

### General Information

It's important to understand that FocalPoint is a biofiltration system that uses a very high flow, coarse sand media with about 10% peat by volume. The media is designed to drain very quickly but through various physical, chemical and biological processes to capture nutrients and other pollutants very efficiently. It is an open system, thus, it receives nutrients and organic material from the contaminated runoff every time it rains.

As a filter it treats a very large impervious surface and is exposed to much more water compared to a typical landscape plant. For example, a typical landscape shrub (on the east coast) would only receive an annual rainfall volume of about 40 inches per square foot or 3.3 ft. of run off per year. A FocalPoint system treating 1/4 acre of impervious surface would receive over 1,200 inches per square ft. or 100 ft. of runoff per year.

As a result of this unique circumstance, the FocalPoint biofiltration system creates a completely different environment when compared with typical growing media or soil, and therefore many common rules and traditional landscape industry concerns about soils and plant productivity are not applicable. This high flow media has been in use as a bioretention system for over 20 years and through experience, a great deal has been learned about the types of plants needed for this unique environment. There are now over 5,000 high flow rate bioretention systems throughout the country and all are working well with the plants thriving.

### General Rules

1. Native Plants are best suited as they adjust well to periodic droughts and temperature extremes. Plants should be watered at planting, especially during drought periods. Use USDA Hardiness zones as the first guide for plants. Keep in mind that some perennials (i.e. daylilies, hortas etc. die back in fall and re-emerge in spring. If you want green year round be mindful of the perennials used)
2. Root morphology is important. Shallow fibrous root systems are best, generally only grow to depths of 3 ft. Dig planting holes the depth of the root ball and two to three times as wide as the root ball. Wide holes encourage horizontal root growth that plants naturally produce. If roots are circling around the root ball exterior, cut through the roots in a few places and remove the first inch of roots and plant in material around the root ball. Cutting helps prevent circling roots from eventually girdling the trunk. If roots are not circling, the root ball should still be rubbed to loosen roots and promote growth into the media.

### Spacing

	Shrubs			Clump Grasses	Small Trees
<b>Rootball Size</b>	< 1 gallon	5 gallons	15 gallon	Plant clump grasses 24 inches on center	Plan small trees 12 feet on center
<b>Spacing On Center</b>	24 inches	42 inches	60 inches		

3. Small trees, woody shrubs or herbaceous plants are all suitable for the system. With trees, you must ensure you are not planting too deep. Don't dig holes deeper than root balls. The media should be placed at the root collar. Otherwise the stem will be vulnerable to disease.
4. Where water is entering a FocalPoint in one location be sure to place erosion control stones to prevent scouring.

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5. Generally facultative plants that like well drained soils should be used. Despite the volume of water treated, the soil drains very well so facultative-wet or obligate plants will not do well in these systems. If runoff could be contaminated with road salts, salt tolerant plants should be used.
6. Soil moisture is maintained through the use of 10% peat moss in the original media mix and the use of 3 inch layer of mulch on the media surface. Over the years, due to routine replacement of the mulch and ongoing input of organic material from the runoff (leaf litter, organics and detritus materials), this level of organic content is maintained. Through experience this has been adequate to help the plants survive extended droughts.
7. Plant selection can sometimes be a function of the soil depth used for the FocalPoint system. For example, if large canopy trees are required, a soil depth of 5 ft. or more may be needed to prevent wind throw. If there is only 1ft. of media then flowers or grasses should be used. Only stake trees with large crowns or those situated on windy sites or where people may push them over for a maximum of one year. Allow trees a slight amount of flex rather than holding them rigidly in place. Use guying or attach material that won't damage the bark. To prevent trunk girdling, remove all guying material after one year.
8. The palette used is often dictated by the list of acceptable materials in local regulations. Most of the time, it is possible to find

### **Q & A with a Registered Landscape Architect**

Q. Are plants suitable for use with FocalPoint limited to a specific palette?

A. There is no need to create a special palette of plants. You can select plants from the general list attached or you can select from a list of approved required landscape materials. All of the plants on the attached list will work in the filter media. This list can be modified based on the USDA hardiness zones.

Q. What specific organic matter exists in the soil?

A. The media contains 10% by volume peat moss. Over the years the decaying mulch, roots, fungi, bacteria and organic inputs from storm-water runoff add to the organic mix as it evolves a more natural soil strata.

Q. Are there specific aged organic substrates used in the mix? If so, what?

A. As indicated above, peat and other external organic inputs.

Q. Are any fertilizers incorporated into this mix? If so, are they organic or synthetic?

A. No fertilizers are required as the system receives all the nutrient inputs necessary from stormwater runoff.

Q. What is the pH of the soil?

A. Soil pH ranges from 6.5 to 6.8, the peat moss and mulch have a tendency to buffer the sand pH.

Q. What is the EC level in this soil?

A. Due to the unique nature of the sandy media and how it receives and captures nutrients from the high volumes of contaminated runoff the EC level of the soil is not a very useful indication of the amount of nutrients available.

Q. FocalPoint is designed to infiltrate water, but does it have any moisture holding capacity?

A. Yes it has soil moisture holding capacity through the use of peat moss and mulch. Additionally this system receives more water, more often, than a typical landscape plant due to its larger impervious drainage area.

Species/Common Name	Exposure	Mature Size	Time of Bloom	Comments
Aster novae angliae/ New England Aster	Full sun to partial	1-6'	September- October	<i>Violet flowers attract butterflies, good food source for birds and mammals; saturated to dry soils</i>
Helianthus angustifolius/ Swam Sunflower	Sun	6-8'	August- October	<i>Yellow flowers with maroon centers; butterfly nectar plant; birds eat seeds</i>
Hibiscus militaris/ Halberd Rose Mallow	Full sun	4-6'	July- September	<i>Large plant that assumes shrub-like proportions. Large pink or white blooms; hummingbird nectar plant</i>
Hibiscus moscheutos/ Rose Mallow	Full sun	3-8'	July- September	<i>Shrub-like plant; very large pink or white flowers; hummingbird nectar plant; can grow with roots in water</i>
Panicum virgatum/ Switch Grass	Sun	3-6'	July- October	<i>Tolerates wet to well-drained soil; flowers appear to float; high wildlife value; yellow Fall color; buff in Winter; excellent wildlife habitat and erosion control</i>
Vernonia noveboracensis/ New York Ironweed	Sun	4-8'	August- October	<i>The red-purple flowers of this wet meadow plant attract butterflies; will tolerate seasonal inundation</i>
Aster laevis/ Smooth or Blue Bird Aster	Sun	2-5'	August- October	<i>Pale blue flowers attract butterflies, good food source for birds and mammals; moist to dry soils; mildew free</i>
Boltonia asteroides/ Boltonia	Full sun to partial	4-6'	Late Summer to Late Autumn	<i>Easy to grow native with aster-like white or pink flowers. Attractive grey-green foliage. Prefers well drained moist soil</i>
Cimicifuga racemosa/ Black Snakeroot	Full sun to partial	3-8'	Mid Summer to early Autumn	<i>Bold woodland edge plant with white, wand-like blooms. Handsome foliage</i>
Elymus virginicus/ Virginia Wild Rye	Partial shade to shade	1.5-5.5	June- October	<i>Found in wooded stream sides, floodplains, and the woodland edge, this grass tolerates from 15-30 days of flooding as well as drought. Spreads easily, good for erosion control</i>
Eupatorium fistulosum/ Joe Pye Weed	Sun	1.5-6'	July- September	<i>Huge, dusty-pink flowers attract butterflies; good food source for birds and mammals; saturated to dry soils; good Fall color</i>
Eupatorium perfoliatum/ Boneset	Full sun to partial shade	3-4'	July- October	<i>Large, flat, pearl-white flower heads attract butterflies; mallards and grouse eat seeds</i>
Eupatorium rugosum/ White Snakeroot	Full sun to partial shade	3-4'	June- September	<i>Flowers so white they glow in twilight; cultivar with purple foliage is available</i>
Filipendula rubra/ Queen of the Prairie	Full sun to light shade	4-6'	Early to Mid Summer	<i>Prefers well drained evenly moist soils but will tolerate wet soils. Foamy clusters of tiny pink blooms. Prairie native</i>
Helianthus angustifolius/ Swamp Sunflower (P)	Sun	6-8'	August- October	<i>Yellow flowers with maroon centers; butterfly nectar plant; birds eat seeds</i>
Myosotis laxa/ Smaller Forget-me-not	Partial shade	3-6"	Early Spring to Mid Summer	<i>Will die back during dry summer and reappear in winter; will not tolerate consistently dry conditions; clusters of clear blue blooms with a yellow eye; found near springs and on muddy shores</i>

<u>Species/Common Name</u>	<u>Exposure</u>	<u>Mature Size</u>	<u>Time of Bloom</u>	<u>Comments</u>
Chasmanthium latifolium/ River Oaks (M)	Sun to partial shade	2-3'	July- September	<i>Broad-bladed grass resembles bamboo; bright green in spring, turns copper in Fall and tan in Winter; dangling "oats"; tolerates dry shade</i>
Aronia arbutifolia/ Red Chokeberry (P)	Full sun to partial shade	4-10'	May-June	<i>White flowers with red stamens; bright red, edible berries persist in Winter; salmon to scarlet Fall color; wildlife; bank stabilizer; dry to wet soils</i>
Aronia melanocarpa/ Black Chokeberry	Full sun to partial shade	3-5'	May	<i>White flowers with red stamens; black berries persist in Winter; dark purple-red Fall color; wildlife; bank stabilizer; dry to wet soils</i>
Aronia prunifolia/ Purple Chokeberry	Full sun to partial shade	5-12'	April- May	<i>White flowers with red stamens; dark purple berries persist in Winter; dark purple-red Fall color; wildlife; bank stabilizer; moist to wet soils</i>
Baccharis halimifolia/ Groundsel Tree (M)	Sun	6-12'	August- September	<i>White flowers become silver-white seed-heads lasting through November; green twigs and striped bark add winter interest; moist to wet soils</i>
Callicarpa americana/ Beautyberry (M)	Full sun to partial shade	4-8'	June- August	<i>Lavender-pink flowers on new wood; yellow Fall color; purple berries ring branch through winter; dry to wet soils</i>
Cephalanthus occidentalis/ Buttonbush (P)	Sun	3-10'	July -August	<i>White flower buttons turn tan and persist; yellow Fall color; moist to flooded soil; high wildlife value including butterflies and hummingbirds</i>
Clethra alnifolia / Sweet Pepperbush (P)	Full sun to partial shade	6-10'	July- September	<i>Very fragrant white or pink flowers; yellow Fall color; butterfly nectar plant</i>
Cornus sericea / Red Twig	Full sun to partial shade	7-9'	Late Spring- Summer	<i>White flowers; blue or white berries; high wildlife value; red/maroon Fall color; scarlet twigs in winter; good bank stabilizing shrub; Northeastern native</i>
Euonymus americanus/ Hearts-a-bustin (P)	Partial shade	1.5-6'	May- June	<i>Small brown flowers; fuchsia hearts with scarlet seeds; yellow to orange Fall color; green stems add winter interest; moist to wet soils</i>
Hamamelis virginiana/ Witch Hazel (P)	Full sun to partial shade	4-15'	September- December	<i>Tolerates irregular flooding or dry sites; yellow fragrant strap-like flowers; yellow Fall color; green stems add winter interest; moist to wet soils</i>
Hydrangea arborescens/ Wild Hydrangea (P)	Partial Shade	3-8'	June-July	<i>Creamy white flowers on new wood dry tan and persist; dry to moist soil</i>
Hypericum densiflorum/ St John's Wort (P)	Full sun to partial shade	3-6'	Summer	<i>Yellow flowers; tolerates variety of moisture regimes; medium wildlife value</i>
Ilex glabra / Inkberry (P)	Full sun to partial shade	3-10'	May-July	<i>Slow-growing evergreen; can be formally pruned; creamy-white flowers; tolerates wet soils; need male female for berries; high wildlife value</i>
Ilex verticillata/ Winterberry (P)	Full sun to partial shade	6-12'	June-July	<i>Can also be trained as small tree; white flowers; yellow Fall color; need male and female for scarlet berries; high wildlife value; tolerates wet soil</i>
Juniperus communis 'Compressa'/ Juniper	Sun	3-6'		<i>Mounded shrub; deep taproot; high wildlife value, evergreen</i>

Species/Common Name	Exposure	Mature Size	Time of Bloom	Comments
Juniperus horizontalis/ Creeping Juniper	Sun	<1-3'		<i>Matted shrub; deep taproot; high wildlife value; 'Bar Harbor' variety has plum foliage in winter; center dies back as plant ages</i>
Leucothoe recemosa/ Fetterbuch (M)	Partial shade to shade	3-8'	May-June	<i>White drooping flowers; evergreen leaves turn red/purple after frost; moist soil</i>
Lindera benzoin/ Spicebush (P)	Sun to shade	6-12'	March-May	<i>Chartreuse flowers; scarlet berries taken by birds; leaves fragrant when crushed; yellow Fall color; butterfly host plant; tolerates wet or dry sites</i>
Myrica cerifera/ Wax Myrtle (P)	Sun to shade	6-10'	March-April	<i>Chartreuse or white flowers; fragrant evergreen leaves; fragrant berries taken by birds and used for candles; can prune as hedge; dry to wet soils</i>
Myrica pennsylvanica/ Bayberry (P)	Full sun to partial	6-8'	April-May	<i>Chartreuse or white flowers; semi-evergreen fragrant leaves; fragrant berries taken by birds and used for candles; need male and female plants</i>
Physocarpus opulifolius/ Ninebark (P)	Full sun to partial	6-12"	May-June	<i>Peeling bark; pink or white flower clusters; moist or wet soil; medium wildlife value</i>
Rhododendron canescens/ Sweet Azalea (P)	Full sun to partial shade	3-10'	May-June	<i>White or pink, fragrant flowers; moist, acid, well-drained soil; red or yellow Fall color</i>
R. periclymenoides/ Pinxterbloom Azalea (P)	Full sun to partial	3-10'	April-May	<i>Pink flowers open before leaves are out; moist, acid, well-drained soil; red/wine/orange brilliant Fall Color</i>
Rhododendron viscosum/ Swamp Azalea (P)	Full sun to partial shade	6-8'	June-August	<i>Intensely fragrant white flowers; bronze Fall color; moist to wet soils</i>
Rhus aromatica/ Fragrant Sumac (M)	Full sun to partial shade	6'	March-May	<i>Spicy smelling leaves turn orange and scarlet in Fall; high wildlife value; variety 'gro-low' makes good groundcover for slopes</i>
Rhus copallina/ Shining Sumac (P)	Sun	20'	June-July	<i>Chartreuse flowers; scarlet fruit; bright red Fall color; wildlife value; tolerates dry, sandy soils; spreads</i>
Rhus glabra/ Smooth Sumac (P)	Sun	9-15'	June-July	<i>Chartreuse flowers; scarlet fruit; bright red Fall color; wildlife value; tolerates dry, sandy soils; forms colonies with interesting growth habit</i>
Rhus typhina/ Staghorn Sumac (P)	Sun	10-25'	June-July	<i>Chartreuse flowers; scarlet fruit; bright orange Fall color; wildlife value; tolerates dry, sand soils; forms groves with interesting growth habit</i>
Rosa carolina/ Pasture Rose (P)	Full sun to partial	.5-3'	May-June	<i>Pink, fragrant flowers; red hips; high wildlife value; good Fall color; forms thickets; dry to moist soil</i>
Rosa palustris/ Swamp Rose (P)	Full sun to partial shade	8'	July-August	<i>Dark pink flowers; red hips; high wildlife value; good Fall color; moist to wet soil</i>
Sambucus canadensis/ Elderberry (P)	Sun to shade	6-12'	April-May	<i>Large white flower clusters; ornamental, edible purple berries; wildlife value; moist to wet soils; forms thickets; bank stabilizer; fast-growing</i>

Species/Common Name	Exposure	Mature Size	Time of Bloom	Comments
Vaccinium stamineum/ Deerberry (P)	Full sun to partial shade	5-10'	April-June	White flowers; edible fruit; scarlet Fall color; wildlife value; dry to moist soil
Viburnum acerifolium/ Maple-leaved Vib. (P)	Full sun to partial shade	3-6.5'	April-May	Creamy white flowers; blue berries; pink/ crimson/ purple Fall color; can tolerate dry to moist soil; wildlife value; best in groups
Viburnum cassinoides/ Northern Wild Raisin (M)	Full sun to partial shade	6-8'	June	Fragrant white flowers; pink, red and blue berries turn black; wine-red Fall color; high wildlife value including butterflies
Viburnum dentatum/ Arrow Wood (P)	Full sun to partial shade	8-10'	May- June	Creamy white flowers; blue berries; crimson Fall color can tolerate wet to dry soil; high wildlife value; wood was used for arrows
Viburnum lentago/ Nannyberry (M)	Full sun to partial shade	8-15'	May	White flowers; sweet, edible black berries; purple-red Fall color; very adaptable; high wildlife value
Viburnum prunifolium/ Black Haw (P)	Full sun to partial shade	20'	April-May	White flowers; black berries; purple-red Fall color; very adaptable; high wildlife value; dry to wet soils; slow grower
Viburnum trilobum/ American Cranberry	Full sun to partial shade	8-12'	May	White flowers; edible red berries; yellow-purple-red Fall color; moist to boggy soil; high wildlife value; Northern native

### Representative Plant List



Boltonia Asteroides / Boltonia



Aster Novae Angliae / New England Aster



Helianthus Angustifolius / Swamp Sunflower



Panicum Virgatum / Switchgrass



Vernonia Noveboracensis / New York Ironweed



Cimicifuga Racemosa / Black Snakeroot