potential stormwater retrofit, including but not limited to the following:
    - On-site parking utilization
    - Existing and future driveways/property access
    - Utility conflicts
    - Infiltration potential
    - Available minimum width or area
    - Gaps in stormwater treatment/need for retrofit
    - Need for traffic calming
    - Neighborhood safety programs
    - Development/redevelopment potential
    - Lack of tree canopy
3. Flag excess ROW for future opportunities based on evaluation factors in the matrix. There may be several potential options for making improvements that benefit stormwater management, such as:
    a. Implementing stormwater facilities in unused right-of-way.
    b. Implementing traffic calming/neighborhood safety programs with (a) stormwater improvements, or (b) street narrowing.
    c. Reducing road widths where there are opportunities to do so in conjunction with new development (i.e., modify existing roads to match new standards vs. building new roads to match existing roads that are too wide) or to meet stormwater retrofitting objectives.
4. Following identification of the most promising locations for potential improvements, field evaluation should occur to validate on-the-ground characteristics to identify potential challenges and document conditions. Potential locations should be ranked in order of priority for ability to meet stormwater treatment goals, such as catchment area treated and/or pollutant removal potential (i.e., average daily traffic as a surrogate for pollutant load).
5. Select location for pilot street narrowing or stormwater retrofit and develop conceptual plans with new street standards.
6. Coordinate with development review staff for development of new street standards.

Expected Outcome

The expected outcome of this project is a map and prioritized list of unused right-of-way with potential opportunities for stormwater retrofit, pavement removal, or partnership to meet multiple City objectives.

Deliverables

- Decision matrix of excess right-of-way with factors to be considered for future street narrowing or stormwater retrofit opportunities.
- List of locations where right-of-way should be considered for future opportunities.
- Conceptual design and street standard for pilot street considered for narrowing or stormwater retrofit.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	72	0.045	$8,640.00		$8,640.00				
1	GIS analysis of unused right-of-way (ROW) and preferred street widths	80	0.05	$9,600.00	$ -	$9,600.00		$	$	$
2	Develop decision matrix of factors for consideration to modify unused ROW	40	0.025	$4,800.00	$ -	$4,800.00		$	$	$
3	Evaluate unused ROW relative to factors	120	0.075	$14,400.00	$ -	$14,400.00		$	$	$
4	Flag ROW for future opportunities and field verify up to 10 locations	40	0.025	$4,800.00	$ -	$4,800.00		$	$	$
5	Transportation support for pilot concept and new street standard	120	0.075	$14,400.00	$ -	$14,400.00		$	$	$
6	Coordination with Development Review Staff for new street standards	80	0.05	$9,600.00	$ -	$9,600.00		$	$	$
	Total	552	0.345	$66,240.00	$ -	$66,240.00	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	552	0.345			
TOTAL	552	0.345			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	352		$70,400.00	$	$70,400.00
TOTAL	352		$70,400.00	$	$70,400.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	352	0.22
Transportation Staff	120	0.08
Development Review Staff	80	0.05

Programmatic Action WQ-04

Sewer Connection System Incentives

Water Quality

Septic system graphic

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time and Annual
Public Works/Wastewater	
Planning	
OBJECTIVE	
Reduce water pollution from failing septic systems by connecting systems to the public sewer system.	
STATUS	**PRIORITY**
NEW	Low
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.13 (One-time PW Staff)	$41,400.00 One-time
0.19 (Annual PW Staff)	$38,000.00 Annual
0.03 (Annual Planning Staff)	$80,000 Annual program expenses
$80,000 Annual program expenses	

DELIVERABLES

- Alternatives analysis
- Cost-benefit analysis for program implementation
- Recommendation for preferred alternative
- Public outreach

Project Description

This project recommends incentivizing property owners to connect to a public sewerage system owned and operated by the City of Kirkland, Northshore Utility District, or the Woodinville Water and Sewer District.

Project Rationale

There are almost 800 parcels in the City's wastewater service area that were on individual septic systems as of 2014, and likely more in the Northshore Utility and Woodinville Water and Sewer District areas.

Septic systems can contribute to poor water quality when failing or located adjacent to receiving water bodies. Conversion of septic systems, especially systems in poor condition, to the public sewer system will help improve water quality.

Anticipated Elements

Key elements of this project include:

1. Confirm the locations of parcels with septic systems to determine the numbers of properties in each Utility District that are still on septic systems.
2. Determine whether a sewer connection incentive program would include only City of Kirkland wastewater service areas or areas served by other utility districts. Identify project partners, if necessary.
3. Research programs implemented by other jurisdictions, such as City of Vancouver, WA, or City of Tacoma.
4. Develop criteria for participation in sewer connection incentive program.
5. Research barriers and benefits to sewer connection to identify reasons for hesitancy or motivation for connecting to the public sewer system.
6. Conduct cost/benefit analysis to determine basis for financial incentives.
7. Develop program and identify staff/department to implement.
8. Implement annual program.
9. Conduct public outreach throughout this project to gauge support for program, identify barriers to participation, and if program moves forward, to advertise and educate.

Expected Outcome

The expected outcome of this project is an incentive program that will compel 25% of eligible property owners with septic systems to connect to the public sewer system.

Deliverables

- Alternative analysis for sewer connection program.
- Cost-benefit analysis for program implementation.
- Recommendation for preferred alternative including participation requirements and criteria and strategy for implementation.
- Public outreach.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time Costs										
PM	Admin	27	0.017	$3,240.00		$4,680.00				
1	Map location of septic systems	40	0.025	$4,800.00	$	$4,800.00		$	$	$
2	Research programs in other jurisdictions	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
3	Develop criteria for program	80	0.05	$9,600.00	$	$9,600.00		$	$	$

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
4	Develop strategy	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total One-time	207	0.129	$24,840.00		$24,840.00				
Annual costs										
PM	Admin	30	0.018	$3,600.00		$3,600.00				
5	Public outreach	80	0.05	$9,600.00	$	$9,600.00		$	$	$
6	Annual implementation	80	0.05	$9,600.00		$9,600.00		$	$	$
7	Planning Staff Involvement	40	0.025	$4,800.00		$4,800.00		$	$	$
	Implementation costs (assume $10K/ application times 8 per year)				$ 80,000.00	$80,000.00		$	$	$
	Total Annual	230	0.14	$27,600.00	$ 80,000.00	$107,600.00	0	$ -	$ -	$ -

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
One-time					
City					
City Staff	207	0.129			
TOTAL	207	0.129			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	207		$41,400.00	$	$41,400.00
TOTAL	207		$41,400.00	$	$41,400.00
Annual					
City					
City Staff	230	0.144		$80,000.00	
TOTAL	230	0.144		$80,000.00	
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	190		$38,000.00	$80,000.00	$118,000.00
TOTAL	190		$38,000.00	$80,000.00	$118,000.00

Table 4. Staff summary

	One-time		Annual	
City Staff Distribution	**Hours**	**FTE**	**Hours**	**FTE**
Surface Water/Public Works Staff	207	0.13	190	0.19
Planning Staff	0	0	40	0.03

Programmatic Action WQ-05

Google, Kirkland campus. Large landholders, such as Google, represent a potential opportunity for the City to partner for stormwater retrofit, if opportunities can be identified in advance and negotiated.

Public/Private Retrofit Opportunities

Water Quality

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Planning	One-time
OBJECTIVE	
Process to highlight potential target areas for public-private partnerships for storm-water retrofit that can be identified early in the development process.	
STATUS	**PRIORITY**
NEW	Low
LEVEL OF EFFORT (FTE) *OR*	**CONSULTANT COST**
0.16 (One-time SW Staff) 0.08 (One-time Planning staff) 0.06 (One-time GIS Staff)	$72,600.00

DELIVERABLES

- GIS coverage of potential stormwater retrofit areas to target public-private partnerships.
- City policy and process for private-public stormwater partnerships.

Project Description

This project recommends flagging areas identified for stormwater retrofit so that early coordination and potential partnerships can be negotiated with planned private developments for mutual benefits.

Project Rationale

One of the biggest barriers to stormwater retrofit is the location, availability, and cost of land to build new facilities to treat stormwater run-off. Citing facilities on private property in partnership with new private development or redevelopment could be a mutually beneficial opportunity for the City and developers.

There are few properties that are sufficient size and are in the right location relative to stormwater conveyance and treatment needs to address the Utility's need for stormwater retrofit. Flagging areas that are desirable for retrofit in advance will help facilitate discussions with planners and developers in the pre-application phase for potential partnerships.

Anticipated Elements

Key elements of this project include:

1. Develop a GIS coverage that shows areas of interest or specific parcels of interest for stormwater retrofit for use by City planners at the map counter prior to a pre-application meeting.
2. Developing a process for public/private stormwater opportunities, including but not limited to City staff roles and responsibilities, procedures, site criteria, incentives, operations and maintenance obligations.
    a. How will public/private partnerships be negotiated?
    b. At what point in the process will negotiations begin? At pre-application meetings, during design review board process, etc.?
    c. In what circumstances will it make sense to enter into an agreement? What is the minimum criteria needed for retrofit (i.e., facility size to make it worthwhile?)?
    d. Should the City offer incentives for the opportunity to partner? What kinds of incentives?
    e. Does a budget item need to be included for City share?
    f. How does potential comingled stormwater affect maintenance responsibilities and NPDES MS4 permitting?

Expected Outcome

The expected outcome of this project is to define and develop a strategy for identifying and pursuing public/private partnerships for stormwater retrofit.

Deliverables

- GIS coverage of potential stormwater retrofit areas to target public private partnerships at Pre-Submittal meetings.
- City policy and process for public-private stormwater partnerships.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	75	0.047	$9,000.00		$9,000.00				
1	Develop map of retrofit areas- GIS staff	100	0.0625	$12,000.00	$	$12,000.00		$	$	$
2	Develop process for public-private stormwater retrofit strategy.	200	0.125	$24,000.00	$	$24,000.00		$	$	$
3	Coordination with Planning and codify a process for public-private retrofit.	120	0.075	$14,400.00	$	$14,400.00		$	$	$
	Total	483	0.301	$57,960.00	$	$	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	483	0.301			
TOTAL	483	0.301			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water and GIS Staff)	363		$72,600.00	$	$72,600.00
TOTAL	363		$72,600.00	$	$72,600.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	263	0.16
GIS Staff	100	0.06
Planning Staff	120	0.08

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Programmatic Action WQ-06

Geotechnical Map Update

Water Quality

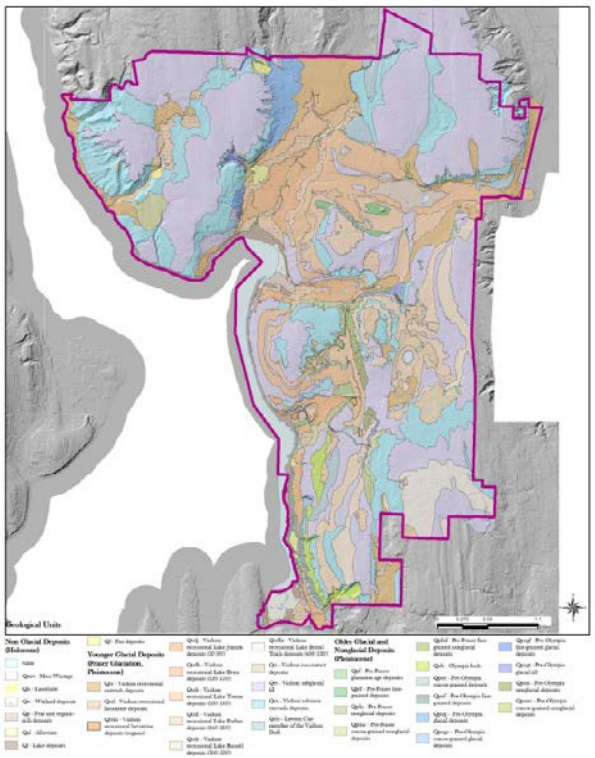

Figure 13: 1:12,000 scale Surficial geology map of Kirkland.

2017 Surficial Geology Map of Kirkland by Justin Brooks.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Planning	One-time
OBJECTIVE	
Updated geologic and infiltration potential mapping.	
STATUS	**PRIORITY**
AUGMENTATION	Low
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.16 (One-time SW Staff) 0.03 (One-time Planning Staff) $85,100.00 Consultant Cost (Geotech)	$136,900.00

DELIVERABLES

- Updated map of geotechnical data.
- Updated map of infiltration potential.

Project Description

This project recommends conducting a review of geotechnical reports from development projects that have occurred after 2017 (or the date of the last review of development proposals) to append the City's geologic map with subsurface data points that will help inform infiltration potential and use of low impact development (LID) stormwater management techniques.

Project Rationale

Many development projects require subsurface investigation of geologic conditions and reports that document characteristics, including subsurface geologic units, depth to groundwater at the time of drilling or test pit exploration, density, and other useful information.

A map of data points showing locations of geotechnical borings, test pits, or other subsurface data is useful for desktop evaluations of whether geologic conditions may be appropriate for certain types of stormwater management techniques. The Washington Geologic Information Portal on the Washington Department of Natural Resources (DNR) website provides baseline information as developed in the GeomapNW project. This project updated Kirkland geologic maps in both 2010 and 2017 (to include the annexation area).

The data could be used to update infiltration potential maps in the annexation area.

Anticipated Elements

This programmatic action is anticipated to include the following:

1. Collect and compile geotechnical reports from development projects in Kirkland after 2017.
2. Review and interpret geotechnical data and develop GIS map with point locations and hyperlinks to reports and data (similar to Washington Geologic Information Portal).
3. Update infiltration potential maps based on new geotechnical data.

Expected Outcome

The expected outcome of this is an updated map of geotechnical data and an updated infiltration potential map.

Deliverable

- Update map of geotechnical data.
- Updated infiltration potential map.

Planning Level Cost Estimate

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	39	0.024	$4,680.00		$4,680.00	60	$11,100.00		$11,100.00
1	Collect and compile geotechnical reports.	100	0.062	$12,000.00	$	$12,000.00	$	$	$	$
2	Interpret geotechnical reports.				$		200	$ 37,000.00	$	$ 37,000.00
3	Update infiltration potential map.						200	$ 37,000.00	$	$ 37,000.00
4	Update GIS map with points and data links.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
5	Surface water staff coordination.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
6	Planning staff coordination.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	299	0.186	$35,880.00	$	$35,880.00	460	$85,100.00	$	$85,100.00

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	299	0.186			
Consultant or Contractor				$85,100.00	$85,100.00
TOTAL	299	0.186		$85,100.00	$85,100.00
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	259		$51,800.00	$85,100.00	$136,900.00
TOTAL	259		$51,800.00	$85,100.00	$136,900.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	259	0.16
Planning Staff	40	0.03

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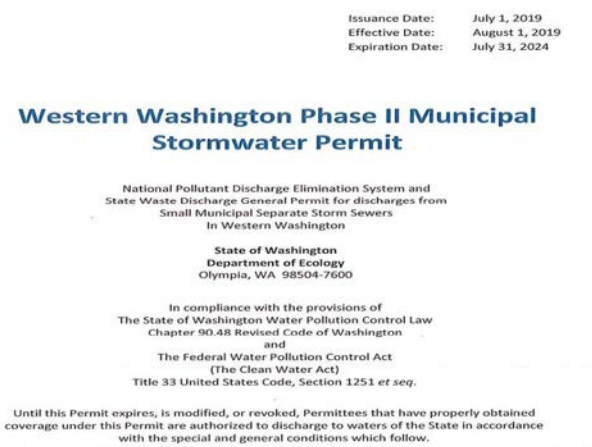
Programmatic Action WQ-07



Issuance Date: July 1, 2019
Effective Date: August 1, 2019
Expiration Date: July 31, 2024

Western Washington Phase II Municipal Stormwater Permit

National Pollutant Discharge Elimination System and
State Waste Discharge General Permit for discharges from
Small Municipal Separate Storm Sewers
In Western Washington

State of Washington
Department of Ecology
Olympia, WA 98504-7600

In compliance with the provisions of
The State of Washington Water Pollution Control Law
Chapter 90.48 Revised Code of Washington
and
The Federal Water Pollution Control Act
(The Clean Water Act)
Title 33 United States Code, Section 1251 *et seq.*

Until this Permit expires, is modified, or revoked, Permittees that have properly obtained coverage under this Permit are authorized to discharge to waters of the State in accordance with the special and general conditions which follow.

Cover page of current NPDES Phase II Permit.

NPDES Permit Gap Analysis

Water quality

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	Twice
OBJECTIVE	
Identify program needs associated with next NPDES Phase II Permit (Effective August 1, 2024 and expected August 1, 2029)	
STATUS	**PRIORITY**
NEW	High
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.4 (SW staff for two gap analyses) 0.06 (Avg. Annual over 6-year permit cycle)	$129,000.00 (for two gap analyses)

DELIVERABLES

- Table of permit requirements, identified gaps, and resource needs to fill gaps
- Memorandum summarizing resource needs.

Project Description

This project consists of conducting a step-by-step review of each subsequent NPDES Phase II permit conditions to identify resource needs and schedule for permit compliance. The next permit is August 2024 and the one after that will be available to review in late 2028, early 2029.

Project Rationale

The city's current NPDES Phase II Municipal Stormwater Permit will expire on July 31, 2024, at which time a new permit will become effective. It is expected that the new permit will have new conditions, just as every subsequent NPDES Phase II permit cycle has revised and modified existing conditions and added new ones.

Typically, the current NPDES Phase I Municipal Stormwater Permit and the outcomes of current permit appeals provides a window into what might be expected with the next Phase II permit, and the city has already begun to think about some of possible requirements, such as implementing structural stormwater source controls.

Regardless of what changes are made, it will be necessary for the city to go through the new permit and each subsequent permit carefully to ensure existing stormwater management approaches are in compliance with conditions of the permit, and to identify potential program needs to address new conditions.

Anticipated Elements

Key elements of this project include:

1. Review NDPES Phase II Municipal Stormwater Permit.
2. Create a table that documents the following:
    a. Permit condition
        i. Is the condition new? Yes/No
    b. What is the deadline for meeting the condition?
    c. Is the city meeting the condition? Yes/No.
        i. If yes, how?
        ii. If no, why?
        iii. Is this a program gap?
    d. Resources
        i. How much staff time is spent on meeting this condition?
        ii. How much staff time is needed? Are there alternative methods of meeting this condition? If so, what is the preferred alternative?
        iii. What other resources are needed to meet this condition?
            1. Consultant
            2. Equipment/Technology
3. Summarize staffing and/or other resource needs in a memorandum.
4. Develop service package, if needed, to meet permit compliance.

Expected Outcome

The expected outcome of this programmatic project is identification of stormwater program gaps for NPDES Phase II permit compliance, and resource needs and schedule to fill the gaps.

Deliverables

- Memorandum summarizing resource needs.
- Table of permit conditions, deadlines, how city is meeting conditions, and resource needs
- Service Package(s) (if necessary)

Level of Effort (FTEs)

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	84	0.0525	$10,080.00		$10,080.00				

1	Review permit.	40	0.025	$4,800.00	$	$4,800.00		$	$	$
2	Summary table of permit conditions, gaps, schedule, and resource needs.	320	0.2	$38,400.00	$	$38,400.00		$	$	$
3	Memo summarizing needs.	120	0.075	$14,400.00	$	$14,400.00		$	$	$
4	Develop service packages, if necessary.	80	0.05	$9,600.00	$	$9,600.00		$	$	$
	Total	644	0.4	$77,280.00	$	$		$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	644	0.4			
Consultant or Contractor	0				
TOTAL	644	0.4			
Consultant or Contractor					
OR Consultant or Contractor Only	644		$129,000.00	$	$129,000.00
TOTAL	644		$129,000.00	$	$129,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	644	0.4

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Programmatic Action WQ-08

NPDES and Other Surface Water Training

Water quality

The City's NPDES Phase II Municipal Stormwater Permit requires on-going training activities. Training needs to be tracked to show the city is in compliance with the permit.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time

OBJECTIVE

Enhance existing Surface Water training programs, including NPDES-required activities and tracking mechanisms.

STATUS	PRIORITY
NEW	Medium

LEVEL OF EFFORT (FTES) ***OR***	CONSULTANT COST
0.38 (One-time Surface Water staff)	$122,000.00
0.01 (One-time Public Works staff)	$3,000 equipment and software
0.01 (One-time Finance staff)	
$3,000 One-time equipment and software	

DELIVERABLES

- Memorandum describing evaluation and recommendation.
- Training videos/modules

Project Description

This project recommends evaluating current surface water training opportunities and requirements, including NPDES required training, developing a streamlined approach for managing training materials, tracking training events, and ensuring permit compliance,and developing online modules and videos for thehighest priority trainings.

Project Rationale

The City's NPDES permit requires an on-going training program for municipal field staff for various permit conditions including:

- Illicit discharge and detection elimination (IDDE)
- Development review
- Best management practices (BMPs) for inspection and maintenance, and water quality protection

Additional training may also be needed for certain job classifications (e.g., confined space entry, 40-hour hazardous waste training) within the Surface Water Utility.

Gaps between the existing training program and required training program need to be identified so that modifications can be made to improve or streamline training materials or methods for tracking compliance with the NPDES permit conditions.

The City has been exploring options within its Munis system to add a training module to be able to track staff training. This would help facilitate reporting and compliance for the NPDES Phase II Municipal Stormwater Permit coordinated by the Surface Water Utility, but this option has not yet been selected by City management for deployment. Additionally, the Kirkland intranet-based Learning Management System (LMS), managed by the Human Resources Department, is one tool currently used by Surface Water staff for pushing on-line training modules and videos out to staff. The use of these tools will be evaluated with the goal of optimizing existing resources to meet the Utility's training objectives.

The City has recorded videos for several on-line training modules and would like to produce additional in-house educational materials for staff use.

Anticipated Elements

Key elements of this project include:

1. Document current surface water training goals for City staff, including, but not limited to NPDES training requirements.
    a. What tools (such as the learning management system on-line training) are available for self-study, in-person training, or on-the-job training?
    b. What is the frequency and type of training offered or required?
        i. One-time
        ii. One-time with annual or bi-annual refreshers
        iii. Progressive
        iv. Certification
    c. How many staff require annual training?
2. Evaluate types of training modules available with existing city software, including Munis
3. Determine which trainings should be converted to online or video format.
    a) Evaluate if in-house staff has expertise and capacity to produce trainings.
    4. Prepare curriculum and produce videos for top 5 high-priority training modules..

Expected Outcome

The expected outcome of this programmatic project is a recommendation for consolidation and tracking of surface water and NPDES training, and development of 5 training modules.

Deliverables

- Memorandum documenting status and recommendations for training program, including modifications to existing tracking methodology and training methods.
- Five new on-line training modules (topics to be determined).

Level of Effort (FTEs)

Table 1. Task detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	85	0.05	$10,200.00		$10,200.00				
1	Document current surface water training goals.	60	0.0375	$7,200.00	$	$7,200.00		$	$	$
2	Evaluate training modules available.	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
3	Determine which trainings should be convert-ed to on-line or video format.	70	0.044	$8,400.00	$	$8,400.00		$	$	$
4	Develop curriculum and create up to 5 video training modules, plus equipment and soft-ware.	375	0.23	$45,000.00	$3,000.00	$48,000.00		$	$	$
5	Coordination with Public Works	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
6	Coordination with Finance	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
	Total	650	0.41	$78,000.00	$3,000.00	$81,000.00	0	$	$	$

Table 2. Task assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$120.00

Table 3. Task summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	650	0.41		$3,000.00	$3,000.00
TOTAL	650	0.41		$3,000.00	$3,000.00

Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water Staff)	610		$ 122,000.00	$3,000.00	$ 125,000.00
TOTAL			$ 122,000.00	$3,000.00	$ 125,000.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	610	0.38
Public Works Staff	20	0.01
Finance Staff	20	0.01

Programmatic Action WQ-09

Illicit Discharge Detection and Elimination (IDDE) Program Augmentation

Water Quality

Vactor trucks are typically used to clean up spills, especially when pollutants reach the stormwater system.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going

OBJECTIVE

Continue to respond to water quality concerns and spills in a timely manner and follow-up with appropriate clean-up, provide education and technical assistance, complete proper regulatory documentation, and code enforcement actions to prevent pollutants from entering the City's stormwater system and receiving waters.

STATUS	PRIORITY
Augmentation	Medium

LEVEL OF EFFORT (FTES) AND EQUIPMENT COST

0.2 (Annual SW Engineering Staff)

1.0 (Annual SW O&M Staff)

$400,000.00 Equipment (Small Vactor Truck)

DELIVERABLES

- Continuation of spill response program and ability to respond in a timely manner to water quality calls to protect Kirkland's natural resources and comply with State and local regulations.

Project Description

This project recommends increasing staff and equipment resources to keep up with IDDE program demands, including rising numbers of water quality concerns and spills that require investigation, education and technical assistance, regulatory documentation, and/or cleanup.

Project Rationale

The Western Washington Phase II Municipal Stormwater Permit requires Kirkland to conduct an IDDE program. Between 2009 and 2021, the number of water quality calls per year has increased from 21 to 333. This is partly due to the education and outreach conducted by staff to inform the business community, first responders, and the public about water quality issues and making resources more accessible to report problems when they see them. Additionally, a new program will be initiated to conduct source control inspections for existing development in 2023 (see Programmatic Action WQ-10). This program is also expected to generate additional follow-up water quality actions to either cleanup spills or conduct water quality code enforcement. Figure 1 shows the increase in staff hours for IDDE since 2009.

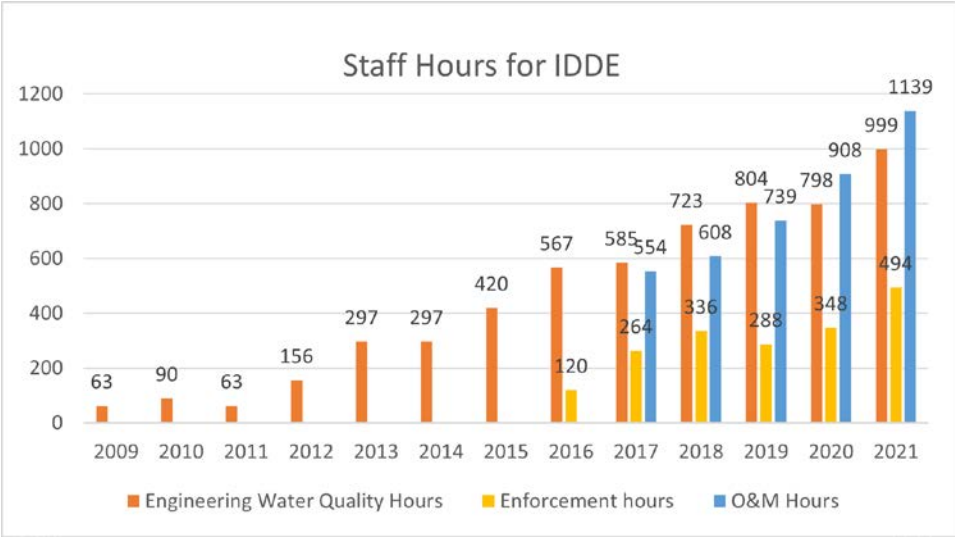

Figure 1. History of staff hours spent on IDDE (2009 through 2021)

The IDDE program involves staff and equipment from the Surface Water Engineering Group and Operations and Maintenance. A typical water quality call requires the following activities:

Operations and Maintenance staff:

- Source tracing in the public municipal storm system
- Clean-up, including a range of possibilities from absorbent pads, street sweeping (streets and grounds crew), pressure washing, and cleaning the storm system
- Response documentation (including photos and field notes)

Engineering staff:

- First response after initial call to assess situation
- Source tracing and investigation
- Coordination with city staff inspectors, first responders, other local and state agencies
- Water quality sampling and tracking lab results
- Education and outreach, and technical assistance
- Regulatory documentation
- Prepare code enforcement cases (fine and/or cost recovery actions)
- Training for all City field staff

Spill response is challenging to staff because the nature of the work is un-planned and the magnitude of the problems staff respond to are unknown. The volume of work does not justify a dedicated crew for only spill response, therefore, staff are interrupted from other planned work activities to respond to calls, assess the situation, and determine additional equipment or staffing needs for clean-up or pollution prevention. If cleanup is needed, a vactor truck may need to be called off another job to clean out the storm system, interrupting workflow of the staff and equipment.

The program response needs have exceeded the staff and equipment resources available to keep up with the quality and quantity of the program while also meeting other surface water obligations. Cost recovery has been modified to allow first-time forgiveness and will reduce the amount of code enforcement cases for the engineering group. Maintenance will evaluate if they will shift the cost recovery enforcement at a later date (with other disciplines). In 2014, the spill response need was estimated at 100 hours/year for operations and maintenance. The actual time spent in 2021 was 1138 hours, ten times higher than what was estimated 8 years ago. Roles and responsibilities were evaluated and the first response after the initial call was shifted back to the engineering group. It is recommended that an additional 0.2 FTE be allocated for the IDDE program within the engineering division to support this shift.

Anticipated Elements

Key elements of this project include:

1. Increasing staff resources to meet current and future expected water quality call demands based on upward trends and stay in compliance with State regulatory requirements. The following staff positions are recommended:
    a. 0.2 FTE in the Surface Water Engineering group for water quality field responses and program management, including education and outreach, documentation, and training, as well as support of potential code enforcement actions.
2. Purchase small vactor truck to be available for spills and other small jobs to reduce interruptions from other work activities.
3. Increase staff resources to operate the small vactor truck, including the following recommended positions:
    a. 0.5 FTE Sr. Utility Worker in the Operations and Maintenance Group (The rest of this position would work on other maintenance activities such as potholing and accessing difficult locations (ex: Goat Hill) using the small vactor truck)
    b. 0.5 FTE Utility Worker in the Operations and Maintenance Group (The rest of this position would work on other maintenance activities such as potholing and accessing difficult locations (ex: Goat Hill) using the small vactor truck)

Expected Outcome

The expected outcome of this project is the ability to continue mitigating pollutant discharge to the City's stormwater system by quick response and clean-up of spills.

Deliverables

Deliverables for this project include:

1. Continued spill response program that meets the needs of the community and reduces pollutants from reaching the City's receiving waters.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
One-time costs										
1	Vactor truck				$400,000.00			$	$	
	Total One-time				$400,000.00					
Annual costs										
1	Staff to meet increased water quality complaints	320	0.2							
2	Sr. Utility Worker	800	0.5							
3	Utility Worker	800	0.5							
	Total Annual	1920	1.2							

Table 2. Cost Assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
Annual					
City					
City Staff	1920	1.2		$400,000.00	
TOTAL	1920	1.2		$400,000.00	$400,000.00

Table 4. Staff Summary

City Staff Distribution	Annual	
	Hours	FTE
Surface Water Engineering Staff	320	0.2
Surface Water O&M Staff	1600	1.0

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Programmatic Action WQ-10

Photo of spill response kit.

Source Control Program

Water Quality

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	On-going

OBJECTIVE

Meet NPDES Phase II Permit Condition S5.C.8. Source Control for Existing Development, by applying and enforcing Kirkland ordinances, and implementing an inspection program of businesses that have the potential to generate pollutants to the City's stormwater system.

STATUS	PRIORITY
New	Medium

LEVEL OF EFFORT (FTES)

0.9 (Annual SW Engineering Staff)

DELIVERABLES

- Inspection of up to 180 businesses annually.

Project Description

This project recommends increasing staff resources to implement NPDES Phase II permit condition S5.C.8.

Project Rationale

Kirkland currently participates in the Washington State Department of Ecology's Pollution Prevention Assistance (PPA) program that funds business outreach and inspection for 375 businesses over an 18-month period. Some of the businesses inspected under the PPA program may be credited toward compliance with S5.C.8, depending on the type of business and inspection conducted, but it is estimated that an additional 1,440 hours (0.9 FTE) will be needed for the source control program long-term to conduct up to 180 site visits per year (20% of all qualifying businesses), assuming 8 hours per visit.

Anticipated Elements

Key elements of this project include:

1. Increasing staff resources to meet the needs of permit condition S5.C.8, Source Control for Existing Development.

Expected Outcome

The expected outcome of this project is the ability to meet NPDES permit conditions and reduce water quality issues that could result from businesses that are likely to generate pollutants that could reach the City's stormwater system.

Deliverables

Deliverables for this project include:

1. Inspection of up to 180 businesses per year, once the source control program is up and running.

Planning Level Cost Estimate

Table 1. Cost Detail

Task	Description	City Staff					Consultant/Contractor Staff			
		Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
Annual costs										
1	Staff to conduct annual source control inspections (assume 180 per year at average 8 hours/visit)	14480	0.9							
	Total Annual	1440	0.9							

Table 2. Cost Assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600

Table 3. Cost Summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
Annual					
City					
City Staff	1440	0.9			
TOTAL	1440	0.9			

Table 4. Staff Summary

City Staff Distribution	Annual	
	Hours	FTE
Surface Water Engineering Staff	1440	0.9

Programmatic Action WQ-11

Juanita Bay and beach.

Juanita Beach Park Water Quality

Water Quality

DEPARTMENTS	FREQUENCY
Public Works/Surface Water Parks and Community Services (PCS)	One-time
OBJECTIVE	
Reduce beach closures due to poor water quality	
STATUS	**PRIORITY**
NEW	High
LEVEL OF EFFORT (FTES) *OR*	**CONSULTANT COST**
0.1 (One-time SW Staff) 0.03 (One-time PCS staff)	$33,400.00

DELIVERABLES

- Technical memorandum describing results of analysis including:
  a. Description of historical beach closures and conditions that led to closures.
  b. Sources of bacteria, and alternative strategies to reduce on-going sources.

Project Description

This project recommends evaluating actions that could improve water quality in Juanita Bay and reduce beach closures. Examples include (1) policies or regulatory measures to reduce pollutants that contribute to unhealthy swimming conditions, (2) operational changes, and (3) capital projects to actively improve water quality conditions.

Project Rationale

King County monitors swimming beaches, including Juanita Beach every week during the summer months. Three water samples are collected from different parts of the beach and analyzed for bacteria. If the bacteria concentrations are high, beach managers may recommend closure. Additionally, some beaches are tested for toxic algae. In 2020, toxic algae was detected at Juanita Beach at levels exceeding the state recreation guideline (https://www.nwtoxicalgae.org/FindLakes.aspx).

Juanita Beach has been closed to swimming at least once due to high bacteria levels in each of the last four years. There are several factors that contribute to poor water quality conditions in Juanita Bay in the summer, including:

- Shallow water, which heats up more rapidly, grows more bacteria, and does not mix as readily with deeper, cooler water in the rest of Lake Washington
- Beach is situated in a protective cove, reducing circulation of water and flushing of bacteria.

- Upland sources of bacteria (i.e., fecal contamination) transported to Juanita Bay via Juanita Creek from waterfowl, pets, other wildlife, and illicit discharges/spills.

The City has been addressing fecal coliform bacteria pollution through education and outreach programs, including pet waste campaigns, some of which have specifically targeted at Juanita Beach Park. Additionally, a recommended programmatic action in this Plan, WQ-04, Sewer Connection System Incentives, addresses septic systems, which sometimes contribute bacteria to waterways if they are not functioning properly. Parks and Community Services also takes multiple active measures to reduce bacterial contamination. They regularly monitor and remove waterfowl feces, maintain deterrence measures to reduce use by waterfowl, monitor parks for unlawful pet use, and promote showering and effective diaper use during the swimming season. Evaluation of additional measures to reduce the number of days that Juanita Beach Park is closed for swimming is warranted due to the popularity of the park.

Anticipated Elements

Key elements of the Juanita Beach Park water quality project include:

1. Conduct an analysis of historical beach closures and conditions that resulted in the closures, including:
    a. Weather leading up to the beach closure (temperature).
    b. Bacteria levels that led to the beach closure (concentrations and for how many days).
    c. Time of year that beach was closed and for how many days.
    d. Number and types of toxic algae blooms, including time of year.
2. Evaluate sources of bacteria and potential options for reducing bacteria, including different strategies such as:
    a. Education and outreach (i.e., continuing pet waste campaign, messaging to not feed wildlife, etc.)
    b. Park operations (i.e., sweep/vacuum goose poop from beach and grassy areas)
    c. Policy/regulatory (i.e., fines for people that violate scoop laws or feeding wildlife, or have failing septic systems within the Juanita watershed)
3. Documenting results in a memorandum that prioritizes additional actions that can be implemented.

Expected Outcome

The expected outcome of this programmatic project is to have additional strategies for reducing Juanita Beach Park closures, building upon the water quality programs already in place.

Deliverables

Deliverables for this project are anticipated to include technical memorandum summarizing results, including the following:

1. Description of historical beach closures and conditions that led to closures.
2. Sources of bacteria, and alternative strategies to reduce on-going sources.

Planning Level Cost Estimate

Table 1. Cost detail

		City Staff					Consultant/Contractor Staff			
Task	Description	Labor Hours	FTE	Labor Cost	Direct Costs	Subtotal City	Labor Hours	Labor Cost	Direct Costs	Subtotal Contractor/ Consultant
PM	Admin	27	0.016	$3,240.00		$3,240.00				
1	Review historical information from King County including conditions that lead up to beach closures	20	0.0125	$2,400.00	$	$2,400.00		$	$	$
2	Evaluate sources of bacteria and potential reduction methods	80	0.05	$9,600.00	$	$9,600.00		$	$	$
3	Memo documenting results	40	0.025	$4,800.00	$	$4,800.00		$	$	$
4	Coordination with Parks	40	0.025	$4,800.00	$	$4,800.00		$	$	$
	Total	207	0.129	$24,840.00	$ -	$24,840.00	0	$	$	$

Table 2. Cost assumptions

FTE and Rate Assumption	
Project Management (0.15* FTE)	0.15
Available staff hours (hrs/year/FTE)	1600
City Staff Rate	$120.00
Consultant Staff Rate	$200.00

Table 3. Cost summary

Summary	Hours	FTE	Labor Cost	Other Direct Costs	Total
City					
City Staff	207	0.129			
TOTAL	207	0.129			
Consultant or Contractor					
OR Consultant or Contractor Only (in lieu of Surface Water and GIS Staff)	167		$33,400.00	$	$33,400.00
TOTAL	167		$33,400.00	$	$33,400.00

Table 4. Staff summary

City Staff Distribution	Hours	FTE
Surface Water Staff	167	0.1
Parks and Community Planning Staff	40	0.03

Equipment Sheets

Equipment Sheet 2022-01

CCTV Camera and Crawler Infrastructure

Photo from pipetrekker.com showing CCTV camera and crawler.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time
OBJECTIVE	
Improve	
STATUS	**PRIORITY**
NEW	High
COST	
$55,000	

DELIVERABLES

- Replace aging equipment

Project Description

This equipment will replace existing aging CCTV camera and crawler kits.

Project Rationale

The CCTV truck, camera and wheel sets (crawler kits) are used daily by the stormwater maintenance division. The camera and crawler kits operate through stormwater pipes, which often have accumulated sediment, roots, and other debris. This gritty water causes significant wear and tear on the equipment. The current camera and wheel sets (2 cameras and crawlers) were purchased in 2015 and one set is reaching the end of its lifespan. The amount of time to maintain and repair the existing equipment outweighs the cost of new equipment. These camera and crawler sets should be replaced regularly, every couple of years based on operating conditions, to support efficient and effective CCTV camera inspection work.

Deliverables

Deliverables for this project include the following:

1. Procure new CCTV camera and crawler kit.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	Direct Costs
Purchase	Equipment	$55,000.00
	Total One-time	$55,000.00

Equipment Sheet 2022-02

Skid Steer

Photo from Wikipedia.org

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time
OBJECTIVE	
Purchase skid steer and attachments	
STATUS	**PRIORITY**
NEW	Low
COST	
$300,000	
DELIVERABLES	
• Acquire skid steer and suitable attachments	

Project Description

This equipment is extremely versatile and considered industry standard for public works maintenance and operations. A skid steer has a narrow wheelbase that allows it to access otherwise difficult locations. The machine can be tailored to a variety of activities through changing out attachments. Applications of this equipment are various; examples include forklift, bucket, field mower, grapples, maintenance hole lid cutting and removal, cold plane concrete, mill asphalt, or snowplow.

Project Rationale

This equipment could quickly become the most utilized item in the public works maintenance fleet. It's size and versatility allow for nearly endless opportunity. The stormwater maintenance division would utilize the skid steer with multiple attachments. To start, the attachments proposed are for maintenance hole cutting and removal, a grinder for asphalt and concrete resurfacing (cold planning), and a bucket for efficient material movement, a sweeper, and a forklift. The maintenance hole cutter and remover would eliminate the need for a jackhammer, reducing disruptive sound and potential for injury. The cold planning/milling attachment allows for surface grinding on concrete and asphalt in narrow applications to support asphalt overlay. The bucket attachment allows for scooping and pick-up of materials and efficient transfer to a new location. The sweeper attachment quickly cleans surfaces, which will reduce potential pollutants from entering the stormwater system. The forklift attachment would allow for another piece of equipment to operate as a forklift. Other attachments could be acquired in the future to support additional tasks.

It is anticipated this piece of equipment would be used daily.

Deliverables

Deliverables for this project include the following:

1. Procure skid steer and attachments.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	Direct Costs
Purchase	Equipment	$300,000.00
	Total One-time	$300,000.00

Equipment Sheet 2022-03

Hook Lift Asphalt Hot Box

Photo from falconrme.com showing hook lift technology and a mobile asphalt hot box.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time
OBJECTIVE	
Purchase asphalt hot hox for hook lift truck	
STATUS	**PRIORITY**
NEW	High
COST	
$180,000 (ONE-TIME COST)	
DELIVERABLES	
• Acquire new asphalt hot box for use with hook lift truck	

Project Description

This equipment will store asphalt and keep it hot (ready for use) for multiple days. The temporary storage of asphalt can prevent waste of asphalt that cannot be used on the day-of pick-up. The asphalt hot box will be configured for use with a hook lift equipped truck. Size of box can vary between 2 and 10 tons.

Project Rationale

There are multiple efficiencies that could be achieved through the acquisition of this equipment. Currently the field staff uses a product called Easy Street. This is a cold-mix asphalt that provides a temporary road surface in locations where roads had to be cut to replace or rehabilitate infrastructure, such as catch basin, maintenance holes, or pipes. The Streets Maintenance Division will return to these cold-patched locations, remove the cold-patch material, and replace with hot-patched asphalt for a permanent repair. Effectively all cold-patched locations must be worked twice. Easy Street is not able to be recycled to additional locations, it is disposed of after one use.

This equipment would likely be shared between the Public Works maintenance divisions. While hot mixed asphalt needs to be picked up from a nearby location (Kenmore, Redmond, Monroe), it can be stored within this hot box unit for multiple days to be used in various locations and projects throughout the city.

With this equipment, Easy Street could be reduced and potentially removed from use. It is currently brought in 10-12 tons at a time, unloaded with Yard equipment and labor, and loaded project by project into trucks. It is then removed by the Streets crew and returned to the yard for disposal. The City would save money on Easy Street delivery charges and waste disposal charges.

It is anticipated that this equipment would be used multiple days a week during asphalt laying season, generally warmer and drier weather.

Deliverables

Deliverables for this project include the following:

1. Procure hook lift asphalt hot box.

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	Direct Costs
Purchase	Equipment	$180,000.00
	Total One-time	$180,000

Equipment Sheet 2022-04

Hook Lift Concrete Mixer

Photo from cementech.com showing hook lift technology and a mobile cement mixer.

DEPARTMENTS	FREQUENCY
Public Works/Surface Water	One-time

OBJECTIVE

Purchase concrete mixer for hook lift truck.

STATUS	PRIORITY
NEW	Low

COST

$175,000

DELIVERABLES

- Acquire mobile concrete mixer for use with hook lift truck

Project Description

This equipment will mix and deliver concrete to City infrastructure rehabilitation projects within the stormwater maintenance division and may be shared by other maintenance divisions.

Project Rationale

Currently concrete is mixed in small batches on job sites including sidewalk, curb and gutter and pipe installations. This process involves purchasing, lifting, and loading 60-pound bags of concrete into work vehicles. Mixing is completed by a tow behind mixer with water carried by truck and moved in wheelbarrows. This process is slow and labor intensive. Mixing can take 2 to 3 hours per job, depending on the size. Back injuries are possible with this type of labor.

With a hook lift concrete mixer, pre-mixed concrete would be picked up from a nearby ready-mix plant and distributed on the job site by a chute, reducing mixing time, and injury potential, while ensuring a consistent concrete mix.

Deliverables

Deliverables for this project include the following:

1. Procure concrete mixer

Planning Level Cost Estimate

Table 1. Cost detail

Task	Description	Direct Costs
Purchase	Equipment	$175,000.00
	Total One-time	$175,000.00