

LANDSCAPING CONSIDERATIONAS AND CANDIDATE PLANT LIST

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Winter Tree Canopies Intercept 15%-28% of Rainfall

1. Crown Interception

Scientific studies have shown that a significant amount of gross precipitation is intercepted (i.e., never reaches the ground) by tree crowns. A 50 year old evergreen forest in Scotland had canopy interception of 28% of annual rainfall (Johnston, 1990). Studies of open grown urban trees in Davis, California (average annual rainfall of 446 mm) have shown significant crown interception even in winter – about 15% by a leafless pear tree, and about 27% by a broadleaf evergreen oak (Figure 1–2 – Xiao *et al.*, 2000).

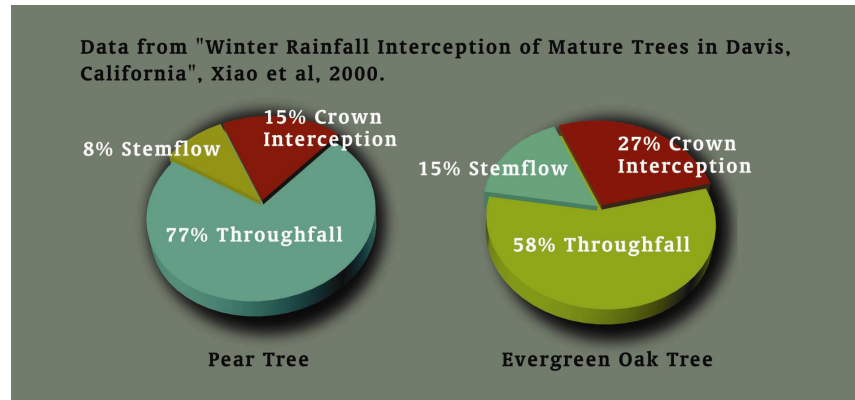


Figure 1-2: Interception, stemflow and throughfall data from California (Xiao *et al.*, 2000)

2. Throughfall and Stemflow

Plants provide a stormwater detention function, slowing down rain before it hits the ground surface. Although some rain falls through the canopy as free throughfall, a significant portion lands on either leaf or twigs, where it is delayed prior to creating canopy drip. Some of this rainfall flows down twigs and branches to become stemflow at the tree trunk. The twigs, branches and rough bark of leafless deciduous trees play a significant role in stormwater detention.

3. Evapotranspiration

Trees, shrubs, grasses and other plants draw water up from the soil to the leaves, where the stomata (openings) in the leaves allow for evapo-transpiration. Evaporation also occurs from surface water (puddles, lakes, streams, rooftops) and from surface soils, snow and tree/plant surfaces. The combination of tree canopy interception and evapotranspiration in a natural rainforest can approach 40% of annual rainfall (Stephens *et al.*, 2002).

Rainfall Storage in Soil is 7% to 20% of Soil Volume

4. Soil Water Storage

Soils are the most significant landscape storage mechanism for stormwater. Landscape soils typically store from 7% (sand) to 20% (loam) of their volume as water before becoming saturated to field capacity and generating flow-through or runoff. Loamy soils store more water than sandy soils (Ferguson, 1994).

5. Soil Infiltration

The rate at which water soaks into soils (the infiltration rate or saturated hydraulic conductivity) varies depending on the texture and amount of organic matter in the soil. Fine textured soils with silt and clay exceeding 35% by volume tend to have low infiltration rates (0.6 to 6 mm/hr), whereas sand surface soils are very open to infiltration (210 mm/hr), with loam soils having moderate infiltration rates (13 mm/hr).

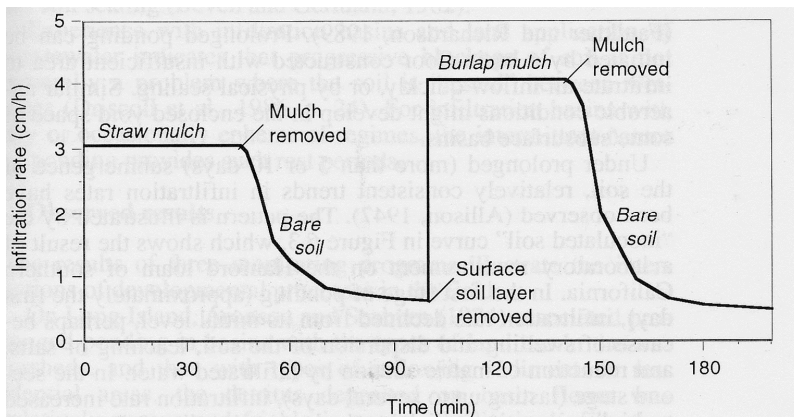


Figure 1-3: Infiltration rate of a sandy loam under continuous water sprinkling at a rate in excess of intake with a series of 4 surface conditions (Ferguson, 1994: 191)

Surface crusting and compaction of the top 2 mm of soil can be an important limitation. Thin crusts can be formed on all bare soil surfaces, including fine sand, due to raindrop impact. Surface crusting risks can be addressed by avoiding erosion and sedimentation that carries fines onto the soil surface, and by providing surface mulching, vegetation, organic matter and related soil life in the surface soil (Figure 1-3 – Ferguson, 1994).

Candidate Plant List

Design plantings to respect the wet, dry or moist soil zones of the stormwater facilities. The following plants are recommended for stormwater source control facilities. Most plants listed are native. Non-native street trees are identified as such.

The 'Availability' column in the tables has 3 codes which represent general plant availability as listed in the BC Landscape and Nursery Association website

(www.canadanursery.com)in 2004:

- A available at 3 or more nurseries in BC.
- B available at 2 nurseries in BC.
- C available at 1 nursery in BC.

Latin Name / Botanical name	Common Name	Type	Light Condition	Typical Size / Spacing	Application	Availability
WET SITES						
TREES						
<i>Acer rubra</i>	Red Maple	Broadleaf Deciduous Tree	Full Sun /Part Shade	25m	Wet/Moist	A
<i>Nyssa sylvatica</i>	Black Gum	Broadleaf Deciduous Tree	Full Sun /Part Shade	20m	Wet/Moist	A
<i>Quercus palustris</i>	Pin Oak	Broadleaf Deciduous Tree	Full Sun	20m	Wet/Moist	A
<i>Quercus rubra</i>	Red Oak	Broadleaf Deciduous Tree	Full Sun	25m	Wet/Moist	A
<i>Salix lucida Ssp. Lasiandra</i>	Pacific Willow	Deciduous Tree or Shrub	Full Sun /Part Shade	12m	Wet	A
<i>Salix scouleriana</i>	Scouler's Willow	Deciduous Tree or Shrub	Full Sun /Part Shade	2-12m	Wet	A
<i>Salix sitchensis</i>	Sitka Willow	Deciduous Tree or Shrub	Full Sun /Part Shade	1-8m	Wet	A
SHRUBS						
<i>Cornus stolonifera (sericea)</i>	Red Osier Dogwood	Broadleaf Deciduous Shrub	Full Sun	1-6m	Wet/Moist	A
<i>Ledum groenlandicum</i>	Labrador Tea	Broadleaf Evergreen Shrub	Full Sun	0.5-1.5m	Wet	C
<i>Myrica gale</i>	Sweet gale	Broadleaf Deciduous Shrub	Full Sun /Part Shade	1.5m	Wet	B
<i>Spirea douglasii</i>	Douglas Spirea (Hardhack)	Broadleaf Deciduous Shrub	Full Sun	2m	Wet	A
HERBACEOUS PERENNIALS						
<i>Carex lyngbyei</i>	Lyngby's Sedge	Herbaceous Perennial	Full Sun	0.3-1.5m	Wet	B
<i>Carex obnupta</i>	Slough Sedge	Herbaceous Perennial	Full Sun	1-1.5m	Wet	B
<i>Carex rostrata</i>	Beaked Sedge	Herbaceous Perennial	Full Sun	0.3-1.5m	Wet	A
<i>Scirpus microcarpus</i>	Small-flowered Bullrush	Herbaceous Perennial	Full Sun /Part Shade	1-1.5m	Wet	B
AQUATIC PLANTS						
<i>Lysichiton americanum</i>	Skunk Cabbage	Herbaceous Perennial	Part Shade / Shade	0.30-0.90m	Wet/Submerged	C
<i>Nuphar luteum Ssp. Polysepalum</i>	Pond Lily	Aquatic	Full Sun	0.15-5m long	Wet/Submerged	C
<i>Sparganium angustifolium</i>	Narrow-leaved Bur-reed	Herbaceous Perennial	Part Shade / Shade	0.20-1m long	Wet/Submerged	C

Latin Name / Botanical name	Common Name	Type	Light Condition	Typical Size / Spacing	Application	Availability
<i>Rosa nutkana</i>	Nootka Rose	Broadleaf Deciduous Shrub	Full Sun	3m	Moist	A
<i>Rosa pisocarpa</i>	Swamp Rose	Broadleaf Deciduous Shrub	Part Shade	1.5m	Moist	A
<i>Rubus spectabilis</i>	Salmonberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	4m	Moist	A
<i>Salix scouleriana</i>	Scouler's Willow	Broadleaf Deciduous Tree or Shrub	Full Sun /Part Shade	2-12m	Moist	A
<i>Salix sitchensis</i>	Sitka Willow	Broadleaf Deciduous Tree or Shrub	Full Sun /Part Shade	1-8m	Moist	A
<i>Sambucus caerulea</i>	Blue Elderberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	6m	Moist	B
<i>Sambucus racemosa</i>	Red Elderberry	Broadleaf Deciduous Shrub	Part Shade	6m	Moist	A
<i>Sherpherdia canadensis</i>	Soapberry	Broadleaf Deciduous Shrub	Full Sun	1-2m	Moist	B
<i>Sorbus sitchensis</i>	Sitka Mountain Ash	Broadleaf Deciduous Shrub	Full Sun /Part Shade	4m	Moist	B
<i>Symphocarpus albus</i>	Snowberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	0.5-2m	Moist	A
<i>Vaccinium alaskaense</i>	Alaska Blueberry	Broadleaf Deciduous Shrub	Full Sun	2m	Moist	C
<i>Vaccinium membranaceum</i>	Black Huckleberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	1.5m	Moist	C
<i>Vaccinium ovalifolium</i>	Oval-leaved Blueberry	Broadleaf Deciduous Shrub	Full Sun	2m	Moist	C
<i>Vaccinium ovatum</i>	Evergreen Huckleberry	Broadleaf Evergreen Shrub	Full Sun /Part Shade	2-3m	Moist	A
<i>Vaccinium parvifolium</i>	Red Huckleberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	1.2-3m	Moist	B
<i>Viburnum edule</i>	Highbush Cranberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	0.5-3.5m	Moist	C
Herbaceous Perennials Grouncovers and Ferns						
<i>Achlys triphylla</i>	Vanilla-leaf	Herbaceous Perennial	Full Sun /Part Shade	0.1-0.3m	Moist	C
<i>Adiantum pedatum</i>	Maidenhair Fern	Fern	Shade	0.3-0.5m	Moist	A
<i>Aquilegia formosa</i>	Red Columbine	Herbaceous Perennial	Full Sun /Part Shade	1m	Moist	B
<i>Aruncus dioicus</i>	Goat's Beard	Herbaceous Perennial	Full Sun /Part Shade	1-2m	Moist	C
<i>Asarum caudatum</i>	Wild Ginger	Herbaceous Perennial	Full Sun /Part Shade	0.05-0.2m	Moist	B
<i>Athrium felix-femina</i>	Lady Fern	Fern	Part Shade / Shade	2m	Moist	A
<i>Cammasia leitchinii</i>	Great Camas	Herbaceous Perennial	Part Shade	0.7m	Moist	C
<i>Cammasia quamash</i>	Common Camas	Herbaceous Perennial	Part Shade	0.7m	Moist	B
<i>Carex deweyana</i>	Dewey's Sedge	Herbaceous Perennial	Full Sun /Part Shade	0.2-1.2m	Wet/Moist	C
<i>Carex obnupta</i>	Slough Sedge	Herbaceous Perennial	Part Shade	0.6-1.5m	Wet/Moist	B
<i>Carex stipata</i>	Sawbeak Sedge	Herbaceous Perennial	Part Shade	0.25-1m	Wet/Moist	C
<i>Clintonia uniflora</i>	Queen's cup	Herbaceous Perennial	Part Shade / Shade	0.2m	Moist	C
<i>Cornus canadensis</i>	Bunchberry	Deciduous Groundcover	Shade	0.2m	Moist	A
<i>Dicentra formosa</i>	Pacific Bleeding Heart	Herbaceous Perennial	Shade	0.5m	Moist	C
<i>Disporum hookeri</i>	Hooker's fairybell	Herbaceous Perennial	Shade	1m	Moist	C
<i>Dodecatheon Ssp.</i>	Shooting Star	Herbaceous Perennial	Part Shade / Shade	0.1-0.5m	Moist	C
<i>Dryopteris expansa</i>	Spiny Wood Fern	Fern	Part Shade / Shade	1m	Moist	C
<i>Empetrum nigrum</i>	Crowberry	Evergreen Groundcover	Shade	0.2m	Moist	C
<i>Erythronium oregonium</i>	White Fawn Lily	Herbaceous Perennial	Full Sun /Part Shade	0.3m	Moist	C

Latin Name / Botanical name	Common Name	Type	Light Condition	Typical Size / Spacing	Application	Availability
<i>Fragaria vesca</i>	Woodland Strawberry	Deciduous Groundcover	Part Shade / Shade	0.2m	Moist	B
<i>Goodyera oblongifolia</i>	Rattlesnake Plantain	Herbaceous Perennial	Shade	0.4m	Moist	C
<i>Gymnocarpum dryopteris</i>	Oak Fern	Fem	Part Shade / Shade	0.4m	Moist	C
<i>Heuchera micrantha</i>	Small-flower Alumroot	Herbaceous Perennial	Shade	0.1-0.4	Moist	C
<i>Juncus effusus</i>	Common Rush	Herbaceous Perennial	Full Sun	0.3-1m	Wet/Moist	A
<i>Juncus tenuis</i>	Slender Rush	Herbaceous Perennial	Full Sun	0.15-0.70	Wet/Moist	C
<i>Linnaea borealis</i>	Twinflower	Deciduous Groundcover	Full Sun /Part Shade	0.1m	Moist	B
<i>Maianthemum dilatatum</i>	False lily-of-the-valley	Herbaceous Perennial	Shade	0.1-0.4	Moist	B
<i>Mitella breweri</i>	Brewer's mitrewort	Herbaceous Perennial	Shade	0.2-0.4m	Moist	C
<i>Polystichum munitum</i>	Sword Fern	Fem	Part Shade / Shade	1.5m	Moist	A
<i>Pteridium aquilinum</i>	Bracken Fern	Fem	Part Shade / Shade	3m	Moist	C
<i>Scirpus microcarpus</i>	Small-fruited Bullrush	Herbaceous Perennial	Full Sun /Part Shade	1.5m	Moist	B
<i>Smilacina stellata</i>	Star Flowered Solomon's Seal	Herbaceous Perennial	Part Shade / Shade	0.3-1m	Moist	B
<i>Tellima grandiflora</i>	Fringecup	Deciduous Groundcover	Full Sun /Part Shade	0.4-0.8m	Moist	C
<i>Trillium Ovatum</i>	Western Trillium	Herbaceous Perennial	Part Shade / Shade	0.4m	Moist	C
<i>Viola glabella</i>	Yellow Wood Violet	Herbaceous Perennial	Part Shade / Shade	0.5m	Moist	C
<i>Viola sempervirens</i>	Trailing Yellow Violet	Herbaceous Perennial	Shade	.08m	Moist	C

Latin Name / Botanical name	Common Name	Type	Light Condition	Typical Size / Spacing	Application	Availability
DRY SITES						
TREES						
<i>Alnus rubra</i>	Red Alder	Broadleaf Deciduous Tree	Full Sun	25m	Dry	A
<i>Prunus emarginata</i>	Bitter Cherry	Broadleaf Deciduous Tree	Full Sun	2-15m	Dry	B
<i>Quercus garryana</i>	Garry Oak	Broadleaf Deciduous Tree	Full Sun	25m	Dry	B
<i>Pseudotsuga menziesii</i>	Douglas Fir	Coniferous Evergreen	Full Sun /Part Shade	70m	Dry	B
<i>Pinus ponderosa</i>	Ponderosa Pine	Coniferous Evergreen	Full Sun	35m	Dry	B
SHRUBS						
<i>Amelanchier alnifolia</i>	Western Serviceberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	1-5m	Dry	A
<i>Holodiscus discolor</i>	Oceanspray	Broadleaf Deciduous Shrub	Full Sun /Part Shade	4m	Dry	A
<i>Ribes sanguineum</i>	Red-flowering Current	Broadleaf Deciduous Shrub	Full Sun /Part Shade	1-3m	Dry	A
<i>Rosa gymnocarpa</i>	Baldhip Rose	Broadleaf Deciduous Shrub	Full Sun	1.5m	Dry	A
<i>Rubus parviflorus</i>	Thimbleberry	Broadleaf Deciduous Shrub	Part Shade	0.5-3m	Dry	A
<i>Sambucus racemosa</i>	Red Elderberry	Broadleaf Deciduous Shrub	Part Shade	6m	Dry	A
<i>Gaultheria shallon</i>	Salal	Broadleaf Evergreen Shrub	Part Shade / Shade	0.2-0.5m	Dry	A
<i>Mahonia Aquifolium</i>	Tall Oregon Grape	Broadleaf Evergreen Shrub	Full Sun /Part Shade	0.9-3m	Dry	A
<i>Mahonia nervosa</i>	Cascade Oregon Grape	Broadleaf Evergreen Shrub	Full Sun /Part Shade	0.6m	Dry	A
<i>Symphocarpus albus</i>	Snowberry	Broadleaf Deciduous Shrub	Full Sun /Part Shade	0.5-2m	Dry	A
Herbaceous Perennials Grouncovers and Ferns						
<i>Achillea millefolium</i>	Yarrow	Herbaceous Perennial	Full Sun /Part Shade	0.5-1m	Dry	C
<i>Arctostaphylos uva-ursi</i>	Kinnikinnick	Broadleaf Evergreen Goundcover	Full Sun /Part Shade	0.20m	Dry	A
<i>Elymus glaucus</i>	Blue Wildrye	Herbaceous Perennial	Full Sun	0.5-1.5m	Dry	C
<i>Fragaria vesca</i>	Wood Strawberry	Herbaceous Perennial	Part Shade	0.25m	Dry	A
<i>Lupinus bicolor</i>	Two Color Lupine	Herbaceous Perennial	Full Sun	0.1-0.45m	Dry	C
<i>Lupinus latifolius</i>	Broadleaf Lupine	Herbaceous Perennial	Full Sun	0.1-0.45m	Dry	C
<i>Lupinus polyphyllus</i>	Large-Leafed Lupine	Herbaceous Perennial	Full Sun	0.1-0.45m	Dry	C
<i>Mahonia repens</i>	Creeping Oregon Grape	Broadleaf Evergreen Groundcover	Full Sun /Part Shade	0.30m	Dry	A
<i>Pteridium aquilinum</i>	Bracken Fern	Fern	Part Shade / Shade	3m	Dry	C
<i>Solidago canadensis</i>	Canada Goldenrod	Herbaceous Perennial	Full Sun	0.40-1.5m	Dry	C

Latin Name / Botanical name	Common Name	Type	Light Condition	Typical Size / Spacing	Application	Availability
NON-NATIVE TREES						
<i>Gleditsia triacanthos</i>	Honeylocust	Broadleaf Deciduous Tree	Full Sun	30m	Moist	A
<i>Acer rubra</i>	Red Maple	Broadleaf Deciduous Tree	Full Sun /Part Shade	25m	Wet/Moist	A
<i>Quercus rubra</i>	Red Oak	Broadleaf Deciduous Tree	Full Sun	25m	Wet/Moist	A
<i>Liriodendron tulipifera</i>	Tulip Tree	Broadleaf Deciduous Tree	Full Sun	35m	Moist	A
<i>Quercus palustris</i>	Pin Oak	Broadleaf Deciduous Tree	Full Sun	20m	Wet/Moist	A
<i>Cercis canadensis</i>	Redbud	Broadleaf Deciduous Tree	Full Sun /Part Shade	8m	Moist	A
<i>Nyssa sylvatica</i>	Black Gum	Broadleaf Deciduous Tree	Full Sun /Part Shade	20m	Wet/Moist	A
<i>Acer saccharinum</i>	Silver Maple	Broadleaf Deciduous Tree	Full Sun	35m	Moist	A