Climate Resilient Landscaping Standards

Prepared by LEES+Associates on behalf of the City of Port Moody.

PORT MOODY
CITY OF THE ARTS

Climate Resilient Landscaping Standards

Introduction

The development of *Climate Resilient Landscaping Standards for Public Lands* was identified as a short term priority in the City of Port Moody's *Climate Action Plan (2020)*. The City recognizes that strengthening and restoring its natural environments, and the right selection, installation and maintenance of plant material on city owned lands is necessary to ensure that the City of Port Moody is resilient to changing climatic conditions.

As stated in the Plan:

> *"Species and ecosystems are both impacted by climate change and can provide a buffer against certain impacts. Impacts include changes to species ranges, loss of appropriate habitat due to temperature and precipitation pattern changes and direct impacts from drought and storms. The natural environment can also help reduce the severity of impacts on our communities by providing services such as shade during hot summers, infiltration of rainfall and protection against erosion. A multitude of co-benefits are provided by the natural environment ranging from physical and mental health benefits, to cleaner air and the sequestration of carbon."*

The guidance provided in these standards is based on best practices and a review of regionally appropriate literature on increasing climate resiliency through horticultural practices. The standards are intended to maximize a multitude of benefits such as stormwater management, soil stabilization, urban heat island mitigation, habitat enhancement and aesthetic quality.

To help Port Moody move towards greater resiliency to the impacts of climate change, these standards include guidance on:

- Both climate mitigation and adaptation strategies related to horticultural practices;
- Plant selections that can tolerate a range of climatic conditions (drought and wet conditions; wildfire considerations);
- Enhancing and supporting biodiversity through planting and maintenance;
- Guidance on how to create a sense of place through planting design;
- Soil considerations that support long-term health and potentially act as carbon sinks;
- Maintenance practices that consider sustainability best practices (e.g. reducing watering and other maintenance requirements, reducing carbon contributions, etc.).

The Standards are intended to supplement the City's *Landscaping Standards and Specifications (2020)* and *Naturescape Policy (2019),* and all landscaping on City lands must adhere to other City bylaws, policies, and requirements, and must meet the Canadian Landscape Standards (CLS).

The *Climate Resilient Landscaping Standards* take an adaptive management approach to addressing climate resiliency through planting and maintenance, and as such, they should be revised periodically to reflect the most up to date best practices.

Precedent:

Grey to Green Project, Sheffield City. Photo: Nigel Dunnet[4]

Culturally Significant Plants:

Port Moody resides on the unceded territories of Coast Salish Nations - including q̓i̓c̓əy̓ (Katzie), kʷikʷəƛ̓əm (Kwikwetlem First Nation), xʷməθkʷəy̓əm (Musqueam), sḵwx̱wú7mesh (Squamish), S'ólh Téméxw (Stó:lō), and əlilwətaɬ (Tsleil-Waututh). As the original stewards of the coast, much of the region's native ecology has cultural significance to local Indigenous communities. Engaging in discussions with local First Nations on incorporating culturally significant plants and land management practices into City landscapes is an important step towards reconciliation.

Climate Resilient Landscaping Standards

General Guidance

Climate Adaptation/ Mitigation Strategies:

- Adjust planting and maintenance schedules to reflect changing climatic conditions and plan for extreme weather.
- Increase overall biomass to maximize carbon sequestration. To increase biomass, plant larger plants, and select long-lived and low maintenance plant species.[5]
- Enhancing biodiversity on landscapes on City lands will result in a more climate resilient City. For example, identify local wildlife species and include their habitat requirements in new planting areas.
- Incorporate more nitrogen fixing plants, such as legumes, into the landscape. Nitrogen fixing plants sequester carbon and improve overall soil health.[5]
- Layer and cluster plants, rather than planting individually, to create microclimates and allow for resource sharing between plant species.[5]
- Conserve existing natural areas and mature vegetation where possible.
- Where appropriate (such as in parks and natural areas), mimic natural ecosystem processes and allow natural plant succession to take place. More dominant species may need to be managed or limited to naturalized areas that don't require maintenance.
- Maximize stormwater retention by reducing the amount of impermeable surfaces where possible. Reduce reliance on irrigation and refer to Metro Vancouver's watering restriction guidelines for appropriate watering times.
- Use existing native soil where possible, especially for meadow plantings that require low-nutrient soil. Amend soil as needed according to a soil test. Protect existing soil from compaction.[5]
- Use mulch cover for moisture retention and to provide habitat for invertebrates.

Planting Considerations:

- Select drought-tolerant plants where possible.
- Avoid planting bear attractants in areas identified as higher risk for human-bear conflict.
- Choose pollinator friendly plant species where possible.
- Diversify planting to maximize flowering periods and habitat types.[3]
- Convert irrigated lawn areas to a more biodiverse landscape by incorporating trees, shrubs, and forbs.[3]
- Add vertical structure (e.g. ground, shrub, and tree layers) to increase biodiversity and habitat.
- Enhance a sense of place through planting design by layering plants, using evergreen species to provide winter interest and using native species where appropriate. Integrate elements like benches, local art and local stone to encourage visitors to stop and stay.

Planting for pollinators:

- Include a mix of early, mid, and late flowering plants to ensure a continuous pollen source.[3]
- Flowers should be diverse in shape, colour, and size; clusters of flowers are preferred.[3]
- Incorporate habitat diversity by leaving areas of exposed soil, brush piles, leaf litter and pithy plant stems for ground nesting bees and other species.[3]

FireSmart Considerations:

- Selectively thin and lift prune (at least 5m from the ground) forested areas in parks that interface with natural areas.[1]
- Remove accumulations of ground fuels, such as dry leaves and brush piles, in City landscapes that are adjacent to buildings.[1]
- Plant fire resistant species.
- Incorporate rock and mulch as "firebreaks" in planted areas. [1]

Maintenance Considerations:

- Design low maintenance planting plans that incorporate resilient, non-invasive, native, and non-native species to achieve climate resiliency.
- Control invasive plant and pest species through regular maintenance.
- Climate resilient landscapes may appear messy to audiences that are accustomed to highly manicured landscapes. Managing public perception through education and communication is important. On-site signage, informational websites, walking tours, and visual cues such as fencing are a few ways to communicate the importance of climate resilient landscapes.
- Use of pesticide products for cosmetic purposes is not permitted under the City's Pesticide Use Control Bylaw (No.2575). Exceptions, such as the control or eradication of Noxious Weeds, is outlined in section 4 of the Bylaw.
- Minimize mowing and avoid mowing at important times of the year for pollinators. Waiting until the end of August to mow allows most wildflowers time to seed.[3]
- Consider allowing some "good" weeds such as dandelions and nettles, in appropriate areas. Dandelions provide an important early source of pollen and nectar for pollinators, and nettles are a host plant for butterflies.

High Traffic Areas:

- Open tree pits may need edge treatments in high pedestrian walking traffic areas to prevent soil compaction.[7]
- Grates or surface treatments may be needed to cover soil surface in high volume pedestrian areas and to ensure permeability is maintained.
- Create a gravel or mulch buffer between the sidewalk and planting to allow for high traffic. Add pavers, gravel or mulch pathways where "desire lines" have been created by pedestrians.

Climate Resilient Landscaping Standards

Parks and Horticultural Beds

Climate Adaptation/ Mitigation Strategies:

- Planting trees, shrubs, and forbs in horticultural beds that are suited to the current and future climate in the City of Port Moody and will provide cooling, reduce and clean stormwater runoff, prevent erosion and sequester carbon. [8]
- Moderately dense groups of tree and shrub plantings can buffer wind and air pollution, provide shade, and function in the management of stormwater, water quality and slope stabilization **(A)**.[8]
- Consider integrating bioponds (constructed ponds that use plants to filter excess nutrients (e.g., nitrogen and phosphorus from stormwater) in parks **(B)**.[8]
- Minimize irrigated and lawn areas in parks. Integrate trees and shrubs into existing lawn areas and convert lawns to a more naturalized landscape where possible **(C).**

Maintenance Considerations:

- Retain some leaf litter as over-wintering habitat for insects and avoid cutting back floral beds and other landscaped areas until spring (tall plants can provide winter cover habitat for pollinators and forage for birds)**(D).**
- Following firesmart principles, retain existing logs and snags in parks for wildlife trees **(D)**.[1]
- Avoid significant compaction of soils to promote rainwater infiltration into the ground **(E)**.[3]

Planting Considerations:

- Consider existing and future climate conditions when selecting plants. Include site appropriate, low maintenance, drought-tolerant plants that are long lasting.[8]
- Prioritize maximizing tree canopy when selecting park trees (large to medium trees) to provide shade and habitat value **(F)**.[3]
- Integrate native and non-native plants that attract pollinators, birds, and small mammals. Note that some ornamentals have the potential to be invasive. Avoid plants that are considered invasive or have the potential to become invasive in the Pacific North West and similar climates.
- Establish heterogeneous plant communities and introduce vertical structure (trees and medium and low growing shrubs and forbs).[3]
- Include a mix of early, mid, and late flowering plants to ensure a continuous pollen source **(G)**.[3]
- For bio-retention areas in parks (bioswales, raingardens, ponds) select plants suited to the specific site conditions and anticipated hydrologic regime. Water levels may fluctuate significantly depending on rainfall and the drainage area **(H)**.[3]

Climate Resilient Landscaping Standards

Example Plant Palette

Horticultural Bed in Park (Pollinator Focus - Sun)

Plant Name	Height	Spread	S/PS/SH	Flowering	Status	Climate Resiliency	Wildlife Value
California Bayberry *Morella californica* (Mc)	3-3.7 meters	3-3.7 meters	○ ◐	Spring	Ornamental	Drought, moisture, low nutrient, sun and shade tolerant	Provides winter food for birds
Terracotta Yarrow *Achillea millefolium 'Terracotta'* (am)	0.6-0.9 meters	0.3-0.6 meters	○ ◐	Summer	Ornamental	Drought tolerant and thrives in disturbed soil	Attracts pollinators
Nodding Onion *Allium cernuum* (*)	0.3-0.6 meters	0.1 meter	○ ◐	Early Summer	Native	Drought Tolerant	Attracts pollinators
Showy Milkweed *Asclepias speciosa* (as)	0.6-1.2 meters	0.3-0.6 meters	○	Mid Summer	Native	Drought Tolerant	Important host plant for butterflies Plant where ever appropriate
Globe Thistle *Echinops sp.* (es)	0.9-1.2 meters	0.3-0.6 meters	○ ◐	Late Summer	Ornamental	Drought Tolerant	Attracts pollinators
Nootka Rose *Rosa nutkana* (Rn)	1.5-1.8 meters	0.9-1.2 meters	○ ◐	Late Spring	Native	Drought and seasonal flooding tolerant, erosion control	Important food source and shelter for pollinators, birds and small mammals


California Bayberry


Terracotta Yarrow


Nodding Onion


Showy Milkweed


Globe Thistle


Nootka Rose

Climate Resilient Landscaping Standards

Example Plant Palette

Horticultural Bed in Park (Native Focus - Shade)

Plant Name	Height	Spread	S/PS/SH	Flowering	Status	Climate Resiliency	Wildlife Value
Wild Ginger *Asarum caudatum* (a)	0.15-0.2 meters	0.3-0.6 meters	●	Spring	Native	Winter moisture tolerant	Attracts pollinators
Low Oregon grape *Mahonia Nervosa* (Mn)	0.3-0.6 meters	0.9-1.2 meters	◐ ●	Spring	Native/ evergreen	Shade, cold and drought tolerant	Attracts birds and pollinators
Goatsbeard *Aruncus dioicus var. acuminatus* (ad)	1-2 meters	0.6-1.2 meters	◐ ●	Spring/ Summer	Native	Shade and moisture tolerant	Attracts pollinators, host plant for butterflies
Leopard Plant *Ligularia 'Bottle Rocket'* (lb)	0.6-0.9 meters	0.6-0.9 meters	○ ◐ ●	Summer	Ornamental	Shade and moisture tolerant	Attracts butterflies
Sweet Box *Sarcococca ruscifolia* (Sr)	0.9-1.8 meters	0.9-1.8 meters	◐ ●	Winter	Ornamental/ evergreen	Shade and drought tolerant	Attracts birds
Deer Fern *Blechnum spicant* (bs)	0.5 - 2.5 meters	0.3-0.9 meters	◐ ●	N/A	Native/ evergreen	Adaptable to moist or dry conditions	Attracts birds, hummingbird, and pollinators
Big Leaf Maple *Acer macrophyllum* (AM)	10-30 meters	10-30 meters	○ ◐	Spring	Native/ evergreen	Moisture and drought tolerant, Cooling effect	Important food source for birds & small mammals


Wild Ginger


Leopard Plant


Low Oregon grape


Goatsbeard


Sweet Box

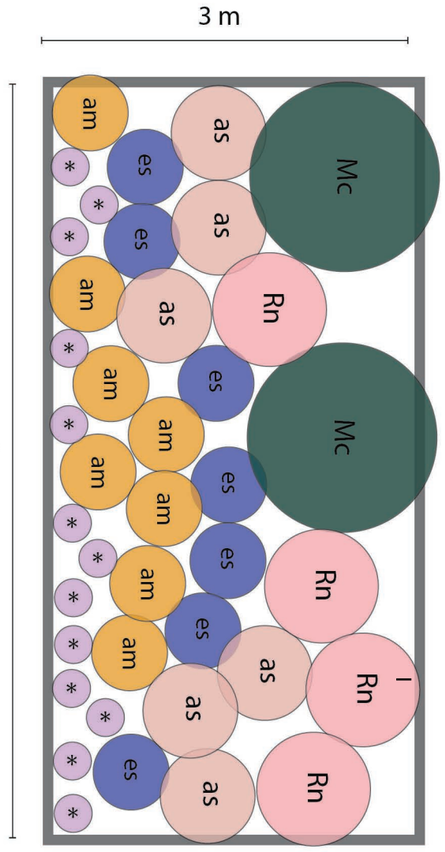

Deer Fern


Big Leaf Maple

Climate Resilient Landscaping Standards

Example Planting Plans

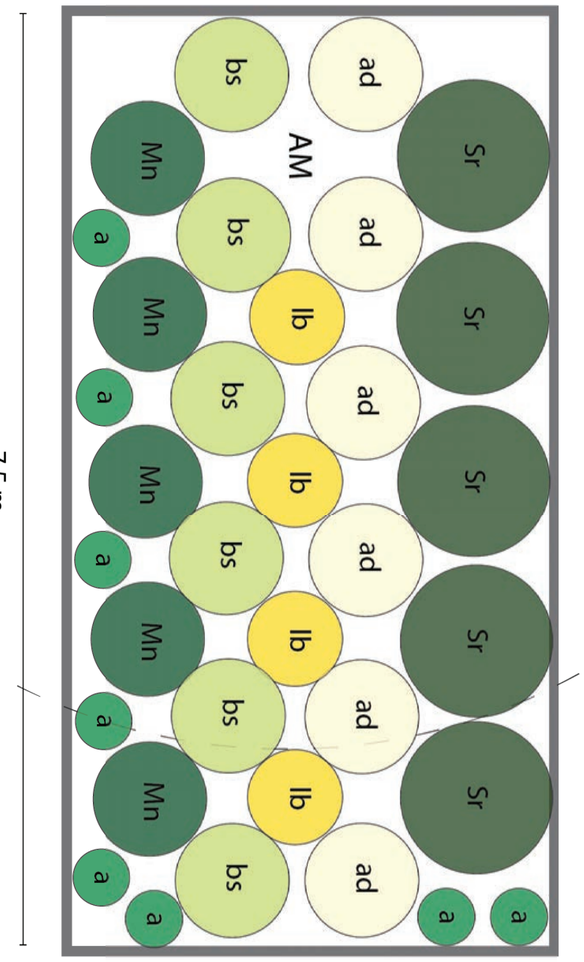
Horticultural Bed in Park (Sun)



Symbol Legend:

Plant Name
California Bayberry *Morella californica* (Mc)
Terracotta Yarrow *Achillea millefolium 'Terracotta'* (am)
Nodding Onion *Allium cernuum* (*)
Showy Milkweed *Asclepias speciosa* (as)
Globe Thistle *Echinops sp.* (es)

Horticultural Bed in Park (Native Focus - Shade)



Symbol Legend:

Plant Name
Wild Ginger *Asarum caudatum* (a)
Low Oregon grape *Mahonia Nervosa* (Mn)
Goatsbeard *Aruncus dioicus var. acuminatus* (ad)
Leopard Plant *Ligularia 'Bottle Rocket'* (lb)
Sweet Box *Sarcococca ruscifolia* (Sr)
Deer Fern *Blechnum spicant* (bs)
Big Leaf Maple *Acer macrophyllum* (AM)

Climate Resilient Landscaping Standards

Plant Lists

Parks and Horticultural Beds in Parks

BOTANICAL NAME	COMMON NAME	SUN/ SHADE	SOIL MOISTURE
TREES			
Acer campestre	Field Maple	○◐	☀ 💧
Acer griseum	Paperbark Maple	○◐	☀ 💧
Carpinus betulus	Hornbeam	○◐	💧
Cercis canadensis	American Redbud	○◐	☀ 💧
Gleditsia triacanthos	Honey Locust	○	☀
Nyssa sinensis	Tupelo	○◐	☀ 💧
Pinus nigra	Austrian Pine	○	☀
*Pseudotsuga menziesii**	Douglas Fir	○	☀ 💧
Quercus coccinea	Scarlet Oak	○	☀ 💧
Quercus macrocarpa	Bur Oak	○◐	☀ 💧
Tilia cordata 'Halka'	Little-leafed Linden	○◐	☀ 💧
Ulmus americana	American Elm	○◐	☀ 💧
SHRUBS			
*Holodiscus discolor**	Oceanspray	○◐	☀ 💧
Lonicera nitida	Box Honeysuckle	○◐	☀ 💧
*Mahonia aquifolium**	Tall Oregon Grape	◐●	☀ 💧
*Mahonia nervosa**	Low Oregon Grape	○●	☀ 💧
*Philadelphus lewisii**	Mock Orange	○◐	☀ 💧
*Physocarpus capitatus**	Pacific Ninebark	○◐	💧
*Rosa gymnocarpa **	Baldhip Rose	○◐	☀ 💧
*Rosa nutkana**	Nootka Rose	○◐	☀ 💧
*Symphoricarpos albus**	Snowberry	○◐	☀ 💧

BOTANICAL NAME	COMMON NAME	SUN/ SHADE	SOIL MOISTURE
GROUND COVERS AND PERENNIALS			
*Achillea millefolium**	Yarrow	○◐	☀ 💧
*Allium cernuum**	Nodding Onion	○◐	☀ 💧
Baptisia australis	False Indigo	○	☀ 💧
Geranium macorrhizum 'Bevan's Variety'	Bevan's Variety Big Root Geranium	○◐	☀ 💧
Echinacea purpurea	Coneflower	○	☀
Echinops sp.	Globe Thistle	○	☀
Eryngium sp.	Sea Holly	○	☀
Lavandula angustifolia	English Lavender	○	☀
*Linum lewisii**	Prairie Flax	○	☀
*Polystichum munitum**	Sword Fern	◐●	☀ 💧
Rosmarinus officinalis	Rosemary	○	☀
Sedum sp.	Sedum species	○	☀
GRASSES			
Calamagrostis 'Karl Foerster'	Karl Foerster Fountain Grass	○◐	☀ 💧
*Deschampsia cespitosa**	Tufted Hair Grass	○◐	☀ 💧
*Festuca idahoensis**	Idaho Fescue	○	☀ 💧
Helictotrochon sempervirens	Blue Oat Grass	○	☀ 💧
Sesleria autumnalis	Autumn Moor Grass	○◐	☀ 💧
Sporobulus heterolepis	Prarie Dropseed	○	☀ 💧

Legend: ○ (Full sun) ◐ (Part shade) ● (Shade) ☀ (Dry Soils) 💧 (Moist Soils) (Moisture Tolerant) * (Native to PNW)

Note: When selecting plant species, consider trade-offs such as drought tolerance vs. benefits for pollinators or habitat value

Climate Resilient Landscaping Standards

Streetscapes

Climate Adaptation/ Mitigation Strategies:

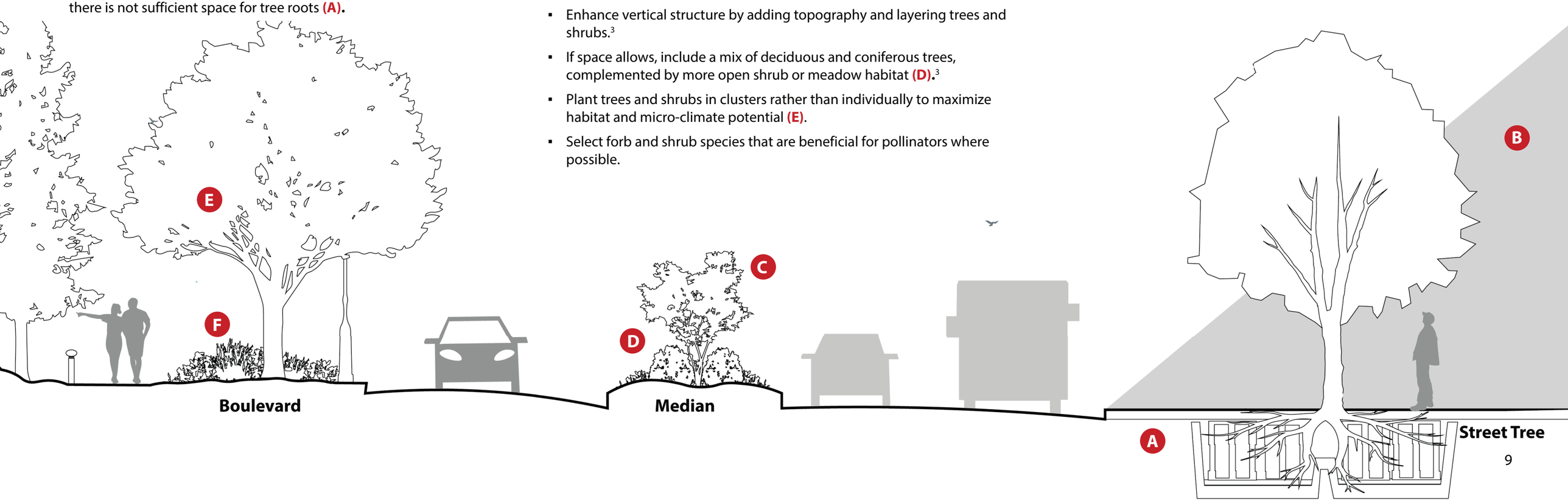
- Planting street trees that are suited to the current and future climate in the City of Port Moody will provide cooling, reduce and clean stormwater runoff, prevent erosion and sequester carbon. [9]
- Streetscapes have the potential to act as green corridors that connect larger green spaces across the city and allow wildlife to move more readily through the City.[3]
- Care should always be taken to select plant species that are resilient to road conditions, foot traffic, and changing climatic conditions (e.g. increased winter flooding and summer drought).[3]
- Consider the use of soil cells or structural soil to increase soil volume when there is not sufficient space for tree roots **(A).**

Planting Considerations:

- Plantings along streets are subject to harsh conditions including extreme temperatures, air pollution, road salt and low soil volumes. Select plant species with moderate to high drought and salt tolerance.[10]
- Where tall buildings shade the road for most of the day, select shade tolerant tree species **(B).** [10]
- Where visibility and site lines may be a concern within the boulevard and median areas, height of mature shrubs must not exceed 0.6 m and trees must be limbed so that there is a 3.0 m clearance from the grade. Additionally, planting within a 1.0 m setback from the face of curb must provide clear sightlines between 0.6 m and 1.5 m in height **(C).**
- Enhance vertical structure by adding topography and layering trees and shrubs.[3]
- If space allows, include a mix of deciduous and coniferous trees, complemented by more open shrub or meadow habitat **(D).**[3]
- Plant trees and shrubs in clusters rather than individually to maximize habitat and micro-climate potential **(E)**.
- Select forb and shrub species that are beneficial for pollinators where possible.

Maintenance Considerations:

- Prioritize site appropriate, low maintenance and hardy plants (e.g. tolerant to drought, salt, flood) that are adaptable to future climate conditions.[3]
- Retain some leaf litter as over-wintering habitat for insects and avoid cutting back floral beds and other landscaped areas until spring (tall plants can provide winter cover habitat for pollinators and forage for birds).[3]
- Wildflower mixes can be a cost effective treatment for large, hard to plant areas. Good initial site prep, mulching and weeding is key for long term success. Wildflower mixes native to the Pacific Northwest should be used. Revisit every two years and evaluate whether reseeding is needed **(F)**.

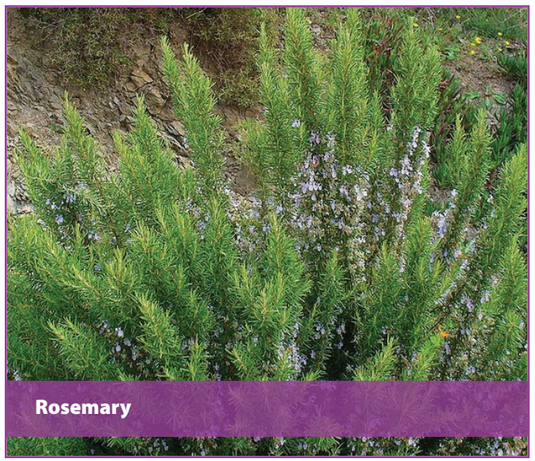


Climate Resilient Landscaping Standards

Example Plant Palette

Narrow Median (1.5m or Less - Full Sun)

Plant Name	Height	Spread	S/PS/ SH	Flowering	Status	Climate Resiliency	Wildlife Value
Rosemary *Rosmarinus officinalis* (Ro)	0.6-1.2 meters	0.6-1.5 meters	○	Early-Mid Spring	Ornamental	Drought Tolerant	Attracts pollinators
Pacific North West Wild flower seed mix (wm)	Varies	Varies	○	Early-Late Summer	Native	Drought Tolerant	Attracts pollinators
Autumn Moor Grass *Seseleria autumnalis* (sa)	0.2-0.6 meters	0.2-0.6 meters	○ ◐	Late Summer	Ornamental/Evergreen	Drought and Alkaline Tolerant	High value for pollinators
'Magnus' Coneflower *Echinacea purpurea 'Magnus'* (ep)	0.6-0.9 meters	0.3-0.6 meters	○ ◐	Summer	Ornamental	Drought Tolerant	Winter food for birds; attracts pollinators



Rosemary

Pacific North West

Autumn Moor Grass

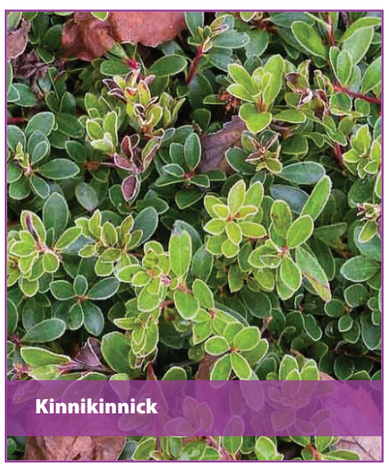
'Magnus' Coneflower

Climate Resilient Landscaping Standards

Example Plant Palette

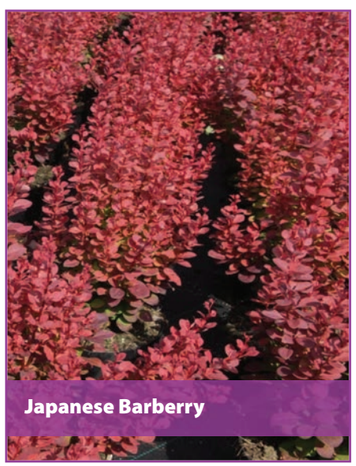
Traffic Circle (Full Sun)

Plant Name	Height	Spread	S/PS/SH	Flowering	Status	Climate Resiliency	Wildlife Value
Kinnikinnick *Arctostaphylos uva-ursi* (a)	0.15-0.3 meters	0.9-1.5 meters	○	Spring	Native/Evergreen	Erosion control and drought tolerant.	Attracts butterflies and birds.
Silver Grass *Miscanthus sinensis 'Sarabande'* (ms)	1-2 meters	0.9 meters	○ ◐	Fall	Ornamental/Winter Interest	Drought tolerant	Attracts birds.
Japanese Barberry Various Cultivars *Berberis thunbergii* (Bt)	Up to 2 meters	1-1.5 meters	○ ◐	Summer	Ornamental	Drought tolerant	Provides bird shelter.
Dwarf Strawberry Tree *Arbutus unedo 'Compacta'* (AU)	1.8 - 3 meters	2 meters	○ ◐	Spring	Ornamental/Evergreen	Drought tolerant	Provides food, shelter and nesting sites for a variety of wildlife. Host plant for several butterfly species.
False Indigo *Baptisia australis* (ba)	0.9-1.2 meters	0.9-1.2 meters	○	Spring	Ornamental	Drought tolerant	Attracts pollinators.


Kinnikinnick


Silver Grass


False Indigo

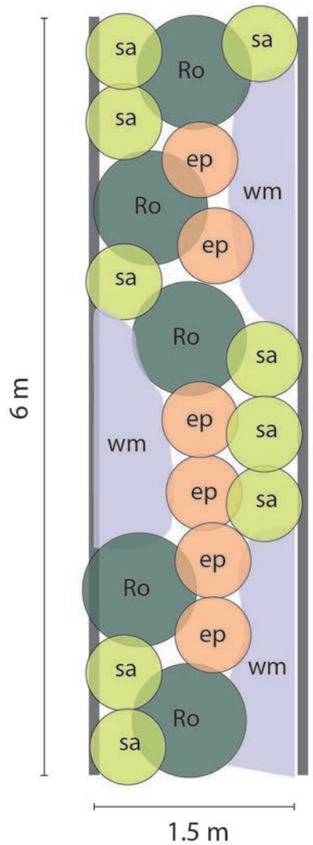

Japanese Barberry


Dwarf Strawberry Tree

Climate Resilient Landscaping Standards

Example Planting Plans

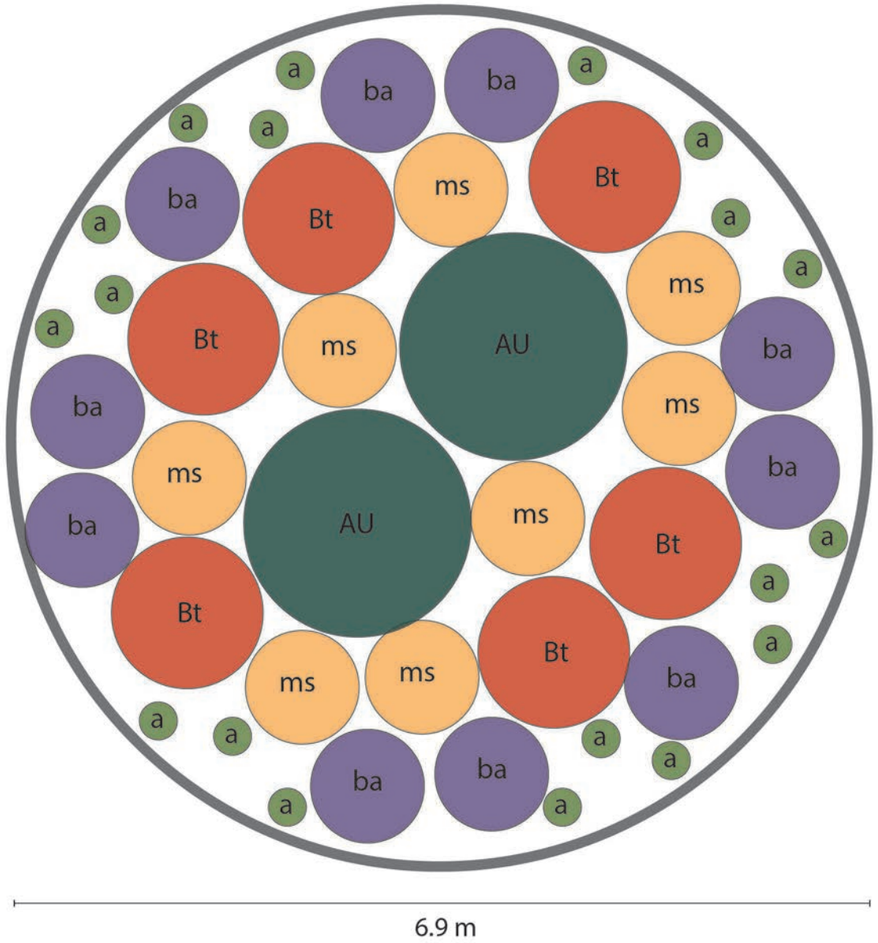
Narrow Median (Full Sun)



Symbol Legend:

Plant Name
Rosemary *Rosmarinus officinalis* (Ro)
Pacific North West Wild flower seed mix (wm)
Autumn Moor Grass *Seseleria autumnalis* (sa)
'Magnus' Coneflower *Echinacea purpurea 'Magnus'* (ep)

Traffic Circle (Full Sun)



Symbol Legend:

Plant Name
Kinnikinnick *Arctostaphylos uva-ursi* (a)
Silver Grass *Miscanthus sinensis 'Sarabande'* (ms)
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Dwarf Strawberry Tree *Arbutus unedo 'Compacta'* (AU)
False Indigo *Baptisia australis* (ba)

Climate Resilient Landscaping Standards

Plant Lists

Streetscapes

BOTANICAL NAME	COMMON NAME	SUN/ SHADE	SOIL MOISTURE
TREES			
Acer campestre	Field Maple	○◐	☀ 💧
Acer griseum	Paperbark Maple	○◐	☀ 💧
Carpinus betulus	Hornbeam	○◐	💧
Cercis canadensis	American Redbud	○◐	☀ 💧
Gleditsia triacanthos	Honey Locust	○	☀
Nyssa sinensis	Tupelo	○◐	☀ 💧
Pinus nigra	Austrian Pine	○	☀
*Pseudotsuga menziesii**	Douglas Fir	○	☀ 💧
Quercus coccinea	Scarlet Oak	○	☀ 💧
Quercus macrocarpa	Bur Oak	○◐	☀ 💧
Tilia cordata 'Halka'	Little-leafed Linden	○◐	☀ 💧
Ulmus americana	American Elm	○◐	☀ 💧
SHRUBS			
Lonicera nitida	Box Honeysuckle	○◐	☀ 💧
*Mahonia aquifolium**	Tall Oregon Grape	◐●	☀ 💧
*Mahonia nervosa**	Low Oregon Grape	○●	☀
*Physocarpus capitatus**	Pacific Ninebark	○◐	💧
*Rosa gymnocarpa **	Baldhip Rose	○◐	☀ 💧
*Rosa nutkana**	Nootka Rose	○◐	☀ 💧
*Symphoricarpos albus**	Snowberry	○◐	☀ 💧

BOTANICAL NAME	COMMON NAME	SUN/ SHADE	SOIL MOISTURE
GROUND COVERS AND PERENNIALS			
*Achillea millefolium**	Yarrow	○◐	☀ 💧
*Allium cernuum**	Nodding Onion	○◐	☀ 💧
Baptisia australis	False Indigo	○	☀ 💧
Geranium macorrhizum	Bevan's Variety' Big Root Geranium	○◐	☀ 💧
Echinacea purpurea	Coneflower	○	☀
Echinops sp.	Globe Thistle	○	☀
Eryngium sp.	Sea Holly	○	☀
Lavandula angustifolia	English Lavender	○	☀
*Linum lewisii**	Prairie Flax	○	☀
*Polystichum munitum**	Sword Fern	◐●	☀ 💧
Rosmarinus officinalis	Rosemary	○	☀
Sedum sp.	Sedum species	○	☀
GRASSES			
Calamagrostis 'Karl Foerster'	Karl Foerster Fountain Grass	○◐	☀ 💧
*Deschampsia cespitosa**	Tufted Hair Grass	○◐	☀ 💧
*Festuca idahoensis**	Idaho Fescue	○	☀ 💧
Helictotrochon sempervirens	Blue Oat Grass	○	☀ 💧
Sesleria autumnalis	Autumn Moor Grass	○◐	☀ 💧
Sporobulus heterolepis	Prarie Dropseed	○	☀ 💧

Precedent:

Fairford Parkette, Toronto[4]

Legend: ○ (Full sun) ◐ (Part shade) ● (Shade) ☀ (Dry Soils) 💧 (Moist Soils) (Moisture Tolerant) * (Native to PNW)

Note: When selecting plant species, consider trade-offs such as drought tolerance vs. benefits for pollinators or habitat value

Climate Resilient Landscaping Standards

Rain Gardens

Climate Adaptation/ Mitigation Strategies:

- Rain gardens have gently sloped channel profiles and typically include native and non-native plants, soil, and a porous substrate to capture, store, treat, and discharge/convey stormwater. Rain gardens can also help to recharge groundwater.[3]

Planting Considerations:

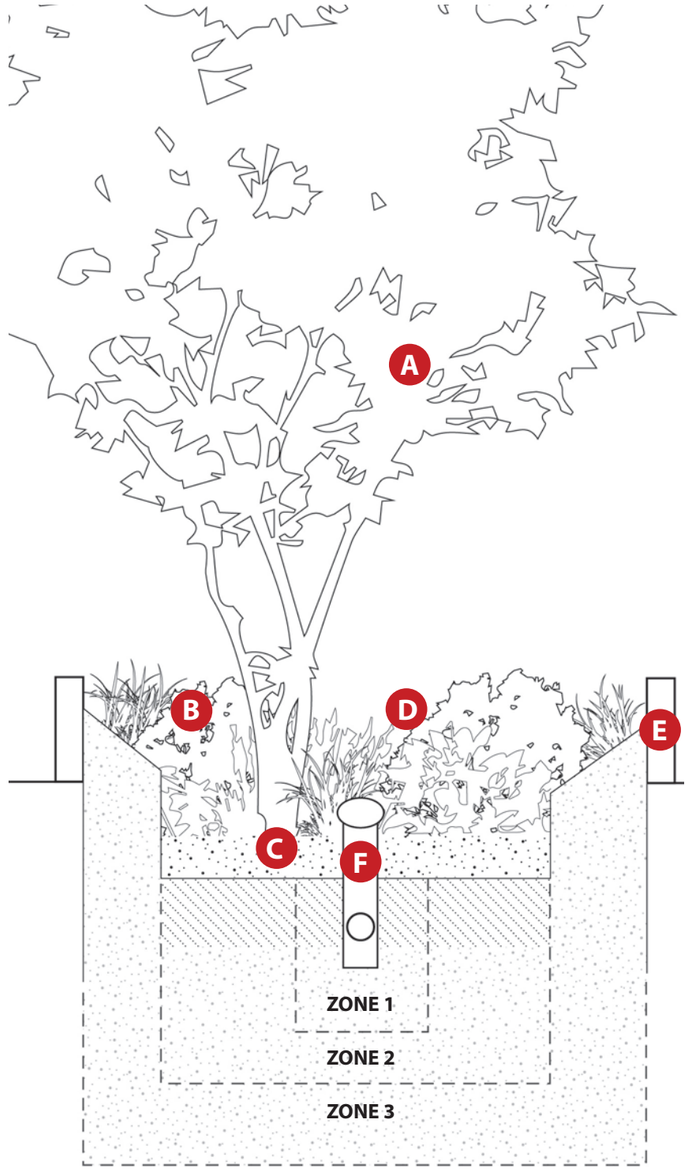
- Select plants that are suited to a range of moisture regimes and fluctuating water levels. Plants at the top of garden should be suited to dryer, sunnier conditions (Zone 3), and plants at bottom of garden suited to more shaded, saturated conditions (Zone 1).[3]
- Integrate trees into rain garden design. Trees should be selected based on transpiration rate (high), size at maturity, and health and condition (able to withstand road pollution) **(A)**.[4]
- Select species that are suited to smaller spaces and are unlikely to spread rapidly.[2]
- Select deep rooted shrubs, forbs, and grasses. Plant densely to build soil structure and allow water infiltration **(B)**.[3]
- Consider using engineered soil. Engineered soil provides a growing medium for plant material and filters out pollutants as the runoff flows through the layer**(C)**. [2]
- Avoid placement on steep and/or unstable slopes due to potential for erosion. Terracing can be implemented to address slope concerns.[3]

Maintenance Considerations:

- Refer to *Metro Vancouver Stormwater Source Control Guidelines* and work with the City's Engineering Department for specific engineering requirements.
- General garden maintenance is required, with more weeding and watering in the first couple of years until plants establish. [3]
- Provide vertical layering and consider dense vegetation as living green mulch for soil stabilization, weed suppression, moisture retention, and increased infiltration rates **(D)**. [3]
- Minimize the use of machinery (i.e hedge trimmers) and opt for hand pruning to reduce disturbances to soil. Consider using bark mulch to suppress weeds and minimize maintenance requirements.
- Create a defined edge (timber, steel, concrete) where planting and sod meet to avoid intrusion of grass and other weed species **(E)**.[6]
- Provide an overflow to the grey drainage infrastructure system to provide relief during larger storm events **(F)**.[6]

Monitoring and Long- Term Maintenance:

- Monitor the rain garden periodically to ensure that the water is infiltrating sufficiently.[3]
- At least twice a year, check around the inlet and overflow areas for debris build-up such as leaves, sticks, and other items. Keep these areas clear to help the garden absorb rain water.[2]
- Maintain a healthy cover of plants, and replace any dead plants to fill in gaps in planting.[2]



Climate Resilient Landscaping Standards

Example Plant Palette

Rain Garden (Sun-Part Shade)

Plant Name	Zone	Height	Spread	S/PS/SH	Flowering	Status	Climate Resiliency	Wildlife Value
Blue Beard *Caryopteris x clandonensis* (cc)	3	0.5-0.9 meters	0.5-0.9 meters	○ ◐	Late summer	Ornamental	Drought tolerant	Attracts pollinators
Douglas Iris *Iris douglasiana* (id)	3	0.3-0.9 meters	0.6-1.2 meters	○ ◐	Early Spring	Native/ semi-evergreen	High salt tolerance	Attracts pollinators
Tufted Hairgrass *Deschampsia cespitosa* (dc)	2	0.6-0.9 meters	0.3-0.6 meters	○ ◐	Mid-summer	Native	Moderate salt; heavy metals tolerance	Attracts birds and moths
Orange Coneflower *Rudbeckia fulgida* (rf)	2	0.5-0.9 meters	0.7-0.7 meters	○ ◐	Summer	Ornamental	High salt tolerance	Attracts pollinators
Slough Sedge *Carex obnupta* (c)	1	0.5 meters	0.3 meters	◐ ○ ●	n/a	Native/ evergreen	Erosion control; moisture and salt tolerant	Provides food for wildlife; host plant for butterflies
River Birch *Betula nigra* (BN)	1	To 9 meters	4.5-6 meters	○ ◐	Early Spring	Ornamental	Erosion control; moisture and salt tolerant	Attracts birds; host plant for butterflies


Blue Beard


Douglas Iris


Tufted Hairgrass


Orange Coneflower


Slough Sedge


River Birch

Climate Resilient Landscaping Standards

Example Plant Palette

Rain Garden (Part Shade-Shade)

Plant Name	Zone	Height	Spread	S/PS/SH	Flowering	Status	Climate Resiliency	Wildlife Value
Small-Fruited Bulrush *Scirpus microcarpus* (sm)	1	0.5-0.9 meters	0.3-0.6 meters	○ ◐	Spring	Native/evergreen	Moisture tolerant, erosion control	Food and shelter for birds, fish and small mammals
Sweetflag *Acorus gramineus 'Ogon'* (o)	1	0.15-0.5 meters	0.15-0.3 meters	○ ◐	n/a	Ornamental/ evergreen	Moisture tolerant, erosion control	Food for waterfowl and animals
Common Camas *Camassia quamash* (cq)	2	0.3-0.6 meters	0.3-0.6 meters	○ ◐	Spring	Native	Moderate salt tolerance	Attracts pollinators
Western Columbine *Aquilegia formosa* (af)	2	0.5-0.9 meters	0.2-0.6 meters	○ ◐	Late spring	Native	Self seeds	Attracts hummingbirds and butterflies
Evergreen Huckleberry *Vaccinium ovatum* (Vo)	2	1-2 meters	0.9- 3 meters	○ ◐ ●	Spring	Native/ evergreen	Erosion control; moisture and salt tolerant	Attracts birds and hummingbirds
Western Sword Fern *Polystichum munitum* (pm)	2	0.5-1.2 meters	0.5-1.2 meters	◐ ●	n/a	Native/ evergreen	Moderate drought and salt tolerance	Ground nesting bird habitat
Vine Maple *Acer circinatum* (AC)	3	5-6 meters	2.5-4.5 meters	○ ◐	n/a	Native	Moisture tolerant	Attracts birds; host plant for butterflies


Small-Fruited Bulrush

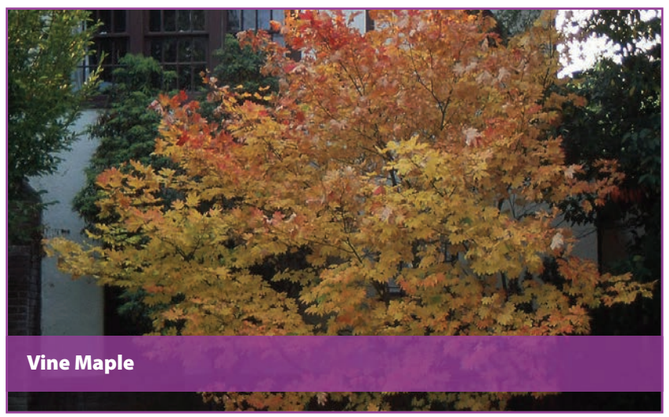

Sweetflag


Common Camas


Western Columbine


Evergreen Huckleberry

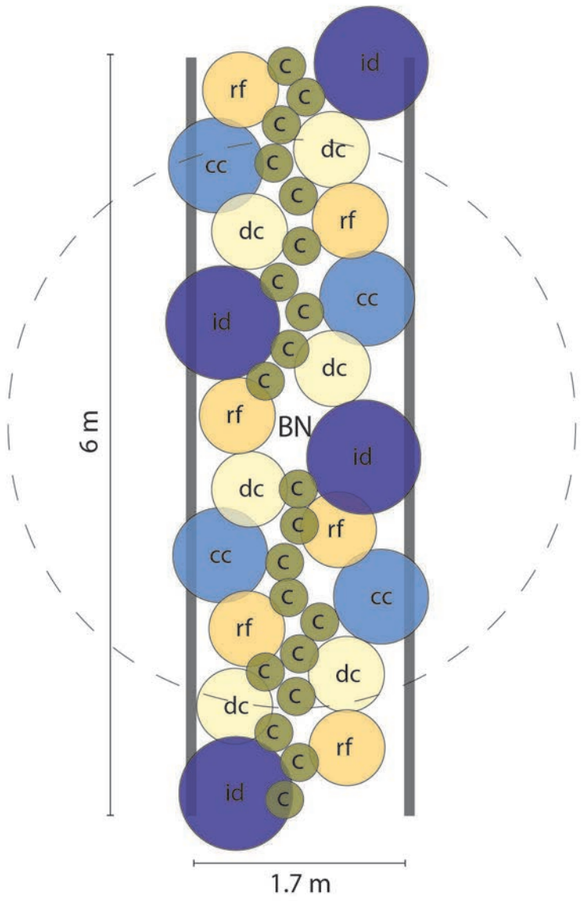

Sword Fern


Vine Maple

Climate Resilient Landscaping Standards

Example Planting Plans

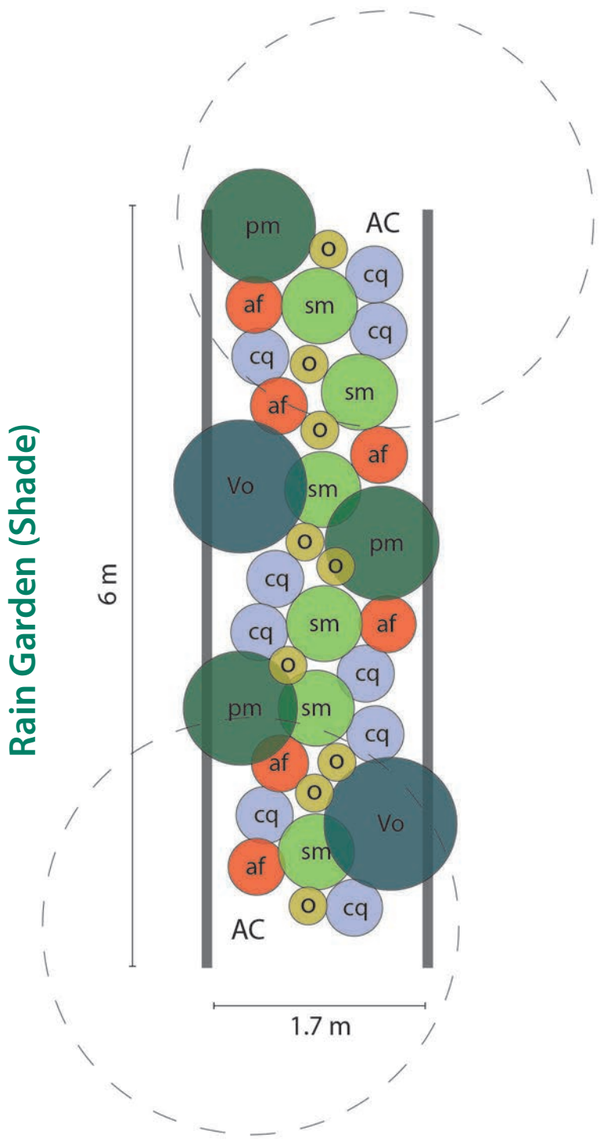
Rain Garden (Sun)



Symbol Legend:

Plant Name
Blue Beard *Caryopteris x clandonensis* (cc)
Douglas Iris *Iris douglasiana* (id)
Tufted Hairgrass *Deschampsia cespitosa* (dc)
Orange Coneflower *Rudbeckia fulgida* (rf)
Slough Sedge *Carex obnupta* (c)
River Birch *Betula nigra* (BN)

Rain Garden (Shade)



Symbol Legend:

Plant Name
Small-Fruited Bulrush *Scirpus microcarpus* (sm)
Sweetflag *Acorus gramineus 'Ogon'* (o)
Common Camas *Camassia quamash* (cq)
Western Columbine *Aquilegia formosa* (af)
Evergreen Huckleberry *Vaccinium ovatum* (Vo)
Western Sword Fern *Polystichum munitum* (pm)
Vine Maple *Acer circinatum* (AC)

Climate Resilient Landscaping Standards

Plant Lists

Bioretention

BOTANICAL NAME	COMMON NAME	SUN/ SHADE	SOIL MOISTURE	ZONE
TREES				
*Acer circinatum**	Vine Maple	◯◐	☀ 💧	2/3
Betula nigra 'Heritage'	Heritage River Birch	◯◐	☀ 💧	1/2
Nyssa sinensis	Tupelo	◯◐	☀ 💧	1/2
Pinus sylvestris	Scotch Pine	◯	☀ 💧	2/3
Platanus x hispanica	London Plane Tree	◯◐	☀ 💧	2
Quercus palustris	Pin Oak	◯◐	☀ 💧	1/2
Quercus phellos	Willow Oak	◯	☀ 💧	2
Salix babylonica	Weeping Willow	◯	☀ 💧	1/2
Styrax japonicus	Japanese Snowbell	◯◐	☀ 💧	2
Taxodium distichum	Bald Cypress	◯	💧	1
SHRUBS				
Arbutus unedo 'Compacta'	Dwarf Strawberry Tree	◯◐	☀ 💧	3
Brachyglottis greyi	Daisy Bush	◯	☀	3
Callicarpa bodinieri 'Profusion'	Profusion Beauty Berry	◯◐	💧	2
*Cornus sericea 'Flaviramea' **	Golden Twig Dogwood	◯◐	☀ 💧	2
*Mahonia repens**	Creeping Oregon Grape	◯◐	☀ 💧	2/3
Morella californica	California Bayberry	◯●	☀ 💧	2/3
*Myrica gale**	Sweet Gale	◯◐	💧	1
*Ribes sanguineum **	Red Flowering Currant	◯◐	💧	2
*Rosa nutkana**	Nootka Rose	◯◐	☀ 💧	2/3
*Salix hookeriana**	Hooker's Willow	◯◐	💧	1
*Salix scouleriana**	Scouler's Willow	◯◐	💧	1/2
*Spiraea douglasii**	Douglas Spirea	◯◐	💧	1/2
Pinus mugo var. pumilio	Dwarf Mountain Pine	◯	☀	3
*Vaccinium ovatum**	Evergreen Huckleberry	◯●	💧	2

BOTANICAL NAME	COMMON NAME	SUN/ SHADE	SOIL MOISTURE	ZONE
GROUND COVERS AND PERENNIALS				
*Achillea millefolium**	Yarrow	◯◐	☀ 💧	2/3
Agastache aurantiaca 'Apricot Sunrise'	Apricot Sunrise Hyssop	◯	☀	3
*Allium cernuum**	Nodding Onion	◯◐	☀ 💧	1/2
*Aruncus dioicus**	Goatsbeard	◐	☀	2
Echinacea pallida	Pale Pink Coneflower	◯	☀	3
Lavandula angustifolia 'Hidcote Blue'	Hidcote Blue Lavender	◯	☀	3
Ligularia sp.	Leopard Plant species	◐●	💧	1
*Lupinus polyphyllus**	Bigleaf Lupine	◯	☀ 💧	2
Santolina chamaecyparissus	Lavender Cotton	◯	☀	3
Stachys byzantina	Lamb's Ear	◯	☀	3
Verbena bonariensis	Purple Top Vervain	◯	☀	3
GRASSES				
*Bouteloua gracilis**	Blue Grama	◯	☀	3
*Carex obnupta**	Slough Sedge	◯●		1
*Deschampsia cespitosa**	Tufted Hair Grass	◯◐	☀ 💧	2/3
*Juncus sp**	Rush species	◯		1
Helictotrichon sempervirens	Blue Oat Grass	◯	☀ 💧	3
Leymus condensatus 'Canyon Prince'	Canyon Prince Wild Rye	◯	☀	3
Nassella tenuissima	Mexican Feather Grass	◯	☀ 💧	3
Sesleria caerulea	Blue Moor Grass	◯◐	☀ 💧	3
Sporobolus heterolepsis	Prairie Dropseed	◯	☀ 💧	3

Precedent:

Sedgwick Station, Philadephia[4]

Legend: ◯ (Full sun) ◐ (Part shade) ● (Shade) ☀ (Dry Soils) 💧 (Moist Soils) (Moisture Tolerant) * (Native to PNW)

Note: When selecting plant species, consider trade-offs such as drought tolerance vs. benefits for pollinators or habitat value

Climate Resilient Landscaping Standards

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