



GreenTools Government Confluence:
THE "UNCONFERENCE" FOR IMPLEMENTING CHANGE
IN YOUR JURISDICTION.
CO-HOSTED BY CASCADIA REGION GREEN BUILDING COUNCIL.

Session:
Low Impact Development With a Twist

Presenters:
David Hymel, Stewardship Partners
Dale Mikkelsen, Simon Frasier University

Date:
May 5, 2010



STEWARDSHIP PARTNERS



Helping Landowners Preserve the Environment

David Hymel

Sustainable Building Program



Mission

Helping private landowners restore and preserve the natural landscapes of Washington State.

- water quality protection, fish and wildlife habitat, sustainable land management
- voluntary collaborative conservation
- rural and urban landscapes



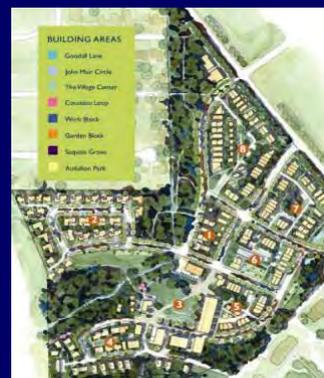
Helping Landowners Preserve the Environment

Programs

- Community-Based Collaborative Conservation
- Snoqualmie Valley Stewardship Program
- Salmon-Safe Certification
- Low Impact Development (LID) for Stormwater Management

Salmon-Safe Residential Certification Phases

- Stage 1: inventory & assessment
- Stage 2: site planning
- Stage 3: site design
- Stage 4: site construction
- Stage 5: site management & monitoring



www.salmonsafe.org



Scope of Certification

- Stormwater management
- Instream habitat
- Riparian & wetland areas
- Water use & irrigation
- Integrated pest management



2006 Muller/Cerra Studio-University of Oregon

www.salmonsafe.org



Salmon Safe Residential

Standards are designed to integrate with other green building standards

- Stand-alone certification
- Or plug-in to existing programs like LEED and Built Green



www.salmonsafe.org



Why Rain Gardens?

Protect streams
and Puget
Sound

Meet new
stormwater permit
requirements



Recharge
groundwater

Rain Garden at Pioneer
Valley Elementary School

Filter
pollution and
prevent local
flooding

Pollutant Removal Rates

Pollutant	Removal Rate
Total Phosphorous	70-83%
Metals (Cu, Zn, Pb)	93-98%
Total Kjeldahl Nitrogen	68-80%
Total Suspended Solids	90%
Organics (pesticides)	90%
Bacteria	90%

Source: Davis et al. 1998

Rain Garden at UW Pack
Forest



Rain Gardens and Community Based Stormwater Management

- Residential focus
- Regional classroom education outreach
- Assistance to jurisdictions in NPDES
- Community based installation events
- Watershed approach

2010 Class Schedule

STEWARDSHIP PARTNERS presents

Rain Garden Workshops

PIERCE COUNTY

03/11 Graham
03/16 Spanaway
04/08 Fircrest
04/13 Sumner
04/20 Gig Harbor
04/29 Puyallup
05/06 Steilacoom
05/12 Milton

KING COUNTY

02/25 Redmond
03/18 Bothell
03/30 Seattle
04/01 Mercer Island
04/20 Lake Forest Park
04/29 Bellevue
05/18 Duvall

Advance registration required!

For more information or to register, please contact
Stacey at sg@stewardshippartners.org or call (206) 292-9875



Phase II Municipal Stormwater Permittees

- Cities and towns: Aberdeen, Algona, Arlington, Auburn, Bainbridge Island, Battle Ground, Bellevue, Bellingham, Black Diamond, Bonney Lake, Bothell, Bremerton, Brier, Buckley, Burien, Burlington, Camas, Centralia, Clyde Hill, Covington, Des Moines, DuPont, Duvall, Edgewood, Edmonds, Enumclaw, Everett, Federal Way, Ferndale, Fife, Fircrest, Gig Harbor, Granite Falls, Issaquah, Kelso, Kenmore, Kent, Kirkland, Lacey, Lake Forest Park, Lake Stevens, Lakewood, Longview, Lynnwood, Maple Valley, Marysville, Medina, Mercer Island, Mill Creek, Milton, Monroe, Mountlake Terrace, Mount Vernon, Mukilteo, Newcastle, Normandy Park, Oak Harbor, Olympia, Orting, Pacific, Port Orchard, Poulsbo, Puyallup, Redmond, Renton, Sammamish, SeaTac, Sedro-Woolley, Shoreline, Snohomish, Steilacoom, Sumner, Tukwila, Tumwater, University Place, Vancouver, Washougal, Woodinville, and Yarrow Point
- Counties: Cowlitz, Kitsap, Thurston, Skagit, and Whatcom

Rain Garden

Handbook for Western Washington Homeowners

Designing your landscape
to protect our streams,
lakes, bays, and
wetlands



WASHINGTON STATE UNIVERSITY
FERICE COUNTY EXTENSION

4 STEPS TO BUILDING A RAIN GARDEN

1 LOCATE



2 DESIGN
& BUILD



3 PLANT



4 MAINTAIN



RAIN GARDENS

Designing your landscape
to protect our streams,
lakes, bays, and
wetlands



Puget Sound
Rain Garden
 Project King County

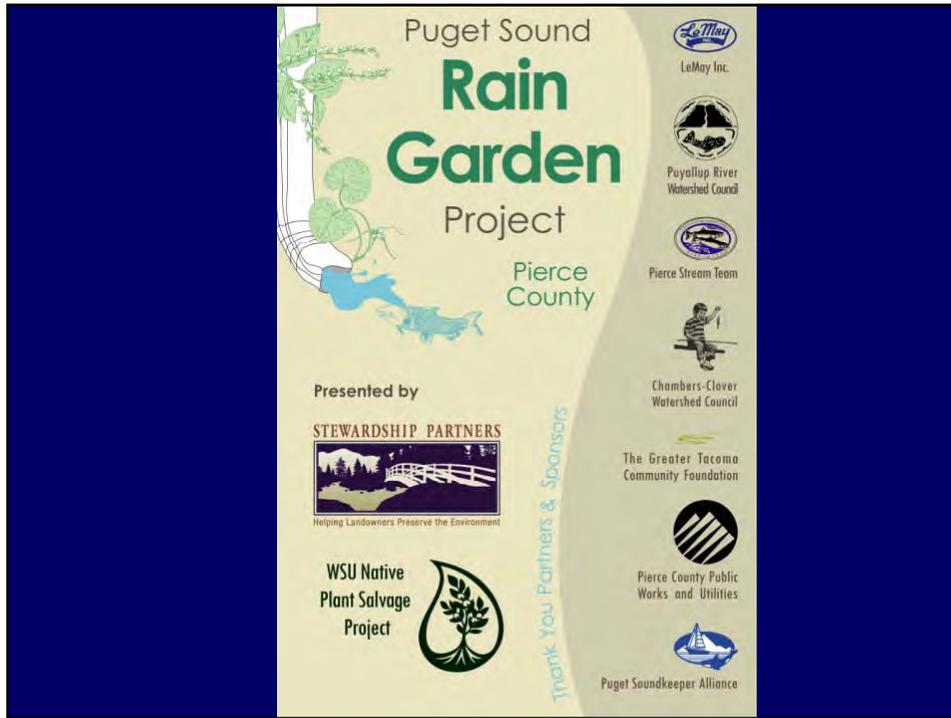
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WSU Native Plant Salvage

Seattle Aquarium Washington Native Plant Society King County Department of Natural Resources & Parks Seattle Public Utilities King Conservation District Seattle Tilth Environmental Outreach and Stewardship Alliance

2009 Community Involvement Installation Workshops in King County

Day	Date	Location
Saturday-Sunday	April 25-26	Seattle Tilth—Good Shepherd Center
Friday-Sunday	June 19-20	St. Mary's Church
Friday-Saturday	July 17-28	BF Day Elementary School
Saturday-Sunday	August 1-2	Covington Library
Saturday-Sunday	August 8-9	Fairwood Library



2009 Community Involvement Installation Workshops in Pierce County

Day	Date	Location
Saturday-Sunday	April 18-19	Eatonville Library
Friday-Monday	May 1-4	Pioneer Valley Elementary
Friday-Saturday	May 8-9	Lakewood City Hall (2)
Saturday-Sunday	June 6-7	City of Orting Station
Saturday-Sunday	June 27-28	UW Pack Forest
Saturday-Sunday	July 10-11	City of Tacoma (4)
Saturday-Sunday	July 25-26	Buckley Youth Center
Saturday-Sunday	Aug 15-16; 22-23	City of Puyallup (7)
Friday	October 2	Chloe Clark Elementary
Friday	October 30	Roy Elementary

BF Day Elementary Before



After





St Mary's Church
Before



After

Fairwood Library Before



After





Seattle Tilth
Before



After

Pioneer Valley Elementary Before



After



Pioneer Valley Elementary School Rain Garden

Designed by the 4th grade classes of Mrs. Colt & Mrs. Heller, Mrs. T. Johnson, Mrs. Sonovich, Ms. Dary, and Mrs. Gordon 2008-09

Rain Garden presented by: 

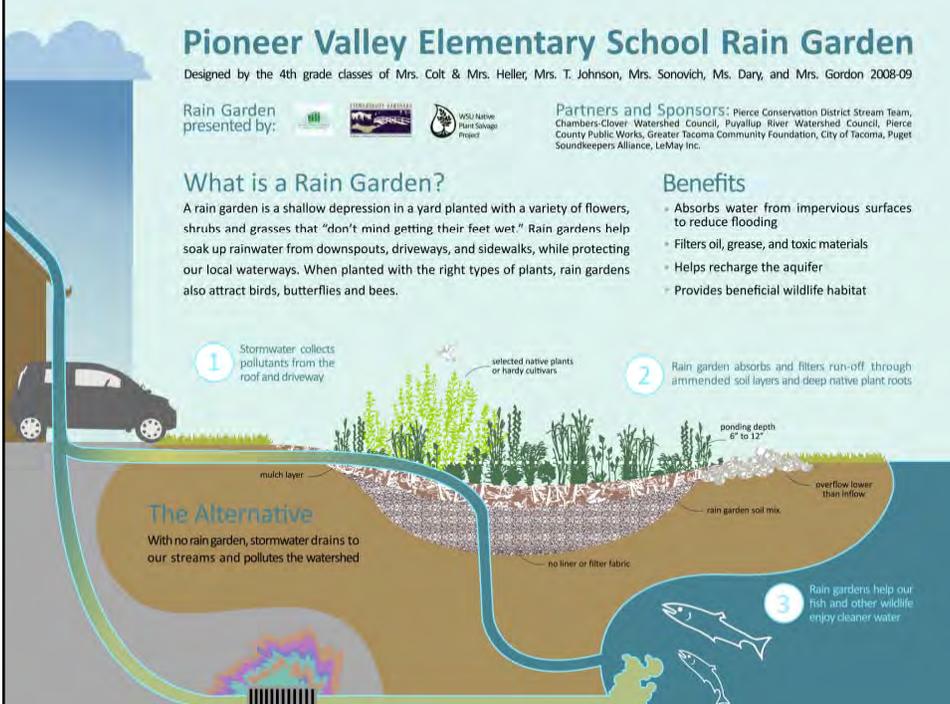
Partners and Sponsors: Pierce Conservation District Stream Team, Chambers-Clover Watershed Council, Puyallup River Watershed Council, Pierce County Public Works, Greater Tacoma Community Foundation, City of Tacoma, Puget Soundkeepers Alliance, LeMay Inc.

What is a Rain Garden?

A rain garden is a shallow depression in a yard planted with a variety of flowers, shrubs and grasses that "don't mind getting their feet wet." Rain gardens help soak up rainwater from downspouts, driveways, and sidewalks, while protecting our local waterways. When planted with the right types of plants, rain gardens also attract birds, butterflies and bees.

Benefits

- Absorbs water from impervious surfaces to reduce flooding
- Filters oil, grease, and toxic materials
- Helps recharge the aquifer
- Provides beneficial wildlife habitat



1 Stormwater collects pollutants from the roof and driveway

selected native plants or hardy cultivars

2 Rain garden absorbs and filters run-off through amended soil layers and deep native plant roots

mulch layer

ponding depth 6" to 12"

overflow lower than inflow

rain garden soil mix

no liner or filter fabric

The Alternative
With no rain garden, stormwater drains to our streams and pollutes the watershed

3 Rain gardens help our fish and other wildlife enjoy cleaner water



After



Chloe Clark Elementary School Before



After



Roy Elementary School Before



After



Yelm High School Before



After



Eatonville Library Before



After



City of Orting Before



shama

After



Town of Buckley Before



After



City of Tacoma Before



After



City of Tacoma Before



After



City of Lakewood Before



After



City of Lakewood Before



After



Community Involvement and Participation



Pioneer Valley
Elementary
School



Town of Eatonville
Library



City of Lakewood

Community Involvement and Participation



City of Puyallup
Rain Garden Cluster
August 2009

City of Puyallup

Rain Garden Project

1000 Block of 8th Ave NW
Puyallup, WA 98371
Sat & Sun Aug 15/16, Sat Aug 22*
9:30am - 4:30pm

Please RSVP at (253) 845-2973 or
streamteam@piercecountycd.org

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WSU Native Plant Salvage Project

City of Puyallup
DM Disposal, Inc.
KIRO
LeMay Inc.
Lowe's
Pierce Stream Team
Puyallup River Watershed Council
Waste Connections Inc.

*Gardening with Ciscoe Live Broadcast
Saturday, Aug 22
10 am - 1 pm!

Thank You Partners & Sponsors



After



8th Ave NW Before



After



8th Ave NW Before



After



8th Ave NW Before



After



OPTION 3-20 FOOT WIDE DIAGONAL PARKING, CURVILINEAR (SEA Street Example)

- 20 foot wide pavement, diagonal parking
- Curvilinear alignment slows traffic
- Rain Gardens



October 19, 2009

8th Ave NW LID Retrofit

69

Watershed Approach to LID



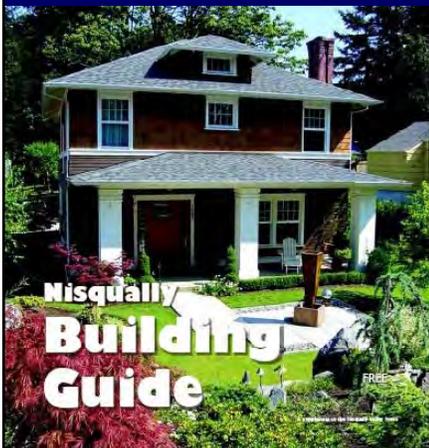
- WRIA based participation
- Develop working collaboration and stakeholders
- Build consensus on deliverables
- Stormwater management and LID focus at watershed scale
- Write competitive EPA Watershed Management Grant application

“Implementing LID in the Puyallup Watershed”



- Endorsed by 12 jurisdictions
- 4 year program
- 20 rain garden clusters
- LID ordinance development
- Classroom education
- Communications plan
- \$1.3M project costs

Publish Sustainable Building Guide



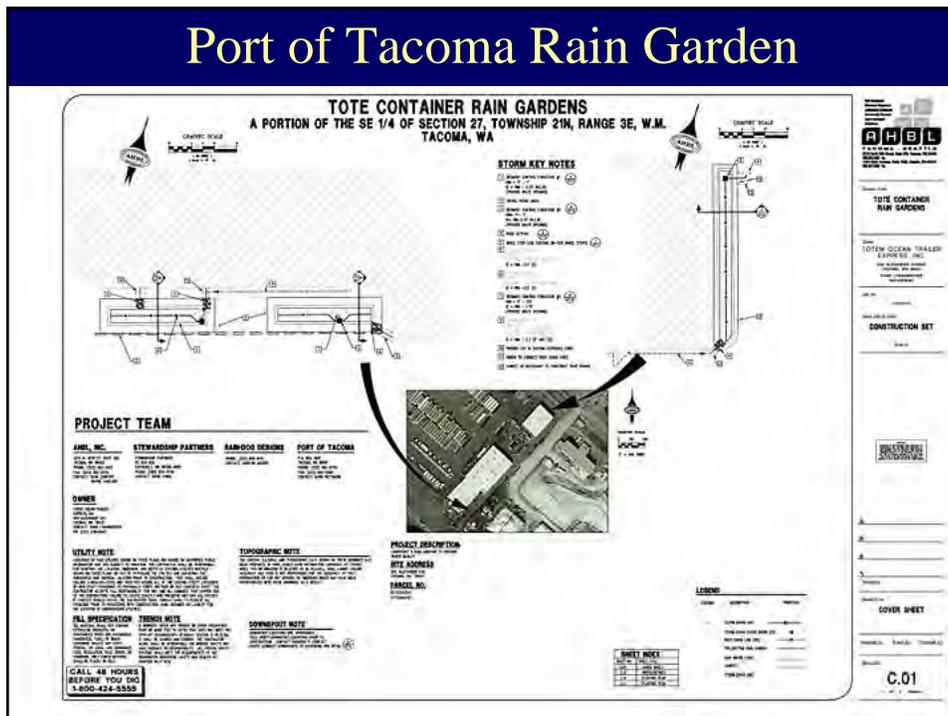
- Watershed based
- Showcase sustainable building
- Attract conventional builders
- Connection to business
- Sustain with advertising

Industrial General Stormwater Permit



- New permit January 2010
- Copper - 63 to 14 $\mu\text{g/L}$
- Corrective actions mandated
- 340 permit holders in King County
- DOE certification training
- Fee for service

Port of Tacoma Rain Garden



Outreach to Landscaping Contractors



- Thousands of contractors in King County
- Natural yard care focus
- Hands on component
- Create standard for Puget Sound
- Broad support for certification
- Sustain with fee for service

Town of Eatonville
Rain Garden Cluster
May 2010

Eatonville
Rain Garden Project

Saturday, May 22
9:00am - 3:00pm
100 Block of Baumgartner Pl N
Eatonville, WA 98328

Puget Sound Starts Here

VOLUNTEERS WANTED!

GARDENING WITH CISCOE LIVE BROADCAST!

Please RSVP with Myrna Lopas at
(360) 918-2122 or shamasuniv@gmail.com

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STEWARDSHIP PARTNERS
WSU Native Plant Salvage Project

Rain Garden Workshop
Ciscoe and Myrna, Volunteer Coordinator

Town of Eatonville
Nisqually Stream Stewards
Pierce County Library System
KIRO 3
Root for Blooms Garden Club

Eatonville Rain Gardens Installation

Baumgartner Place NE

Saturday, May 22nd



City of Puyallup Rain Garden Clusters June and September 2010

Free Rain Garden Installations in 2010

Nominate your neighborhood!

The City of Puyallup is looking for 6-8 neighbors who would like FREE rain gardens installed within City limits. The date of the first installation will be June 12, 2010. These installations are provided at no cost to the homeowner given the following criteria:

- Visibility from the street
- Well draining soils
- Homes must be within City limits (excluding the NW quadrant)
- Help with installation and maintenance



Email City Planner, Tim Parham tparham@ci.puyallup.wa.us or call (253) 841-5556

June 19th Rain Garden Planting Event



Sept 18th
Gardening with Cisco
Live Broadcast!

One of seven rain gardens installed on 8th Ave NW (near Karshner Elementary School) in Puyallup during the 2009 installation event.

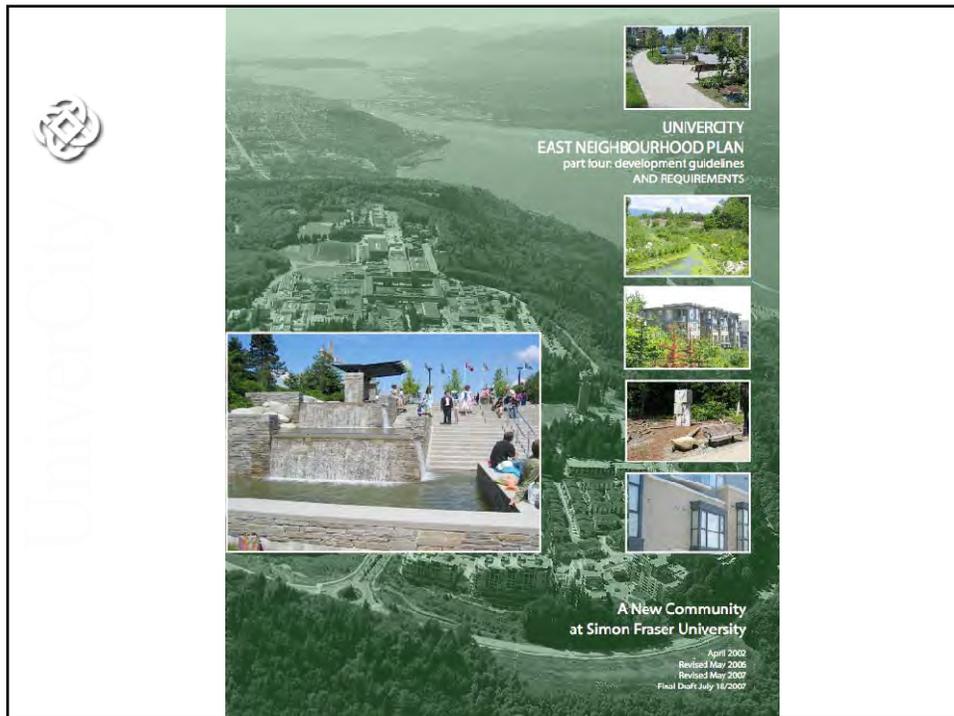


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Helping Landowners Preserve the Environment





2.2 Planning and Design Principles

In planning the Burnaby Mountain Community several general principles formed the foundation for the work leading up to the development of the plan for the UniverCity Highlands.

In addition, there are key design principles that related directly to the development of individual parcels. These ten principles aspire to ensure that new buildings relate to both the existing campus and to the natural surroundings.

- 2.2.1 Plan a complete community through the inclusion of a wide range of new land uses and sharing existing facilities of the university.
- 2.2.2 Create strong links with the nature of the site - its topography, watercourses, trees and magnificent views.
- 2.2.3 Pay careful attention to the mountain climate in the design of new buildings to acknowledge the higher levels of rain, snow and fog that can occur here.
- 2.2.4 Provide opportunities for housing choices for students and others wishing to live in the new community through a range of housing types and tenures.
- 2.2.5 Reduce auto dependency by integrating new developments with public transit and a network of bicycle and pedestrian routes through the community.
- 2.2.6 Foster a sense of community through development that animates public streets and places such as the HighStreet and Town Square at the "heart" of the campus/community interface.
- 2.2.7 Ensure that new development relates to the linear, axial pattern of the SFU campus and its architecture.
- 2.2.8 Design with nature by retaining significant trees on sites, integrating "forest fingers" between developments and planting indigenous species.
- 2.2.9 Adopt sustainable strategies including on-site stormwater management and green building design in new construction.
- 2.2.10 Create a distinctive architecture that unites both urban and natural responses to the site and defines the new community by a "family of buildings".



2.3 Use and Activity Guidelines

Several guidelines are included to achieve a broad range of uses and activities to ensure both a more vibrant community life and urban animation.

2.3.1 Mix of use

To insure vitality and diversity in the community, the CD comprehensive zoning identifies opportunities for a mix of uses in the new community including retail, office, restaurant and academic space in addition to residential. Integrating these uses into the same building adds vitality to the community.



2.3.2 A central shopping area

A variety of retail stores will be provided in a central location, along HighStreet in the UniverCity Highlands Neighbourhood. The retail mix should include uses such as a food store sized to serve the East Neighbourhood, a pharmacy, restaurants, a cleaners, a bookstore and a financial institution. Outdoor retailing is encouraged in the Town Centre area. These developments will be determined through independent CD zonings as population and need support them.



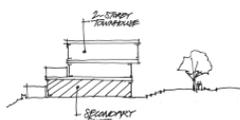
2.3.3 Small-scale, commercial neighbourhood

Areas may be included in building designs to provide spaces to serve as home offices and studios. In the case of townhouses, the ground floor, with a direct relationship with the street, may afford a separate, office address. The opportunity may also exist for the ground floor space of buildings to be used for small galleries, arts and crafts and retail shops at key locations compatible with a residential neighbourhood. Commercial uses of this type would be limited to 50 square metres in area and located on the ground floor only. Bed and breakfast use may be considered as a home occupation subject to any required zoning amendment.



2.3.4 Housing for University community

The CD zoning permits innovative approaches to the design of dwelling units to create rental suites for students, university staff and faculty in up to 50% of the units in each development. For example, townhouses may be designed with lower levels with separate entries to allow for secondary suites. Self-contained suites in apartments may have an additional private entry from the corridor to create a "lock-off" suite.





2.4 Building Form Guidelines

These guidelines define the elements that will lead to an appropriate overall scale and massing of development in the UniverCity Highlands Neighbourhood. The primary objective is to produce an overall form compatible with the linearity and the horizontality of the campus, allowing for individual expression in new projects, while ensuring that the overall development reads as a "family" of buildings.

2.4.1 Building height gradient

Buildings in the UniverCity Highlands Neighbourhood will range from two storeys for some street-fronting townhomes to twenty storeys for important landmark sites. Buildings with a greater height along the street frontage are generally located along the northern edge of University Crescent and the southern edge of University High Street where views will be maximised for all development parcels. Building height does not include elevator and mechanical penthouses. Parking levels above existing grade will be counted as part of building height.



2.4.2 Terraced buildings

Terraced buildings are encouraged given the predominance of this form within the campus and the topographic nature of Burnaby Mountain. Terracing will increase the sense of hill-town in the overall development. Building terraces can be either single floor or double floor increments.

Ground floor slabs should also terrace along sloping site frontages to ensure a better grade-oriented relationship of the building to the street, and to avoid high walls in the landscape.

Roofs and terraces in a stepped building should be used where practical, for private and communal outdoor patios, decks, and gardens. Green roofs are encouraged as a means of retaining stormwater from smaller storm events and to add visual interest.



2.5 Architectural Expression Guidelines

The following guidelines identify the important characteristics of building design to ensure compatibility with the Simon Fraser campus and to establish an appropriate aesthetic for the UniverCity Highlands Neighbourhood. The goal is to achieve a balance between a consistency of design as well as individual expression in new developments. A more contemporary 'West Coast' design is encouraged for new developments rather than 'heritage reproduction' from another time and place.

2.5.1 Horizontality

The architectural expression of all new highrise (greater than 4 storey) buildings should focus on the use of horizontal lines, contrasted with small vertical elements, similar to the approach taken on the University campus. Design elements should include projecting roofs and floor slabs, trellises, sun screens, extended wall planes and a horizontal expression in wall materials.

Low rise buildings (typically 4 storeys or less) should try to express horizontality, but this need not be a dominant design requirement in favour of other design elements.



2.5.2 Design of windows

An emphasis should be placed on the use of glass to maximize natural illumination within buildings while taking advantage of the magnificent outward views from this setting. Windows should be operable to maximize natural ventilation as part of the energy design of new buildings.

The detailing of window elements is important to avoid a "tacked-on" appearance. The use of a rebate window, set into the façade, will create a more solid expression and increased shadow lines. Metal/aluminum and wood windows are encouraged, with vinyl windows not preferred.

Window walls shall not be used for vertical walls and should be limited in all buildings; spandrel panels are acceptable on apartment buildings.





UNIVERCITY

2.6 Residential Livability Guidelines

Certain guidelines are of importance to ensure that the new community achieves a high standard of livability for residents.

2.6.1 Building setbacks

Privacy for grade level units should be enhanced through low walls, hedges and changes in elevation. Buildings should be separated by landscaping elements such as extensions of the natural forest along property lines, where feasible. Buildings should be designed to avoid overlook problems between units facing one another. Windows located in sideyards should take into account those located in existing or approved adjacent developments.



2.6.2 Children's play areas

Children of all ages shall have easy access to appropriately located, designed and landscaped outdoor play areas suited to their developmental and play needs.

Total outdoor play area shall be a minimum of 130 square metres in size and shall be visually accessible from amenity areas and residential units. Outdoor play areas shall be situated to maximize sunlight access. There should be a minimum of 2 hours of sunlight between the hours of 10:00 a.m. and 5:00 p.m. on December 21st. Adequate artificial lighting shall be provided.



Landscape Guidelines

3.0



UNIVERCITY

The overall landscape design intent of UniverCity is to respect and build on the indigenous character of the site atop Burnaby Mountain. To this end, significant tree stands at the edges of the neighbourhood are being protected by tree and riparian covenant areas. Other stands of trees have also been identified for protection and preservation both within development sites and public areas like parks and the school site.

Within individual development sites, easements and covenant areas are identified for tree retention and riparian protection along streams and public walkways traversing the community. Proponents are encouraged to retain trees in side and rear yard areas of sites, where practical. New landscape elements should complement the natural species of the mountain.

The following guidelines provide greater definition towards achieving this design intent and provide design information that supports implementation of the "Landscape Requirements" identified in Section 7.0 of this document.

3.1 Landscape Character

3.1.1 The landscape character throughout the UniverCity should fit with the overall native forest character of Burnaby Mountain.

- Existing stands of trees should be preserved to the greatest extent possible and protected during construction.
- Native plant species should be maximised.
- A mix of deciduous and coniferous species should be utilized.
- Large informal groupings of plants should predominate.
- Informal, naturalistic planting should be used adjacent to greenbelts, riparian corridors, and certain streetscapes with naturalized planting schemes.
- Flowering plants are appropriate to add colour.





UNIVERSITY HIGHLANDS

Development Parcel Criteria 5.0

This section of the Development Guidelines deals with the precincts and the individual parcels in the University Highlands that form part of the Phase 3 and Phase 4 subdivision. The intent is to ensure that the developer of the individual parcels in the new community will have explicit criteria to assist in preparing designs for the site and to ensure that they are able to proceed with a satisfactory project without rezoning.

Furthermore, the criteria are of benefit to any approving agency charged with a review function as part of the development process. In this manner, both developer and authorities having jurisdiction for approvals have a common language by which to properly plan and design the community.

These criteria do not replace the existing CD zoning that is currently in place for these parcels. With the prior approval of SFU CT, proponents may apply for a Comprehensive Development (CD) rezoning of a parcel if they wish to seek adjustments to certain development parameters related to that

Parcel Plan



UNIVERSITY HIGHLANDS

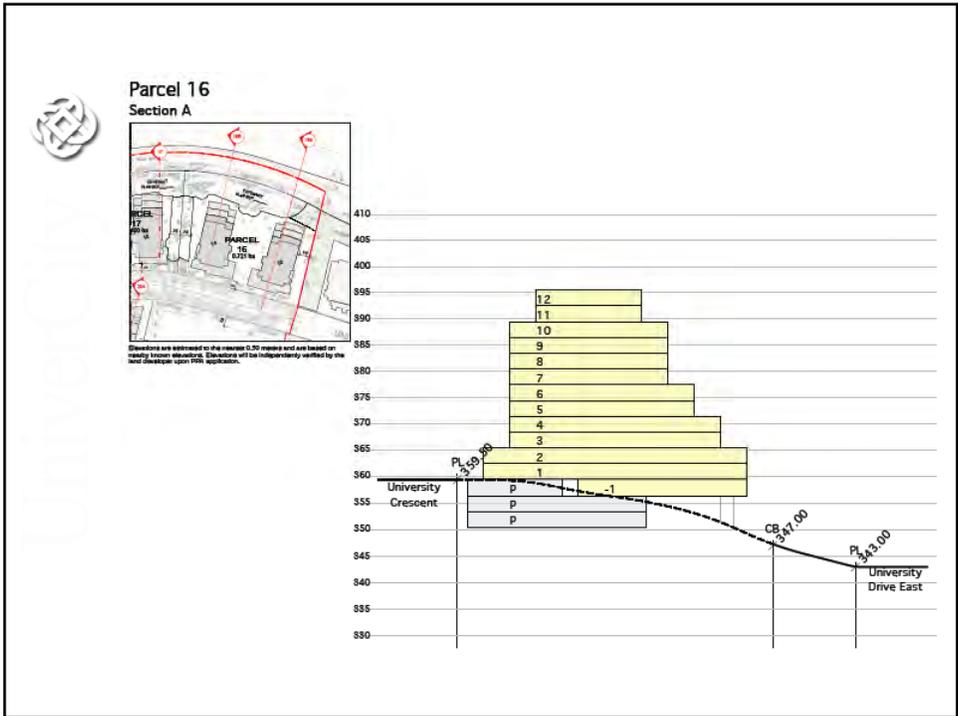
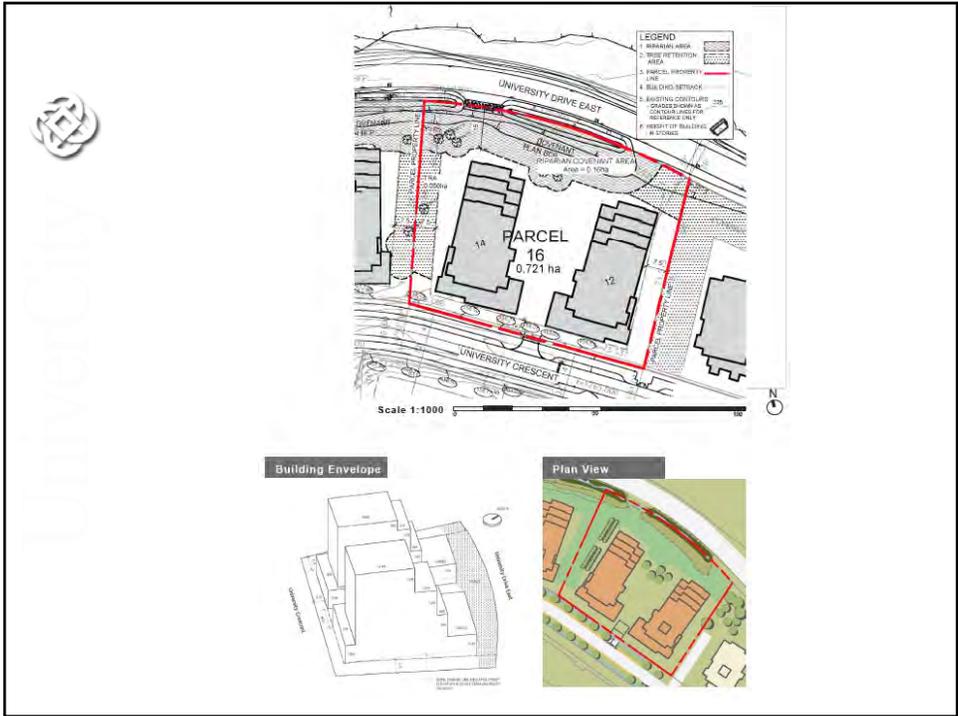
Parcel 16 Requirements



Parcel 16 is suitable for two terraced tower forms, up to 12 and 14 storeys in height (for the east and west towers respectively), with two and three storey townhouse units at their base facing University Crescent. Building entries should be oriented towards the street. The tower forms shall be terraced, particularly at the lower levels, and upper three floors, to add interest and create larger usable outdoor areas for some units. Parcel 16 includes a unique tree preservation area on its east side that should be embraced by the building design. This green space will form a permanent visual buffer between parcel 16 and 17 and will strengthen the association of the building to the forest environment.

Required Elements

Site Area:	7,210 m ²
Maximum Site Coverage:	0.35
Maximum Floor Area Ratio (incl. 10% bonus):	3.0 maximum
Bonusable Floor Area Ratio:	5-10% of the maximum
Estimated Maximum Building Height:	12 storeys / 37 m and 14 storeys / 43m
Estimated Number of Units:	303 units
Minimum Setbacks:	Front yard 5m West side yard 7.5m or the tree covenant boundary, whichever is greater East side yard 7.5m Rear yard 15m or the tree and/or riparian covenant boundary, whichever is greater
Street Relationship:	Ground floor units fronting University Crescent to have direct access from the street. Axis of tower elements to be perpendicular to the tangent of the curvature of the street. Underground parking accessed from University Crescent at the centre of the parcel.
Parking Ramp Location:	none
Public Pathway Right-of-Way:	As per Section 9.0 (Stormwater Requirements)
Stormwater Management:	Provide 1,800m ² as per riparian covenant.
Riparian Covenant Area:	Provide 500m ² as per tree retention covenant.
Tree Retention Area:	
Discretionary Elements	
Building Aesthetic and Character:	12 and 14 storey tower with two to three storey townhouses;
Landscape Character:	Street tree planting along frontages, where appropriate; Reforestation of rear and side yards in character with indigenous forest; Plantings along the western and eastern edges of the site should be of a natural character to enhance the "green finger" along the parcel edges.





UNIVERCITY

Part 2 - Development Requirements

The Development Requirements are part of the UniverCity Slopes and West Highlands and Slopes CD zoning schedule available from the City of Burnaby. The intent is to ensure that the design of individual development parcels is compatible with the overall design concepts for the Slopes and West Highlands Neighbourhoods. In addition to assisting applicants with their Preliminary Permit Application, these Requirements will be used by the SFU Community Trust in the evaluation of each application. These required components must be met in order to successfully fulfill the conditions of development as set out in the CD zoning schedule. There are four required components:

1. Green Building Requirements (and Green Building Bonus)
2. Landscape Requirements
3. Stormwater Management Requirements

All building types are covered by these Requirements, unless otherwise specified within a specific requirement. With the prior approval of SFU CT, proponents may apply for a Comprehensive Development (CD) rezoning of a parcel if they wish to seek adjustments to certain development parameters related to that site, although this is not viewed favourably on most accounts.



UNIVERCITY

Green Building Requirements

The adoption and regulation of more sustainable practices





PRIORITY AREAS:

The strategy relates to six priority areas:

- 1.1. Site Strategies
- 1.2. Water Conservation and Efficiency
- 1.3. Energy and Atmospheric Impacts
- 1.4. Resource Efficient Materials
- 1.5. Waste Reduction
- 1.6. Healthy Buildings, Indoor Air Quality

In addition, there are optional green building features that are available for **density bonus**.

These features are green building elements that are important to SFU Community Trust, but do come with an incremental increase in cost to the developer that should be offset with additional value.



VERIFICATION:

- The applicant shall have an approved green building consultant to fulfill the following obligations:

PPA: submission of “Letter of Intent” outlining strategy for achievement of green building requirements, and **Checklist**.

Building Permit: submission of finalized strategy reflecting design changes/modifications since PPA, and **Revised Checklist** including identified submittals for this phase.

Occupancy Permit: submission of “Letter of Compliance” for all green building requirements and **Final Checklist** including all outstanding submittals.

SFUCT provides the approval at each of these verification stages.



Green Building Requirements

1. Site Strategies



Habitat Preservation/Protection



Permeable Paving on Driving Surfaces



Site Stormwater Management



Permeable/Naturalised Decks/Patios



Green Building Requirements

2. Water Conservation and Efficiency



Dual Flush or Low Flow Toilets



Ultra Low Flow Fixtures



Native and Drought Tolerant Planting



High Efficiency or No Irrigation



Green Buildings

3. Energy and Atmospheric Impacts



MNECB plus 30% or EnerGuide 77



Sealed, Double Glazed, Low E Energy Star



Energy Star Appliances & Washers



Rough-In for Solar Hot Water



Green Buildings

4. Resource Efficient Materials



Rental or Reclaimed Forms



Concrete with 20% Fly-Ash



UF Free Woodwork and Finishes



Fiberglass Batt Insulation; 40%
Recycled



Green Building Requirements

5. Waste Reduction



75% Diversion and Waste Separation



In-Unit Recycling



3 Stream Waste Separation



Future Composting



Green Buildings

6. Healthy Buildings, Indoor Air Quality



Indoor Air Quality Management Plan



Water-Based Finishes for all Finishes



Operable Openings in all Rooms



Low VOC Paints



Green Building Bonus

Green Building Density Bonus Provision

5% - **Enhanced Stormwater Management**



5% - **Enhanced Energy Efficiency**



2.0. GREEN BUILDING DENSITY BONUS con't:

Verification:

- The applicant shall have an approved green building consultant submit design proposal and details to SFUCT prior to PPA Submission.
- SFUCT will review and provide approval of bonus density.
- The fulfillment of bonus provision commitment will be verified by SFUCT at issuance of Occupancy Permit
- Compliance will ensure release of Letter of Credit.
- SFUCT provides approval to the City of Burnaby Planning and Building Department with applicant's PPA submission and prior to Occupancy Permit through formal letter of compliance with supporting proof.



2.0. GREEN BUILDING DENSITY BONUS con't:

2.1. Enhanced Stormwater management: 5% FAR Bonus.

Design and install an enhanced Stormwater management system that utilizes multiple measures of stormwater control systems (greenroofs, interflow zones, detention trenches, cisterns, etc) in order to exceed the minimum UniverCity stormwater requirements for both storage and flow rates by a minimum of 10% as shown through water balance model calculations.

If green roofs are chosen as the sole technology, an increase in density of 1.0sq.ft. will be granted for every 3sq.ft. of green roof installed up to a maximum density increase of no greater than 5%.

Preference will be given to systems that demonstrate stormwater management by managing it in visually attractive systems.

PPA: Provision by proponent of Water Balance model and calculations showing enhanced reduction in storage and flow.

Occupancy Permit: Provision by proponent of construction drawings and documentation showing installation of approved system.



2.0. GREEN BUILDING DENSITY BONUS con't:

2.2. Enhanced energy efficiency: 5% FAR Bonus.

Buildings with a common corridor (typically Part 3 Buildings) shall perform no less than 15% better than the minimum building energy requirement in Section 1.3.1, or a total of 45% better than MNECB for the building type, including the provision of modeling results for verification.

For buildings without a common corridor (typically Part 9 Buildings), the base requirement meet or exceed EnerGuide 80 and/or R2000, including the provision of modeling results for verification.

Ensure that when low temperature hydronic district heating systems are installed, that they shall work within operating temperatures specified by SFUCT, including rough-in and/or stub-outs/ connections for future integration.

PPA: Provision by proponent of energy modeling showing reduction.

Occupancy Permit: Provision by proponent of as-built energy model simulation/test.



**2.0. GREEN BUILDING DENSITY BONUS
- Cost, Value, and Profit**

In order to determine the value of the density bonus, a pricing exercise for each bonusable element was completed and included:

- SOFT COSTS
 - consulting fees
 - building permit fees
 - development management fee
 - insurance
 - financing
- HARD COSTS



**2.0. GREEN BUILDING DENSITY BONUS
- Cost, Value, and Profit**

From this costing, the following were derived:

- cost per buildable square foot for green strategy
- hard and soft combined per buildable square foot
- estimated sales price of representative unit type
- total value created by bonus item
- residual land value (per buildable and % on cost)



**2.0. GREEN BUILDING DENSITY BONUS
- Cost, Value, and Profit**

2.1 ENHANCED STORMWATER MANAGEMENT:

*** assumes 5% bonus achieved of 3660sq.ft.*

*** assumes typical E. Highlands construction standard and site*

*** assumes green roof solution as most expensive solution*

- cost per buildable square foot for green strategy
= \$52.00
- buildable square foot land cost
= \$75.00
- residual land value (per buildable sq.ft.)
= \$23.00
- residual land value (% profit on costs)
= 44%



**2.0. GREEN BUILDING DENSITY BONUS
- Cost, Value, and Profit**

2.2 ENHANCED ENERGY EFFICIENCY (concrete):

*** assumes 5% bonus achieved of 3660sq.ft.*

*** assumes typical E. Highlands construction standard and site*

*** assumes geexchange for domestic H2O and window upgrades*

- cost per buildable square foot for green strategy
= \$48.00
- buildable square foot land cost
= \$75.00
- residual land value (per buildable sq.ft.)
= \$27.00
- residual land value (% profit on costs)
= 56%



**2.0. GREEN BUILDING DENSITY BONUS
- Cost, Value, and Profit**

2.2 ENHANCED ENERGY EFFICIENCY (woodframe):

- ** assumes 5% bonus achieved of 3660sq.ft.
- ** assumes typical E. Highlands construction standard and site
- ** assumes improved envelope tightness and ventilation

- cost per buildable square foot for green strategy
= \$56.00
- buildable square foot land cost
= \$90.00
- residual land value (per buildable sq.ft.)
= \$34.00
- residual land value (% profit on costs)
= 60%



Landscape Requirements

8.0

In keeping with the landscape design intent for UniverCity, landscapes within the UniverCity development shall include a significant proportion of Native Plant Materials in their design. This will support the intent to reflect the indigenous character of the site and to support ecologically responsible development. It is acknowledged that native plants do not fulfill all landscape needs; however, such materials shall be included and used in preference to ornamental species as per these requirements.

A representative list of useful native plant materials is included in the Appendices.

Requirements:

8.1. Top Soil

Native top soils are often poor in organics and on the slopes of Burnaby Mountain the soils can be expected to be principally free draining soils of course texture.

Required Practices

8.1.1 The use of native top soils or free draining soils with low organic content (typically fast draining and more porous) be specified in areas that contain significant percentages (50% or greater) of native plant materials.

Texture	- Sand 75% - Silt/Clay 15% - Organic 10% Matter
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Saturated Hydraulic Conductivity	13.1 mm/hr
Winter Water Storage (% volume)	23% water
Winter Water Storage in 300mm depth of soil	86mm

8.2. Water Management Requirements

Landscape design shall comply with the SFU CT Green Building Requirements Stormwater Management Requirements, and the GVRD Absorbent Landscape Initiative Guidelines.

Required Practices

8.2.1 Wherever possible, water shall be dealt with through on site infiltration or absorption by plant material.

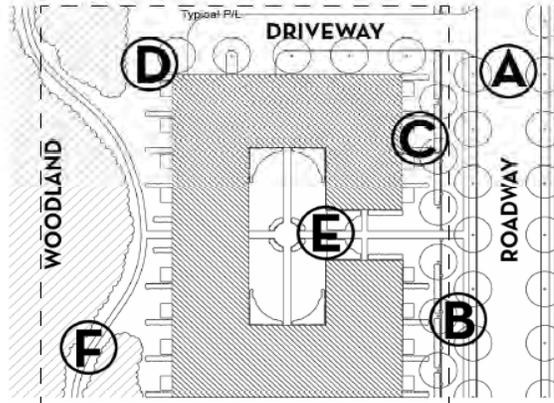
8.2.2 Native wetland plant material shall be specifically selected and used in areas intended for accumulation of run-off water.

8.3. Native Plant Requirements



In order to appropriately balance native and ornamental species within the site property line, required minimum percentages are specified for different situations. All percentages are expressed on the gross number of plants to be installed, not on the relative percentages of species. A schematic site diagram identifies the general application areas with respect to other typical site features. The application areas are generally defined by public visibility, utility, ecological continuity and proximity to woodlands.

For example, a plant list on which 75% of the species names are native but only 40% of the gross number of plants installed are native, would not be acceptable. A plant list on which 40% of the species names are native but 75% of the gross number of plants are native would be acceptable.



Appendix C - Native Species Reference Table



Botanical Name	Common Name	Height Width	Sun Shade	Description
DECIDUOUS TREES				
1 <i>Acer circinatum</i>	Vine Maple	8.0 m 3.0 m	Sun Shade	Prefers moist areas with drainage; shade tolerant; low to mid elevations; excellent autumn colour; understory tree in coniferous forests; predominantly south coastal British Columbia
1 <i>Betula papyrifera</i>	Paper Birch	25.0 m 4.0 m	Sun	Prefers moist to wet sites; valleys and low mountain slopes; ornamental peeling white bark; south-western British Columbia.
1 <i>Cornus nuttallii</i>	Pacific Flowering Dogwood	12.0 m 8.0 m	Sun Partial Shade	Prefers moist soil conditions; showy flowers; coastal southern British Columbia to California.
1 <i>Crataegus douglasii</i>	Black Hawthorn	9.0 m 3.0 m	Sun	Prefers moist sites; showy white flowers and black fruit; British Columbia to California.
1 <i>Oemleria cerasiformis</i>	Indian Plum	4.0 m 3.0 m	Sun Shade	Grows in dry to moist sites, open areas; pendant white flowers in early spring; British Columbia to California.
1 <i>Sorbus sitchensis</i>	Sitka Ash	7.5 m 3.0 m	Sun	Prefers moist soils; red/orange fruit in the autumn; common from Alaska to California
CONIFERS				
2 <i>Abies grandis</i>	Grand Fir	5.5 m 5.0 m	Sun to Shade	Moist soils in valleys or mountain slopes; BC and California.
2 <i>Pinus contorta contorta</i>	Shore pine	8.0 m 3.0 m	Sun	Grows in dry to moist soils from British Columbia to California. Tolerant of poor, sandy soils.
2 <i>Pseudotsuga menziesii</i>	Douglas Fir	100.0 m 10.0 m	Sun	One of the most common forest trees in the Pacific Northwest. Prefers moist, acidic soils. Ranges from Southern British Columbia Arizona to California and east to Montana.
2 <i>Thuja plicata</i>	Western Red Cedar	50.0 m 5.0 m	Sun	Moist to wet sites; low to mid elevations; common west of Cascades and Interior cedar/hemlock ecosystem
2 <i>Tsuga heterophylla</i>	Western Hemlock	80.0 m 5.0 m	Sun	One of the most common forest trees in the Pacific Northwest. Prefers moist, acid soils. Ranges from Alaska to California.
SHRUBS				
3 <i>Amelanchier alnifolia</i>	Saskatoon Serviceberry	3.0 m 2.0 m	Sun	Ranges from dry to moist sites; prefers well drained soils and open areas; showy white flowers and good autumn colour; low to mid elevations
3 <i>Cornus sericea</i>	Red-osier Dogwood	3.0 m 2.0 m	Sun Shade	Prefers moist soils, stream banks; ornamental bark exposed in winter; throughout western North America



UNIVERCITY

Stormwater Management Guidelines 9.0



On-Site Storm Water Management

This chapter describes the required performance criteria and design procedure for on-site storm water management, as defined in the Burnaby Mountain Watercourse and Storm water Management Report. On-site measures for storm water are to be distinguished from community, or off-site facilities. Off-site storm water facilities are infiltration, storage and drainage systems designed to serve more than one property. They are constrSFU CTed as part of the subdivision servicing and provide approximately 2/3 of the storage requirements of the development. On-site measures include storm water systems that serve an individual development site. They will be designed by the developer in the process of meeting conditions for a PPA with the City of Burnaby. It shall be noted that On-site storm water management requirements are in addition to the detention pond capacity constructed as part of the subdivision services.

The on-site facilities designed by the developer are planned to integrate with the community facilities. They will limit the frequency and magnitude of storm flows, as well as improve water quality within the community and downstream.



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