

**CITY COUNCIL PRESENTATION
on the
Data Analysis Report
for
Upper Joe's Creek
Watershed Nutrient Reduction Study**

June 20, 2017

**Presented by:
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Surface Water Division
Public Works Department**



Upper Joe's Creek Watershed Nutrient Reduction Study

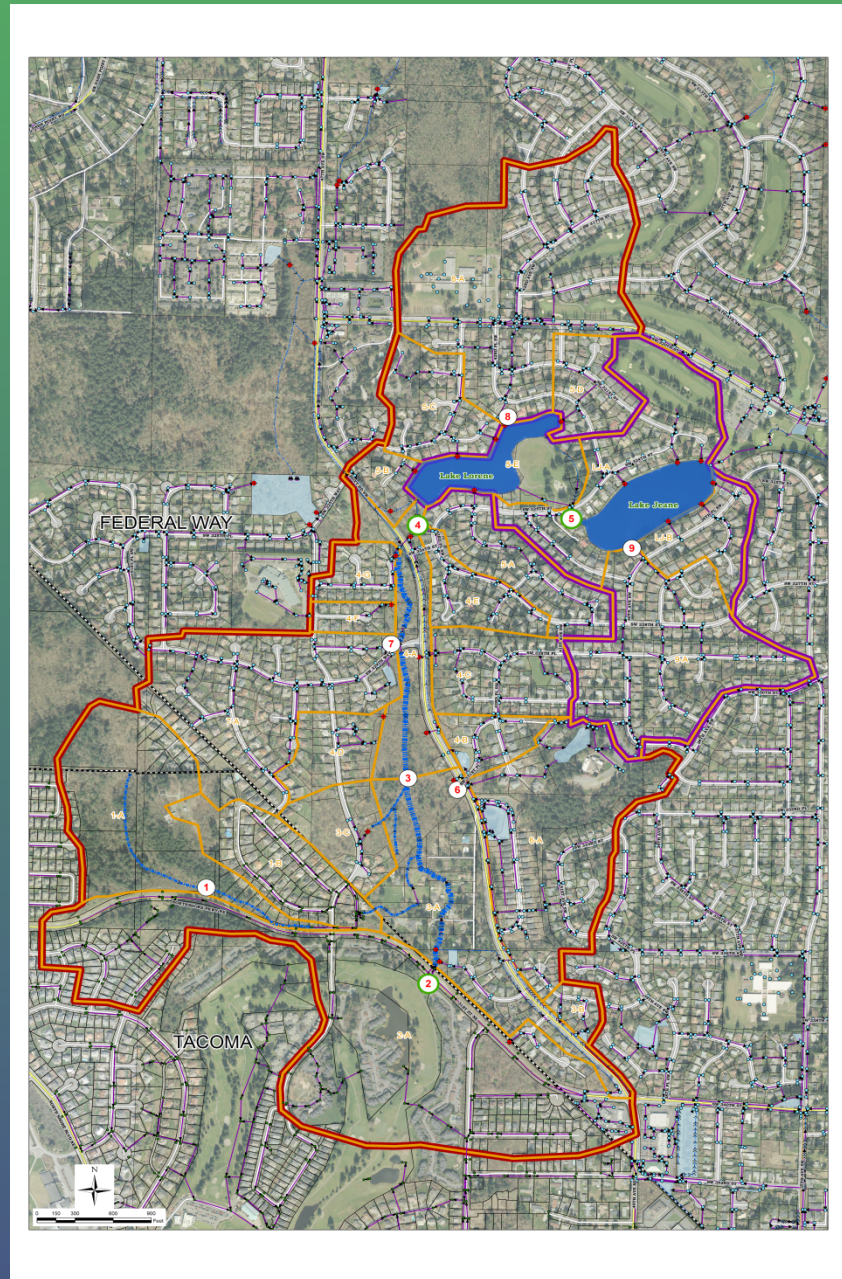
<http://www.cityoffederalway.com/node/1468>

WA Department of Ecology
(Ecology)

Freshwater Algae Program
Grant awarded to City of
Federal Way (City) in 2015

Grant Purpose:

“To generate credible and valuable surface and stormwater water quality and hydrologic data used to identify, control, and reduce external surface and stormwater sources of nutrients to the Twin Lakes (Lake Lorene and Lake Jeanne)”



Upper Joe's Creek Watershed Nutrient Reduction Study

Project Team:

City of Federal Way Surface Water Management (SWM)

WA Department of Ecology (Ecology)

Herrera Environmental Consultants, Inc. (Herrera)



Upper Joe's Creek Watershed Nutrient Reduction Study

Background:

- 2012 - 2014 – In response to blue-green algae issues on Lake Lorene, a private lake managed by Twin Lakes Homeowner's Association (TLHOA), TLHOA president engages City of Federal Way and identifies concerns with Joe's Creek.
- 2013 – 2014 SWM develops and implements a water quality action plan to identify and eliminate sources of illicit discharges into Upper Joe's Creek.
- September 2014 – Ecology responds to a letter sent to them by TLHOA outlining concerns about Joe's Creek and the blue-green algae blooms on Lake Lorene. Ecology recommends that TLHOA investigate sources of Phosphorus (P) loading to Lake Lorene. SWM staff refer to this as a phosphorus budget.



Upper Joe's Creek Watershed Nutrient Reduction Study

Background Continued...

- September 2014 – SWM holds a public meeting for the Twin Lakes community to present information on blue-green algae blooms, work within Upper Joe's Creek watershed by SWM staff, City's Municipal Separate Storm Sewer System (MS4) permit requirements, and public education and outreach efforts. SWM proposes applying for Ecology's Freshwater Algae Grant to help identify all the sources of P loading to the Twin Lakes. TLHOA is interested in this approach and willing to pay the local match for the grant.
- October 2014 – SWM puts together information for a grant application to identify all sources of P loading to Lake Lorene and notifies TLHOA the cost of the grant match. As the lake is private, SWM funds cannot be used to provide the match for determining the P budget within the lakes.



Upper Joe's Creek Watershed Nutrient Reduction Study

Background Continued...

November 2014 – TLHOA notifies the City that they determined their funds would be better spent on treating Lake Lorene, therefore they are not interested in funding the local match.

November 2014 – SWM revises application to determine what nutrients are carried from Upper Joe's Creek Watershed through the City's public MS4 into the Twin Lakes . SWM receives Council authorization to apply for Ecology's Freshwater Algae Control Grant Funding.

2015 – SWM receives a grant for "Upper Joe's Creek Watershed Nutrient Reduction Project". SWM hires a consultant, Herrera, and begins work on the Quality Assurance Project Plan (QAPP) and budget, which is reviewed and approved by Ecology.

2016 – Ecology approves QAPP and SWM implements the sampling and monitoring plan. Samples are tested for nutrients of interest in area laboratories and the results are provided to Herrera for the data analysis.



Upper Joe's Creek Watershed Nutrient Reduction Study

Background Continued...

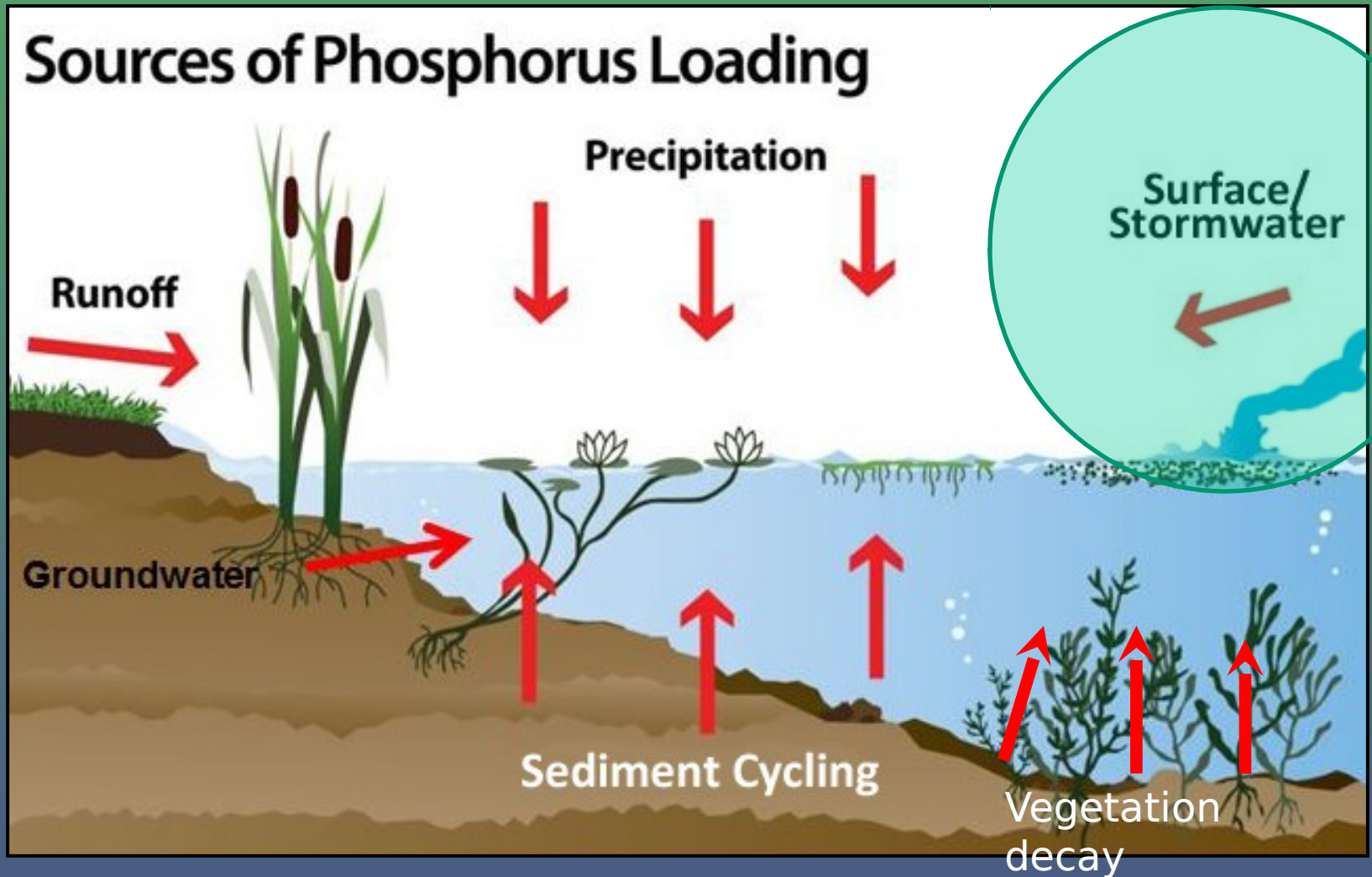
May 2017 –Herrera provides a draft report on the results from data analysis of the sampling and monitoring to SWM Staff.

June 2017 – Final report to be published and presented to City Council. Final report will also be presented to businesses and residents within Upper Joe's Creek Watershed. SWM Staff will develop a public education and outreach plan and recommend a course of action.

July 2017 – SWM staff will submit the final grant documentation and close out Upper Joe's Creek Watershed Nutrient Reduction Project grant.



Upper Joe's Creek Watershed Nutrient Reduction Study

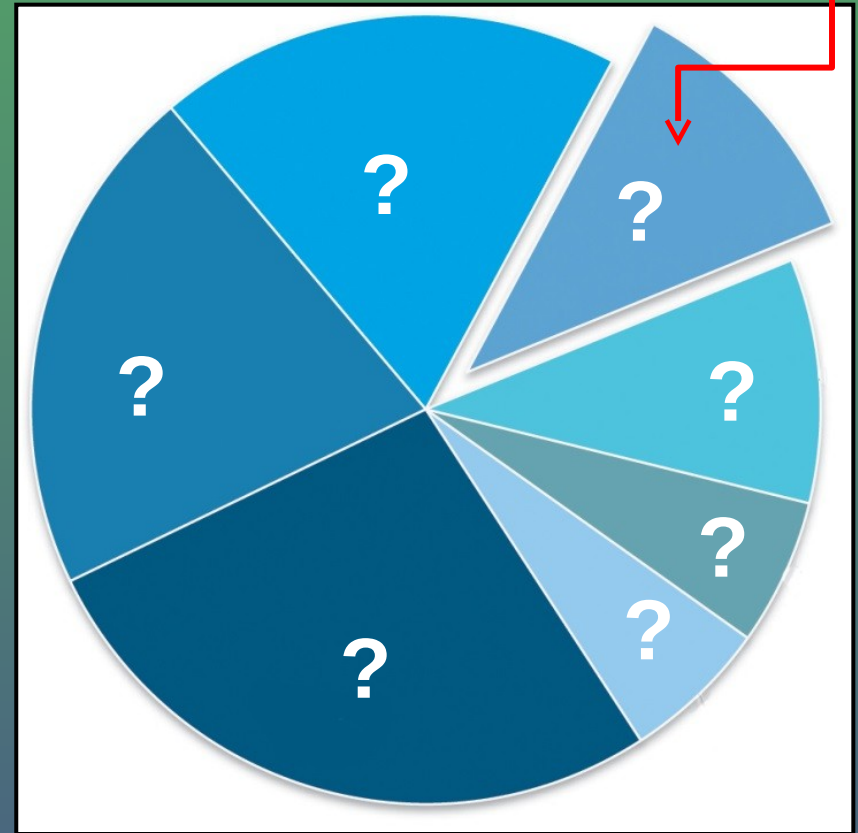


Twin Lakes Phosphorus Budget

Typical Sources of P:

- Surface and stormwater runoff
- Impermeable surface pollutants
- Lawn and garden fertilizers
- Pet and animal waste
- Residential car washing
- Failing on site septic systems
- Groundwater
- Erosion from soils
- Internal cycling of lake sediments
- Decaying plant matter
- Precipitation
- Organic Pesticides

Upper Joe's Creek Watershed MS4



Upper Joe's Creek Watershed Nutrient Reduction Study

Project Goals

1. Identify problematic surface and stormwater nutrient sources in the Upper Joe's Creek and Twin Lakes Watershed.
2. Implement corrective actions for the reduction and/or elimination of identified surface and stormwater nutrient sources through ongoing municipal and/or county code compliance efforts.
3. Estimate external surface and stormwater nutrient loading to Twin Lakes that may be used for development of phosphorus budgets and/or algae control plans in the future.
4. Implement a public education program that provides information to targeted populations in the watershed and best management practices (BMPs) for controlling urban sources of nutrients.



Upper Joe's Creek Watershed Nutrient Reduction Study

Nutrients of Interest to be sampled under the study

Total Phosphorus (TP)

All phosphorus found in a sample, dissolved or in particulate form.

Soluble Reaction Phosphorus (SRP)

Measure of orthophosphate, that phosphorus which can be taken up by plant cells.

Nitrate+Nitrite Nitrogen

Although phosphorus is the primary nutrient of concern, nitrogen does contribute to algae growth.

Fecal Coliform Bacteria (FC)

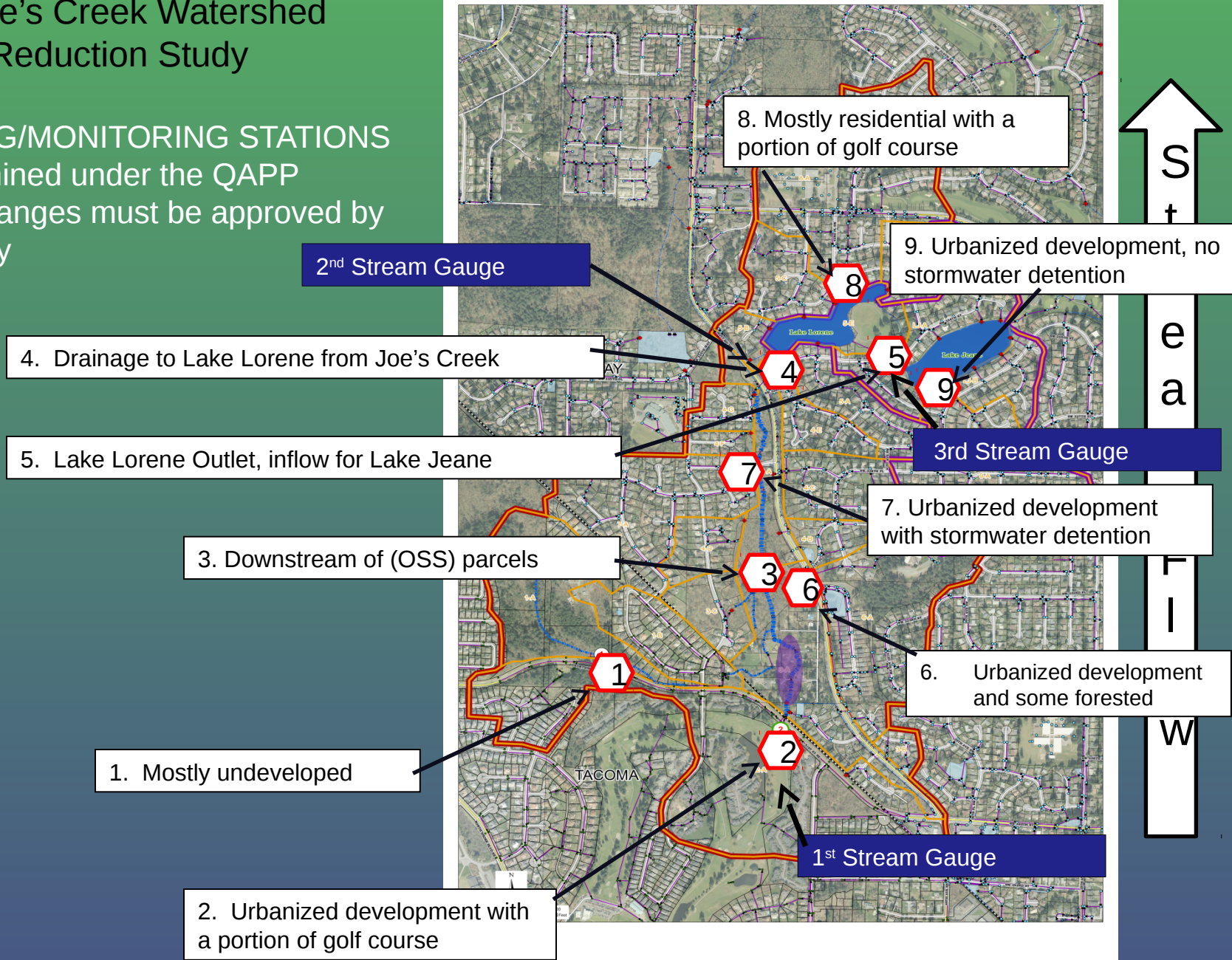
Presence of FC bacteria can assist in identifying the possible phosphorus input from a leaking OSS, wildlife, or pet waste. (This test does not identify whether the bacteria is human or animal.)



Upper Joe's Creek Watershed Nutrient Reduction Study

SAMPLING/MONITORING STATIONS

- Determined under the QAPP
- Any changes must be approved by Ecology



Upper Joe's Creek Watershed Nutrient Reduction Study

Comparison of Medians with similar urban King County Streams

Table 5. Comparison of Medians in Upper Joe's Creek to Four Small Streams in King County Watersheds with Low to Medium Density Development.

Parameter	Upper Joe's Creek Mouth (JC-4)		King County Streams ^a		
	Base	Storm	Stream	Base	Storm
Total phosphorus (mg/L)	0.048	0.068	Soosette	0.020	0.040
			Lea Hill	0.040	0.060
			Panther	0.055	0.050
			Hamm	0.044	0.095
Soluble reactive phosphorus (mg/L)	0.023	0.032	Soosette	0.006	0.009
			Lea Hill	0.030	0.020
			Panther	0.035	0.020
			Hamm	0.024	0.025
Nitrate+nitrite nitrogen (mg/L)	0.927	0.785	Soosette	0.407	0.818
			Lea Hill	0.790	0.552
			Panther	0.350	0.408
			Hamm	1.251	1.680
Fecal coliform bacteria (CFU/100 mL)	130	690	Soosette	56	900
			Lea Hill	20	180
			Panther	190	395
			Hamm	125	1,057

^a Median values for: Soosette Creek, Green River Tributary at Lea Hill, Panther Creek, and Hamm Creek (Appendix B in Herrera 2007).



Upper Joe's Creek Watershed Nutrient Reduction Study

Base flow - Natural flow in a stream composed largely of subsurface water that rises to the surface.

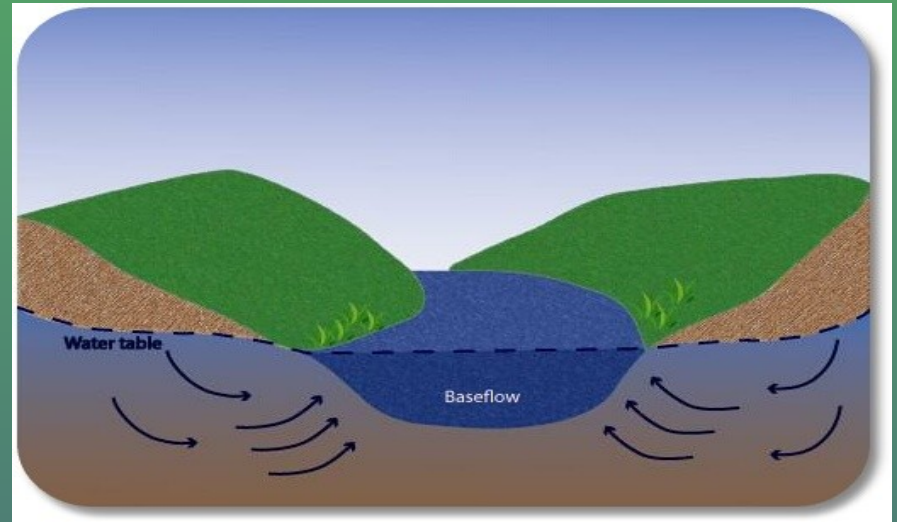
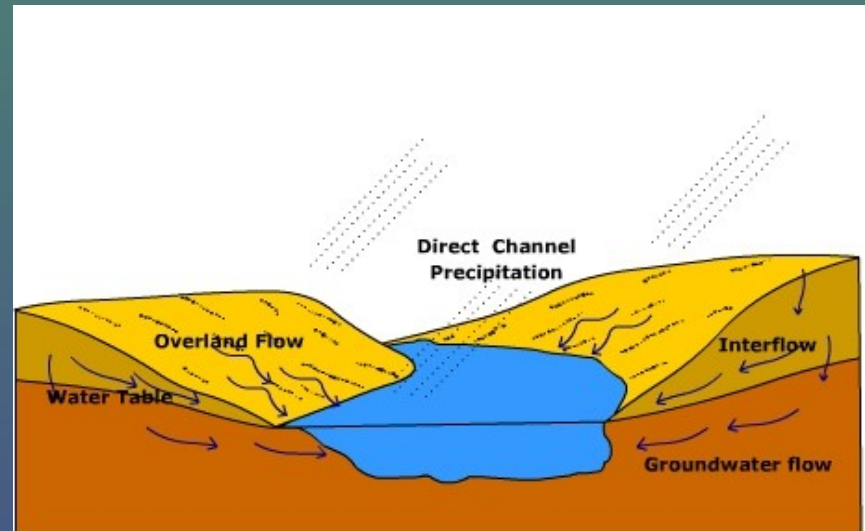
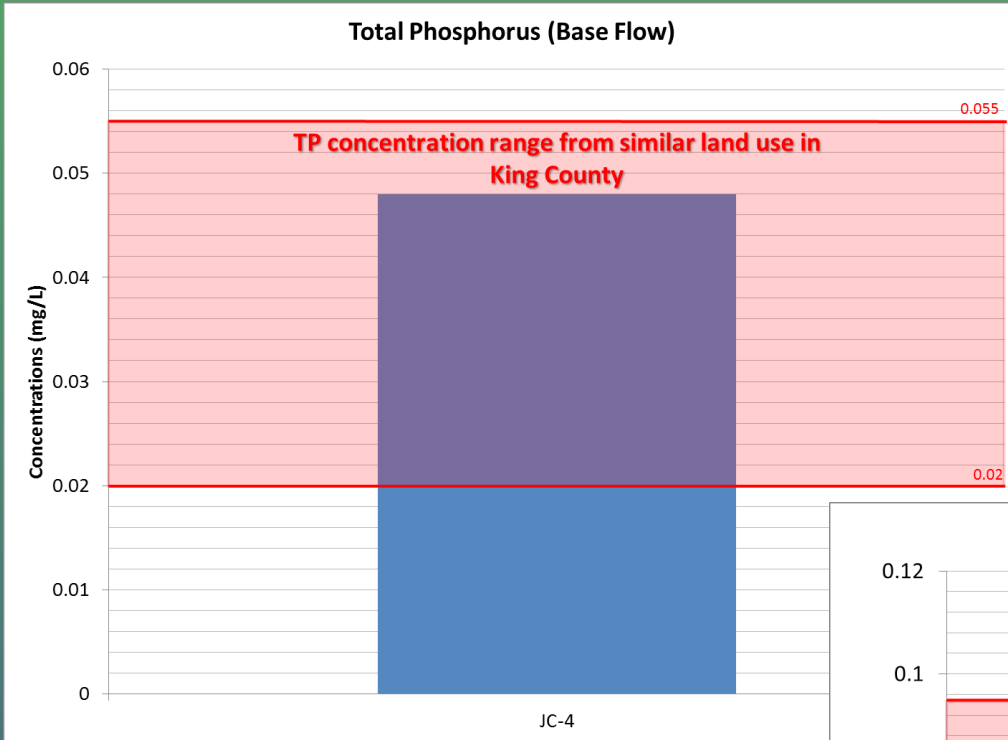


Illustration - dwa.gov.za

Storm Flow – Precipitation, direct runoff from impervious surfaces as a result of precipitation, and base flow.



Median Comparison Total Phosphorus – TP

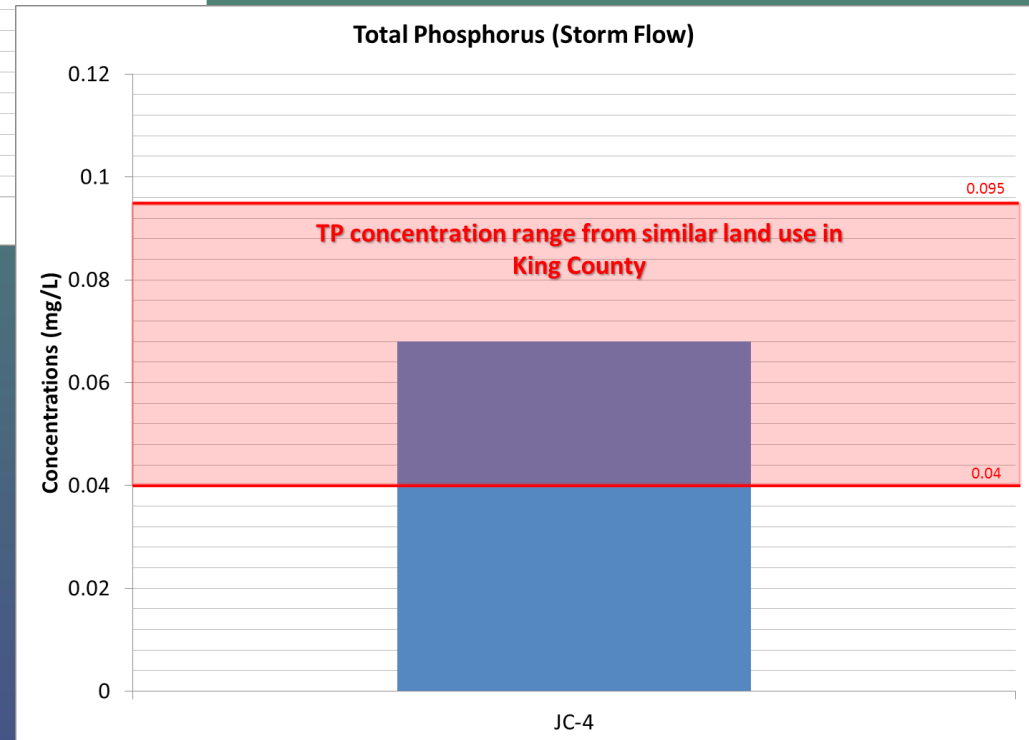


Conclusion:

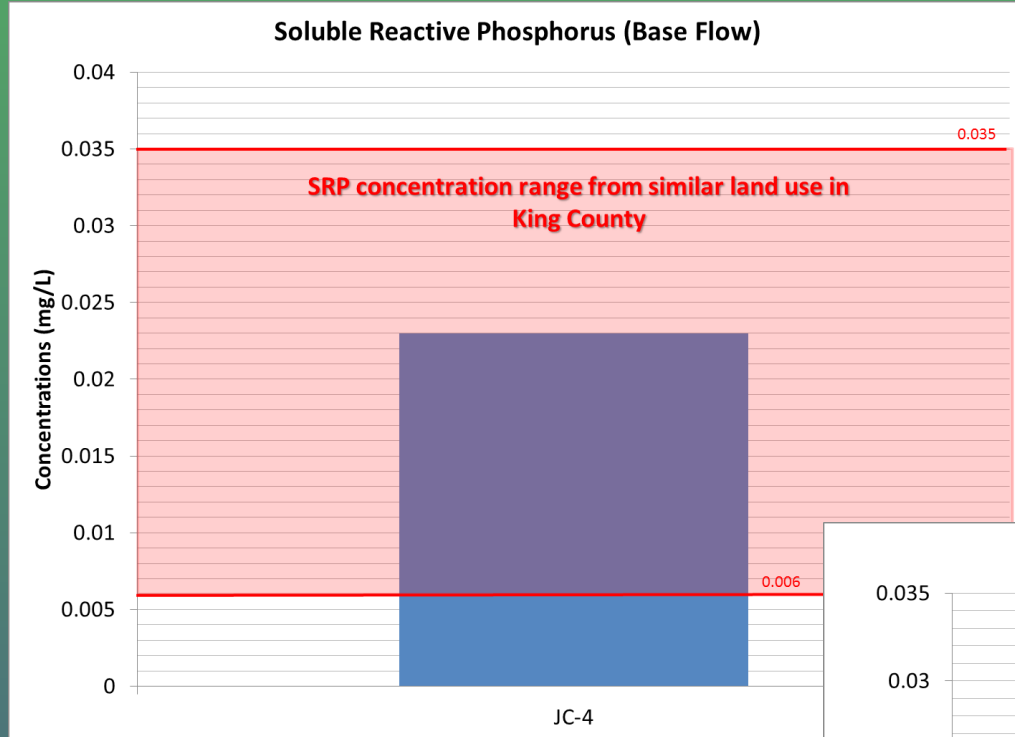
The concentration of TP within Joe's Creek is within the range of similar King County Streams within urbanized areas.

Conclusion:

The TP concentration within Joe's Creek during storm flow is within the range of similar urban streams within King County.

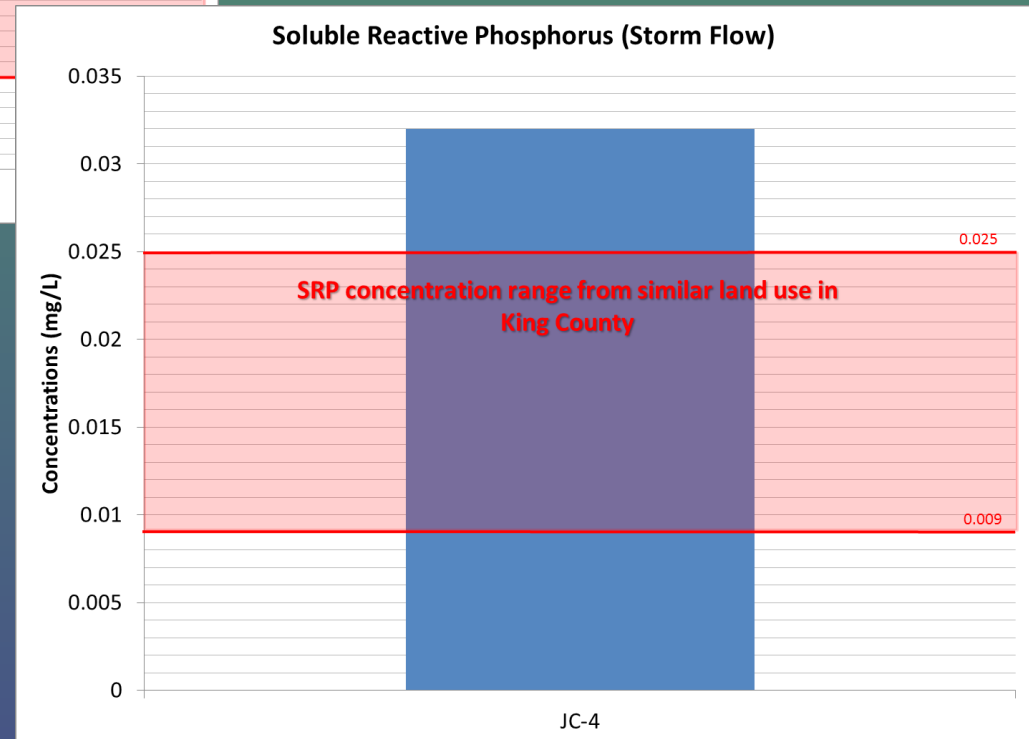


Median Comparison Soluble Reactive Phosphorus – SRP



Conclusion:

The concentration of SRP within Joe's Creek during base flow is within the range of similar King County Streams within urbanized areas.



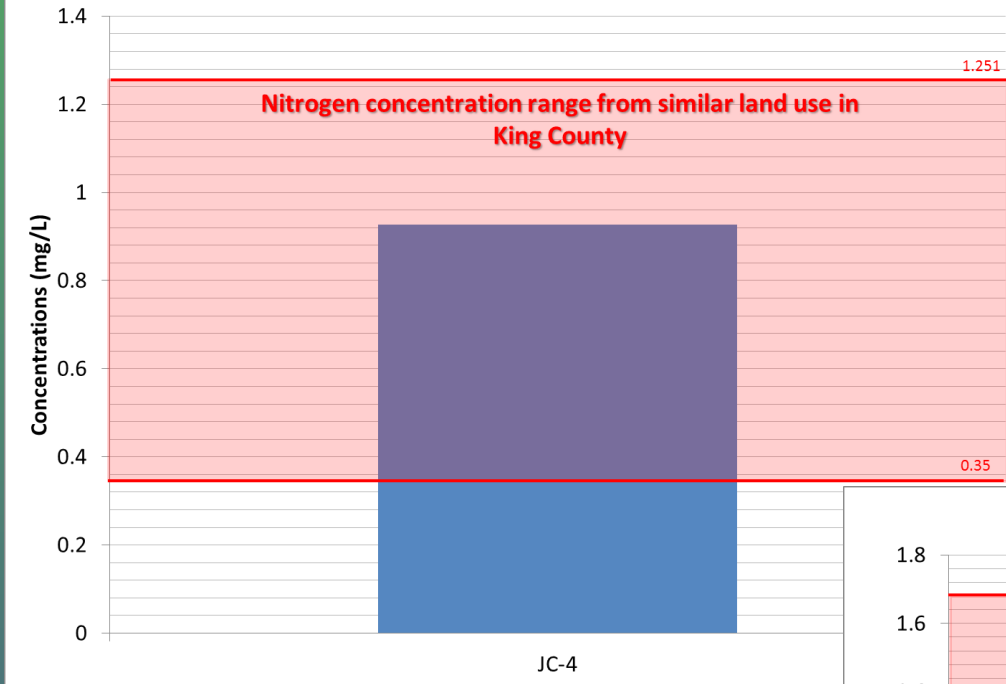
Conclusion:

The concentration of SRP storm flow within Joe's Creek is higher than the range of similar urban streams within King County.



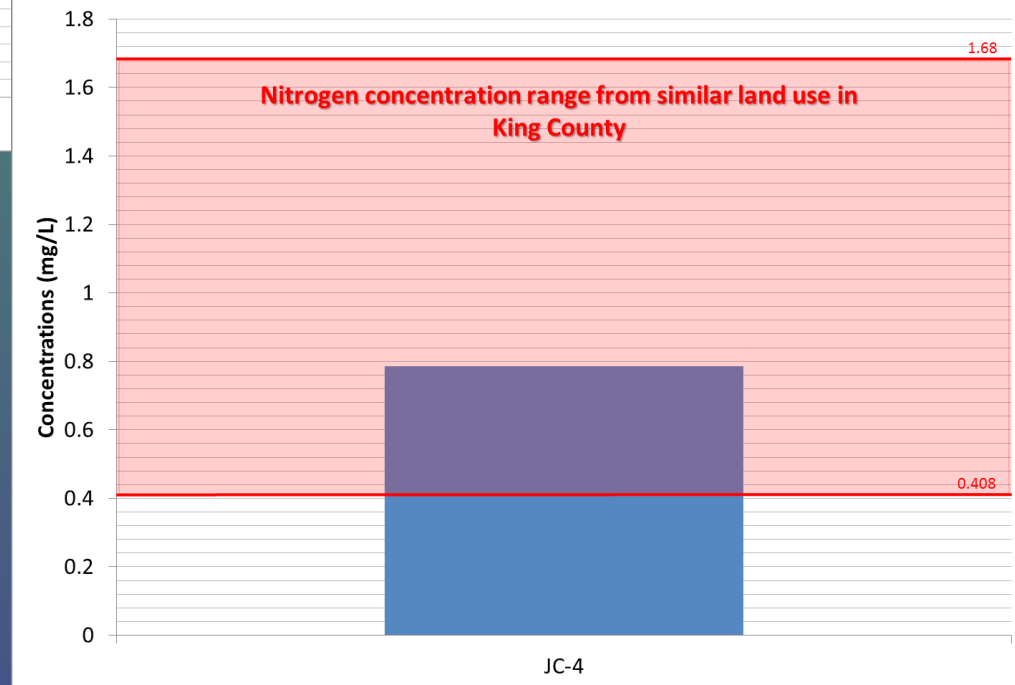
Median Comparison - Nitrate+Nitrite Nitrogen

Nitrates and Nitrites (Base Flow)



Conclusion:
Nitrogen concentrations within Joe's Creek during base flow is within the range of similar King County streams within urbanized areas.

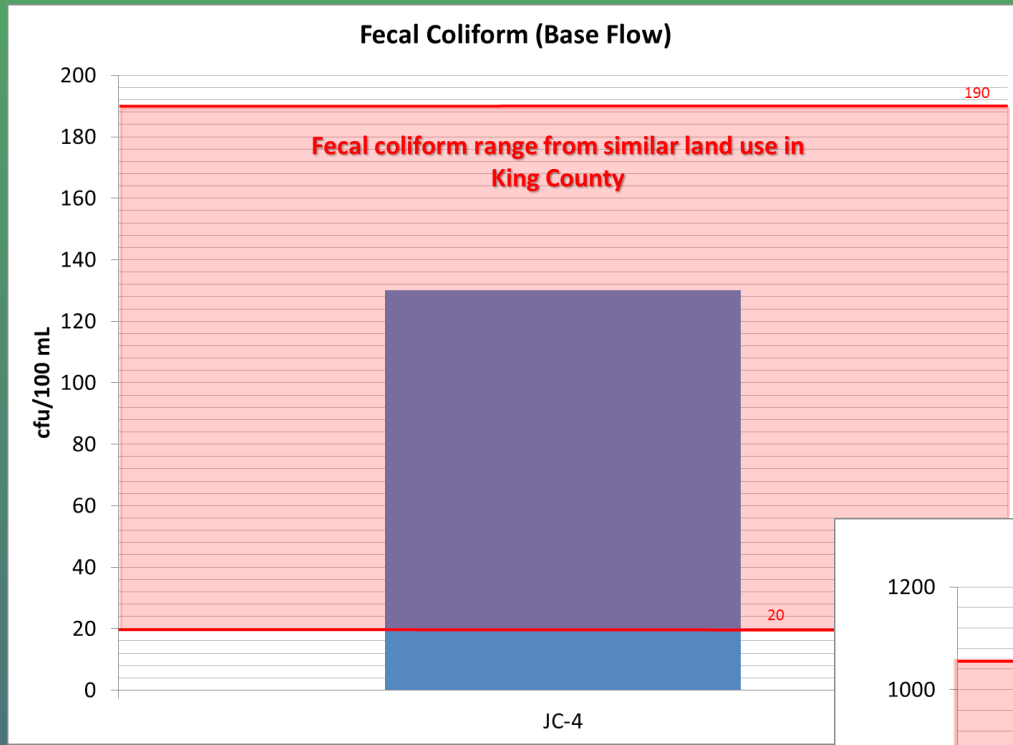
Nitrates and Nitrites (Storm Flow)



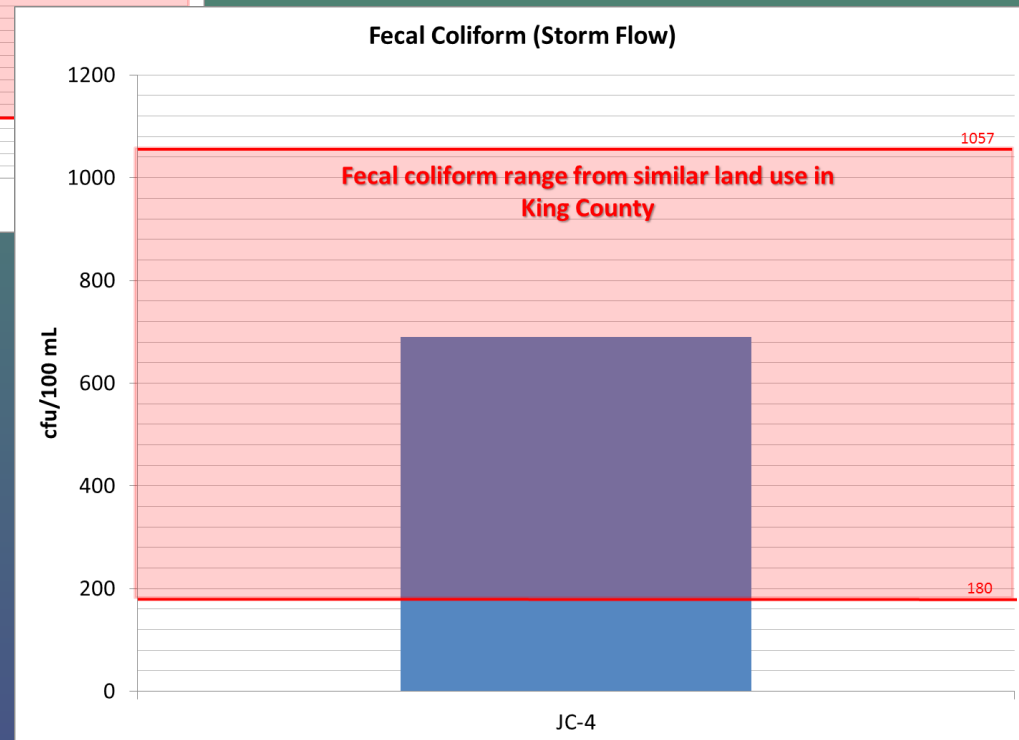
Conclusion:
The Nitrogen concentration during storm flow within Joe's Creek is within the range of similar urban streams within King County.



Median Comparison Fecal Coliform Bacteria



Conclusion:
The FC concentration within Joe's Creek during base flow is within the range of similar urban streams in King.

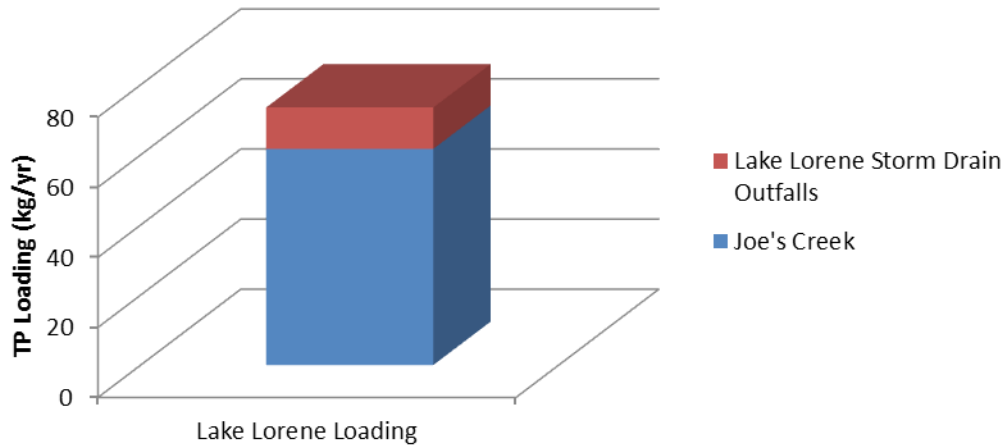


Conclusion:
The FC concentration within Joe's Creek during storm flow is within the range of similar urban streams in King County



Upper Joe's Creek Watershed Nutrient Reduction Study

Lake Lorene Surface Water TP Loading



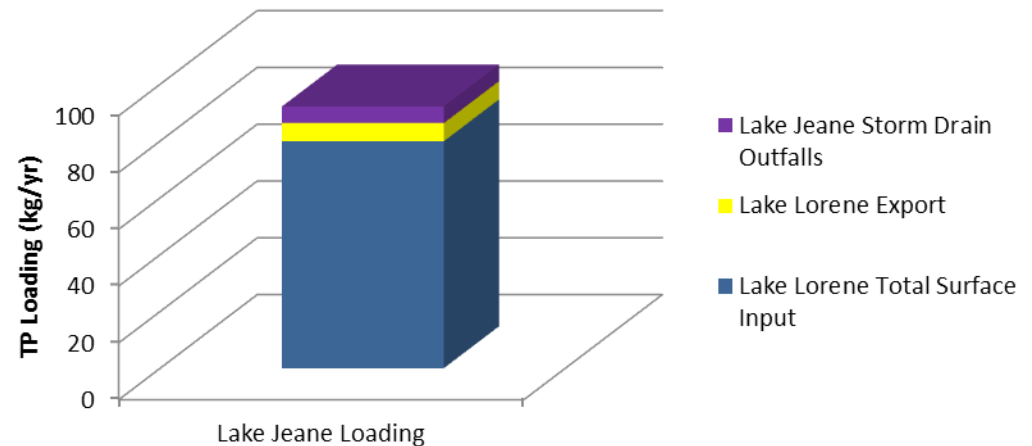
Conclusion:

- Joe's Creek is the predominant surface water source of TP entering Lake Lorene.

Conclusion:

- The amount of TP leaving Lake Lorene is greater than entering Lake Lorene from surface water sources.

Lake Jeane Surface Water TP Loading



Upper Joe's Creek Watershed Nutrient Reduction Study

Conclusions:

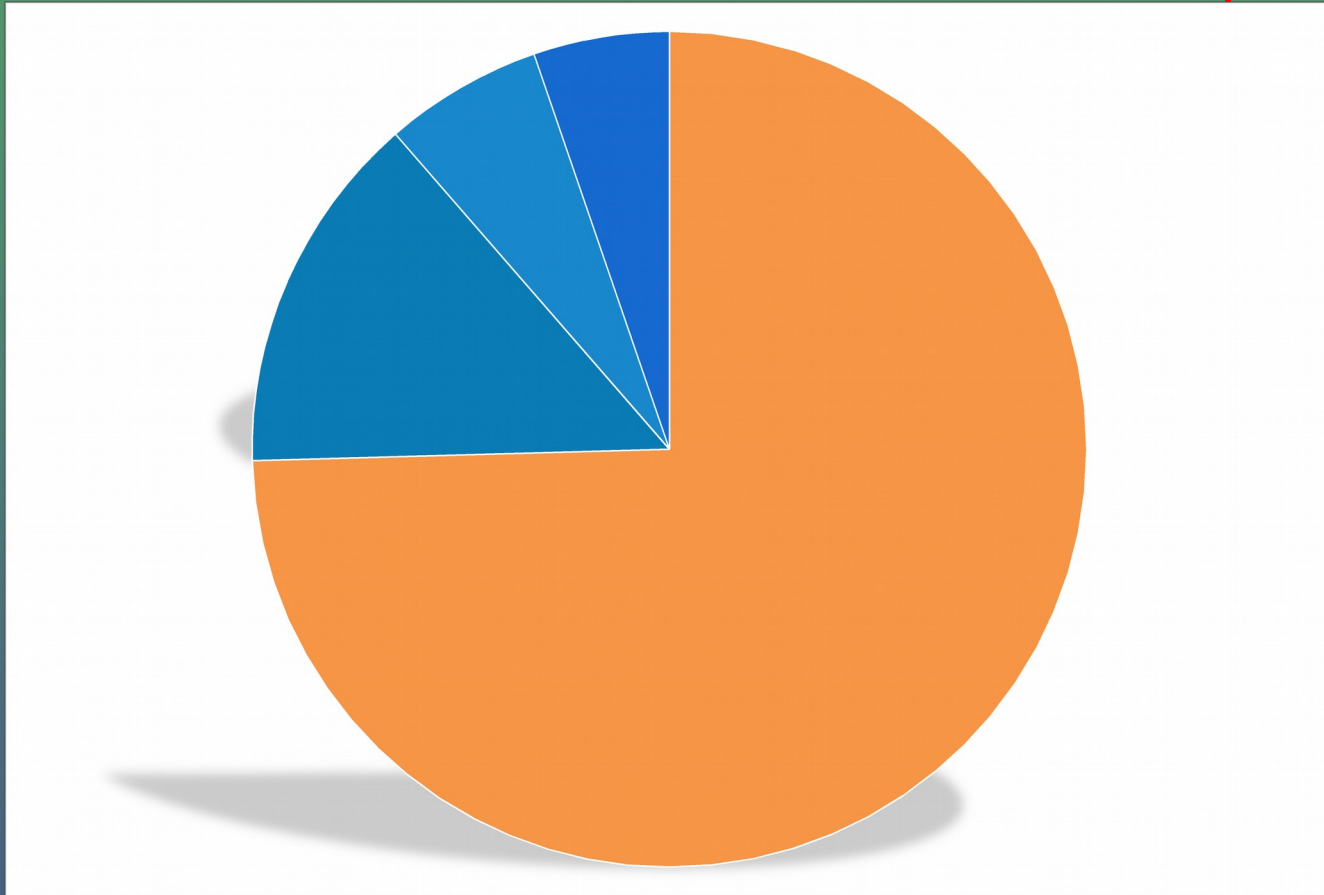
1. The study findings indicate that Upper Joe's Creek has nutrient concentrations similar to other King County streams and is the predominant surface water loading source of the TP loading to both lakes. The one exception appears to be SRP during storm flow.
2. Other sources not evaluated in this study may also contribute a portion of the TP loadings in the summer growing season.
3. Reductions in overall TP loadings to Lake Lorene and Lake Jeane are needed to reduce the amount of algae growth and the frequency of toxic algae blooms in the lakes.
4. A lake restoration analysis is needed to develop a long-term and cost-effective reduction approach. A restoration analysis would include identifying all sources of P (P budget).

Study can be downloaded from Public Works SWM web page:
<http://www.cityoffederalway.com/node/1468>



Twin Lakes Phosphorus Budget

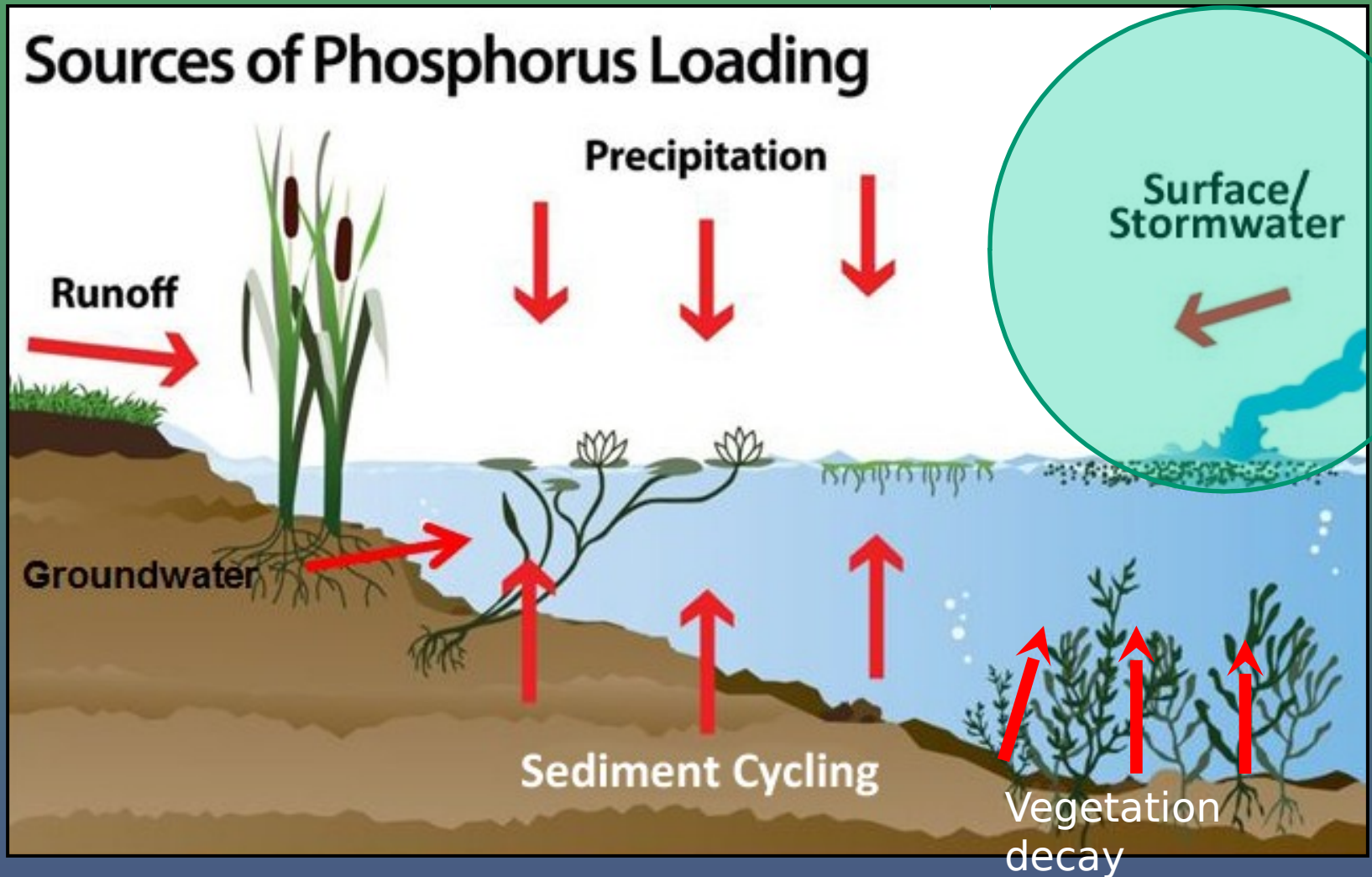
Upper Joe's Creek Watershed MS4 into Lake Lorene



(79.9 kg/yr into Lake Jeane)



Upper Joe's Creek Watershed Nutrient Reduction Study



Upper Joe's Creek Watershed Nutrient Reduction Study

What's Next:

1. Public Outreach to present report on June 28, 2017 at Twin Lakes Elementary School – 6:30 pm.
2. Public education and outreach of Best Management Practices (BMPs) to help reduce pollutant load from surface water runoff.
3. SWM Staff have engaged City of Tacoma Water Quality Staff to explore options for reducing pollutant load flowing into Upper Joe's Creek at station JC-2.
4. Engage King County Department of Health to investigate the possibility of leaking OSS along Joe's Creek.
5. Provide ongoing technical support for surface water issues.
6. Continue source control and illicit discharge investigation efforts.
7. Encourage the managers of Lake Lorene and Lake Jeane to evaluate other sources of TP loading and have a lake restoration analysis developed.



Upper Joe's Creek Watershed Nutrient Reduction Study

End of Presentation

