
2014 Post Construction Monitoring Report King County Multiple Stormwater Facility Retrofits

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Introduction

King County received a grant from the State of Washington Department of Ecology to retrofit stormwater facilities owned and operated by King County. These retrofit projects addressed facility performance deficiencies. These facilities included a mix of stormwater detention and treatment facilities that were constructed by past subdivision development projects to mitigate the flow and water quality impacts of land development.

King County constructed eight stormwater facility retrofit projects in 2013. Five of the retrofit projects are biofiltration swales (bioswales). The grant agreement requires field checks, and reports of the results and recommendations of the bioswale retrofit sites after one wet season. These five bioswale retrofit projects have gone through one wet season of operations. The report evaluates the success of the retrofit improvement. This report includes photographs and a summary of the field checks on each bioswale site. The Quail Creek D92191 bioswale was field checked by Cody Toal, Environmental Scientist, on August 18, 2014. The Ames Lake Hills D92379, Ridge Point Estates D92026, Rock Creek D92035, and Fournier D92350 bioswales were field checked by Senior Engineer, Ken Gresset in October 2014.

Quail Creek Bioswale D92191

The Quail Creek D92191 bioswale was planted with a total of 1,000 emergent plugs including three different species. This swale is in almost complete shade. There is a thick covering of deciduous leaves in many areas. Both of these factors may have contributed to a low survivorship. The surrounding area is vegetated with both native and invasive species and has not been maintained. Plant survival and cover is 30 to 40% for Slough sedge and Small-fruited bulrush, and a bit higher for the Mannagrass. Supplemental plantings are recommended. Recommending the planting of approximately 300 additional emergent plugs to fill the gaps in the vegetation, or wait for it to fill in on its own over time. No rivulets or avulsions have formed in the substrate. The swale appears to be functioning as designed. Both inlet and outlet are clear of obstructions or debris.

Quail Creek Bioswale D92191



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Ames Lake Hills D92379

The Ames Lake Hills D92379 facility was operating at an optimal depth for water treatment when it was inspected. While the splash pad was working well in preventing erosion, flow dispersal was concentrated to the right of center. This was adjusted during the field visit, and flows are now being spread evenly at the start of the swale. Note the strong growth of the bioswale vegetation.



Problems that need to be corrected: None, the project is functioning as designed.

Ridge Point Estates D92026

The Ridge Point Estates D92026 facility had undergone a re-grade of the bioswale. It was also replanted, as invasive vegetation had displaced many of the original plants and grasses. A constant grade was established, yard waste was hauled off and excessive vegetation that was shading the bioswale was removed.



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This photo shows the site. The bioswale runs along the far perimeter of the site and the infiltration basin is in the middle.

Ridge Point Estates



This photo shows the discharge pipe that feeds the bioswale and infiltration basin. Note the evidence of recent flow indicated by the bent over grass.

Problems that need to be corrected:



In the lower part of the swale, non-native vegetation, Bird's Foot Trefoil, has taken over and outgrown the rest of the bioswale plants and grasses. The non-native vegetation, Bird's Foot Trefoil, should be removed to allow the other native plants to grow.

Rock Creek D92035

The Rock Creek D92035 facility showed strong growth of the bioswale grasses.



The retrofit design changed a catch basin to an open rock-lined basin for energy dissipation due to the limited drop in the channel. This would have resulted in a flattened channel slope and standing water would have been a significant problem. The open basin works well with no signs of erosion.



Design of the flow spreaders was changed from the expensive, non-adjustable concrete forms to simple bands of 2"-4" crushed rock that can be easily re-shaped to counter channelization when it occurs.

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Problems that should be corrected:



This photo shows ponding in lower right of the picture. There is also a 4 foot length of standing water at the apex of the switchback in the upstream channel. Ponding takes up approximately 6 of the 191 feet of the bioswale, or about 3% of the length. This can be corrected by adding soil to fill these areas and then planting additional bioswale grasses.

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Fournier D92350

The Fournier D92350 facility needed to be repaired since the shade from trees had killed the bioswale vegetation, and a single channel had formed, providing virtually no biofiltration. Trees were removed and others were trimmed to allow more sunlight to reach the bioswale, rock flow spreaders were added to disperse the flow and a flexible flow splitter was installed to keep the flows separated.



Grading of the site was difficult due to the saturated organic soils, but flow through the site during the wet season is evenly distributed. The size of the treatment area was expanded by stabilizing the left side with quarry spalls. Clearing of vegetation to the south and the west is allowing substantially more sunlight into the area.



This photo shows the density of the bioswale grasses that are now growing in the facility. On the right is a flexible flow divider that keep flows to either side separated. It is made from recycled polyethylene that is impervious to rotting in the saturated soils.

Problems that need to be corrected: None, the project is functioning as designed.

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Summary

King County constructed five bioswale stormwater facility retrofit projects in 2013. Overall, the retrofit facilities are functioning as designed. All of the bioswale facilities had clear inlets and outlet pipes. These bioswale facility retrofit projects are functioning well and some minor maintenance is recommended. The following table summarizes the bioswale facilities and the minor maintenance that is recommended.

Bioswale Facility:	Minor maintenance that is recommended:
Quail Creek D92191	Approximately 300 additional emergent plugs to fill the gaps in the vegetation is recommended or it just may fill in on its own over time.
Ridge Point Estates D92026	Non-native vegetation, Bird's Foot Trefoil, removal is recommended to allow the other native plants to grow.
Rock Creek D92035	Add soil to fill the standing water at the apex of the switchback in the upstream channel and replant additional bioswale grasses.