

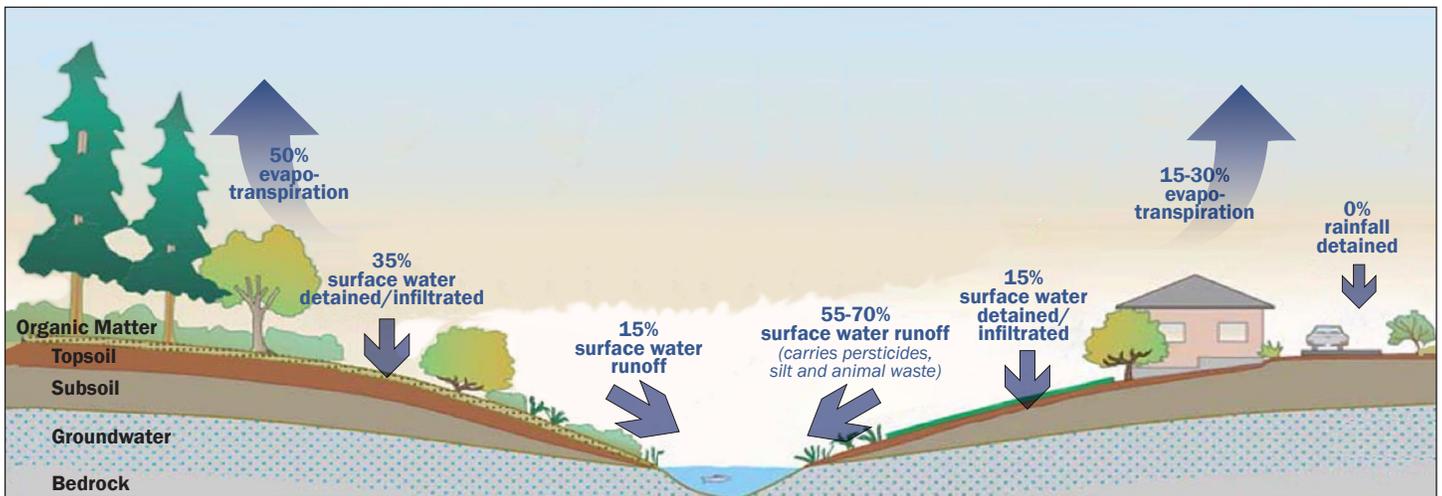


LOW IMPACT DEVELOPMENT ELEMENTS FOR RESIDENTIAL STORMWATER MANAGEMENT

The Puget Sound is growing rapidly; by 2040 the population is expected to increase by over 2 million people. Kirkland’s population is expected to increase by 29%. More people means more residential and commercial development and additional transportation infrastructure. Kirkland needs to continue to be an environmental steward and promote sustainability to preserve our beautiful natural heritage.

What Is Low Impact Development?

LOW IMPACT DEVELOPMENT (LID) is an environmentally sensitive approach for managing stormwater runoff and development in the Puget Sound Region. LID elements can mimic natural and historical hydrologic processes that occurred prior to development in Kirkland. LID protects aquatic resources, water quality, and the natural hydrology of a watershed as development takes place. The image below compares the relationship between rainfall, evaporation, groundwater infiltration, and surface water flow within a watershed or creek basin for predeveloped and developed conditions.



Predeveloped Conditions

During winter months, evaporation continues to be active while the transpiration component is minimal.

Intensity of storm event impacts to waterbodies are moderated by infiltration, evaporation, and transpiration.

Subsurface and groundwater flows sustain stream base flows during the summer months.

Developed Conditions

Evapotranspiration is drastically reduced.

Water flow and water quality cause erosion and pollution within water bodies.

Winter flow is highly variable depending on change in land cover and replaced vegetated surfaces.

Less subsurface water is available to sustain stream flows.

Potential Benefits of Low Impact Development

HOMEOWNERS can reduce stormwater fees and water use for irrigation by installing LID elements. These systems often cost less to maintain.

WATER BODIES will receive less pollutants and cooler water as more LID elements are used. This improves habitat and water quality for recreational uses.

DEVELOPERS can incorporate LID elements to reduce the size of stormwater management facilities and also meet the City’s landscape requirements.





LOW IMPACT DEVELOPMENT ELEMENTS FOR RESIDENTIAL STORMWATER MANAGEMENT

Upcoming City of Kirkland Drainage Code Updates Based on Recent Changes to Federal and State Stormwater Regulations

In January 2007, Washington State Department of Ecology issued the Western WA Phase 2 Municipal Stormwater NPDES Permit. The permit requires all cities that own and operate a municipal stormwater collection network to encourage and educate the community about storm water management programs and LID practices that will help improve the water quality in Lake Washington and the Puget Sound Region.

The permit authorizes and requires Kirkland to develop design and maintenance standards for public and private building and landscapes to manage stormwater in a way that complies with State and Federal laws including the Clean Water Act. It also authorizes and requires the City to adopt codes and develop an enforcement program to ensure property owners, individuals, and businesses adhere to specific stormwater standards. These codes and plans must meet or exceed stormwater management requirements of the WA Department of Ecology 2005 Stormwater Management Manual for Western Washington by 2009. As part of these regulatory changes, the threshold for drainage review will be lowered to 2,000 sf of proposed new or replaced impervious surfaces.

It is the responsibility of Kirkland, the developer, and the homeowner to ensure the design, construction, and maintenance of a system which complies with City standards and regulations.

Kirkland Municipal Codes

Kirkland Municipal Codes will provide current laws and regulations for development in Kirkland.

Pre-Approved Standard Plans and Policies

Pre-approved Standard Plans and Policies provide answers and directions for common residential development.

Building and Construction Permits

Permit forms and contact information will help to outline what information is needed for project approval.

City of Kirkland Contacts

CITY OF KIRKLAND PLANNING

David Barnes, Planner

425-587-3250 · dbarnes@ci.kirkland.wa.us

CITY OF KIRKLAND PUBLIC WORKS - STORM AND SURFACE WATER

Stacey Rush, PE, Surface Water Utility Engineer

425-587-3854 · srush@ci.kirkland.wa.us

Additional LID Resources and Contacts

PUGET SOUND ACTION TEAM (PSAT) is a partnership of local, state, and tribal government representatives who oversee and advise on the implementation of the Puget Sound Water Quality Management Plan. The PSAT also created the **PUGET SOUND LOW IMPACT DEVELOPMENT MANUAL**.

BUILT GREEN WASHINGTON is a resource for developers, contractors, and homeowners who want to find out more information about reducing the environmental impacts of residential construction.

NORTHWEST ECOBUILDING GUILD is an association of designers, developers, homeowners, and others who want to promote ecologically sustainable building.

WASHINGTON STATE DEPARTMENT OF ECOLOGY administers the NPDES Permit to cities and counties in Washington State. Information about the timeline for the regulatory changes is available at their website.

PUGET SOUND CONCRETE SPECIFICATION COUNCIL provides information on porous concrete suppliers, and contractors that are trained for various installations.

Contact - Andrew Marks, PE

E: andrew.marks@comcast.net P: 206-878-0257

PUGET SOUND SHORELINE STEWARDSHIP GUIDEBOOK provides information to homeowners that live in or along riparian corridors or shoreline environments.

Important Links

KIRKLAND MUNICIPAL CODE:

http://kirklandcode.ecitygov.net/CK_KMC_Search.html

PRE-APPROVED PLANS AND POLICIES

http://www.ci.kirkland.wa.us/depart/Public_Works/Development/Pre-Approved_Plans.htm

PUGET SOUND PARTNERSHIP

http://www.psp.wa.gov/our_work/stormwater/lid.htm

BUILT GREEN WASHINGTON:

<http://www.builtgreenwashington.org/>

NORTHWEST ECOBUILDING GUILD:

<http://www.ecobuilding.org/>

WASHINGTON STATE DEPARTMENT OF ECOLOGY:

<http://mrsc.org/subjects/environment/water/sw-regs.aspx>

PUGET SOUND CONCRETE SPECIFICATION COUNCIL:

No need to add web link – contact e-mail already included

PUGET SOUND SHORELINE STEWARDSHIP GUIDEBOOK:

<http://dnr.metrokc.gov/wlr/watersheds/puget/puget-sound-guidebook.htm>





LOW IMPACT DEVELOPMENT ELEMENTS FOR RESIDENTIAL STORMWATER MANAGEMENT

Many elements are easy to incorporate into residential development on smaller lots. These are just a few elements that can be used. Additional options can be found on the resources on the previous page. The elements can be installed in new developments, redevelopments, or existing properties.

Porous or Permeable Pavements

Permeable and porous pavements can be used for walkways, parking areas, driveways, and patios. These surface treatments will reduce the amount of rainwater from your property by allowing the water to infiltrate into the ground. In addition, parking areas that are created with permeable and porous pavements will reduce the pollutants from driveways that enter the City stormwater system.



Porous concrete and pavers can be used for walkways and overflow parking areas.

Swales and Bioswales

Swales and bioswales can be installed on your property or along roadways and driveways to collect stormwater. Bioswales are swales that have been planted with vegetation that can survive in wet soils and will help clean out the pollutants from dirty stormwater coming from driveways and roadways. They can be designed on gradual slopes to convey, control, and treat water.



Swales and bioswales can be used to convey and treat stormwater. Bioswales have been installed along a public street in City of Kirkland.

Green Roofs

Residential green roofs often include a thin layer of soil planted with drought tolerant plants to reduce stormwater runoff. These can be installed on existing flat roofs and sloped roofs.



A wide variety of plants can be used including seedums.

Rain Gardens

Rain gardens can also be used to collect stormwater from rooftops, driveways and patios. Instead of water flowing out (like a swale or bioswale) water is retained in the rain garden. The water infiltrates or is used by the plants. Rain gardens are designed so that there is no standing water. Native plants are used that are able to survive in wet and dry soils.



Rain gardens can be planted with native vegetation like shrubs, tall grasses, ferns and perennials and be a garden amenity even when it is not raining.

Disconnect Roof Drains

Disconnecting roof drains from footing drains or connections to the Kirkland stormwater pipes and draining it to your garden is a simple LID practice that can be done on any structure.



Splash blocks can also be placed under drains to direct flows. Stormwater from roofs can be directed to LID elements such as rain gardens.

Amended Soils

Amending soils with compost will increase infiltration and absorption. Nutrients in the composted soils work to break down and remove the pollutants from the stormwater runoff. Amended soils can be used in all of these LID elements.



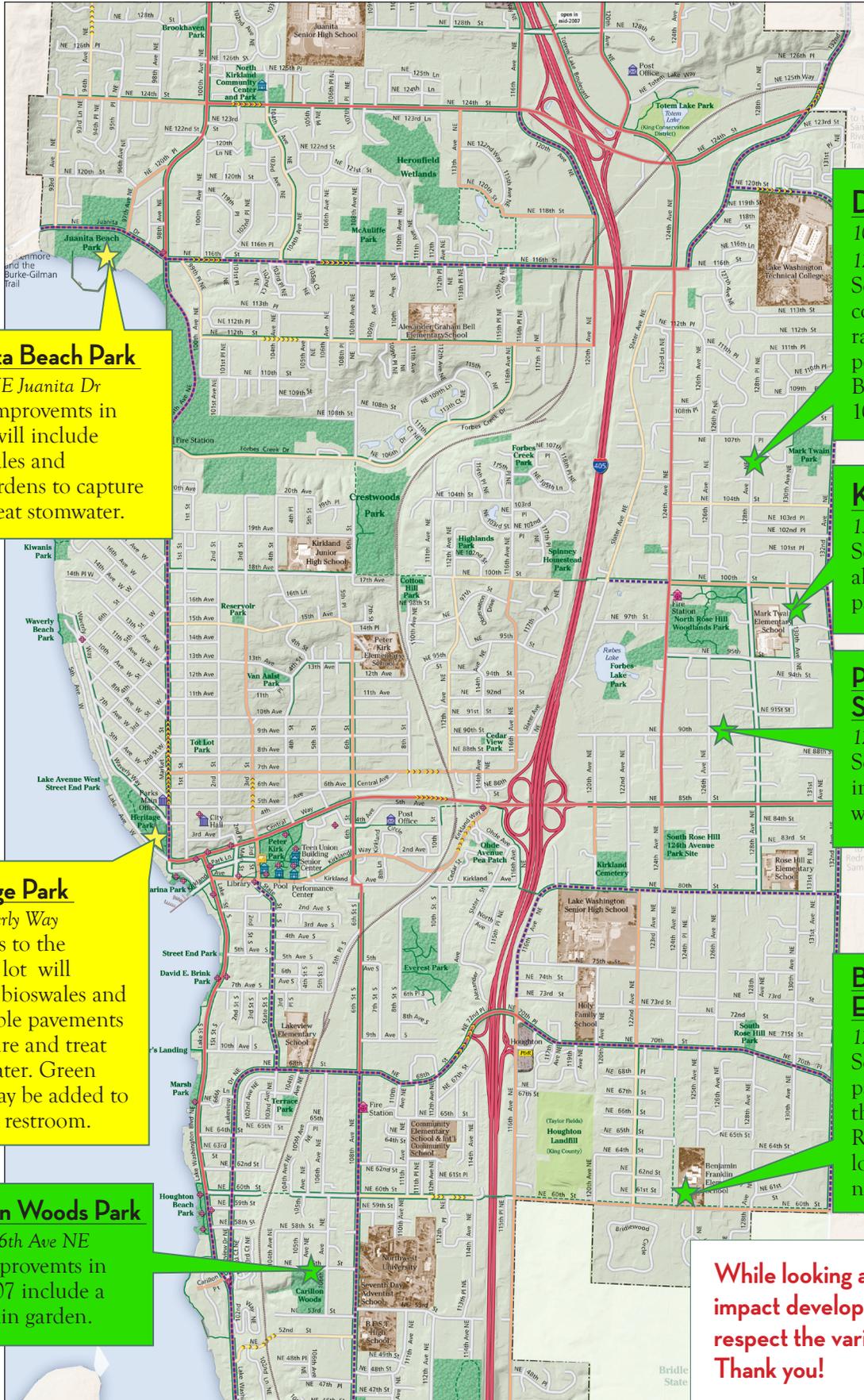
Chemical, biological and physical properties of plants, microbes and soils improve the health of plants and remove pollutants.



LOW IMPACT DEVELOPMENT ELEMENTS FOR RESIDENTIAL STORMWATER MANAGEMENT

 = pending

 = complete



Juanita Beach Park
 9703 NE Juanita Dr
 Park improvements in 2009 will include bioswales and raingardens to capture and treat stormwater.

Danielson Grove
 10428-10512
 128th Avenue NE
 See swales, porous concrete sidewalks, raingardens and permeable pavers. Best viewed from NE 105th Place.

Kirkland Bungalows
 13003-13131 NE 97th St
 See swales and bioswales along the roadway and parking areas.

Pervious Concrete Sidewalk
 12508 NE 90th St
 See a public sidewalk installed in right-of-way along NE 90th St.

Heritage Park
 111 Waverly Way
 Changes to the parking lot will include bioswales and permeable pavements to capture and treat stormwater. Green roofs may be added to a future restroom.

Ben Franklin Elementary
 12434 NE 60th St
 See rain gardens in the parking areas and at the bus turnaround. Raingardens are also located in the courtyard near the office.

Carillon Woods Park
 5429 106th Ave NE
 Park improvements in July 2007 include a small rain garden.

While looking at these exciting low impact development projects, please respect the various property owners - Thank you!