Meeting Series #1

May 2014

MILLER-WALKER BASIN
Stormwater Retrofit

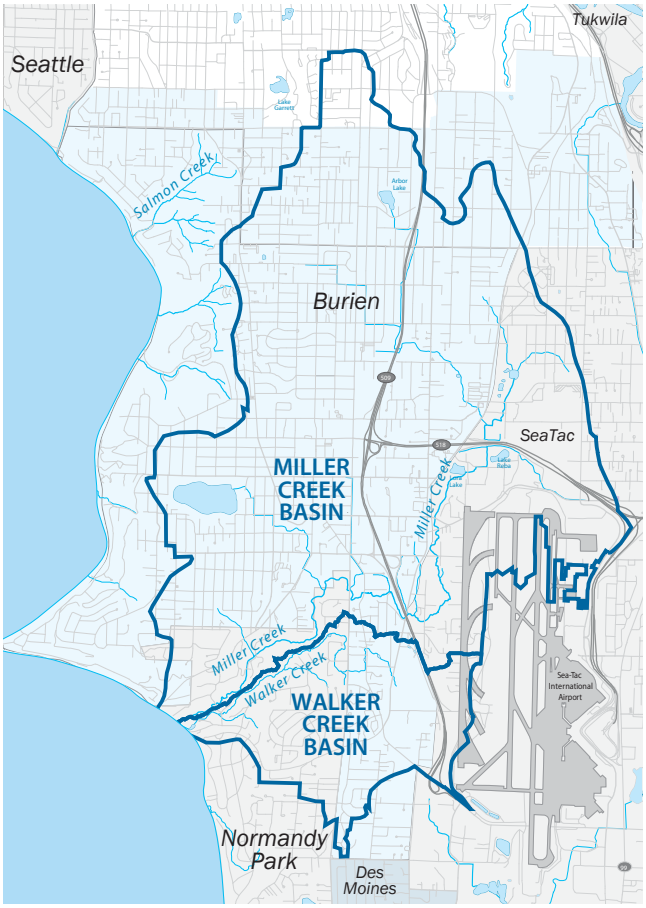
JOIN US FOR A PUBLIC MEETING!

Normandy Park
Wednesday, May 28
6:30 – 7:30 p.m.

Normandy Park Recreation Center
801 SW 174th St
Normandy Park, WA

Burien
Thursday, May 29
6:30 – 7:30 p.m.

Burien Community Center, Shorewood Room
14700 6th Avenue SW
Burien, WA



The Miller-Walker Basin, which covers approximately eight square miles, includes the Port of Seattle, the cities of Burien, Sea-Tac, and Normandy Park, and a small area of unincorporated King County.

Improving Water Quality for Miller-Walker Basin

Join us for a public meeting to learn and offer feedback about efforts to improve water quality in your community! Starting this spring, the Miller-Walker Basin Partners - Burien, Normandy Park, Sea-Tac, the Port of Seattle and King County - are conducting a stormwater retrofit analysis that will identify potential strategies and stormwater projects to help reduce runoff throughout the Miller-Walker Basin.

As the analysis progresses, the Basin Partners will prioritize and ultimately select three to five stormwater retrofit projects for potential design and construction. These projects could use a variety of methods to slow and treat stormwater flows, ranging from additional pipes to carry stormwater to local treatment facilities to green stormwater infrastructure, such as rain gardens and permeable pavement. All potential projects would be located on public property. For more information on green stormwater projects, see inside.

Public meeting series

The stormwater analysis will provide the Miller-Walker Basin Partners with a roadmap of strategies designed to improve water quality and reduce flooding and erosion. Over the next several months through Fall 2014, the Basin Partners will host a series of public meetings to discuss the benefits of the analysis and potential stormwater retrofit opportunities in your community. Meeting attendees will be able to learn more about the objectives of the analysis, the Basin Partners' initial findings, and continued opportunities for you to provide your input.

King County · Port of Seattle · City of Normandy Park

WHAT IS GREEN STORMWATER INFRASTRUCTURE?

One way to manage harmful stormwater runoff is through green stormwater infrastructure. This is a cost-effective and environmentally-friendly way to remove pollutants from our local waterways, reduce occurrences of flooding, and replenish groundwater systems.

For example, rain gardens and swales use plants and soil to absorb the water when it rains. Other types of green stormwater infrastructure, such as permeable pavement, allow water to drain through it and back into the ground.

Stormwater runoff and pollution

When it rains, stormwater collects from impervious surfaces, including roofs and pavement. The untreated water then drains into local waterways, such as Miller and Walker creeks, carrying runoff and pollutants that eventually flow into Puget Sound. Motor oil, brake fluid, weed killers, and other chemicals contaminate the creeks, negatively impacting the wildlife within these waters. As an example, a recent survey showed that over 80% of coho salmon adults in Miller and Walker creeks died before they could lay eggs. This measurement, also referred to as a stream's pre-spawn mortality rate, demonstrates the importance of stormwater quality improvements.

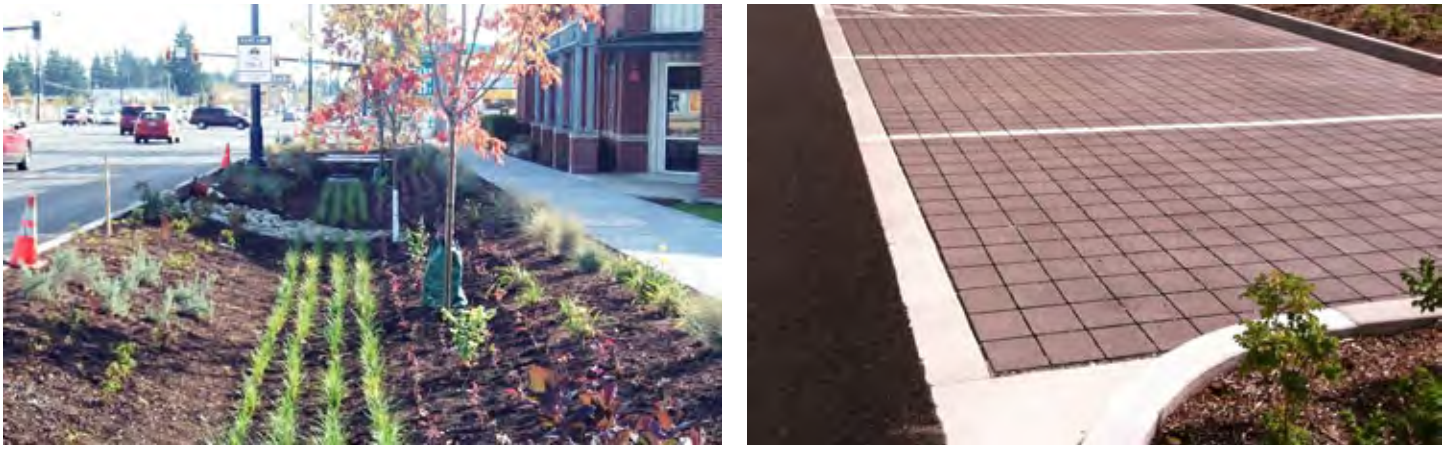
Benefits of managing stormwater

In addition to improving water quality for wildlife and their habitat, stormwater management has benefits for our communities and neighborhoods. Controlling and absorbing stormwater can reduce erosion and flooding on roadways and private property. Traditional stormwater facilities, like detention ponds, allow stormwater to collect and slowly release back into the stormwater system for treatment. Green stormwater infrastructure uses natural features to keep stormwater runoff close to its source.

Current stormwater projects

Communities in the Miller-Walker Basin have already been busy improving water quality:

- In 2007, the Port of Seattle completed significant upgrades to its stormwater management practices to prevent contaminated runoff from reaching local streams and Puget Sound. These practices range from aircraft and equipment management to detention and treatment of stormwater runoff.
- In Burien, the city is constructing a new stormwater and trail project in the Northeast Redevelopment Area north of SR 518. The project will make improvements to treat runoff that would ordinarily flow directly into Miller Creek.



Green stormwater infrastructure can include bioretention swales (left) or permeable pavement (right).

MILLER-WALKER BASIN
Stormwater Retrofit

FOR MORE INFORMATION ON THE MILLER-WALKER BASIN:

- **Search** "Miller-Walker" at kingcounty.gov
- **Contact**
  Elissa Ostergaard
  Miller-Walker Basin Steward
  206-477-4792
  elissa.ostergaard@kingcounty.gov

Swales are a cost-effective option to manage stormwater and remove pollutants from our local waterways.

Schedule

Over the next several months, the analysis will identify and select potential stormwater retrofit project sites to help improve water quality and reduce flooding and erosion.

Spring 2014
Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014
Evaluate and rank stormwater retrofit project sites

Public Meeting Series #2

Fall 2014
Select top stormwater retrofit project sites for potential design and construction

Public Meeting Series #3

Another type of green stormwater infrastructure – roadside gardens – capture and absorb stormwater runoff.

MILLER-WALKER BASIN
Stormwater Retrofit

King County Water and Land Resources Division
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855

JOIN US FOR A PUBLIC MEETING!

Normandy Park
Wednesday, May 28

Burien
Thursday, May 29

King County

Port of Seattle

For more information: Search "Miller-Walker" at kingcounty.gov

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Stormwater Retrofit

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MILLER-WALKER BASIN STORMWATER RETROFIT ANALYSIS

Normandy Park, WA

May 28, 2014

PRESENTATION OVERVIEW

- Describe the need and benefits of stormwater management
- Share examples of stormwater retrofit projects
- Explain the analysis underway in the Miller-Walker Basin and how to be involved

GOALS

- Share preliminary stormwater analysis progress
- Illustrate examples of the types of projects that could be appropriate for the basin
- Answer questions and hear your ideas for stormwater runoff management in Normandy Park

PROJECT BACKGROUND

PROJECT FUNDING

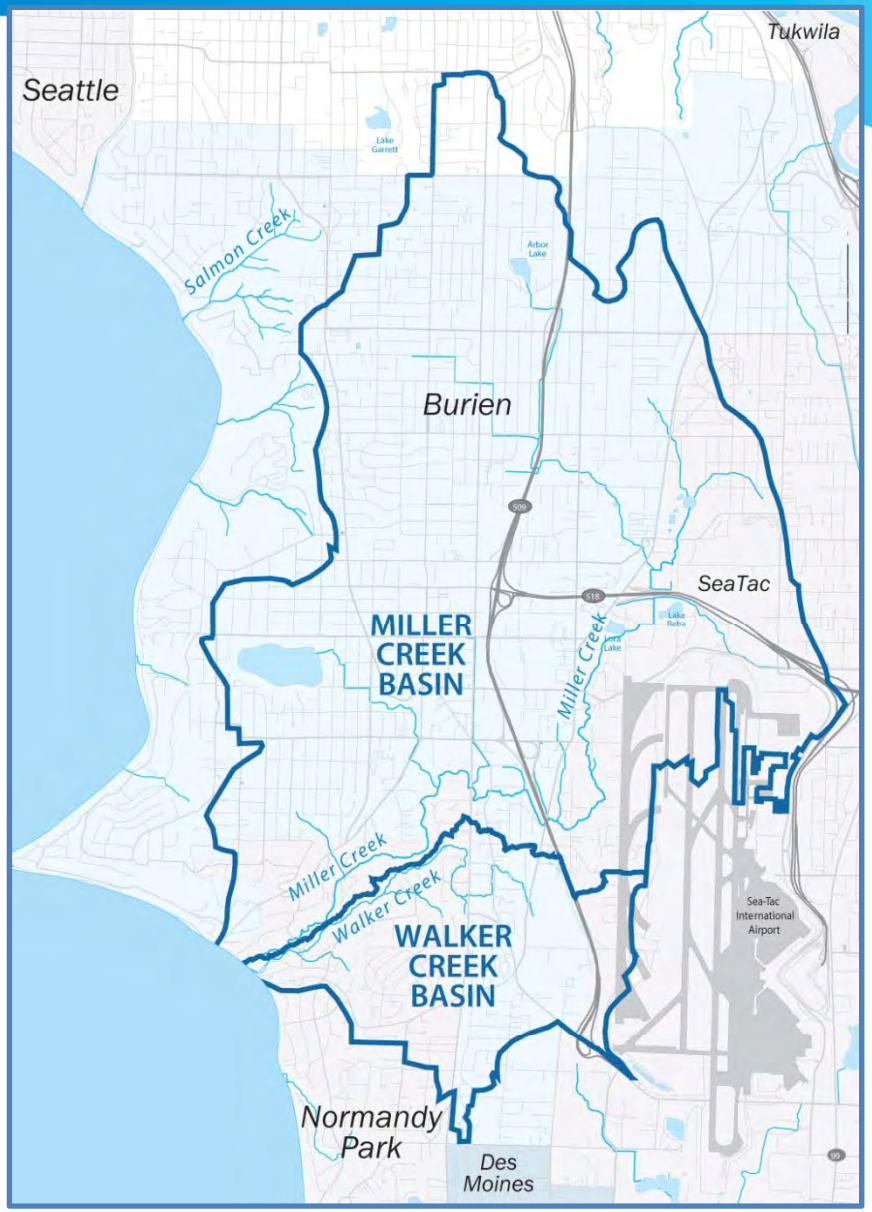
- Miller-Walker Basin Partners:
  - Port of Seattle
  - Burien
  - Normandy Park
  - SeaTac
  - King County

- Washington State Department of Ecology grant through the U.S. Environmental Protection Agency
  - This project has been funded in part by the United States Environmental Protection Agency (EPA) under Puget Sound Ecosystem Restoration and Protection Cooperative Agreement Grant PC-00J20101 with Washington State Department of Ecology. The contents of this document do not necessarily reflect the views and policies of the EPA, nor does mention of trade names or commercial products constitute endorsement or recommendation for use.

MILLER-WALKER BASIN

Stormwater drainage basin that holds Miller & Walker creeks

- Covers approximately eight square miles
- Includes:
  - Port of Seattle
  - Burien
  - Normandy Park
  - SeaTac
  - Unincorporated King County



STORMWATER RUNOFF

When rain falls on impervious and hard surfaces, stormwater:

- Collects pollutants – oils, grease, chemicals, pesticides, metal, animal waste, etc.
- Runoff flows into Miller & Walker creeks, Puget Sound
- Impacts local wildlife and contaminates natural habitat

TYPICAL EXISTING STORMWATER FACILITIES

- Transport stormwater using pipes and conveyance systems
- Focus on controlling peak flow rates
- Little or no focus on cleaning stormwater

STORMWATER RETROFITS

Controlling stormwater benefits our communities, wildlife and natural habitat

- Cleans polluted runoff
- Decreases stream flow in local waterways during storms
- Increases stream flow during the dry summer months
- Reduces erosion
- Reduces flooding on roadways and private property

HOW CAN WE MANAGE STORMWATER?

GREEN STORMWATER INFRASTRUCTURE

Cost-effective and environmentally-friendly way to manage stormwater

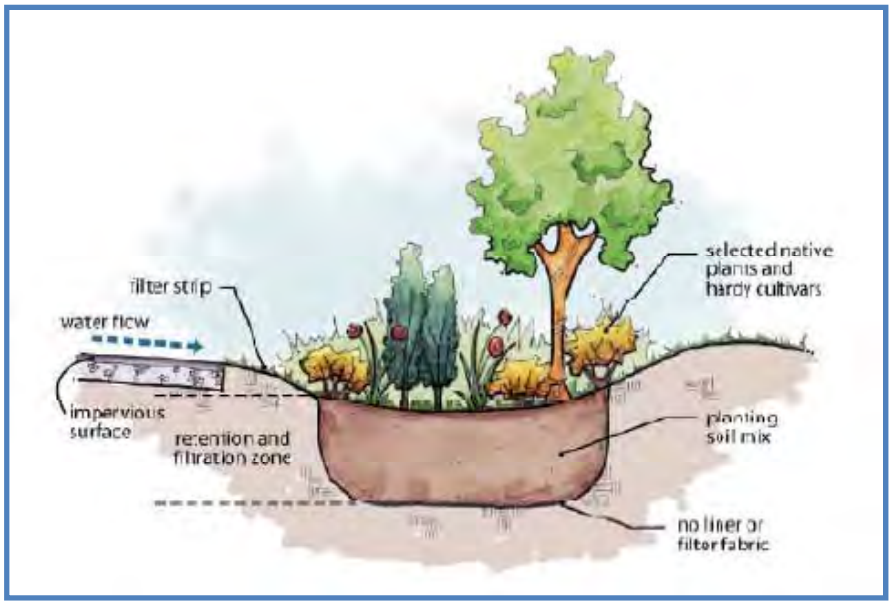
- Removes pollutants using plants and soils
- Replenishes groundwater
- Adds vegetation and attractive plantings to a neighborhood
- Reduced flooding


A roadside rain garden


An example of permeable pavement

GREEN STORMWATER TERMS

- **Stormwater infiltration** – the percolation of stormwater runoff into the ground
- **Permeable** – a surface that allows liquids to pass through it
- **Rain garden** – a shallow depression planted with vegetation that infiltrates and slows stormwater runoff
- **Bioretention** – similar to rain gardens, but bioretention facilities are engineered to meet permit requirements for controlling and cleaning stormwater flows
- **Underdrain** – a small pipe at the bottom of a swale that drains subsurface water

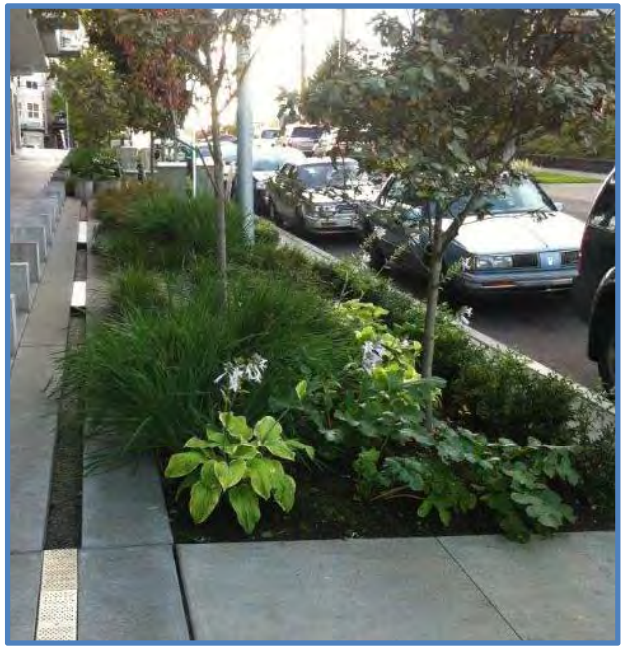


GREEN STORMWATER PROJECTS

Permeable Pavement

GREEN STORMWATER PROJECTS

Roadway Rain Gardens



GREEN STORMWATER PROJECTS

Bioretention Swales

TRADITIONAL STORMWATER PROJECTS

Detention Ponds

TRADITIONAL STORMWATER PROJECTS

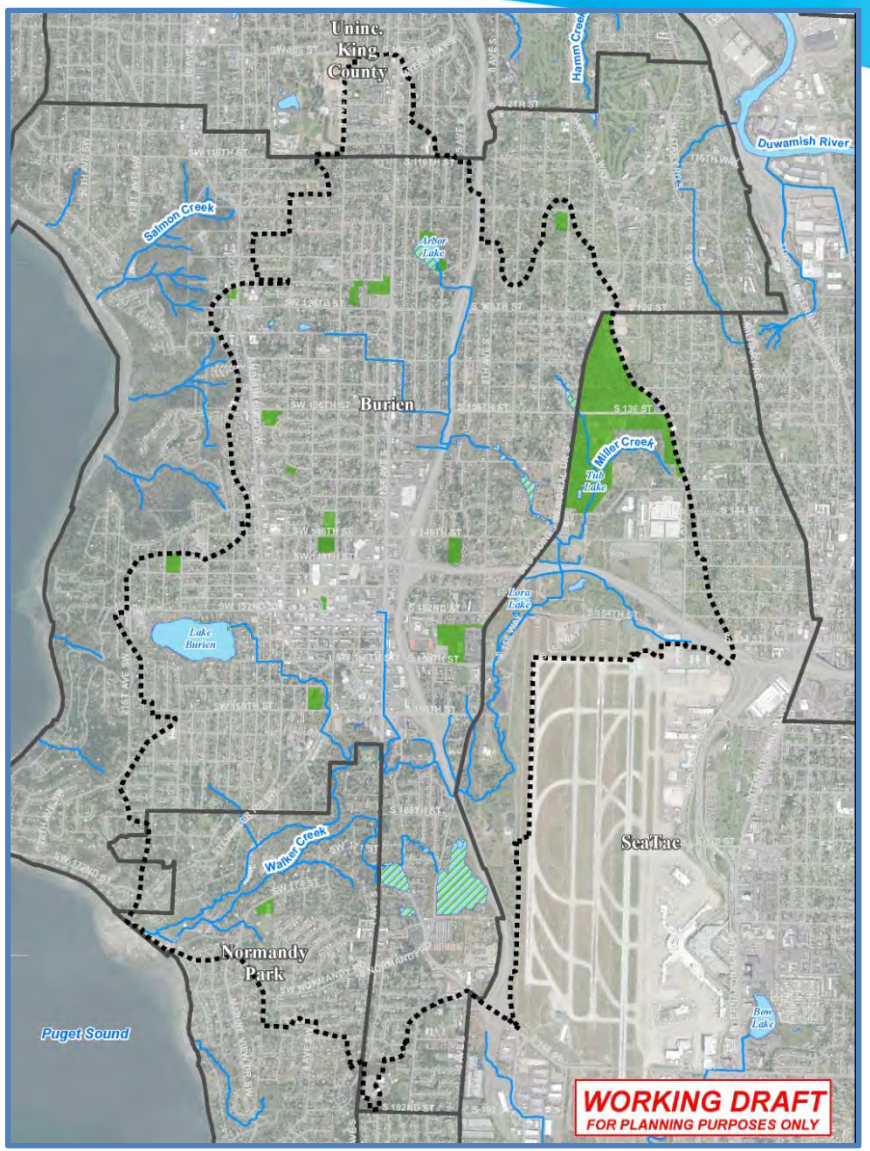
Conveyance Systems

PRELIMINARY ANALYSIS PROGRESS

ANALYSIS STUDY AREA

Legend

- Study Area Boundary
- City Boundary
- Right-of-Way
- Park
- Stream
- Waterbody
- Wetland



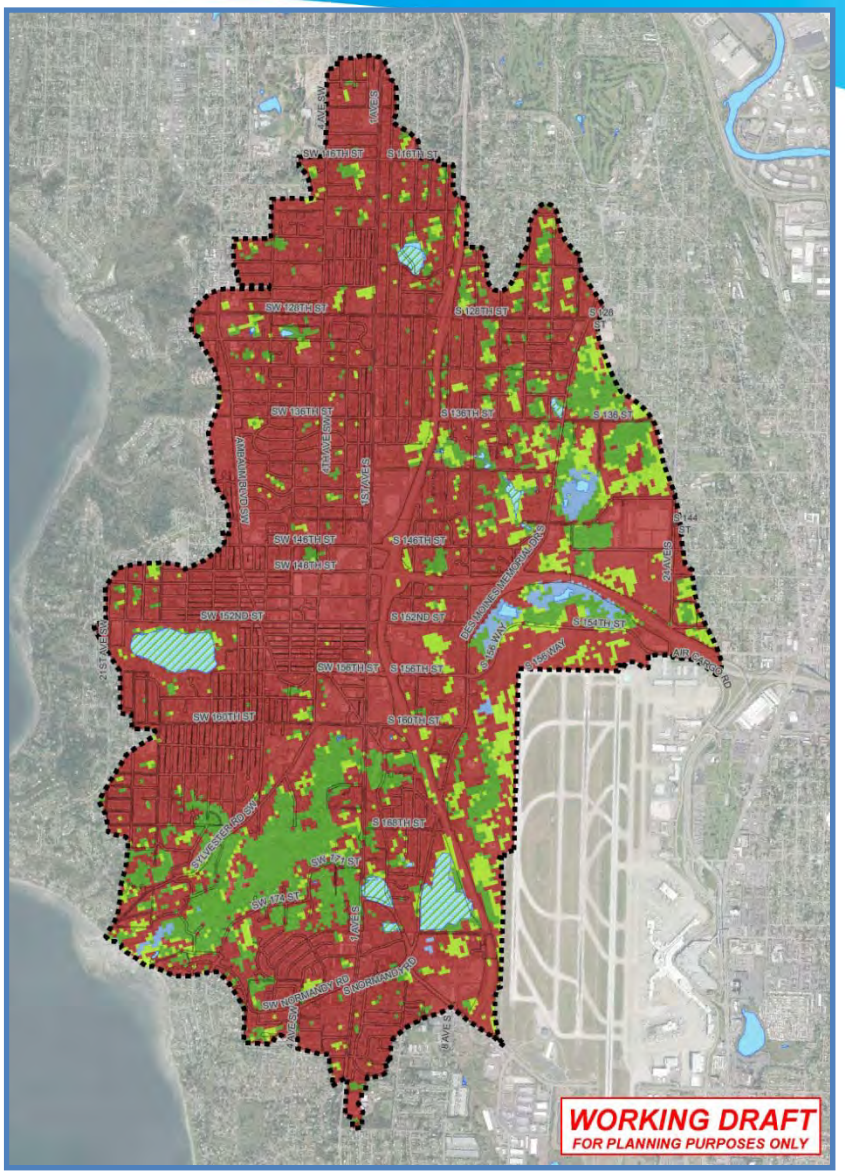
LAND AND IMPERVOUS SURFACE COVER

Legend

- Study Area Boundary
- Right-of-Way
- Wetland
- Waterbody

Land Cover Data

- Impervious
- Lawn and Groundcover
- Tree and Shrub
- Wetland and Waterbody



SHALLOW INFILTRATION ASSESSMENT

Project Extent

Ground Surface Contours

25 ft Contour

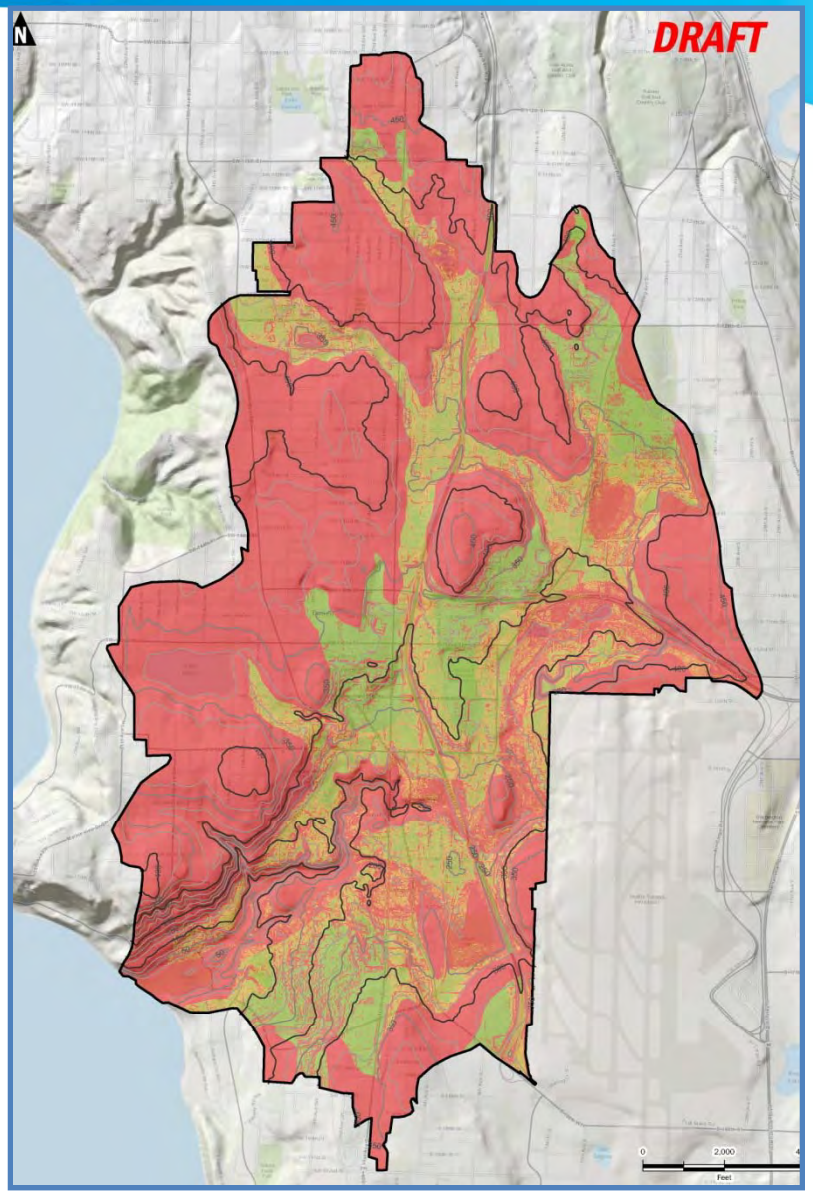
50 ft Contour

100 ft Contour

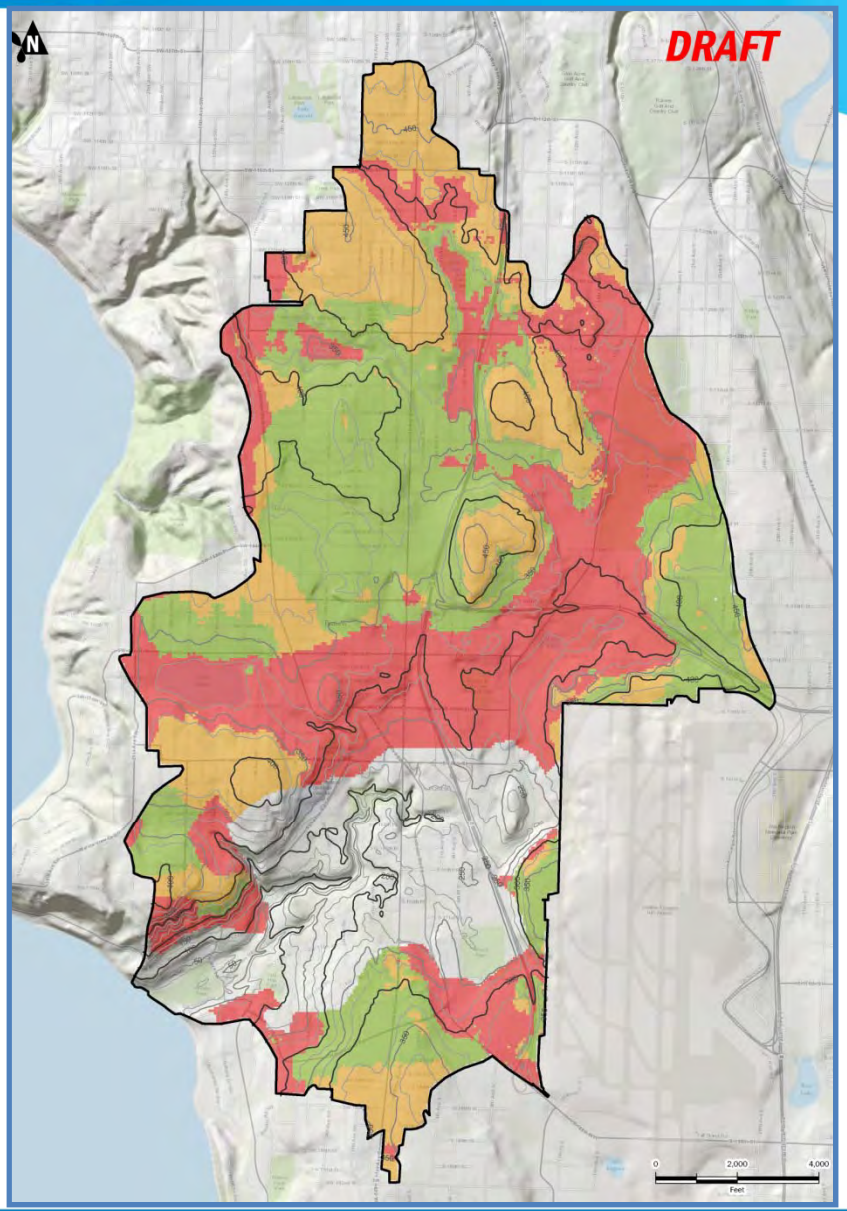
Good

Poor

Moderate



DEEP INFILTRATION ASSESSMENT



NEXT STEPS

PROJECT SCHEDULE

Spring 2014
Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014
Evaluate and rank stormwater retrofit project sites

Public Meeting Series #2

Fall 2014
Select top stormwater retrofit project sites for potential design and construction

Public Meeting Series #3

DISCUSSION

- Questions, ideas and suggestions?

CONTACT US

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Search “Miller-Walker” at kingcounty.gov

Meeting Series #1 – Normandy Park Meeting Summary

Date/Time: Wednesday, May 28, 2014
6:30 pm – 7:30 pm

Location: Normandy Park Recreation Center
801 SW 174th St
Normandy Park, WA

Attendees:

- Elissa Ostergaard, King County
- Robin Kirschbaum, HDR Engineering
- Landon Bosisio, EnviroIssues
- Sophie Cottle, EnviroIssues
- 22 members of the public

Presentation:

Elissa Ostergaard, King County and the Miller-Walker Basin Steward, introduced herself and began the presentation. She described:

- Project purpose: To improve stormwater quality and alleviate local flooding in certain areas.
- Basin Partners: The Miller-Walker Basin Partners of Normandy Park, Burien, SeaTac, and the Port of Seattle, as well as the Washington State Department of Transportation are partnering with King County on this effort.
- Funding: King County was awarded a grant from the Department of Ecology through the US Environmental Protection Agency (EPA).
- Need for the project: Stormwater retrofitting is needed to address some of the problems associated with stormwater runoff in the Miller-Walker Basin, including the effects on coho salmon. Pollutants from the area are collected by stormwater which runs off into the creeks. The high level of contaminants is causing pre-spawn mortality in coho salmon in both Miller and Walker Creeks. Through the stormwater retrofit study, the County hopes to improve stormwater quality and reduce flooding in the area.

Elissa introduced Robin Kirschbaum, HDR Engineering, who is working with the Basin Partners to conduct a stormwater analysis of the basin. Robin discussed stormwater retrofit options for the Miller-Walker Basin, including:

- Green stormwater infrastructure (GSI): Sometimes called low impact development, this includes rain gardens and permeable pavement, both of which help to filter stormwater and reduce peak flow rates and volumes. Because of their ability to provide multiple benefits (i.e., flow control, water quality, and potentially traffic calming), GSI projects will generally be preferred over traditional stormwater projects.
- Traditional stormwater projects: In addition to GSI, the County will also consider traditional stormwater projects such as detention ponds and conveyance systems.
- Preliminary analysis: The project team has identified areas of deep infiltration (10 feet of soil or more), shallow infiltration (less than 10 feet of soil), and the impervious surface cover of the Miller-Walker Basin. The project team will use this and other available data to determine potential project sites for stormwater retrofit projects.
- Project schedule: There will be two more meetings this year at which the project team will present more information on potential project sites and designs.

Robin then opened the floor for questions and feedback from the audience. Detailed questions, comments and transcribed comment forms are described below. Common themes included:

- More stringent stormwater regulations are needed within each city's permitting process.
- How do you capture data for this stormwater retrofit analysis?
- What geographic areas will the analysis focus on?

Questions/Comments:

Meeting attendees voiced the following questions and comments during the Q&A session following the presentation:

- Question: Will you consider projects on 1st Avenue where it meets the basin?
    - Answer: Yes, we definitely will consider projects along 1st Avenue. We are still selecting locations and will present a map of potential sites at the next meeting.
- Q: How much money are you spending on this and where is it coming from?
    - A: We have $235,000 for the planning process from the Department of Ecology. The Ecology grant was received through the US EPA.
- Q: Are you in charge of correcting water pollution? I have a creek at my property that has no aeration, and the City says it's not their problem.
    - A: No, each city is required to follow water quality standards and permits. The city should take care of natural ponds through critical areas, but not built ponds.
- Q: Are you using surface water management fees for this project?
    - A: There are no funding plans at the moment for construction of stormwater retrofit projects; each jurisdiction will fund these projects differently. It is up to the city to decide if they want to use surface water management fees to fund projects.
- Q: Are there existing stormwater retrofit programs that have proven there are benefits for fish and wildlife via monitoring data?
    - A: We are not aware of specific data on the impact to fish, but with conceptual modeling we can estimate how certain amounts of stormwater retention impact flow rates, volumes, and water quality. There is also research at the University of Washington that shows that bioretention can improve fish survival.
- Q: Do fish compensate for high mortality rate by reproducing more?
    - A: We do not count the eggs so we don't know for certain, but it is unlikely.
- Comment: It seems like we are not addressing the 1st Avenue South detention pond adjacent to Miller Creek, which is difficult for fish to get over.
    - A: We will be looking at that site to see if we can make it more effective at addressing flows. Our primary goal is flow control, but we can also look at other benefits.
- C: We have all known for years that we need to do this, so it is time to work together and get it done.
    - A: Yes, agreed. We will also consider water quality and other benefits of these projects.

- Q: There are two major re-developments in Burien (CVS at 5 Corners & LA Fitness). What is being done at these sites to improve stormwater retention?
    - A: We do not know specifically, but will talk to the City of Burien to find out. Current (2012) regulations require low impact development when feasible. New regulations will be adopted by local jurisdictions by the end of 2016.
- Q: If GSI isn't being used, what can we do?
    - A: Every site that can implement GSI will be required to do it under new permits, after the jurisdictions update their codes. It is dependent on feasibility, but developers will be required to implement it where possible.
- Q: The bioretention facilities look like they'll require maintenance. How does a city maintain these facilities?
    - A: There is a new operation and guidelines manual created by the Department of Ecology that includes recommended activities and frequency required to maintain the facilities. In general, GSI maintenance entails more gardening (i.e., weeding, etc.) than traditional stormwater projects, but the life cycle costs of each type are typically similar to each other.
- Q: Do you have any idea of what upstream areas on Miller Creek are most important?
    - A: Downtown Burien may be the most impactful. Areas around Highway 509 also contribute significantly to the health of Miller Creek. We are still determining potential project sites and will present them at the next meeting.
- Q: Does stormwater from Highway 509 flow into the Duwamish River?
    - A: Stormwater flows into the Duwamish River farther north, but not in the Miller-Walker Basin.
- Q: Do you discriminate based on the permeability of soil? Is the assessment you presented an assessment or a simple inventory?
    - A: The assessment was not a simple inventory. We are looking for permeable soils, vertical separation from groundwater, flatter topography, and distance from critical areas. We also want to avoid landslide prone areas and other natural hazards. We will post this information on the Miller-Walker Basin website.

Additional Public Comments:
The following comments are transcribed from emails to Miller-Walker Basin staff and handwritten comment forms submitted at the meeting:

- There is not enough parking here. I drove back home and walked up as there was no place to park. How about the Cove Building?
- Since this project involves Burien, Normandy Park, and SeaTac, it would be nice if we can see some type of "before and after" drawings for these cities if possible. PS, if you need help, please count on me. I'm a mechanical engineer and CAD designer.
- Infiltration, cleaning of the water, and slowing of flows interest me. Green stormwater infrastructure?? Find another word other than "green" which has actual meaning.
- High pollutants in Miller and Walker creeks – killing salmon. Major source is street runoff. Previously have worked water capture and flow, but not water cleaning.

- Want green stormwater infrastructure (plant and soil systems, “rain gardens”, “bio-retention engineered, e.g. porous asphalt) to reduce flooding and clean the water
- Now: no raw water from airport to Miller Creek. Good.
- Project so far: have good maps of basin identifying where there is shallow and deep water filtration.
- Want to piggyback on current planned infrastructure projects of the cities in basin to include water filtration, not just runoff mgt.
- [Map of Sequoia Creek Cul-de-sac and potential stormwater management opportunities sent to Miller-Walker Basin staff.]

Meeting Series #1 – Burien Meeting Summary

Date/Time: Thursday, May 29, 2014
6:30 pm – 7:30 pm

Location: Burien Community Center, Shorewood Room
14700 6th Ave SW
Burien, WA

Attendees:

- Elissa Ostergaard , King County
- Robin Kirschbaum, HDR
- Landon Bosisio, EnviroIssues
- Sophie Cottle, EnviroIssues
- 27 members of the public

Presentation:

Elissa Ostergaard, King County and the Miller-Walker Basin Steward, introduced herself and asked the audience how many of them heard about the meeting through the mailer, email, or website. Approximately 16 attendees were first informed of the meeting by the mailer; two were informed through the Miller-Walker Basin email listserv. She also described:

- Project purpose: To improve stormwater quality and alleviate local flooding in certain areas.
- Basin Partners: The Miller-Walker Basin Partners of Normandy Park, Burien, SeaTac, and the Port of Seattle, as well as the Washington State Department of Transportation are partnering with King County on this effort.
- Funding: King County was awarded a grant from the Department of Ecology through the US Environmental Protection Agency (EPA).
- Need for the project: Stormwater retrofitting is needed to address the problems associated with stormwater runoff in the Miller-Walker Basin, including the effects on coho salmon and other local wildlife. Pollutants from the area are collected by stormwater which runs off into the creeks. The high level of contaminants is causing pre-spawn mortality in coho salmon in both Miller and Walker Creeks. Through the stormwater retrofit study, the County hopes to improve stormwater quality and reduce flooding in the area. Elissa also noted a recent study through the National Oceanic and Atmospheric Administration which tested how salmon reacted to untreated and treated stormwater. Salmon that were placed in the untreated stormwater died in a few hours; those placed in stormwater treated by rain gardens were still living after four days.

Elissa introduced Robin Kirschbaum, HDR Engineering, who is working with the Basin Partners to conduct a stormwater analysis of the basin. Robin discussed stormwater retrofit options for the Miller-Walker Basin, including:

- Green stormwater infrastructure (GSI): Sometimes called low impact development, this includes rain gardens and permeable pavement, both of which help to filter stormwater and reduce peak flow rates and volumes. Because of their ability to provide multiple benefits (i.e., flow control, water quality, and potentially traffic calming), GSI projects will generally be preferred over traditional stormwater projects.
- Traditional stormwater projects: In addition to GSI, the County will also consider traditional stormwater projects such as detention ponds and conveyance systems.
- Preliminary analysis: The project team has identified areas of deep infiltration (10 feet of soil or more), shallow infiltration (less than 10 feet of soil), and the impervious surface

cover of the Miller-Walker Basin. The project team will use this and other available data to determine potential project sites for stormwater retrofit projects.
- Project schedule: There will be two more meetings this year at which the project team will present more information on potential project sites and designs.

Robin then opened the floor for questions and feedback from the audience. Detailed questions, comments and transcribed comment forms are described below. Common themes included:
- How are you collecting and using data for this stormwater retrofit analysis?
- Drainage in certain areas of the basin is a significant problem.
- New developments need to use green stormwater infrastructure.

Questions/Comments:

- Question: Can cars park or drive on permeable pavement?
    - Answer: Yes. We won't likely be using permeable pavement on roadways, but it can be used for sidewalks, shoulders, parking lots, etc.
- Q: Does permeable pavement work?
    - A: Yes, it does work when properly designed, maintained, and installed.
- Q: When will you start estimating budget the cost of these future projects?
    - A: We currently have about 80 potential sites. We will evaluate these and narrow it down to 30 projects. At that point we will develop general cost estimates. We will then develop concept designs with refined estimates for the top 3-5 projects as we begin to apply for grants.
- Q: Have you been in the field/on-site within the basin?
    - A: We start by looking at GIS data to overlay topography, soil types, etc. Then, based on our initial evaluation, we begin to identify potential focus areas. We have conducted a driving/walking tour of the basin, and will conduct more in depth field review as we narrow down the number of sites.
- Comment: I live off of 8th Avenue and there's no room for projects like these rain gardens.
    - A: We start with many potential sites and evaluate them for feasibility, including available space.
- C: King County did an analysis of Miller and Walker Creek and identified numerous sites in the 1970s and 1980s. Drainage investigations and complaints were also logged in a database in the 1970s.
    - A: We have looked at drainage complaints, but they do not appear to be concentrated in any one area, so we are still evaluating many sites.
- Q: What type of methodology are you using for the hydrologic study?
    - A: We are using a calibrated Hydrologic Simulation Program FORTRAN (HSPF) model of the basin. We are also using benthic index of biotic integrity (BIBI), a metric that indexes stream conditions based on hydrologic factors.
- Q: Do you have stream flow data?
    - A: Yes, we have 7-8 stream gauges in the basin.

- C: You said drainage complaints from the cities are sporadic. There are actually more problems than it seems because many people use sump pumps. The problem hasn't disappeared; people are just trying to solve it on their own.
    - We have these meetings so we can hear from you and better understand the basin. It's a good point and we will look into this issue.
- C: King County's drainage investigation database from the 1970s might have information on these complaints.
- Q: When will these projects be built?
    - A: After the planning process, we need to apply for grants to build and design the projects. It will probably be a couple of years before construction would begin.
- Q: Will these projects be built only on public property? Will it consider new developments being built, like the CVS?
    - A: This stormwater retrofit analysis will not address new or re-development projects (which are required to manage stormwater on their own). The analysis will look to find opportunities for stormwater management where needed, often in places that would not be affected by new or re-development projects.
- Q: Are you using current conditions in models?
    - A: Yes, we have a model of pre-developed forest conditions, current conditions, and future conditions to evaluate the effectiveness of potential projects.
- Q: In Ballard there is a city program that funds private rain gardens. Will you be doing something similar?
    - A: The City of Burien has a neighborhood matching program for rain gardens. If there is public access or use of your yard, you may apply for the matching program through the City.
- Q: Is there a how-to-guide and information on stormwater control for new developments?
    - A: There is an existing, user-friendly guide – the 2012 Low Impact Development Manual for Puget Sound.
- C: There used to be a duck pond that was paved over by the new CVS development. I find it ironic that they are now drilling back under the former duck pond as part of their stormwater management system.
    - A: All projects, particularly large ones, require due diligence to properly develop drainage and effectively manage stormwater. As discussed previously, this analysis focuses on retrofitting stormwater facilities in existing areas with inadequate controls, but does not address new and re-development projects, which are required to manage stormwater on-site.
- C: It seems like an easy solution to manage stormwater would be to change the vegetation strips in existing parking lots into depressions that could hold and filter stormwater.
    - Yes, this would be a technically simple solution, generally speaking. Requiring this be done everywhere, however, would call for an update to the ordinances of each jurisdiction through the local planning and development department.
- Q: Will you send a newsletter for the next meeting? It was a helpful reminder.

- A: Absolutely – we may do a postcard instead of a newsletter, and will also have the meeting information available online.

Additional Public Comments:
The following comments are transcribed from emails to Miller-Walker Basin staff and handwritten comment forms submitted at the meeting:

- Road run off on 8th Ave SW down and across Sylvestor interests me.
- Although I live at the top of the hill, I have a sump pump and my neighbors do also. My address is 14515 5th Pl. S.
- Instead of covering drainage ditchers, turn them into rain gardens
- Inaccurate basin map reflects large impervious surfaces. Reality: 1) about 50% impervious 2) depressions without outlets 3)regional detention facilities/control structures are not shown 4) no sub-basin delineation or problem area delineation 5) some proposed systems don't work
- City of Burien may think about financially supporting residents who intend to install rain-wise gardens as districts in Seattle, e.g. Ballard, have done. Consideration: divide project into 1) City of Burien public roads/areas, 2) areas circumference of all large parking lots, e.g. at churches, steak houses, restaurants, 3) residential areas (the suggestion above would be for residential areas). Please schedule meetings on Tuesday evenings, if possible. Please have the greeter say "hi" to everyone who enters. Now I'm wondering if he discriminates! Please do refrain from providing snacks that are sweet. Thanks for the refreshments.
- My neighbor & I both use sump pumps and would be interested in mitigating flooding in my area.
- Be sure to meet with the planning department of the cities. What are your plans for use of trees to reduce runoff? We have ONE sump pump! Will there be any suggestions that individuals can do themselves/ How will you be working with the cities?
- Runoff from streets must be cleaned before entering Lake Burien. A number of years ago I donated approximately 9 free trees & 5 free bushes to worth Miller Creek to be planted. Do not add more blacktop over parking areas – especially along SW 152nd. I had difficulty with breaking down of bulkheads after Miller Creek was put in culverts.
- Ms. Ostergaard, Please let me know when the public hearings are scheduled for pollution control projects for Miller and Walker Creeks. I do not know if you are aware of mycoremediation processes that have been investigated in Washington State, especially those overseen by Paul Stamets. I believe such processes combined perhaps with HSD401 student involvement and using wood waste from city and county storm cleanup may have valuable, low cost approaches to helping reduce "non-point source" and storm water runoff facilitated pollution in the creek basins. If you are not familiar with mycoremediation, below are links to a Wikipedia entry and a Dungeness watershed study. Mycoremediation has successfully helped increase water quality in Mason and Thurston counties as well as in Dungeness, so we have fairly local models to use as a baseline. http://en.wikipedia.org/wiki/Mycoremediation

  http://dungenessrivercenter.org/documents/FinalMycoremediationReport_000.pdf

- If not already on the project map, there are ongoing flooding issues along 152nd Street in Burien, between 14th and 18th Ave, on the north side of Lake Burien. This also might be an area included in the newest Trans. Improvement Plan out of Burien. We will be discussing it this week, so it could be a good opportunity
- Thought I'd send in my comments / thoughts…….some are likely way "out of scope" for your project….but just a list of thoughts off the top of my head , hopefully one or two may provide you an idea to find your projects an implementation opportunity;
    - Might be of some value to evaluate the flow meters on Miller / Walker Creeks to see what segments of the streams get the largest storm water input. With that info, maybe high priority, high benefit work sites could be found?
    - Having and studying the stormwater roadway open ditches and piping plans for Normandy Park and Burien might also lead to the discovery of potential worksites. Just knowing the acreage of roadway drainage areas serviced by each arm of a piping/ditch system might identify the largest areas of water collection. Also being able to see where the outfalls are might help to find worksites?
    - A while back I mentioned the sandbag detention pond built by the Highway Dept. at the downstream side of Highway 509 and Miller Creek. I suspect it was built to handle catch basin sediment off Hwy 509 before it entered Miller Creek. When I saw it 20-years ago, it was full to the brim with silt and didn't appear to have maintenance access. That might be a good location for a project? I think you may have already taken action on that area with the DOT, but not sure?
    - The other issue I mentioned was the surface water runoff from Hwy 518 and Miller Creek on the north end of the airport runway. When I observed that, again, 20-years ago, water/sand/silt was being piped from storm grates on 518 to an area just west of Miller Creek. At the time, there was a big pile of sand at the end of the pipe. Again, you may have already addressed that issue with DOT. If not, another possible work site?
    - The piped outfall of Lake Burien is in Shonewald Kiwanis Park behind Sylvester School. I don't expect that this outfall picks up too much roadway runoff since much of it is piped from Lake Burien to the outfall, although there may be storm grates to the pipe. The pipe, as I remember 3-4' in diameter, dumps into a deep canyon. The water runs in the bottom of the canyon for 200-300' and into Miller Creek. Possibly a place to detain, treat water prior to entering Miller Creek, although a difficult place to work. This little section of stream is not prime Coho habitat, but if deeper pools were created with stream hydraulics, it would serve as great Sea-run Cutthroat habitat? Possibly a combination of storm water treatment and habitat improvement could be applied to this area…..just a thought.
    - Since a new drug store is being built at the old Herr Lumber location, 160th & 1st Ave., has anyone looked over their surface water / parking lot runoff management plan? There's a small creek that runs under the parking lot of the old Asian Buffet Restaurant (demolished now) and part of this construction site and it daylights just west of the parking lot, goes behind the apartment building, then flows into Miller Creek. Possibly inputs to their water management plan prior to building it might lead to a coordinated effort between your project and the contractors plan?

- Way up on Miller Creek, above Des Memorial Drive where Dennis Clarke cleaned up invasive plants and trash and planted native plants. I'm not sure what could be done there to help with stormwater quality, but it's a great site if someone has an idea of what could be implanted? I don't know if water can be delayed / ponded in that area and the area just below to give it more "ground / plant contact" time for cleaning? If so, such ponding habitat would also be great for Coho fry. Think "beaver pond".
- The 1st Ave. Detention Pond is always on my radar for possible water quality improvements, but you already know that.
- There's a storm grate just to the west of the Cove driveway entrance on Shorebrook. It's high and dry and is positioned so street water can't get to it. The right-of-way around this storm grate may provide an improvement opportunity?
- The open ditch along Shorebrook Drive across the street (south) of the Cove entrance road hasn't been maintained in years…..there may be opportunities there.
- I have no idea how the roadway runoff on 1st Ave as it passes thru Normandy Park is handled, same with the runoff from Manhattan Village Shopping Center (eg. QFC) and the new shopping center to the south (eg. Ace Hardware) are handled? Research may identify opportunities? Although I doubt it, there may be opportunities along 1st Ave in Burien also??
- NP City Hall Parking areas, not sure where that water goes and if there are opportunities there? Burien City Hall parking areas?
- The outfall of Tub Lake is a small ditch along the roadway on airport property……not sure about opportunities here?
- Same with the piped outfall of Arbor Lake behind JFK High School which also collects pumped water from Hermes Depression. The site is behind the JFK High School track and along highway 509 right-of-way. Might be an opportunity to capture this water and "treat" it before it enters Miller Creek headwaters?
- All the open ditches in NP & Burien may provide opportunities for water quality / volume improvement. Most roadway ditches in NP use to be maintained every few years, they haven't been maintained in MANY years. Some are filled with soil that causes water to run on the roadways instead of in the ditch, therefore moving more quickly to the streams w/o an opportunity to soak into the ground. (Examples I'm aware of; along 12 Pl. SW and water from roadways above Ken Fridell's property.) Just maintaining existing open ditches again may provide a HUGE surface area contact for roadway water to access soil instead of running down the asphalt? This would have to be investigated to find opportunities.
- Daylighting some sections of piped roadway runoff to open ditches, then installing rain gardens in the open sections, may present opportunities in some places.
- Thanks for all you do to improve water quality to our streams and fish habitat.

Meeting Series #2

July 2014

MILLER-WALKER BASIN
Stormwater Retrofit

COME HEAR THE LATEST!

Summer 2014

Tuesday, July 22
Normandy Park
City Council Workshop
7:00 p.m.

Normandy Park City Hall
801 SW 174th Street
Normandy Park, WA

Wednesday, August 6
Burien
Public Meeting
6:30 p.m.

Burien Community Center
14700 6th Avenue SW
Burien, WA

Fall 2014

Monday, October 27
Normandy Park
Public Meeting
6:30 p.m.

Normandy Park Rec. Center
801 SW 174th Street
Normandy Park, WA

Tuesday, November 4
Burien
Public Meeting
6:30 p.m.

Burien Community Center
14700 6th Avenue SW
Burien, WA

FOR MORE INFORMATION ON THE MILLER-WALKER BASIN:

- **Search** "Miller-Walker" at kingcounty.gov
- **Contact Elissa Ostergaard**
  Miller-Walker Basin Steward
  206-477-4792
  elissa.ostergaard@kingcounty.gov

Stormwater Improvement Projects for the Miller-Walker Basin

Come learn more about improving our local streams! Earlier this year, the Miller-Walker Basin Partners – Burien, Normandy Park, SeaTac, the Port of Seattle and King County – began a stormwater retrofit analysis to identify, evaluate and select stormwater projects to help clean up our local waterways and reduce flooding and erosion. The analysis is funded by a Washington State Department of Ecology grant through the U.S. Environmental Protection Agency.

- Future stormwater retrofit projects, located on public property, will manage the flow of stormwater and help clean polluted runoff
- Various strategies are being considered, including green stormwater infrastructure, such as permeable pavement and rain gardens, which absorb and filter rainwater with plants and soil
- Traditional methods like underground vaults could also be used

Please join us at an upcoming public meeting this summer!

- See progress, share your ideas about the project sites selected for further evaluation
- Hear about how sites will be targeted in areas where other planned bike and pedestrian improvements are already planned
- The final meeting series will be this fall, where you can see early design ideas for the top projects and help improve them with your input

Schedule

This meeting series is one of several opportunities for you to provide input on the stormwater retrofit analysis.

Spring 2014
Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014
Evaluate and rank stormwater retrofit project sites

Public Meeting Series #2

Fall 2014
Select top stormwater retrofit project sites for potential design and construction

Public Meeting Series #3

King County · Port of Seattle · City of SeaTac · City of Normandy Park

MILLER-WALKER BASIN STORMWATER RETROFIT ANALYSIS

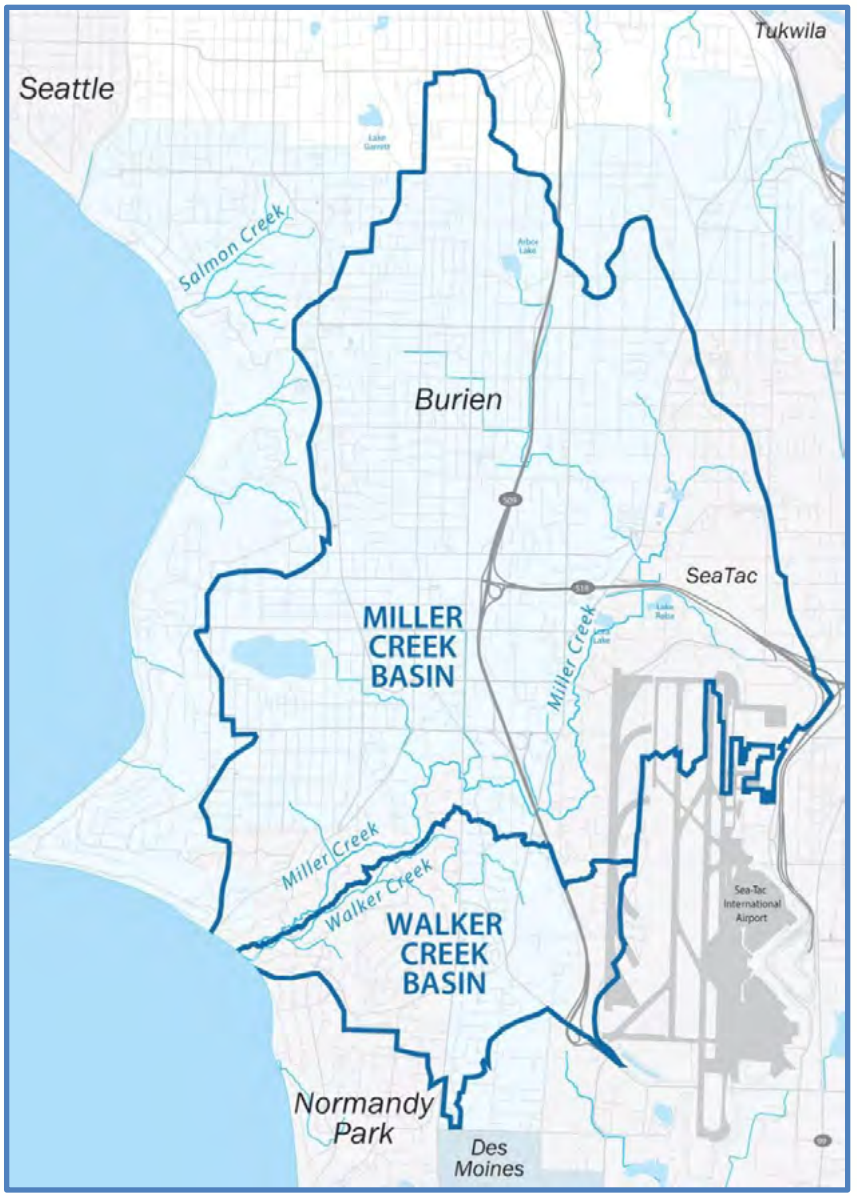
Normandy Park City Council

July 22, 2014

MILLER-WALKER BASIN

Stormwater drainage basin that holds Miller & Walker creeks

- Covers approximately eight square miles
- Basin Partners:
  - Port of Seattle
  - Burien
  - Normandy Park
  - SeaTac
  - King County



PRESENTATION OVERVIEW

- Briefly review project background, purpose and objectives
- Share analysis progress and next steps
- Show potential stormwater retrofit project sites

GOALS

- Describe how potential stormwater retrofit sites were identified and prioritized
- Answer questions so far
- Hear your input on the stormwater retrofit sites

PROJECT BACKGROUND

STORMWATER RUNOFF

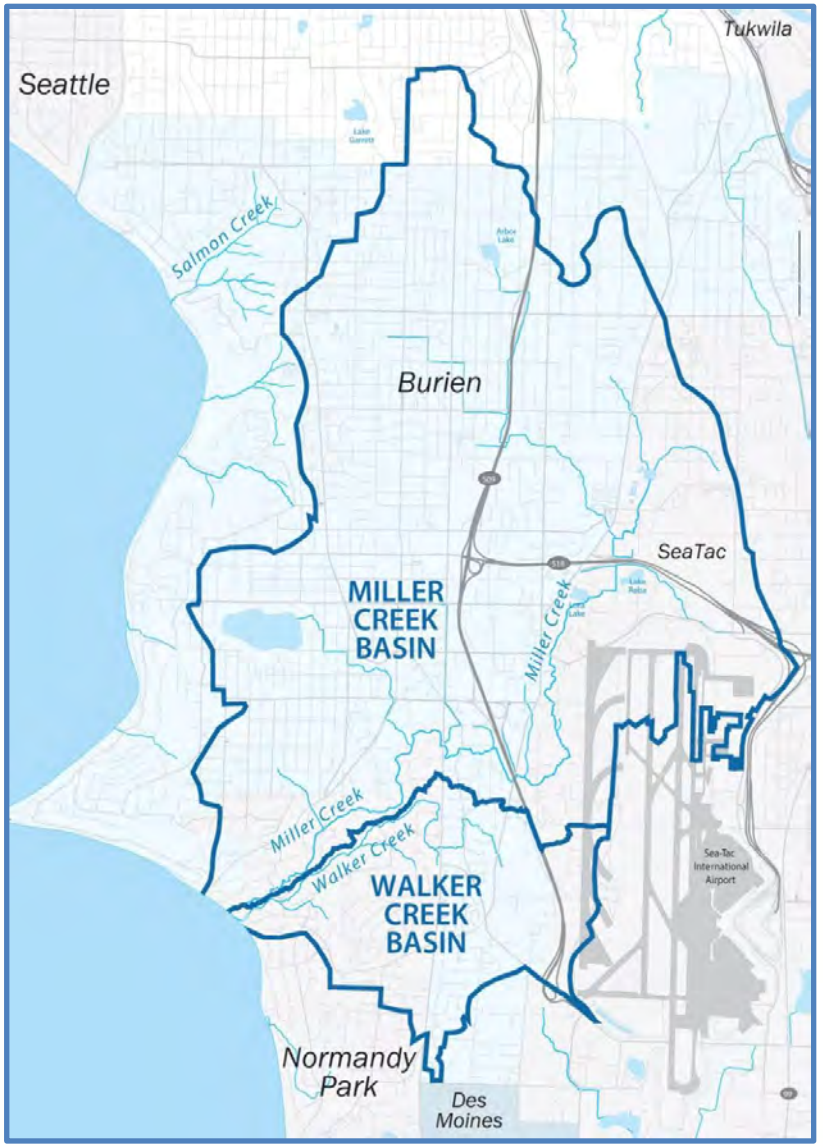
When it rains, unabsorbed stormwater:

- Collects pollutants – oils, grease, chemicals, pesticides, metal, animal waste, etc.
- Causes high stream flow for Miller & Walker creeks
- Damages natural habitat and impacts wildlife

STORMWATER RETROFITS

Controlling stormwater benefits our communities, wildlife and natural habitat

- Cleans polluted runoff
- Decreases stream flow in local waterways during storms
- Increases stream flow during the dry summer months
- Reduces erosion
- Reduces flooding on roadways and private property



GREEN STORMWATER PROJECTS

- Absorb and filter rainwater
- Remove pollutants using plants and soils
- Replenish groundwater
- Add vegetation and attractive plantings to a neighborhood
- Reduce flooding


A bioretention swale


An example of permeable pavement

TRADITIONAL STORMWATER PROJECTS

- Collect and transport stormwater using pipes and conveyance systems
- Focus on controlling peak flow rates
- Little or no focus on cleaning stormwater

A stormwater detention pond in Burien

PROJECT SCHEDULE

Spring 2014
Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014
Evaluate and rank stormwater retrofit project sites

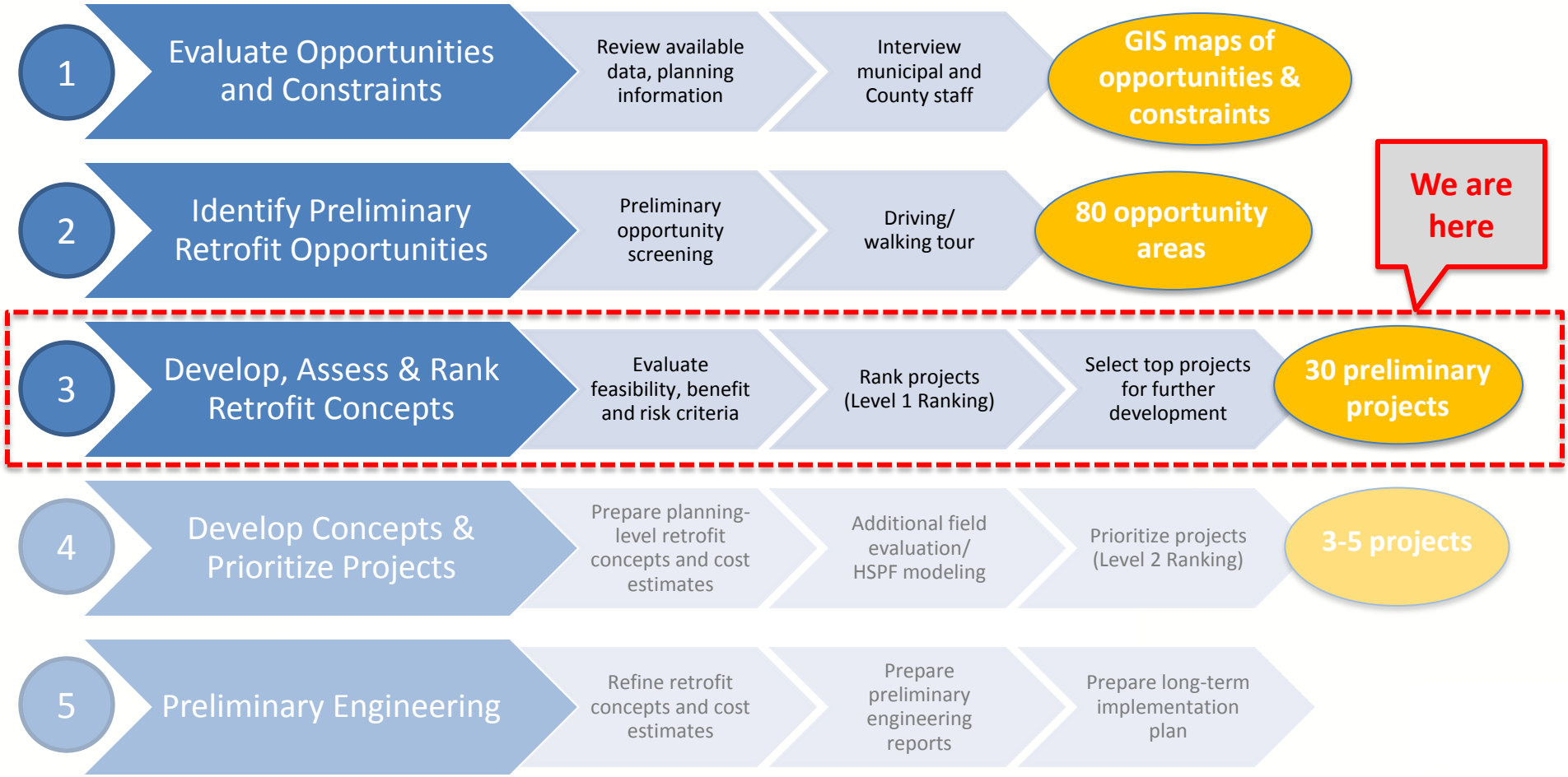
Public Meeting Series #2

Fall 2014
Select top stormwater retrofit project sites for potential design and construction

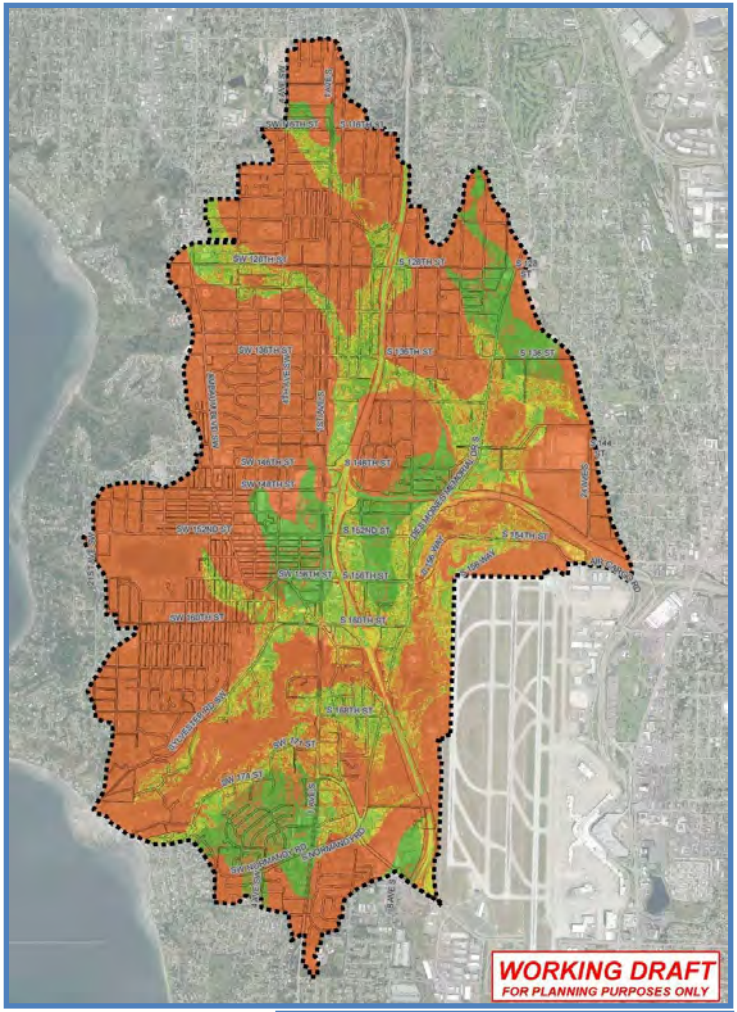
Public Meeting Series #3

IDENTIFYING AND RANKING STORMWATER RETROFIT SITES

STORMWATER RETROFIT ANALYSIS PROGRESS



MILLER-WALKER BASIN
Stormwater Retrofit



SHALLOW INFILTRATION

Legend

Study Area Boundary

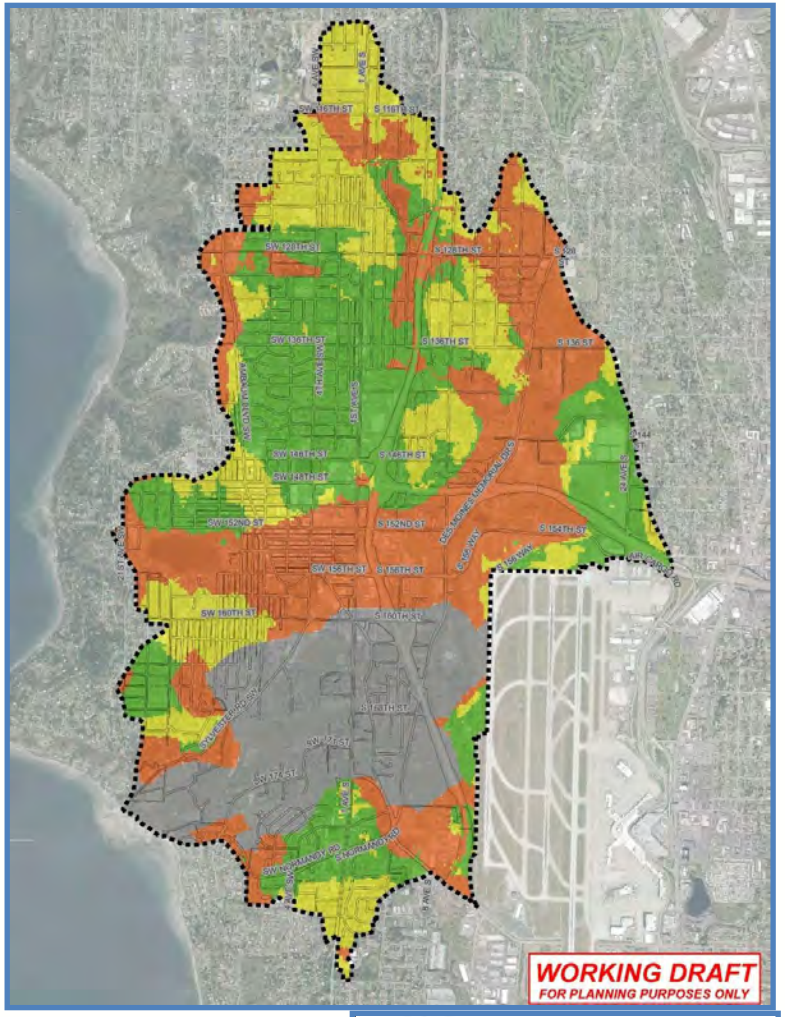
Right-of-Way

Shallow Infiltration Feasibility

Good

Moderate

Poor



DEEP INFILTRATION

Legend

Study Area Boundary

Right-of-Way

Deep Infiltration Feasibility

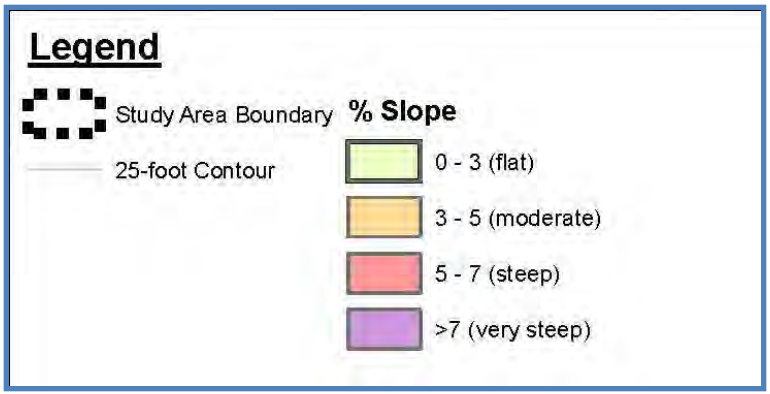
Good

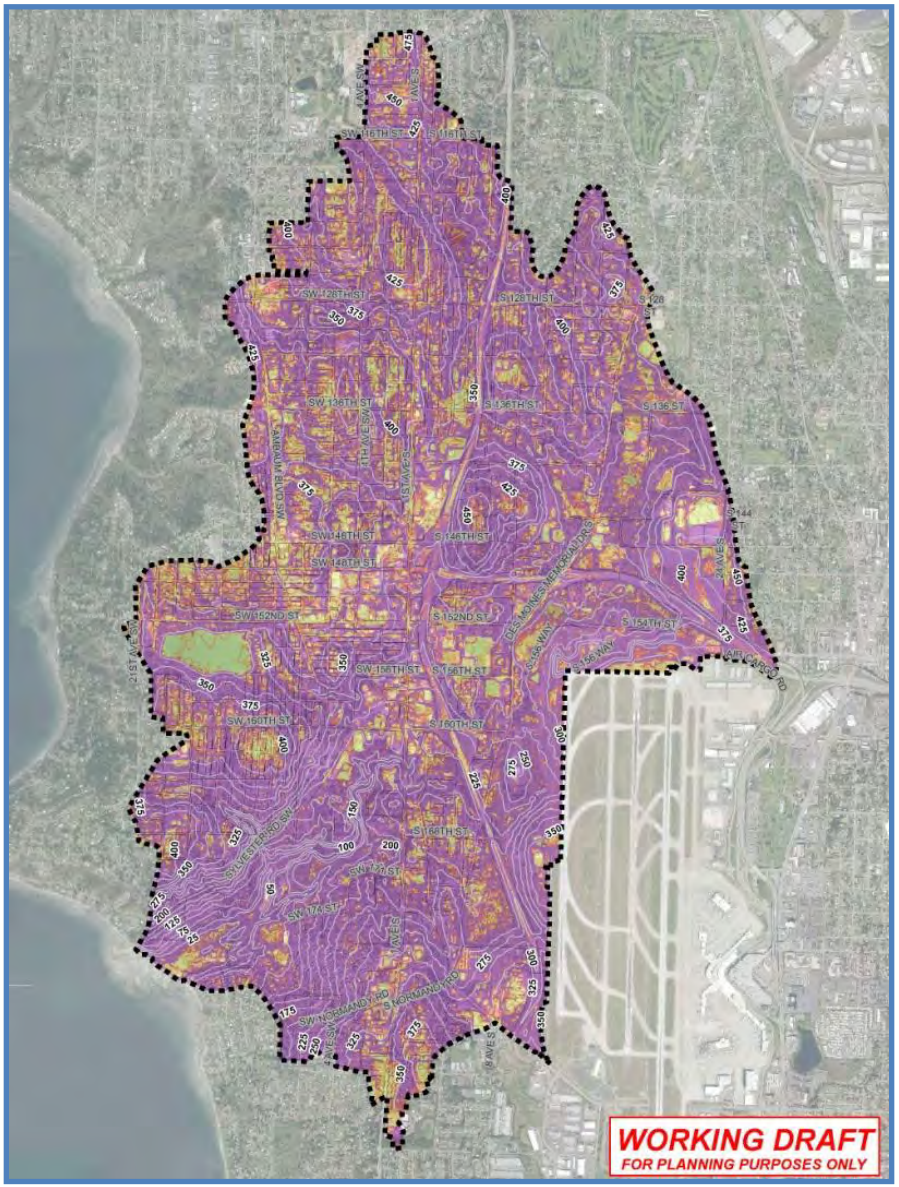
Moderate

Poor

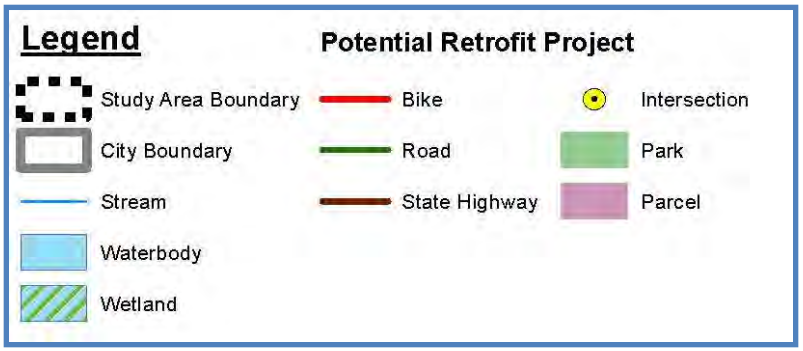
Advance Outwash Not Present

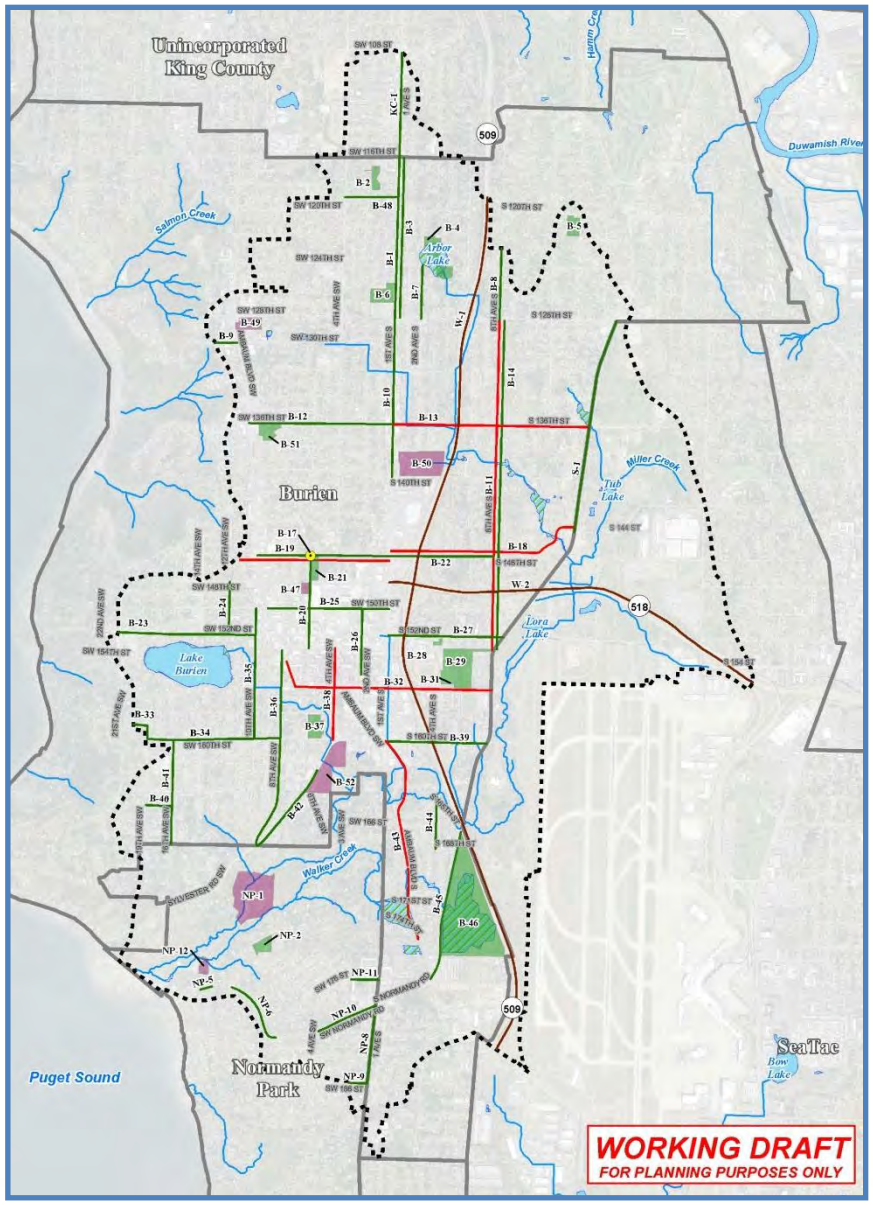
STUDY AREA SLOPE





STORMWATER RETROFIT OPPORTUNITY AREAS



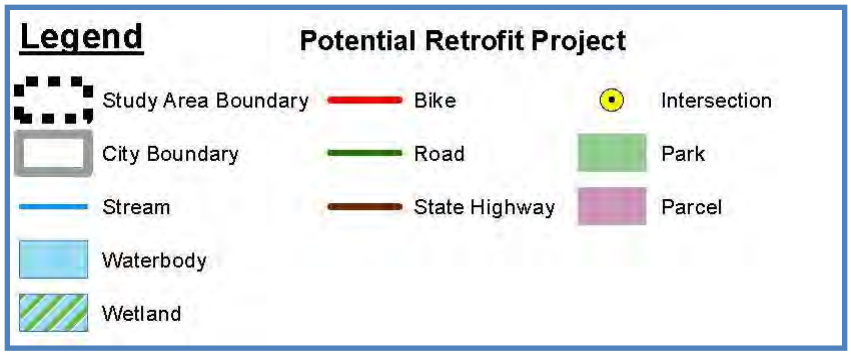


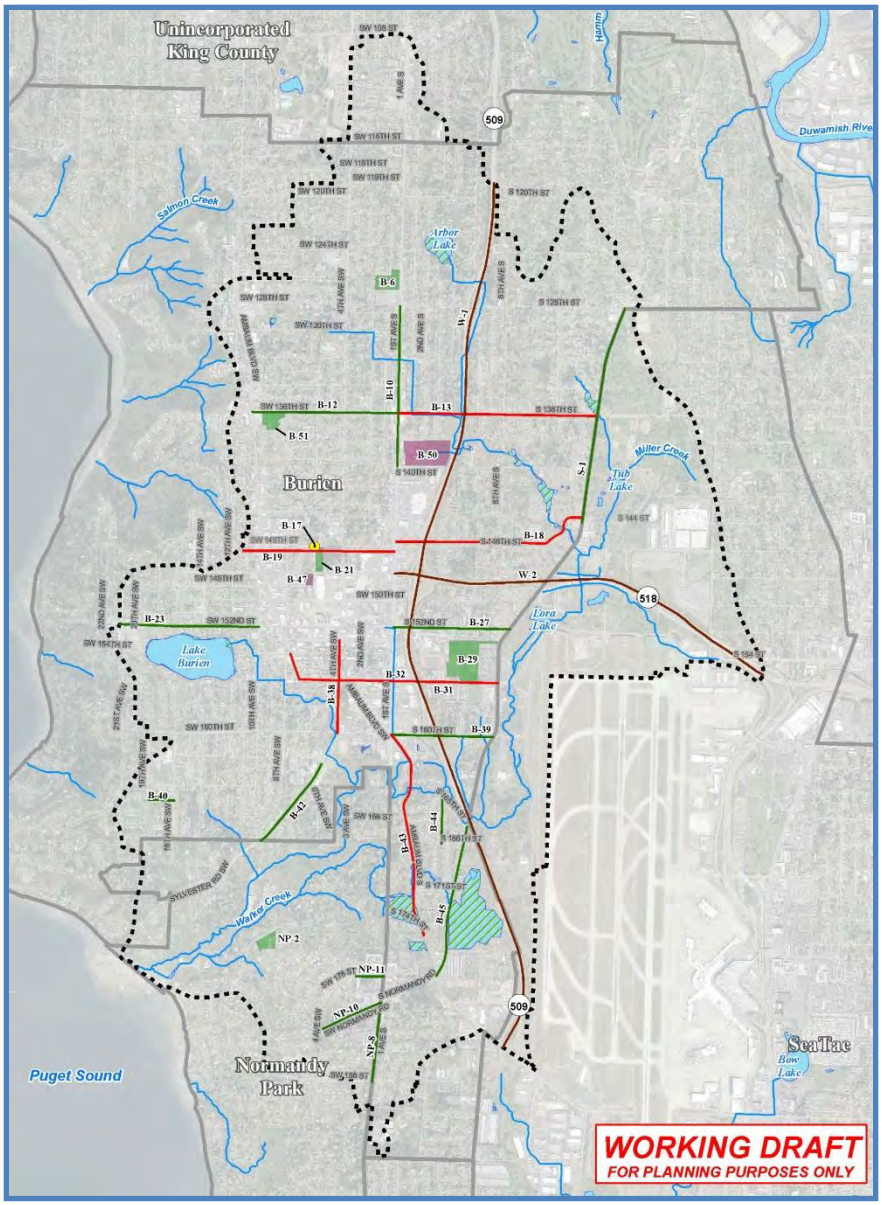
LEVEL 1:
RANKING POTENTIAL STORMWATER PROJECTS

Criteria used:

- Infiltration feasibility
- Slope
- Environmental risk
- Water quality benefit
- Connectivity to stormwater conveyance system

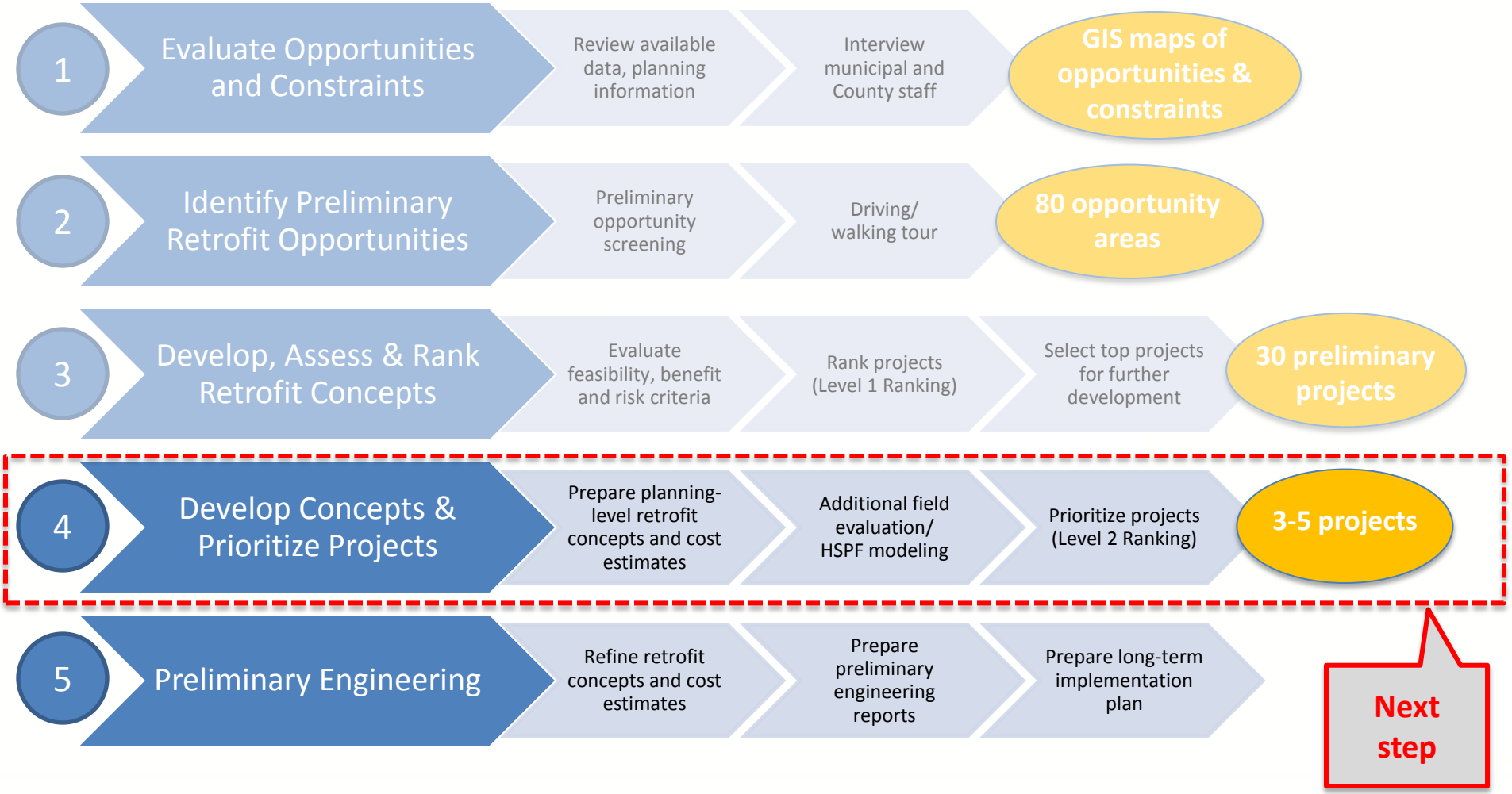
TOP 30 POTENTIAL STORMWATER RETROFIT PROJECTS





NEXT STEPS

STORMWATER RETROFIT ANALYSIS PROGRESS



LEVEL 2:
RANKING POTENTIAL STORMWATER PROJECTS

Criteria used:

- Stream flow benefit
- Available space
- Public property
- Constructability
- Ease of operations and maintenance
- Total area of stormwater management
- Educational opportunities
- Coordination with currently planned projects

PROJECT SCHEDULE

Spring 2014
Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014
Evaluate and rank stormwater retrofit project sites

Public Meeting Series #2

Fall 2014
Select top stormwater retrofit project sites for potential design and construction

Public Meeting Series #3

NEXT MEETING SERIES

Monday, Oct. 20

- Burien
- City Council Briefing
- 7:00 p.m.
- Burien City Hall

Monday, Oct. 27

- Normandy Park
- Public Meeting
- 6:30 p.m.
- Normandy Park Rec. Center

Tuesday, Nov. 4

- Burien
- Public Meeting
- 6:30 p.m.
- Burien Community Center

DISCUSSION

- Questions, ideas or suggestions?

CONTACT US

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Search “Miller-Walker” at kingcounty.gov

Meeting Series #2 – Normandy Park City Council Briefing Summary

Date/Time: Tuesday, July 22, 2014
7:00 pm – 7:50 pm

Location: Normandy Park City Hall, Council Chambers
801 SW 174th St
Normandy Park, WA

Attendees:

- Elissa Ostergaard, King County
- Robin Kirschbaum, HDR Engineering
- Landon Bosisio, EnviroIssues
- 18 members of the public, including the Normandy Park City Council

Presentation:

Elissa Ostergaard, King County and the Miller-Walker Basin Steward, introduced herself and began the presentation. She described:

- **The Miller-Walker Basin:** This stormwater drainage basin for Miller and Walker creeks is within the jurisdictions of Normandy Park, Burien, SeaTac, the Port of Seattle and King County. These jurisdictions also make up the Miller-Walker Basin Partners.
- **Project purpose:** To improve stormwater quality and flow as well as reduce stormwater runoff in Miller and Walker creeks. The pollutants in stormwater runoff cause a variety of issues for wildlife in the creeks, including an 80% mortality rate of salmon before they can spawn.
- **Stormwater retrofits:** Projects that help alleviate stormwater issues, such as improving stream flow, cleaning polluted runoff, and reducing flooding in certain areas.
- **Project schedule:** Earlier this year, project staff began investigative work on the analysis and reviewed each jurisdictions improvement plans. Two public meetings in the spring at Normandy Park and Burien followed. The current Normandy Park City Council briefing is the first of two public meetings for the second series. A third meeting series will occur this fall.

Elissa introduced Robin Kirschbaum, HDR Engineering, who is working with the Basin Partners to conduct a stormwater retrofit analysis of the basin. Robin discussed the process of the analysis, including:

- **Initial evaluation of the basin's opportunities and constraints:** The project team reviewed available data and planned improvement projects throughout the basin's multiple jurisdictions. The team also interviewed municipal and King County staff members to determine future improvement projects that could incorporate stormwater retrofits. A series of GIS maps illustrating the basin's stormwater opportunities and constraints was developed and will be available for use by the jurisdictions.
- **Identification of stormwater retrofit opportunity areas:** After conducting preliminary field evaluation, such as a high-level screening of the basin along with a walking and driving tour, the project team identified 80 opportunity areas for further study.
- **Assessment and ranking of stormwater retrofit concepts:** Using a set of criteria, including environmental risk and water quality benefits, among others, the project team

ranked the 80 opportunity areas and selected 30 potential stormwater retrofit projects to share with the public at the second meeting series.

- **Prioritize stormwater projects:** Next, the project team will conduct additional field evaluation and modeling to assess the remaining 30 stormwater retrofit projects. After preparing project concepts and cost estimates for each project, the Basin Partners and project team will use a second set of criteria to select the top three to five stormwater retrofit projects for future design and potential construction. These projects will be shown at the next meeting series in the fall.
- **Preliminary engineering:** Once three to five projects are selected, the project team will prepare preliminary engineering reports for each project, including details such as planting layouts or piping needs. A long-term implementation plan will also be developed for the stormwater projects' continued operation and maintenance. Depending on additional funding and coordination opportunities, the Basin Partners could then potentially move forward with designing and constructing the stormwater retrofit projects.

Robin then opened the floor for questions and feedback from the audience. Detailed questions and comments are described below. Common themes included:

- How is this analysis integrated with local stormwater policies and programs?
- What are the next steps for the stormwater retrofit projects you've selected?

Questions/Comments:

Meeting attendees voiced the following questions and comments during the Q&A session following the presentation:

- Question: There is a stream that runs into Miller Creek (near Lake Burien, in Sylvester Park) that is now an underground pipe. Will this analysis address that stream and bring it back above ground?
    - Answer: Unfortunately day-lighting streams is not within the scope of our analysis. Streams in the basin are prone to flash flooding, partly due to the amount of impervious surface in the area. Our analysis will help reduce the impact of those impervious surfaces.
- Q: It looks like you will be narrowing down the number of potential stormwater retrofit projects from 30 to three to five projects. Are you going to talk to and receive commitments from the jurisdictions that will have those projects, such as the Port of Seattle?
    - A: We are working with each of the jurisdictions on these projects, including Maryanne Zukowski from the City of Normandy Park. The Port of Seattle is implementing their own stormwater commitments.
- Q: What is the final deliverable you will develop for the top three to five projects?
    - A: We will develop preliminary engineering reports that specify each project site's sizing, potential best management practices, and planting choices and layouts. This will help us secure additional grant funding for the project's final design development. The project team will also provide the Basin Partners with an extensive infiltration analysis of the Miller-Walker Basin that should prove to be very valuable to all of the basin's jurisdictions.

- Q: What will happen to the other 25-27 stormwater projects not selected for future design and construction?
    - A: The project team will compile planning information for the 25-27 projects not selected so that the basin's jurisdictions can easily begin the design process for the projects if they so choose. The planning information will include potential concepts for each project site.
- Q: How many of the 30 preliminary stormwater retrofit projects are located in Normandy Park?
    - A: Four stormwater retrofit projects are located in Normandy Park. The Basin Partners and project team will select the final three to five projects that demonstrate the greatest amount of benefit to the entire basin.
- Q: I'm glad to hear that this effort is aligning itself with planned transportation improvement projects. How is this analysis incorporating potential stormwater retrofits on private property?
    - A: The grant funding for this stormwater retrofit analysis only allows for potential projects on public property. That said, King County and the Basin Partners will continue to work with the basin's jurisdictions and communities to increase public participation in stormwater programs.
- Comment: It seems like there is still a need to integrate stormwater retrofit projects with Normandy Park's policies, codes and programs.
    - A: While the retrofit projects that are ultimately recommended may not provide all of the needed pollution prevention to fully restore our creeks, every little bit helps. We would encourage all of the basin's jurisdictions to update their policies and stormwater codes and provide incentive programs where possible. The project team will also highlight recommendations for future action and policies that can be implemented to improve stormwater quality throughout the basin.
    - The basin's communities also need to continue their support of the Washington State Department of Ecology as they strive to keep our water clean.
- Q: At the previous meeting series in the spring, there was a question about the CVS Pharmacy being built in Burien (at 5 Corners) and if the development project will conduct any stormwater retention facilities. Do you know any more about this issue?
    - A: Yes, we talked to City of Burien staff and determined that CVS will be installing underground stormwater detention vaults and a bioswale to improve stormwater quality.

Meeting Series #2 – Burien Meeting Summary

Date/Time: Wednesday, August 6, 2014
6:30 pm – 7:30 pm

Location: Burien Community Center, Manhattan Room
14700 6th Ave SW
Burien, WA

Attendees:

- Elissa Ostergaard, King County
- Robin Kirschbaum, HDR Engineering
- Landon Bosisio, EnviroIssues
- 9 members of the public

Presentation:

Elissa Ostergaard, King County and the Miller-Walker Basin Steward, introduced herself and began the presentation. She described:

- **The Miller-Walker Basin:** This stormwater drainage basin for Miller and Walker creeks is within the jurisdictions of Normandy Park, Burien, SeaTac, the Port of Seattle and King County. These jurisdictions also make up the Miller-Walker Basin Partners.
- **Project purpose:** To improve stormwater quality and flow as well as reduce stormwater runoff in Miller and Walker creeks. The pollutants in stormwater runoff cause a variety of issues for wildlife in the creeks, including an 80% mortality rate of salmon before they can spawn.
- **Stormwater retrofits:** Projects that help alleviate stormwater issues, such as improving stream flow, cleaning polluted runoff, and reducing flooding in certain areas.
- **Project schedule:** Earlier this year, project staff began investigative work on the analysis and reviewed each jurisdictions improvement plans. Two public meetings in the spring at Normandy Park and Burien followed. The current Burien public meeting is the second of two public meetings for the second series. A third meeting series will occur this fall.

Elissa introduced Robin Kirschbaum, HDR Engineering, who is working with the Basin Partners to conduct a stormwater retrofit analysis of the basin. Robin discussed the process of the analysis, including:

- **Initial evaluation of the basin's opportunities and constraints:** The project team reviewed available data and planned improvement projects throughout the basin's multiple jurisdictions. The team also interviewed municipal and King County staff members to determine future improvement projects that could incorporate stormwater retrofits. A series of GIS maps illustrating the basin's stormwater opportunities and constraints was developed and will be available for use by the jurisdictions.
- **Identification of stormwater retrofit opportunity areas:** After conducting preliminary field evaluation, such as a high-level screening of the basin along with a walking and driving tour, the project team identified 80 opportunity areas for further study.
- **Assessment and ranking of stormwater retrofit concepts:** Using a set of criteria, including environmental risk and water quality benefit, among others, the project team

ranked the 80 opportunity areas and selected 30 potential stormwater retrofit projects to share with the public at the second meeting series. Twenty-two of the projects are located in Burien.

- **Prioritize stormwater projects:** Next, the project team will conduct additional field evaluation and modeling to assess the remaining 30 stormwater retrofit projects. After preparing project concepts and cost estimates for each project, the Basin Partners and project team will use a second set of criteria to select the top three to five stormwater retrofit projects for future design and potential construction. These projects will be shown at the next meeting series in the fall.
- **Preliminary engineering:** Once three to five projects are selected, the project team will prepare preliminary engineering reports for each project, including details such as planting layouts or piping needs. A long-term implementation plan will also be developed for the stormwater projects' continued operation and maintenance. Depending on additional funding and coordination opportunities, the Basin Partners could then potentially move forward with designing and constructing the stormwater retrofit projects.

Robin also outlined an initial landscape concept plan for Moshier Park in Burien, one of the top 30 potential stormwater retrofit projects. The plan includes bioretention facilities, cisterns for the park's existing art center building, and permeable pavement as part of a larger improvement project for the park. The team will be developing detailed concept plans for each of the selected three to five stormwater projects ahead of the fall meeting series.

Robin then opened the floor for questions and feedback from the audience. Detailed questions, comments and transcribed comment forms are described below. Common themes included:

- What are the next steps for the stormwater retrofit projects you've selected?
- Will the maps and criteria used by this analysis be available to the public?

Questions/Comments:

Meeting attendees voiced the following questions and comments during the Q&A session following the presentation:

- Question: Will these maps of the basin's stormwater opportunities and constraints be available to the public?
    - Answer: Yes, we will post the maps on the Miller-Walker Basin website.
- Q: Why isn't cost used as a criterion for evaluating the stormwater retrofit projects?
    - A: Analyses like this typically don't use cost to screen out potential stormwater retrofit projects. Instead, we use the criteria to compare technical feasibility, benefits, and potential risk for each project and which projects warrant further evaluation. Later in the process, we will develop initial cost estimates of the top projects.
- Q: Is there a narrative available to the public of how you narrowed down the number of potential stormwater projects from 80 to 30?
    - A: We can make the Level 1 criteria used for the analysis and the map of the top 30 potential stormwater retrofit projects available on the basin website.
- Q: Is there a strategy for implementing the final three to five projects?

  - A: Yes, we will develop preliminary engineering and pre-design reports that specify each project site's size, potential best management practices, and planting choices and layouts. This will help secure additional grant funding for the project's final design and potential construction. The project team will also provide the Basin Partners with an extensive infiltration analysis of the Miller-Walker Basin that should prove to be very valuable to all of the basin's jurisdictions and a long-term implementation plan that will help secure grant funding for the identified stormwater retrofit projects in the future. Lastly, the project team will make broad-based recommendations for the jurisdictions on incentives, code changes, and other potential program and policy changes to help improve the basin's stormwater quality, above and beyond implementation of the recommended retrofit projects.

- Q: Are these stormwater retrofits supposed to be promoting rain gardens?
  - A: No, this project's funding specifies that all stormwater retrofit projects must be on public property. King County and the City of Seattle's RainWise program do have excellent resources for building your own rain garden on private property.
- Q: Is one of the projects near the wetlands in south Burien?
  - A: We looked at that area but determined that there wasn't much opportunity to infiltrate stormwater there.
- Q: What are the kinds of bicycle improvement projects shown on the map of the top 30 stormwater retrofit projects?
  - A: Most often, the bicycle improvement projects we could coordinate with are new bicycle lanes. Some projects call for new sidewalks, but permeable pavement can be used for either the new lanes or sidewalks.
- Q: Will you be coordinating with the Lake to Sound Trail project that is set to start construction?
  - A: No, typically once projects are about to start construction, they have completed design and it is too late to incorporate stormwater retrofit elements into the project without a significant delay.
- Q: Is there an educational piece of this project that helps teach the public about the development of permeable pavement and its multiple uses?
  - A: Educational signage for each of these projects is also an excellent idea. Permeable pavement has come a long way and is now very effective and versatile. We think the stormwater retrofit projects that will ultimately be chosen from this analysis will be great demonstration projects for the public. We are also including educational opportunities as part of the Level 2 criteria that will be used to select the top three to five projects from the top 30 sites.
- Comment: There aren't too many people here at the public meeting. Need to aim this kind of information at schools as much as possible.
- Q: Is the CVS Pharmacy being built in Burien (at 5 Corners) going to do anything for stormwater quality?
  - A: Yes, we talked to City of Burien staff and determined that CVS will be installing large underground stormwater detention vaults and a bioswale to

capture and filter stormwater.

Additional Public Comments:

The following comments are transcribed from emails to Miller-Walker Basin staff and handwritten comment forms submitted at the meeting:

- Comments on the mock-up model plant list:
  - Showing – Black Hawthorn for dry area trees. I thought that thorny plant materials was not to be used in ROW areas for 2 reasons:
    - A – public safety
    - B – maintenance problems
  - Does Black Hawthorn have big thorns?

- Survey of Lake Burien Area:
  - Approximately 80+ residents and 3+ businesses in sample area
  - 14 properties not checked with yet about flooding and sump pumps
  - 32 sump pumps; all of these have flooding
  - 9 more that have flooding but no sump pumps (other coping mechanisms)
  - Area sampled: 152nd SW, 20th SW, 156th SW, 158th SW, 11th SW, and 10th SW

Meeting Series #3

MILLER-WALKER BASIN
Stormwater Retrofit

King County Water and Land Resources Division
201 South Jackson Street, Suite 600
Seattle, WA 98104-3855

PRSRT STD
U.S. Postage
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Seattle, WA
Permit #6013

Join us!

Miller-Walker Basin Stormwater Retrofit Public Meetings

Monday, October 27
6:30 – 7:30 p.m.
Normandy Park Recreation Center
801 SW 174th Street, Normandy Park

Tuesday, November 4
6:30 – 7:30 p.m.
Burien Community Center
14700 6th Avenue SW, Burien

See reverse for details.

King County
Port of Seattle

MILLER-WALKER BASIN
Stormwater Retrofit

Earlier this year, the Miller-Walker Basin Partners began a stormwater retrofit analysis to identify, evaluate and select stormwater projects to help clean up our local waterways and reduce flooding and erosion.

After months of analysis, the project team has selected the top six stormwater retrofit sites for preliminary design.

At the upcoming meetings you can:

- See what six stormwater retrofit sites were selected and why
- Learn about and provide input on the conceptual designs

For more information:

Search: "Miller-Walker" at kingcounty.gov
Contact: Elissa Ostergaard, 206-477-4792 or elissa.ostergaard@kingcounty.gov

Alternative Formats Available
Call 206-477-5549 or TTY: 711

MILLER-WALKER BASIN STORMWATER RETROFIT ANALYSIS

Burien, WA

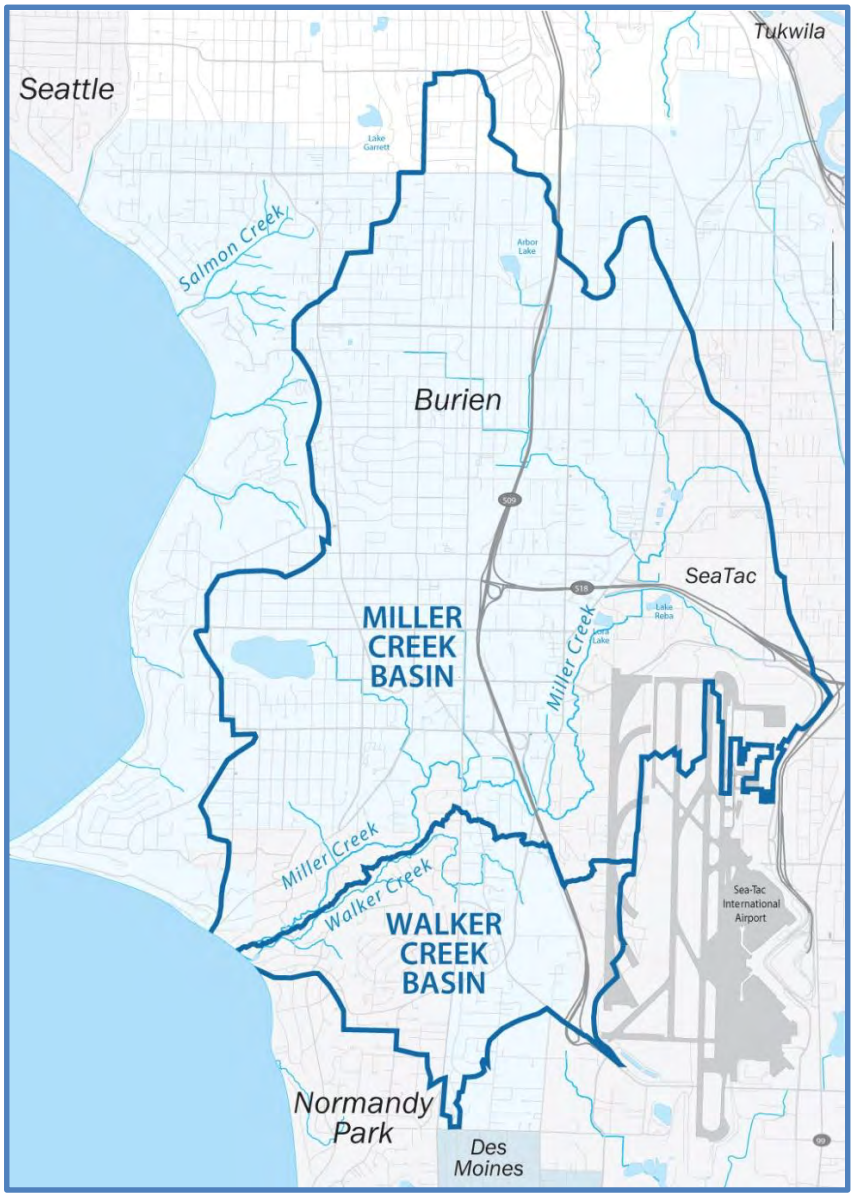
November 4, 2014

Green / Duwamish and Central Puget Sound Watershed
King County
City of Normandy Park Washington
Burien
City of SeaTac Est. 1990
Port of Seattle

MILLER-WALKER BASIN

Stormwater drainage basin that holds Miller & Walker creeks

- Covers approximately eight square miles
- Basin Partners:
  - Port of Seattle
  - Burien
  - Normandy Park
  - SeaTac
  - King County



PRESENTATION OVERVIEW

- Briefly review project background, purpose and objectives
- Show initial concepts for the top stormwater retrofit sites
- Share next steps

GOALS

- Describe the six stormwater retrofit sites and why they were selected
- Answer questions about the stormwater retrofit

PROJECT BACKGROUND

STORMWATER RUNOFF

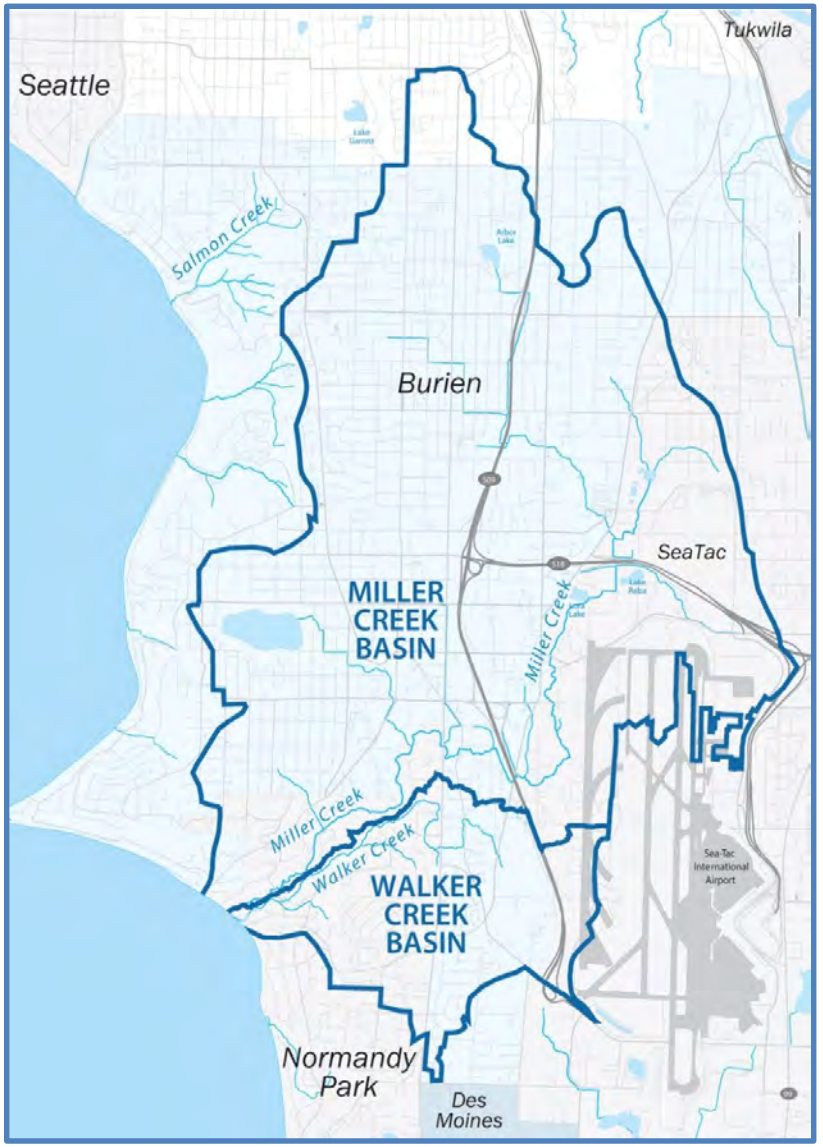
When it rains, unabsorbed stormwater:

- Collects pollutants – oils, grease, chemicals, pesticides, metal, animal waste, etc.
- Causes high stream flow for Miller & Walker creeks
- Damages natural habitat and impacts wildlife

STORMWATER RETROFITS

Controlling stormwater benefits our communities, wildlife and natural habitat

- Cleans polluted runoff
- Decreases stream flow in local waterways during storms
- Increases stream flow during the dry summer months
- Reduces erosion
- Reduces flooding on roadways and private property



GREEN STORMWATER PROJECTS

- Absorb and filter rainwater
- Remove pollutants using plants and soils
- Replenish groundwater
- Add vegetation and attractive plantings to a neighborhood
- Reduce flooding


A bioretention swale


An example of permeable pavement

TRADITIONAL STORMWATER PROJECTS

- Collect and transport stormwater using pipes and conveyance systems
- Focus on controlling peak flow rates
- Little or no focus on cleaning stormwater

A stormwater detention pond in Burien

PROJECT SCHEDULE

Spring 2014

Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014

Evaluate and rank stormwater retrofit project sites

Public Meeting Series #2

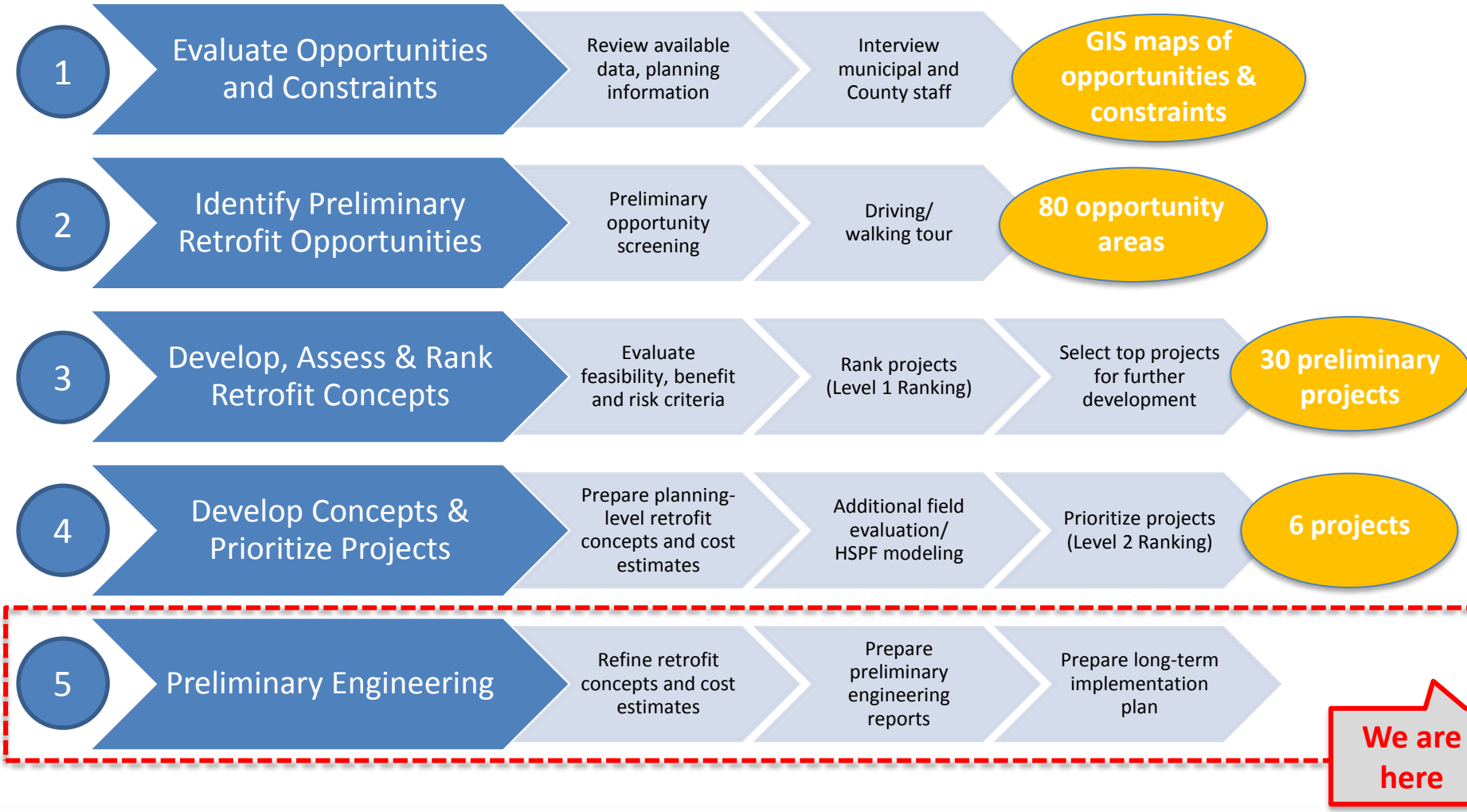
Fall 2014

Select top stormwater retrofit project sites for potential design and construction

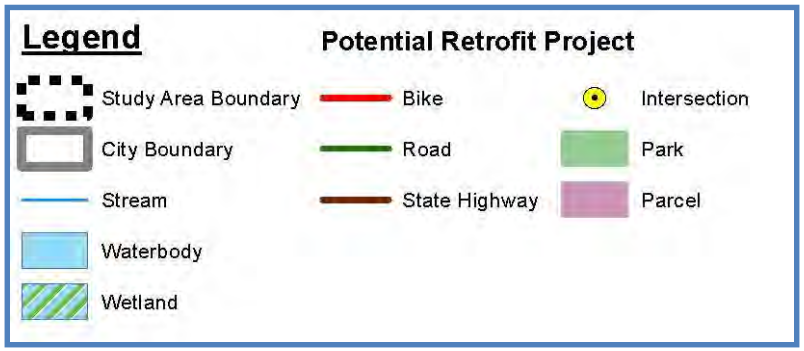
Public Meeting Series #3

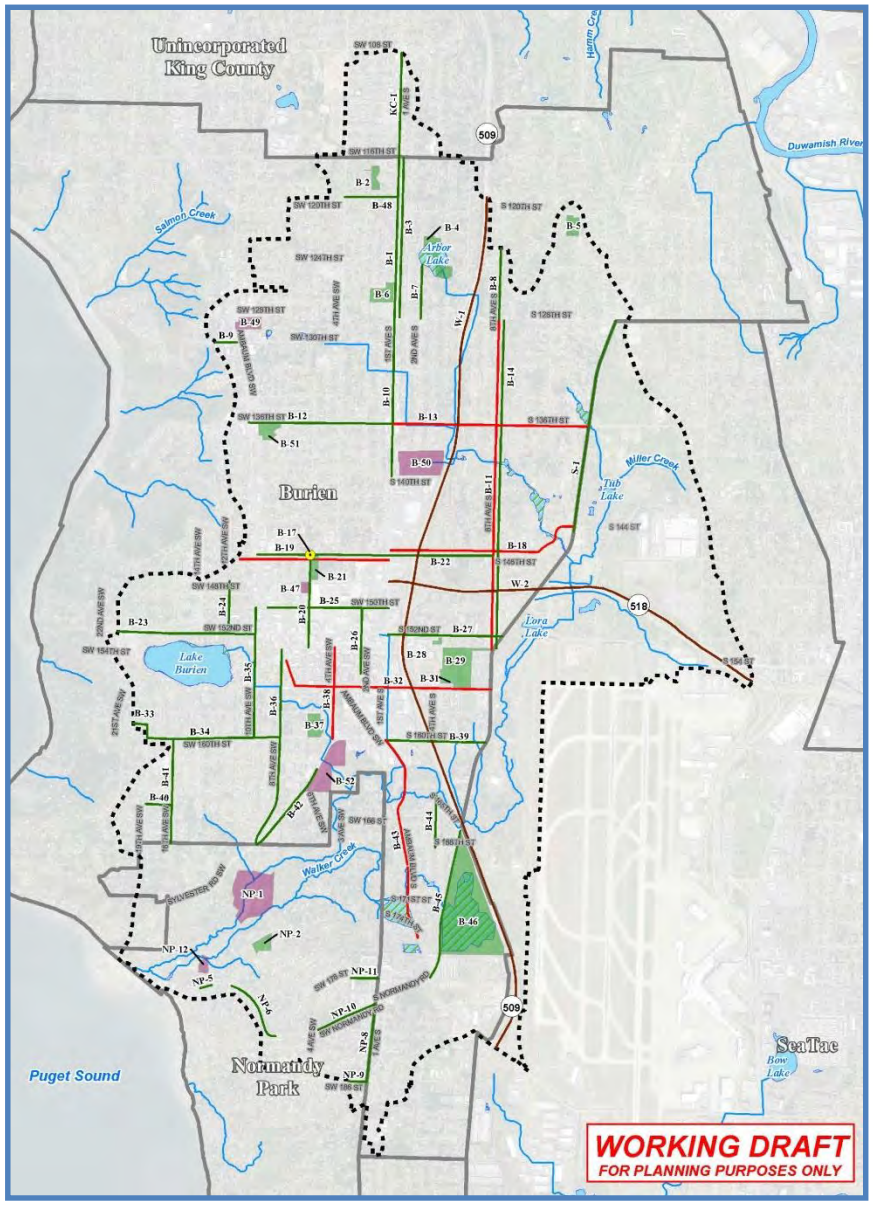
IDENTIFYING AND RANKING STORMWATER RETROFIT SITES

STORMWATER RETROFIT ANALYSIS PROGRESS



80 STORMWATER RETROFIT OPPORTUNITY AREAS

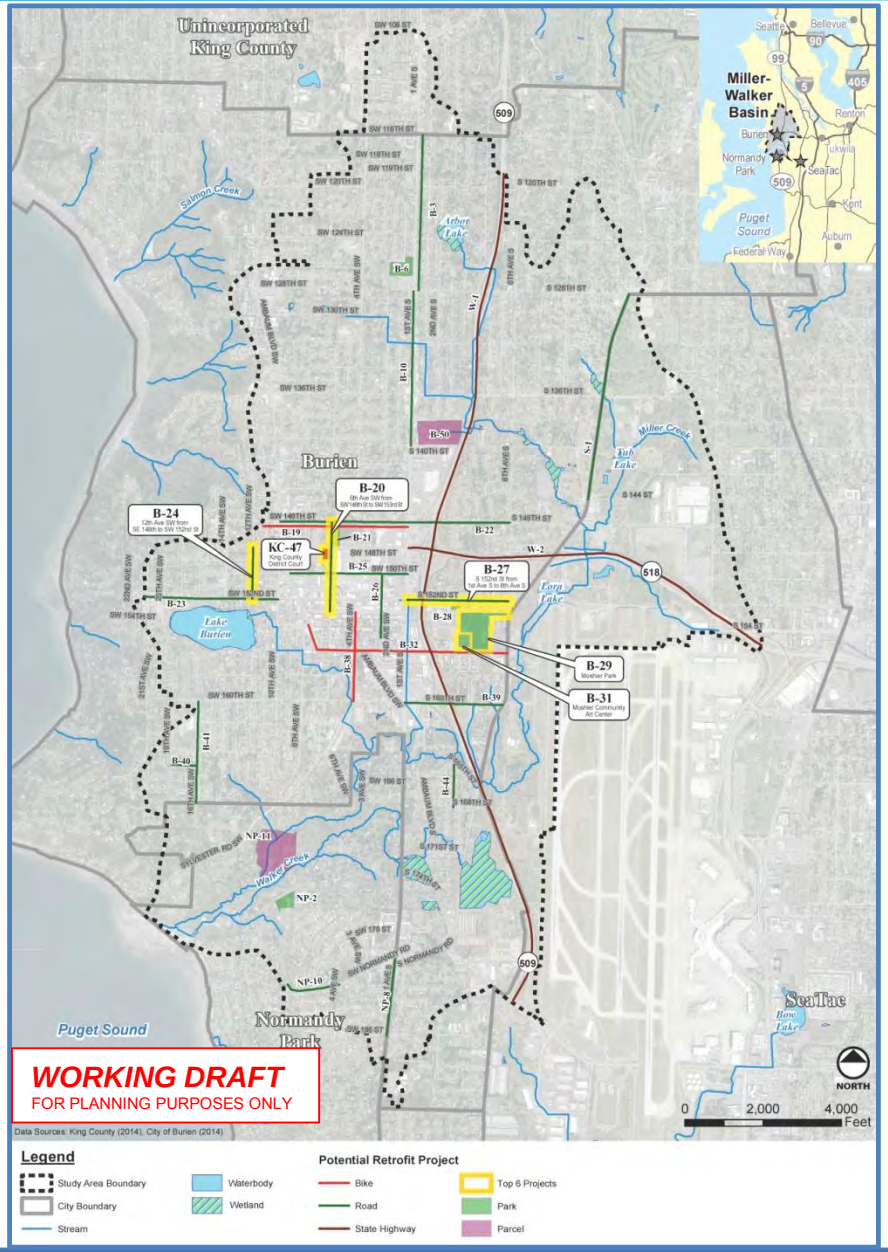




30 POTENTIAL STORMWATER RETROFIT PROJECTS

Criteria used to narrow 80 down to 30:

- Infiltration feasibility
- Slope
- Environmental risk
- Water quality benefit
- Connectivity to stormwater conveyance system



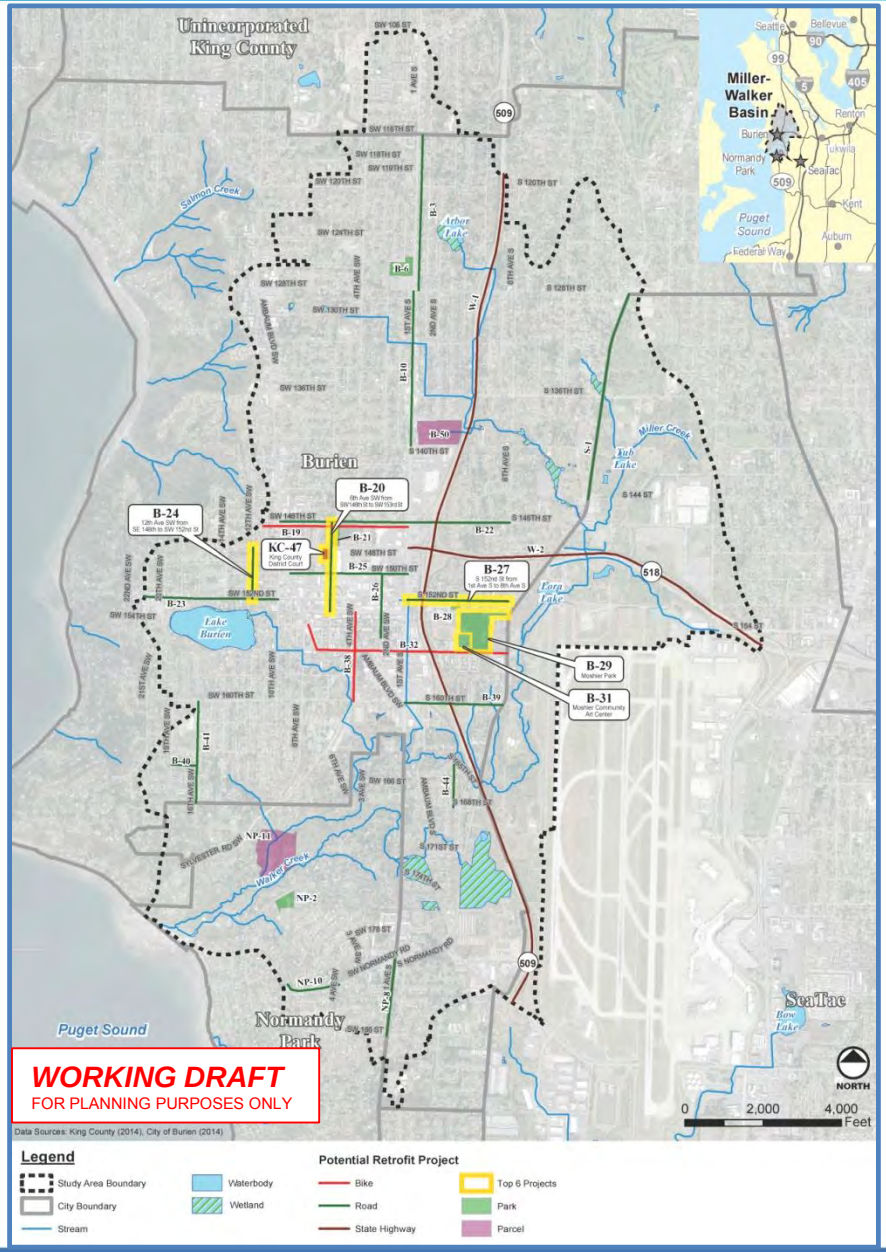
6 POTENTIAL STORMWATER RETROFIT SITES

Criteria used to narrow 30 down to 6:

- Stream flow benefit
- Available space
- Public property
- Constructability
- Ease of funding
- Property risk
- Total area of stormwater management
- Educational opportunities
- Coordination with currently planned projects

TOP STORMWATER RETROFIT SITES

1. 6th Ave SW from SW 146th St to SW 153rd St
2. King County District Court
3. 12th Ave SW (from SE 148th to SW 152nd St)
4. S 152nd St (from 1st Ave S to 8th Ave S)
5. Moshier Park
6. Moshier Community Art Center



MILLER-WALKER BASIN
STORMWATER RETROFIT PROJECT

6TH AVE SW
FROM SW 146TH ST TO SW 153RD ST
BURIEN SITE #20

Proposed Concept

Typical BMP Concepts

A Curb Bulb-out Bioretention

B Permeable Pavement Parking

Project Vicinity

D Open Space Bioretention

C Permeable Concrete Sidewalks

King County · City of Normandy Park · Burien · City of SeaTac · Port of Seattle · HBB Landscape Architecture · HDR

WORKING DRAFT FOR PLANNING PURPOSES ONLY

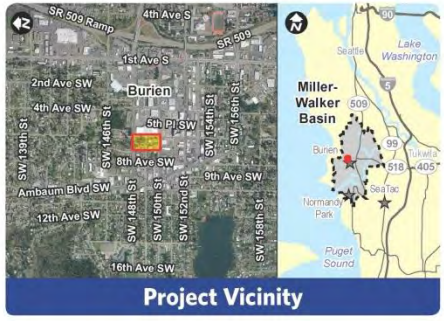
MILLER-WALKER BASIN
STORMWATER RETROFIT PROJECT

KING COUNTY DISTRICT COURT
(601 SW 149TH ST & 14905 6TH AVE SW)
KING COUNTY SITE #47

Proposed Concept

Typical BMP Concept

Open Space Bioretention



Project Vicinity

WORKING DRAFT FOR PLANNING PURPOSES ONLY

MILLER-WALKER BASIN
STORMWATER RETROFIT PROJECT

12TH AVE SW
FROM SW 148TH ST TO SW 152ND ST
BURIEN SITE #24

Proposed Concept

Typical BMP Concepts


A Curb Bulb-out Bioretention

B Permeable Pavement Parking


C Permeable Concrete Sidewalks


D Permeable Concrete Bike Lanes

Project Vicinity

WORKING DRAFT FOR PLANNING PURPOSES ONLY

MILLER-WALKER BASIN
STORMWATER RETROFIT PROJECT

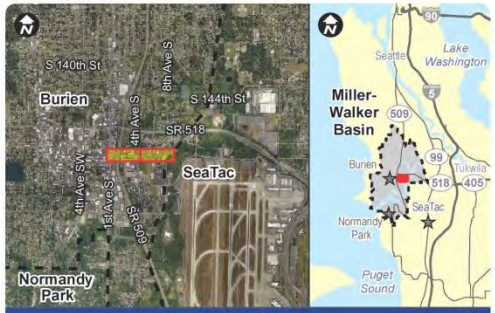
S 152ND ST
FROM 1ST AVE S TO 8TH AVE S
BURIEN SITE #27

Proposed Concept

Typical BMP Concepts

A Curb Bulb-out Bioretention

B Permeable Pavement Parking



Project Vicinity

E Cascading Bioretention

D Permeable Concrete Bike Lanes

C Permeable Concrete Sidewalks

King County · Port of Seattle · HBB · HDR

WORKING DRAFT FOR PLANNING PURPOSES ONLY

MILLER-WALKER BASIN

STORMWATER RETROFIT PROJECT

MOSHIER PARK & MOSHIER COMMUNITY ART CENTER

BURIEN SITES #29 & #31

Proposed Concept

Typical BMP Concepts

A Underground Storage

B Permeable Parking

C Bioretention Swale

D Downspout Rain Garden

Project Vicinity

F Green Roof

E Large Trees in Silva Cells

King County

HBB

HDR

WORKING DRAFT FOR PLANNING PURPOSES ONLY

NEXT STEPS

PROJECT SCHEDULE

Spring 2014
Identify potential stormwater retrofit project sites

Public Meeting Series #1

Summer 2014
Evaluate and rank stormwater retrofit project sites

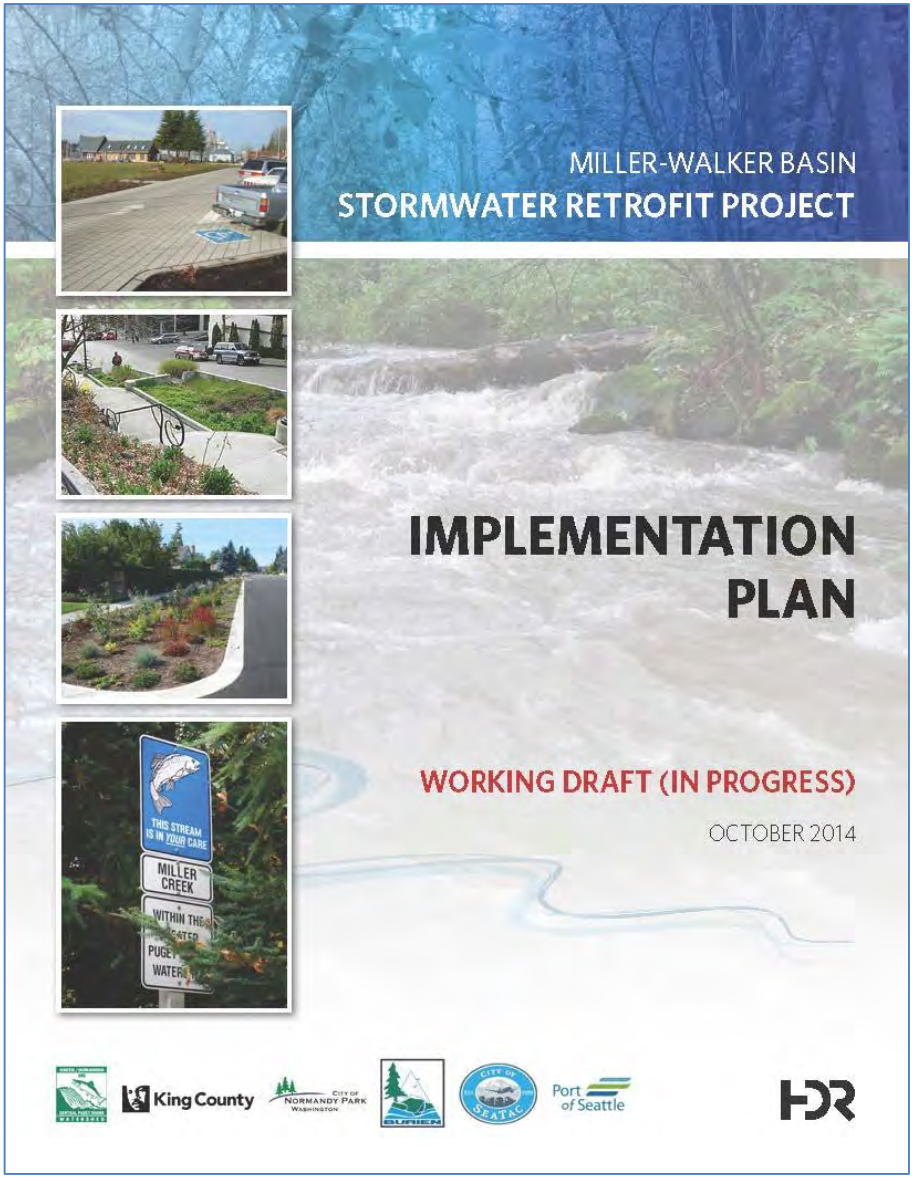
Public Meeting Series #2

Fall 2014
Select top stormwater retrofit project sites for potential design and construction

Public Meeting Series #3

IMPLEMENTATION PLAN

- Finalized by January 31, 2015



OPPORTUNITIES FOR PUBLIC INPUT

- Complete a comment card tonight
- Share your feedback with the project staff

QUESTIONS?

CONTACT US

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ROBIN KIRSCHBAUM
425-450-6229
robin.kirschbaum@hdrinc.com

Search “Miller-Walker” at kingcounty.gov

Meeting Series #3 – Normandy Park Meeting Summary

Date/Time: Monday, October 27, 2014
6:30 to 7:30 pm

Location: Normandy Park Recreation Center
801 SW 174th Street
Normandy Park, WA

Attendees:

- Elissa Ostergaard, Miller-Walker Basin Steward
- Robin Kirschbaum, HDR Engineering
- Dana Olson, EnviroIssues
- 7 members of the public

Presentation:

Elissa Ostergaard, King County and the Miller-Walker Basin Steward, introduced herself and began the presentation. She described:

- **The Miller-Walker Basin:** This stormwater drainage basin for Miller and Walker creeks is within the jurisdictions of Normandy Park, Burien, SeaTac, the Port of Seattle and King County. These jurisdictions also make up the Miller-Walker Basin Partners.
- **Project purpose:** To improve stormwater quality and flow as well as reduce stormwater runoff in Miller and Walker creeks. The pollutants in stormwater runoff cause a variety of issues for wildlife in the creeks, including an 80% mortality rate of salmon before they can spawn.
- **Stormwater retrofits:** Projects that help alleviate stormwater issues, such as improving stream flow, cleaning polluted runoff, and reducing flooding in certain areas.
- **Traditional and green stormwater projects:** Traditional stormwater projects, such as detention ponds and conveyance systems, transport but do not clean the stormwater. Green stormwater projects, such as rain gardens or permeable pavement, use soils or plants to absorb and filter stormwater instead of piping water directly to Puget Sound.
- **Project schedule:** Earlier this year, project staff began investigative work on the analysis and reviewed each jurisdictions improvement plans. Over the summer, project staff continued to evaluate and prioritize which sites had the most potential for future stormwater retrofits. This fall, the project team selected the top stormwater retrofit project sites for design and construction. The current Normandy Park public meeting is the first of two public meetings for the third and final meeting series.

Elissa introduced Robin Kirschbaum, HDR Engineering, who is working with the Basin Partners to conduct a stormwater retrofit analysis of the basin. Robin discussed the process of the analysis, including:

- **Initial evaluation of the basin's opportunities and constraints:** The project team reviewed available data and planned improvement projects throughout the basin's multiple jurisdictions. The team also interviewed municipal and King County staff members to determine future improvement projects that could incorporate stormwater retrofits. A series of maps illustrating the basin's stormwater opportunities and constraints was developed and will be submitted to jurisdictions.

- **Identification of stormwater retrofit opportunity areas:** After conducting preliminary field evaluation, such as a high-level screening of the basin along with a walking and driving tour, the project team identified 80 opportunity areas for further study.
- **Assessment and ranking of stormwater retrofit concepts:** Using a set of criteria, including environmental risk and water quality benefits, among others, the project team ranked the 80 opportunity areas and selected 30 potential stormwater retrofit projects to share with the public at the second meeting series.
- **Prioritize stormwater projects:** Next, the project team conducted additional field evaluation and modeling to assess the remaining 30 stormwater retrofit projects. After preparing project concepts and cost estimates for each project, the Basin Partners and project team used a second set of criteria to select the top six stormwater retrofit projects for future design and potential construction.
- **Preliminary engineering:** Once the six projects were selected, the project team began preparing preliminary engineering reports for each project, including details such as planting layouts or piping needs. A long-term implementation plan will also be developed for the stormwater projects' continued operation and maintenance. Depending on additional funding and coordination opportunities, the Basin Partners could then potentially move forward with designing and constructing the stormwater retrofit projects.

Robin then introduced the top stormwater retrofit sites and noted that all six are located in Burien. She described:

- **6th Ave SW from SW 146th St to SW 153rd St:** Concepts include curb bulb-out bioretention areas, permeable pavement parking lots, permeable concrete sidewalks and open space bioretention.
- **King County District Court:** Concepts include modifying the existing detention pond to include bioretention and accommodate additional stormwater. The proposed concept also includes open space bioretention with more mature plantings and diverting stormwater from existing drainage pipe to proposed bioretention.
- **12th Ave SW (from SE 148th to SW 152nd St):** Concepts include curb bulb-out bioretention area, permeable pavement parking, permeable concrete sidewalks and permeable concrete bike lanes.
- **S 152nd St (from 1st Ave S to 8th Ave S):** Concepts include curb bulb-out bioretention, permeable pavement parking, permeable concrete sidewalks and bike lanes, and cascading bioretention. Cascading bioretention requires weirs.
- **Moshier Park and Moshier Community Art Center:** Although considered two separate projects in the analysis, the Moshier Park sites are being repackaged as one to be submitted for grant funding. Concepts include underground storage, permeable parking, bioretention swales, downspout rain gardens, large trees in silva cells and green roof.

Elissa ended the presentation by reviewing next steps. She mentioned the Implementation Plan would be ready by January 31, 2015 and encouraged the audience to submit comment forms with questions or suggestions.

Questions/Comments:

Meeting attendees voiced the following questions and comments during the presentation and the Q&A session following the presentation:

- Question: What type of synthetic turf will be used at Moshier Park?
    - Answer: That is not determined at this time. The underdrain system would be installed before the turf.
- Question: Since the Performing Arts Center is adjacent to Moshier Park, will there be coordination with the school district?
    - Answer: Highline High School owns part of the parking lot, so there will be coordination with them.
- Question: Where does the runoff go from Moshier Park?
    - Answer: The runoff from Moshier Park goes to Miller Creek, which is about 800 feet to the east.
- Question: Was the volume of water expected to be cleaned one of the criteria?
    - Answer: The amount of impervious area and type (i.e., pollution-generating or non-pollution-generating) were key factors in the evaluation and prioritization of projects.
- Question: What about storm drains? Since runoff comes from storm drains, is there anything that can be done with the storm drains?
    - Answer: Storm drain filters are relatively expensive compared to the amount of water cleaning they can do compared to Low Impact Development techniques that manage stormwater where the rain falls.
- Question: Water gathers in ponds. Why can't you drill holes in soil to infiltrate?
    - Answer: The technique is being investigated, and may be used on some projects.
- Question: Will projects take land away from private property?
    - Answer: No, all projects use existing right-of-way.
- Question: Someone suggested filtering the creek to help with pre-spawn salmon mortality. Bugs aren't faring well either. Would it be possible to install a large filter system in the streams and support it through volunteers?
    - Answer: We need to think creatively about how to address the issues.
- Comment: There should be signage at the new CVS parking lot about what they did and why they did it so people can learn.
- Question: What is the fish pre-spawn mortality rate for Walker Creek?
    - Answer: For Walker Creek, 2012 was the biggest return – 400 coho were seen, over 125 returned to spawn, and the pre-spawn mortality rate was 57%. Miller Creek had a 95% pre-spawn mortality rate that same year.
- Comment: Fresh asphalt is toxic to animals. Burien recently paved a shoulder with ground asphalt and the runoff all goes to Walker Creek.

Additional Public Comments:

The following comments are transcribed from emails to Miller-Walker Basin staff and handwritten comment forms submitted at the meeting:

- I am glad the process is ongoing and the discussion of opportunities – cost effective and efficacious to water quality – is alive. The choice of projects is a technical, science based decision dependent on funding. I would like to see volunteer labor included as the solution to effect the change to be implemented to enhance education of the community. Here is a planning priority idea that I do not think was addressed: what projects can be done with volunteer labor – partly or wholly – like rain gardens – once planned. It is community support we need after the planning, we need to plan how to get this.
- Intercepting all stormwater before entry to the creeks as it leaves parking lots and roads and doing some primary filtering – hopefully biological – is the only long term local solution. A circle mount of plantings around every drain; a filter integrated into pipes (and extractable for maintenance); 100% infiltration on new construction before leaving job site; etc. Maybe we need a design competition in engineering schools – like design contests in architecture schools – to get some new ideas.

Meeting Series #3 – Burien Meeting Summary

Date/Time: Tuesday, November 4, 2014
6:30 to 7:30 pm

Location: Burien Community Center
14700 6th Avenue SW
Burien, WA 98166

Attendees:

- Elissa Ostergaard, Miller-Walker Basin Steward
- Robin Kirschbaum, HDR Engineering
- Sophie Cottle, EnviroIssues
- Steve Roemer, City of Burien
- Angela Gallardo, City of Burien
- 13 members of the public

Presentation:

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Questions/Comments:
Meeting attendees voiced the following questions and comments during the presentation and the Q&A session following the presentation:

- Question: Will you be removing trees at the King County District Court site?

  - Answer: Two red maples located at the back of sidewalk and immediately below overhead power lines would possibly be removed. The trees are in extremely poor condition due to continual PSE trimming and will be replaced with a tree species appropriate below power distribution lines. No other trees are anticipated to be impacted by site improvements.

- Question: Will the King County District Court project change the appearance of the facility? Would it be fenced off like some other existing detention ponds?
  - Answer: No, it will be more like a park facility. Existing features, such as benches, will be factored into the design.
- Question: Are street improvements part of the project on 12th Ave SW?
  - Answer: Street improvements would include the features listed: curb bulb-out bioretention, permeable pavement parking, permeable concrete sidewalks, and permeable concrete bike lanes.
- Question: There is a lot of pollution on 12th Ave SW outside of this project site. Are you doing anything to fix that?
  - Answer: The project focuses on managing stormwater runoff from the project footprint only. Runoff from upstream contributing areas would bypass the proposed LID improvements and would be flow through to the down-slope stormwater conveyance system, as it does now.
- Question: Would overflow water from 12th Ave go into Lake Burien?
  - Answer: Yes.
- Question: Where does the water come from near the Moshier Park site?
  - Answer: It comes from about 11 acres of land including Highline High School and S 156th St.
- Question: Are you doing anything with the Highline High School parking lot accessed from S. 152nd Street?

  Answer: No, the parking lot will remain the same and the project improvements will be kept in the roadway right-of-way.
- Question: Impervious area increased on SW 152nd St between 12th Ave SW and Maplewild Ave SW when the city recently repaved the street. What happened?
  - Answer: This team is not aware of the details of that project, since it was not part of the retrofit planning effort. The City of Burien may have been incorporating water quality features when it repaved the road.
  - Action item: King County will follow up with the City of Burien.
- Question: Are you leaning towards the Moshier Park project? Is there another site that causes more harm, or why was this one ranked #1?
  - Answer: This site was ranked as the top priority based on criteria explained in the presentation: stream flow benefit, available space, public property, constructability, ease of funding, property risk, total area of stormwater management, educational opportunities, and coordination with currently planned projects. The City of Burien submitted an application to the Department of Ecology for funding this week, so if funding is received the City will proceed with

the Moshier Park project. It is one of the projects expected to have the most benefit to the creeks because of its large size and large area of impervious surface managed.

- Question: Are these projects meant to serve as models or are they just based on opportunities available? Will the cost data be available for other cities that want to do the same?
    - Answer: We hope the projects will serve as a pilot for other cities, but they are based on opportunities available. Engineers that design this type of water infrastructure have cost per unit readily available from their past work. Preliminary cost data will be included in the final summary report.
- Question: Several existing catch basins seem like an obvious opportunity for retrofitting. Did you think about using those sites?
    - Answer: We looked that the entire map of city stormwater infrastructure and determined where there were opportunities and where the problem was most severe. Proposed solutions are focused on implementing Low Impact Development in priority areas in the watershed, rather than on retrofitting catch basins.
- Question: If we want to use pervious materials on private property, what resources are available to us?
    - Answer: There is information available online, such as the Stewardship Partners rain garden guide and the WSU technical guide for stormwater infrastructure. City of Seattle's web site also has a lot of resources that would be useful.
- Question: Should existing ditches be left as is?
    - Answer: The existing roadside ditches can provide some help in cleaning up runoff, whereas sidewalks will not. The Transportation Improvement Plan proposes turning some ditches into sidewalks, and it is available online.
- Question: I want to involve my neighbors in fixing an area with flooding problems near Highline High School. What can I do?
    - Answer: The City of Burien has a grant that will match funding up to $5,000 if there is a benefit to the public. You can ask your City to help facilitate a neighborhood meeting to help your neighbors understand the importance of fixing the area.

Additional Public Comments:

The following comments are transcribed from emails to Miller-Walker Basin staff and handwritten comment forms submitted at the meeting:

- I am the property owner at the top of #6 [referring to the Moshier Park and Moshier Community Art Center concepts]. I've lived there for 62 years. This looks like a great plan. I hope it happens.
- Wonderful – we need more work done in the area. Wish there would have been this planning for 152nd between 8th and 21st. The street of 152nd now has more blacktop and the bicycle lanes are blacktop. More soil was covered with asphalt.
- They would be nice if we could get funding for them. Why was more impervious surface added in the 152nd St overlay? A portion of that road dirt that was covered with new

blacktop is in the first 20 feet of the shoreline. We were led to believe that the overlay would not be increasing impervious surface but using more water friendly design.

- I appreciate the foresight and dedication this team has for improving the environment and our water quality. I agree these projects seem doable and are a good beginning for this effort.
- Very interesting. They are worthy. I guess it depends on how much money you will receive for the project and which project will be able to be done with the money. I am very sad that 20th Ave SW between 152nd and 154th was not part of this study. St. Francis built an extra building and paved the complete parking lot. Now all the storm water from the all the cars that go to the school and church pollute the parking lot and streets when it rains heavily the pollution runs directly into Lake Burien uncleaned. There is also a lot of standing water on the whole street.
- Thank you for sharing your efforts this evening. I learned about something new and appreciate action the team has taken to fix things at a level that is do-able and leads to another step and then another. Personally I have increased awareness of sources of pollution in our waterways and how visualizing simple and big changes can improve water quality. Although I am not clear yet how I will contribute, a simple start is not washing my car in the street, checking for oil leaks and sharing information with others.
- Very informative meeting tonight! Chestine said you did not receive my e-mail with the algae picture included so I am sending it again. See below. Also, I believe your choice of the final project should be 12th Ave SW and 148th because it has a lot of vehicular traffic and the water drains directly into Lake Burien and then into Miller Creek with untreated water. Ten years ago there had never been an algae surface water cover as seen in the picture that I have ever seen or heard of. I have lived on the lake, or my family has, since I was 3 years old, and I am now 78. So I am knowledgeable to tell you it is true that there is a direct correlation between added impervious surface and green algae occurrences in the lake. The city has been encouraging 70% lot coverage with impervious surface. Therefore developer creep has occurred in the last 10 years and a lot of trees have been cut down due to age or the city wanting to pave the basin over with 70% lot coverage. Anything you do to help correct this situation by helping clean the water before it enters the lake is greatly appreciated.