Rain Garden Design & Construction Guide for Small Projects

City of Kelso

ELIGIBLITY

This handout is intended to aid applicants using the **Abbreviated Stormwater Site Plan** who have determined that a rain garden is the best method for their project to manage stormwater.

INSTRUCTIONS FOR USING THIS FORM

This handout gives instructions for designing and constructing a rain garden to manage stormwater from small sites. The information is adapted from the *Rain Garden Handbook for Western Washington*. This handout is intended to provide information for simple rain gardens on level sites. If you wish to build a more intricate garden, or your site is constricted or sloped (greater than 5% slope) please refer to the *Rain Garden Handbook for Western Washington* (https://fortress.wa.gov/ecy/publications/documents/1310027.pdf).

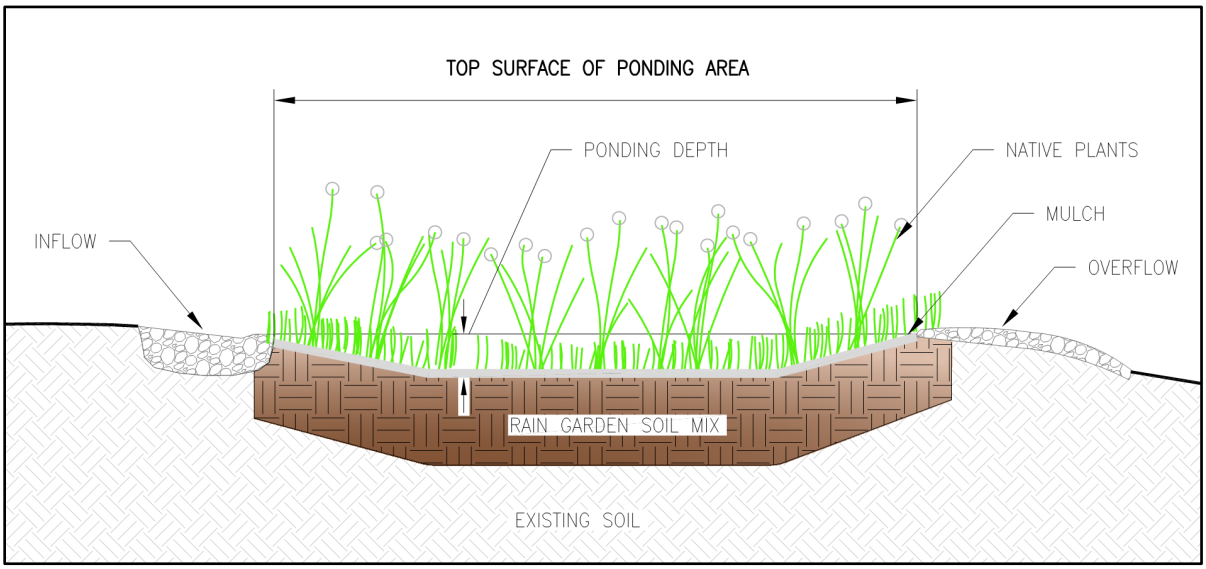
After you have completed the calculations, drawings, and planting plan in this guide:

❑ Submit the entire form with your completed **Abbreviated Stormwater Site Plan**

WHAT ARE RAIN GARDENS?

A rain garden is a landscaped depression that collects stormwater runoff from hard surfaces, such as roof tops and driveways, and allows the runoff to infiltrate into the ground. The rain garden is lined with a soil mix that drains well and supports plant growth. The rain garden is usually planted with low-maintenance native plants. The soil and plants in the rain garden soak up the stormwater and filter out pollutants. Rain gardens must be located in well-drained soil away from structures, utilities, and steep slopes.

ANATOMY OF A RAIN GARDEN



This guidance is intended for use by property owners and is not a substitute for Kelso Municipal Code. We have substituted some technical language with plainer terms. In case of conflict, the meaning and intent adopted in the Kelso Municipal Code and the Kelso Engineering Design Manual shall prevail.

WHAT ARE THE BENEFITS OF RAIN GARDENS?

As cities and suburbs grow, they replace forests and other open spaces with roofs, pavement, and other impervious surfaces. Most rain or snow that falls on native forests and prairies is quickly absorbed into the soil or evaporated. When rain falls on impervious surfaces, it cannot be absorbed and quickly runs off. This runoff can cause erosion and flooding and carries pollutants including pesticides, oil, sediment and heavy metals into lakes and streams. On-site stormwater management BMPs such as rain gardens mimic natural conditions. Rain gardens help recharge aquifers and help protect streams and lakes from pollution.

WHERE SHOULD I BUILD MY RAIN GARDEN?

The detailed feasibility requirements for rain gardens can be found in the Kelso **Abbreviated Stormwater Site Plan,** the **Final Feasibility Checklist** and the Design Guidelines of the *Stormwater Management Manual for Western Washington*.

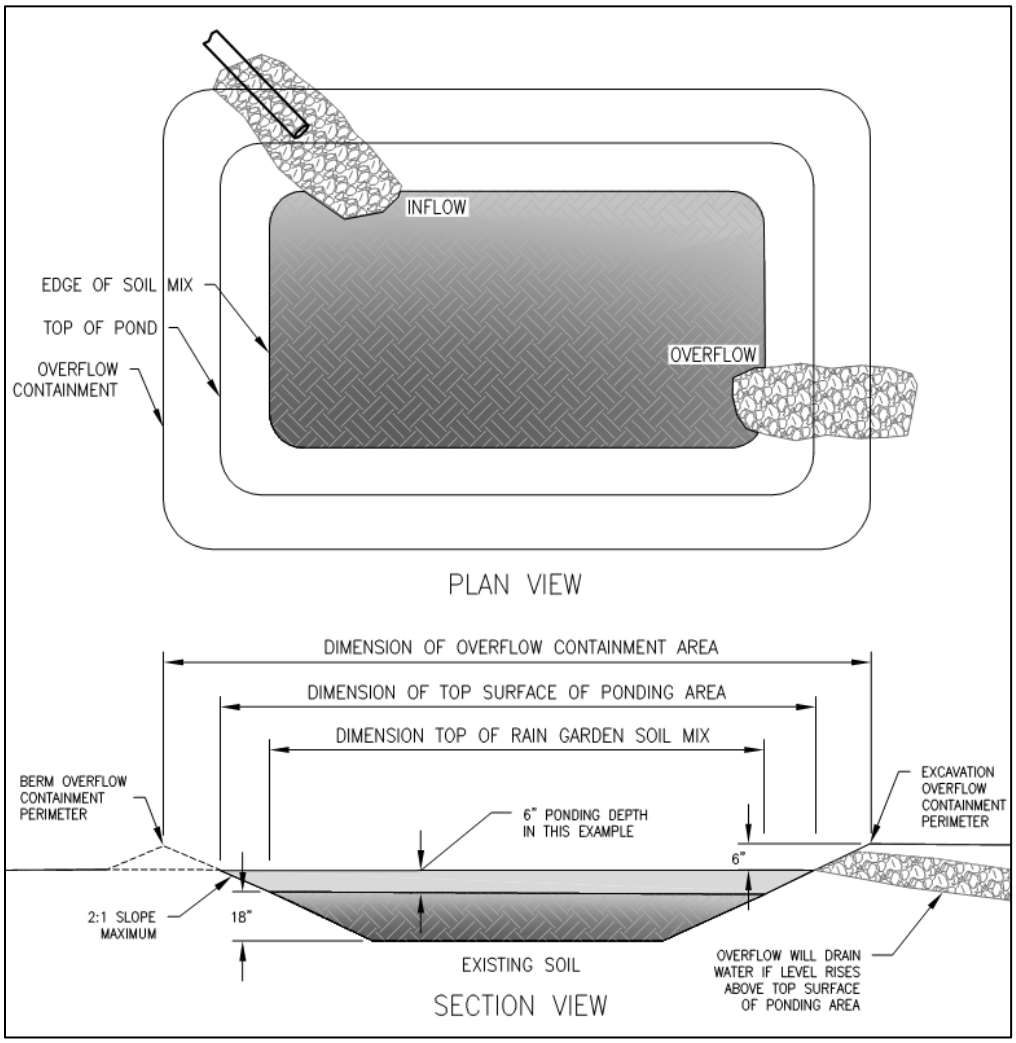
Once you have determined if a rain garden is feasible on your site, you can decide where to place your rain garden. You should locate your rain garden close to the surfaces you want to drain into it: roof downspouts, driveways, patios, etc. You may need more than one rain garden if you have a lot of impervious surfaces. Water should flow into the garden by gravity.

Rain gardens should **not** be located:

1. Within 10 feet of a building foundation.
2. Over utilities – Make sure to have all utilities located and marked before digging. Contact utility locate services by calling 811.
3. Near the edge of steep slopes or bluffs – The additional water soaking into the ground on steep slopes can cause landslides or unwanted settling. Do not build a rain garden within 50 feet of a slope greater than 20%.
4. Near a septic tank, septic drainfield, or reserve drainfield area – Provide at least 10 feet between the rain garden and an existing or planned septic system.
5. In low spots that do not drain well.
6. In areas that would require disturbing healthy native soils, trees and other vegetation – These areas already do a good job of filtering and storing stormwater.
7. Where there is high groundwater during the winter – If groundwater rises to within one foot of the bottom (excavated soil surface) of your rain garden during winter (highest level), you should consider a different location. In areas with high groundwater a rain garden will not drain or function properly.
8. Near wells – Your rain garden must be set back a minimum of 100 feet from drinking water wells.

HOW DO I DESIGN MY RAIN GARDEN?

RAIN GARDEN SCHEMATIC



1. **Soil infiltration rate:** Get the soil infiltration rate for your proposed location from information you gathered to fill out the **Abbreviated Stormwater Site Plan**. Below, fill in the infiltration rate (K_{SAT}) for the soil that covers the location where you plan to place the rain garden.

   Infiltration rate = _____ inches/hour (See page 13 of the **Abbreviated Stormwater Site Plan**)

2. **Runoff area:** Calculate the area that will drain to your rain garden. This may include a roof, patio, driveway, or other hard surface or a combination of surfaces. Or you may need to build multiple gardens to capture the runoff from different parts of your project.

   Runoff area = _____ square feet (length x width = area in square feet)

3. **Rain garden depth:** A ponding depth of either 6 inches or 12 inches is required. A shallower pond will have a larger footprint, but a deeper ponding area will take longer to drain and require more water-tolerant plants.

   Depth = ☐ 6 inches ☐ 12 inches

Refer to the Kelso Engineering Design Manual, online at www.kelso.gov/engineering/engineering-documents, for more information or clarification of stormwater requirements within Kelso. You may also contact the City of Kelso's Engineering Department at (360) 423-6590 or at www.kelso.gov/departments-services/engineering-department.

4. Pond area and location: The infiltration rate, runoff area, and depth of your pond determine the area of the pond surface.

4a. Use the chart below to find the sizing factor based on the infiltration rate and pond depth.

Ponding Depth	Infiltration Rate				
	0.10-0.24 inches/hour	0.25-0.49 inches/hour	0.5-0.99 inches/hour	1.00-2.49 inches/hour	2.50 + inches/hour
	Sizing Factor % (Sizing Factor Decimal)				
6 inches	45% (0.45)	36% (.36)	30% (.30)	25% (.25)	17% (.17)
12 inches	N/A	31% (.31)	26% (.26)	22% (.22)	17% (.17)

(Source: *Rain Garden Handbook for Western Washington*. Sizing factors are for "Best performance" in region 3, average annual precipitation 40-50 inches.)

4b. Calculate the pond surface area using the following equation:

(Runoff area _____ sq. ft.) x (Sizing factor decimal _____) = Top surface area of pond _____ (sq. ft.)

EXAMPLE:

For a rain garden with a depth of 6 inches and an infiltration rate of 0.3 in/hr, the sizing factor is 36%. If the area that drains to the rain garden (runoff area) is 1,200 sq. ft., the surface of the ponding area = 432 sq. ft.

4c. Location

Once you've determined the size of your pond, select a location on your property for the rain garden. The location should be near the source of the runoff (e.g. downspout) and where the overflow can direct water safely to a storm drain or disperse into the landscape. The shape of the pond can be adjusted to fit the space as long as the area matches the calculated **top surface of pond area** plus room for the **overflow containment area.** Determining the final dimensions of your pond may require some trial and error.

Overflow containment: After a heavy storm, water may rise above the ponding level, and the overflow containment area directs the excess to the overflow location. The extra height should be a minimum of 6 inches higher than the top of ponding surface. The sides of the rain garden should be gently sloped so the rain garden is not a hazard and to prevent erosion of the sides. With a maximum recommended slope of 2:1 (2 feet horizontal to 1 foot vertical) the pond needs an additional 1 foot of extra space all the way around. More gradual slopes will need more space.

Write down the pond slope here: _____ horizontal to _____ vertical

Calculate the extra distance required beyond the top surface of pond area dimensions and write it down here(A 2:1 slope needs 2 feet per side. A 3:1 slope needs 3 feet per side.): _____ feet per side.

Write the **top surface of pond area** dimensions here: Length _____ feet x Width _____ feet

Write the **overflow containment perimeter** dimensions here: Length _____ feet x Width _____ feet

See the example on the next page.

EXAMPLE:

The surface of the ponding area calculated in step 4b = 432 sq. ft. In this example, the rain garden must be a maximum of 20 feet wide to fit the site. Using a 2:1 slope, the garden needs an extra 1 foot on each side for the overflow containment area. Since 20 feet is the limiting dimension, subtract 2 feet to find the maximum width of the ponding area. 20 feet – 2 feet = 18 feet. Then divide the total ponding area by 18 feet. 432 sq. ft./18 feet = 24 feet.

***Top surface of pond dimensions**: Length = 24 feet, Width = 18 feet*

*Add two feet per side for the **overflow containment area dimensions**: Length = 26 feet, Width = 20 feet*

5. **Type of overflow containment area:** Decide whether to excavate or build a berm to contain overflow from the pond. The overflow containment area rises a minimum of 6 inches above the level of the **top surface of pond area**. The overflow containment area can be provided by one of two approaches:
   - Dig down from the ground surface, starting at the **overflow containment perimeter**, or
   - Build a berm that rises above the ground. In this case, the **overflow containment perimeter** marks the top of the berm. The outside slope of the berm will extend beyond this boundary. If your location is constricted, you may need to adjust the shape of your pond from step 4 above.

6. **Select a soil option:**

   Option 1. Excavate Soil and Add New Rain Garden Soil: Excavate the soil and completely replace with new rain garden soil mix. Rain garden soil mix contains about 60% screened sand and 40% compost by volume. Rain garden soil mix is available from landscape suppliers, and it may be known as 2-way mix, rain garden soil or bioretention soil. Use this option when you have poor quality soils high in clay content.

   Option 2. Excavate and amend soil for reuse: Excavate the soil, amend it by mixing in compost, and then put it back into the rain garden. Use this option when you have moderately good to good quality soils without too much clay. Mix 65% excavated soil with 35% compost.

   Option 3. Amend soil in place: Amend your existing soil in place by mixing in compost after you've excavated to the proper depth. Use this option if you have good quality soil with minimal clay content and a soil drainage rate of more than 1 inch per hour. With this option, you won't excavate as deeply (see below).

   Note: In all cases, compost for rain gardens must not contain manure or biosolids. Avoid mushroom compost.

7. **Determine the depth of excavation necessary**:

Soil Options 1 and 2:

					Example
Ponding depth	❑ 6	or	❑ 12	inches	*6 inches*
+ Soil mix depth		+ 18		inches	*+18*
+ Overflow containment area depth (do not add if building a berm)		+ 6		inches (minimum)	*+6*
= Excavation depth	=			inches	*= 30*

Soil Option 3:

					Example
Ponding depth	❑ 6	or	❑ 12	inches	*12 inches*
+ Room for compost		+ 3		inches	*+3*
+ Overflow containment area depth (do not add if building a berm)		+ 6		inches (minimum)	*+0 (berm)*
= Excavation depth	=			inches	*=15*

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8. Calculate quantity of rain garden soil mix or compost required

Order the correct quantities in cubic yards from a permitted compost facility.

Soil Option 1:

		Example
Top surface of ponding area (From "How do I design my rain garden?") Multiply by rain garden soil mix depth	_____square feet x 1.5 feet _____cubic feet	*200 sq. ft.* *x 1.5 feet* *300 cu. ft.*
Divide by 27 (cubic feet to cubic yards)	÷ 27 _____cubic yards	*300 cu. ft.* *÷ 27* *11.1 cu. yds.*
Round down	**_____cubic yards** **Rain garden soil mix**	***11 cu. yds.***

Soil Option 2:

		Example
Top surface of ponding area (From "How do I design my rain garden?") Multiply by rain garden soil mix depth	_____square feet x 1.5 feet _____cubic feet	*200 sq. ft.* *x 1.5 feet* *300 cu. ft.*
Divide by 27 (cubic feet to cubic yards) *Total rain garden soil required*	÷ 27 _____*cubic yards*	*300 cu. ft.* *÷ 27* *11.1 cu. yds.*
Multiply **Total** by 0.65	x 0.65 _____cubic yards	*11.1 cu. yds.* *x 0.65* *7.2 cu. yds.*
Round down	**_____cubic yards** **Saved excavated soil**	***7 cu. yds.***
Multiply **Total** by 0.35	x 0.35 _____cubic yards	*11.1 cu. yds.* *x 0.35* *3.9 cu. yds.*
Round down	**_____cubic yards** **Compost**	***3 cu. yds.***

Note: The pre-rounded saved excavated soil and compost values should add up to the total rain garden soil required.

Soil Option 3:

		Example
Top surface of ponding area (From "How do I design my rain garden?") Multiply by 0.25 feet (3 inches)	_____square feet x 0.25 feet _____cubic feet	*200 sq. ft.* *x 0.25 feet* *50 cu. ft.*
Divide by 27 (cubic feet to cubic yards)	÷ 27 _____cubic yards	*50 cu. ft.* *÷ 27* *1.85 cu. yds.*
Round down	**_____cubic yards** **Rain garden soil mix**	***1 cu. yds.***

HOW DO I BUILD MY RAIN GARDEN?

1. **Design the inflow and outflow**

   Inflow: Water can be delivered to your rain garden across a landscaped area, through an open swale, or through a pipe. If the slope is gentle (2% or less) and the swale or landscaped area is well protected with vegetation or rock, then no special design is needed. If the slope is more than 2% and water is directed through a swale, add small rock check dams every 5 to 10 feet to slow the water. Where water enters the rain garden from a swale or pipe, place a pad of rock to slow the water and guard against erosion.

   Outflow: During winter most of the water that flows into your rain garden will soak into the ground. During a big storm, the rain garden may fill up and overflow. Design the rain garden with an overflow lined with rock to protect from erosion. Extend the rock about 4 feet outside the rain garden to slow water as it exits. Direct water safely to a storm drain or disperse into the landscape.

2. **Lay out**

   Lay out the rain garden using the pond surface area from 4b. of "How Do I Design My Rain Garden?" Then add the extra space required for the overflow containment area required by the side slopes.

3. **Excavate**

   Gently slope the sides with a minimum of 2:1 (horizontal distance to vertical distance) slope. To prevent compacting the soil under the rain garden, don't excavate when soil is wet and don't use machinery inside the rain garden area. Compacting the soil greatly reduces the infiltration capacity and may render the rain garden useless.

4. **Overflow containment area**

   The overflow containment area can be provided by one of two approaches (refer back to perimeter in step 5 on page 4):

   - **Dig down from the ground surface.** Start at the **overflow containment perimeter** and slope the sides evenly into the garden at the chosen slope (maximum 2:1).
   - **Create a berm.** Use soil to build a berm that rises evenly (at a maximum of 2:1 slope) from the outside of the **top surface of the ponding area** to the top of the berm (**overflow containment perimeter)** a minimum of 6 inches above the top surface of the ponding area. If a berm is used, it must be water tight. If your soil is sandy, you may need to import soil with higher clay or silt content. Before the soil is placed remove all vegetation and rough up the ground under the berm. Firmly compact the berm every few inches as you add soil.

5. **Level bottom**

   Rain gardens need a level bottom to function properly. This allows the water to spread out and infiltrate across the entire surface.

6. **Install inflow**

   Install the pipe or downspout extension to carry water to your rain garden if you're using one, and test that water flows freely to the rain garden.

7. **Place soil mix**

   Soil Options 1 and 2: Avoid compacting the pond area. Before adding rain garden soil mix, use a rake, shovel or rototiller to rough up the bottom of the excavated area. Roughing up the soil at the bottom will improve drainage in the garden. Place the soil mix in the rain garden about 6 inches at a time and lightly tamp down. Fill the soil to the level that provides the desired ponding depth and overflow containment area. When placing the soil mix, keep the bottom of the rain garden flat and level.

   Soil Option 3: Spread 3 inches of compost at the bottom of the garden and till to a depth of 4 or 5 inches. When placing the compost and tilling, keep the bottom of the rain garden flat and level.

8. Protect the inflow and outflow

Place a pad of rock where water enters the rain garden and where water exists at the overflow. The rock slows the flow of the water and prevents erosion. Use round rock that is a minimum of 2 inches in diameter. If the overflow is through a berm, armor the overflow with extra rock, and extend the rock down the slope a minimum of 4 feet to prevent erosion.

HOW DO I PLANT MY RAIN GARDEN?

Plant easy to maintain native or adapted plants in your rain garden. Plants must be selected from the City of Kelso approved plant list. The list of recommended plants starts on page 9.

There are two planting zones:

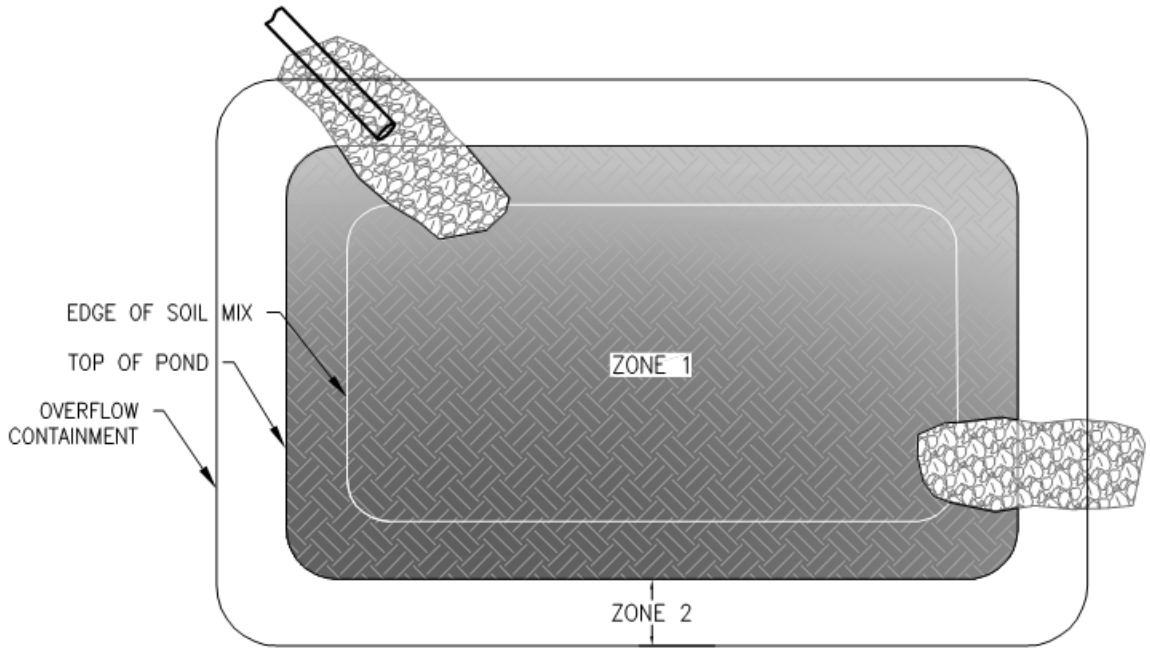
- Zone 1 is the bottom of the rain garden below the ponding depth, the wettest area.
- Zone 2 covers the side slopes above the ponding depth and the area around the perimeter or on the berm, where plants will grow in drier soil.

The recommended plant size is a 1 gallon container. For grasses, plant at a rate of 115 for 100 sq. ft. For shrubs, plant at a rate of 13 per 100 sq. ft. and space at approximately 3' on center. Distribute plants evenly throughout the rain garden.

After planting, place two to three inches of mulch over the surface of the rain garden. Compost mulch is recommended. Do not use grass clippings, pine bark or beauty bark as mulch.

Until the plants are established and thriving, they need to be irrigated or watered regularly. After the plants are established, they usually will not require watering. Keep weeds down by hand pulling before they go to seed and by refreshing compost. Always refresh compost on bare spots in soil. Avoid using herbicides and fertilizers in your rain garden.

PLANTING ZONES



RAIN GARDEN PLANTING LIST

From the Kelso Engineering Design Manual.

ZONE 1: TREATMENT AREAS / WET TO MOIST				
COMMON NAME	***BOTANICAL NAME***	**HT.**	**EXPOSURE**	**REMARKS**
-----TREES-----				
Use only in 6' width minimum facilities				
Tupelo	*Nyssa sylvatica*	30'	Sun/Part Shade	Brilliant and varied fall color
-----SHRUBS-----				
Use only in 6' width minimum facilities				
Redtwig Dogwood	*Cornus sericea*	6'	Sun to Shade	
Clustered Wild Rose	*Rosa pisocarpa*	6'-8'	Sun/Part Shade	Adaptable to drought and innundation. Fruit persists.
Hardhack	*Spiraea douglasii*	4'-7'	Sun/Part Shade	Purple spiked flowers in summer.
-----EMERGENTS-----				
Sough Sedge	*Carex obnupta*	1'-5'	Sun/Part Shade	Very successful LIDA plant. Adaptable to drought and innundation.
Sawbeak Sedge	*Carex stipata*	10"-3'	Sun/Part Shade	
Orange Sedge	*Carex testacea*	20"	Sun/Part Shade	Orange-brown leaves provide color variation. Useful adjacent to curb or sidewalk where shorter plants are desired.
Fox Sedge	*Carex vulpinoidea*	24"	Sun/Part Shade	
Soft Rush	*Juncus effusus var. pacificus*	1'-2'	Sun/Part Shade	
Dagger-leaf Rush	*Juncus ensifoloius*	12"-18"	Sun/Part Shade	Useful adjacent to curb or sidewalk where shorter plants are desired. Seed heads provide interest.
Spreading Rush	*Juncus patens*	36"	Sun/Part Shade	
Slender Rush	*Juncus tenuis*	6"-2.5'	Sun/Part Shade	
Small fruited Bullrush	*Scirpus microcarpus*	24"	Sun/Part Shade	
-----BULBS-----				
Gream Camas Lily	*Camassia leichtlinii*	12"	Sun/Part Shade	
Common Camas	*Camassia quamash*	24"	Sun/Part Shade	

ZONE 2: SIDESLOPES / MOIST TO DRY				
COMMON NAME	***BOTANICAL NAME***	**HT.**	**EXPOSURE**	**REMARKS**
-----TREES-----				
Tupelo	*Nyssa sylvatica*	30'	Sun/Part Shade	Brilliant and varied fall color
Vine Maple	*Acer circinatum*			
-----SHRUBS, GRASSES, HERBACEOUS-----				
Kelsey Redtwig Dogwood	*Cornus sericea*	20"	Sun/Part Shade	
Tufted Hairgrass	*Deschampsia cespitosa*	36"	Sun/Part Shade	Use where not adjacent to curb or sidewalk
Autumn Glory Hebe	*Hebe 'Autumn Glory*	18"	Sun/Part Shade	
Dull Oregon Grape	*Mahonia nervosa*	24"	Part Sun/Part Shade	
Creeping Oregon Grape	*Mahonia repens*	12"	Sun/Part Shade	
Birchleaf Spirea	*Spiraea betulifolia*	24"	Sun/Part Shade	
Snowberry	*Symphoricarpos albus*	36"	Sun/Part Shade	
-----BULBS-----				
Great Camas Lily	*Camassia leichtlinii*	12"	Sun/Part Shade	
Common Camas	*Camassia quamash*	24"	Sun/Part Shade	
-----GROUNDCOVER-----				
Kinnikinnick	*Arctostaphylos uva-ursi*	6"	Sun/Part Shade	
Creeping Raspberry	*Camassia quamash*	6"	Sun/Part Shade	

Note: Trees and shrubs are not required in Zone 1.

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RAIN GARDEN SUBMITTAL INSTRUCTIONS

Your rain garden must be approved by the City as part of the **Abbreviated Stormwater Site Plan** before you may build it. You must submit a plan drawing, a cross-section drawing, and a planting plan for review with the **Abbreviated Stormwater Site Plan**.

The rain garden drawings and planting plan show information necessary to construct and plant the rain garden. For each drawing and the planting plan, you may fill out the worksheets attached to this handout or may prepare your own following the instructions below.

1. Plan Drawing

A plan drawing is an overhead view or map view of the rain garden. For example, the illustration of planting zones on page 8 is a plan drawing. **Select one option:**

Option 1: Fill Out Submittal Worksheet #1	Option 2: Draw Your Own
1. Fill out the top portion of Worksheet #1 2. Choose a scale for the drawing (how many feet each grid square represents), and place a checkmark next to the scale you will use at bottom right. 3. Draw and label the outline of the top surface of ponding area and the overflow containment area. Include dimensions (length and width) for both. 4. Draw and label the locations of the inflow(s) and outflow. 5. Write the area of the top surface of ponding area in the space provided below the grid. 6. Draw a north arrow.	1. Use 8½x11 or 11x17 graph paper. 2. Choose a scale for the drawing (how many feet each inch or grid square represents), and write the scale on the drawing. 3. Label the paper with the site address and applicant name and contact information. 4. Draw and label the outline of the top surface of ponding area and the overflow containment area. Include dimensions (length and width) for both. 5. Draw and label the locations of the inflow(s) and outflow. 6. Write the area (sq. ft.) of the top surface of ponding area within the pond outline. 7. Draw a north arrow.

2. Cross-Section Detail Drawing

A cross-section drawing depicts a hypothetical slice of the rain garden from top to bottom and side to side. For example, the illustration on the front page of this handout is a cross-section. **Select one option:**

Option 1: Fill Out Submittal Worksheet #1	Option 2: Draw Your Own
1. The bottom portion of Worksheet #1 shows a cross-section view already drawn. 2. In the spaces and checkboxes provided, fill in the following information: a. Mark the box indicating whether you are excavating or building a berm for the overflow containment area. b. Ponding depth (6 inches or 12 inches). c. Slope of sides (2 horizontal to 1 vertical (2:1) is the steepest slope allowed).	1. Use 8½x11 or 11x17 graph paper. 2. Label the paper with the site address and applicant name and contact information. 3. Draw and label the excavation contour and berm contour (if building a berm) . 4. Write the slope of the sides on the drawing (2 horizontal to 1 vertical (2:1) is the steepest slope allowed). 5. Write the ponding depth on the drawing. 6. The cross-section drawing does not need to be to scale.

3. Planting Plan

The planting plan shows a plan view drawing (either schematic or to scale) and lists the plant species and numbers of plants needed to plant the garden. **Select one option:**

Option 1: Fill Out Submittal Worksheet #2	Option 2: Draw Your Own	Option 3: Use the **Optional Schematic Rain Garden Planting Plan**
1. Choose a scale for the drawing (how many feet each grid square represents), and place a checkmark next to the scale you will use at bottom right. 2. Draw the outlines of the top surface of ponding area and the overflow containment area. Label these as Zone 1 and Zone 2 (see Planting Zones on page 8). 3. Write the areas in square feet of Zone 1 and Zone 2 at the bottom of the drawing. 4. Draw a north arrow. 5. Write the plant species chosen for Zone 1 and Zone 2 (see Planting Zones on page 8). 6. Write the number of plants and sizes of containers needed in the tables. 7. Label the plants on the plan using the letters (A., etc.) from the plant zone tables on the worksheet.	1. Use 8½x11 or 11x17 graph paper. 2. Choose a scale for the drawing (how many feet each inch or grid square represents), and write the scale on the drawing. 3. Label the paper with the site address and applicant name and contact information. 4. Draw the outlines of the top surface of ponding area and the overflow containment area. Label these as Zone 1 and Zone 2 (see Planting Zones on page 8). 5. Write the areas in square feet of Zone 1 and Zone 2 at the bottom of the drawing. 6. Draw a north arrow. 7. List the plant species, number of plants and sizes of containers used for both Zone 1 and Zone 2 at the bottom of the drawing. 8. Label the plant species on the plan drawing.	1. Use the **Optional Schematic Rain Garden Planting Plan and Worksheet for Private Property** 2. Write the project address and date at the bottom of the page. 3. Write the area and number of plants required for Zone 1 and Zone 2 above the tables. 4. Write the plant species chosen in the tables for Zone 1 and Zone 2 (see Planting Zones on page 8). 5. Write the percent of the zone that will be planted with each species. 6. Write the number of containers of each species required.

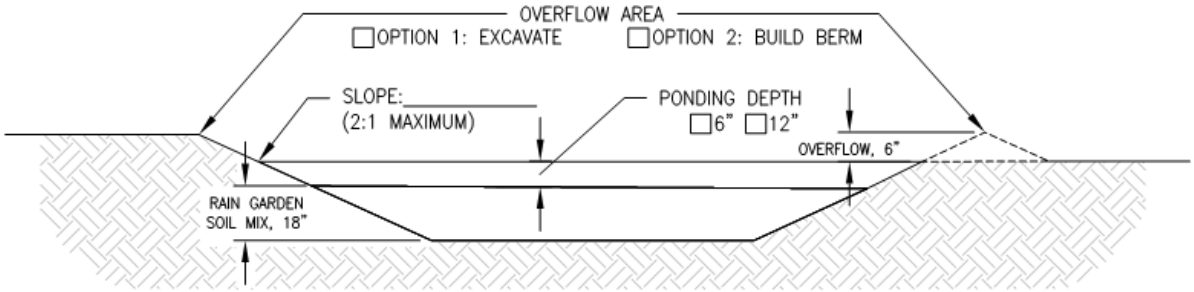
SUBMITTAL WORKSHEET #1: RAIN GARDEN PLAN AND SECTION DETAIL

INDICATE NORTH:

AREA (TOP SURFACE OF PONDING AREA): _____ SQ. FT.

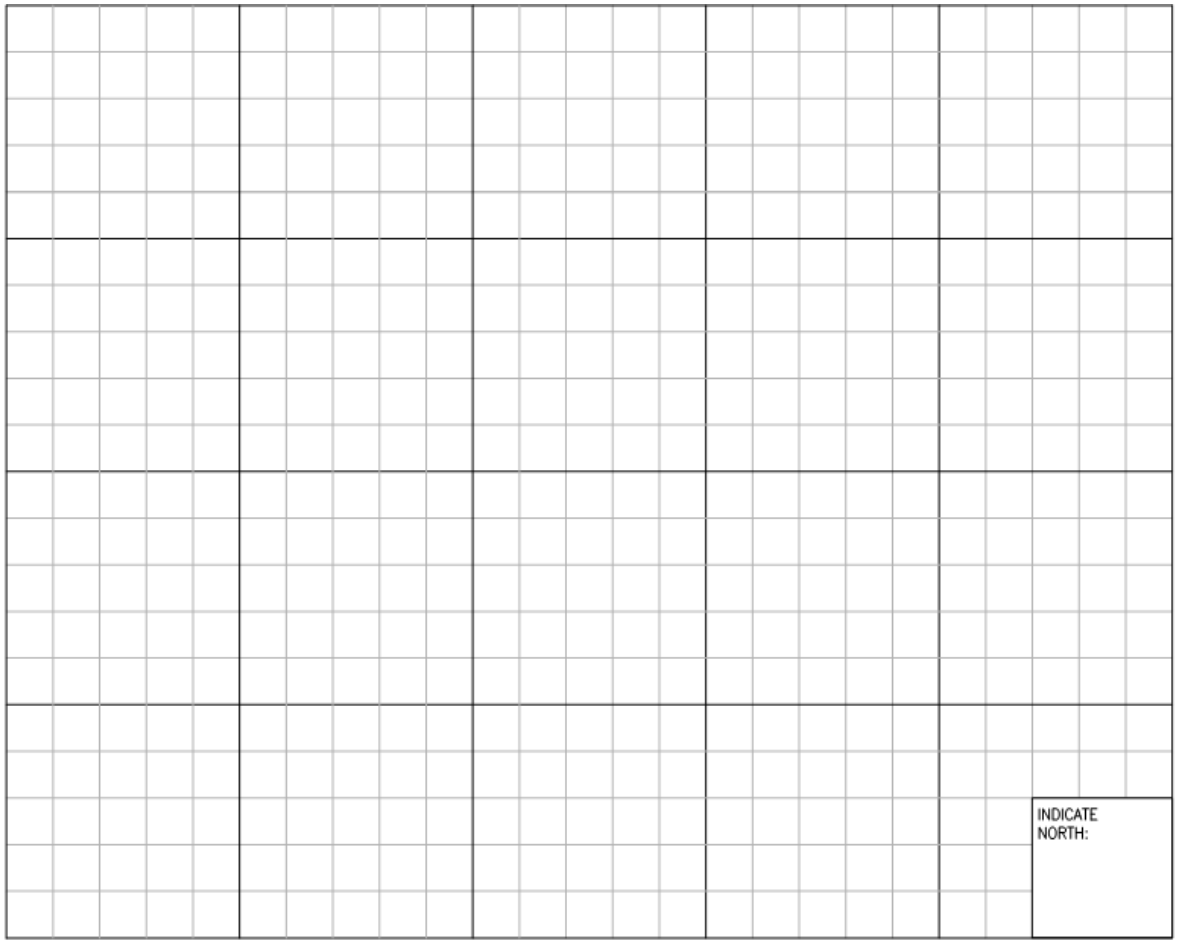
CHECK SCALE USED: ☐ ONE SQUARE = 1 FOOT
☐ ONE SQUARE = 2 FEET

PLAN VIEW



CROSS–SECTION VIEW

SUBMITTAL WORKSHEET #2: RAIN GARDEN PLANTING PLAN



AREA ZONE 1: _____ SQ. FT.

AREA ZONE 2: _____ SQ. FT.

CHECK SCALE USED: ☐ ONE SQUARE = 1 FOOT
☐ ONE SQUARE = 2 FEET

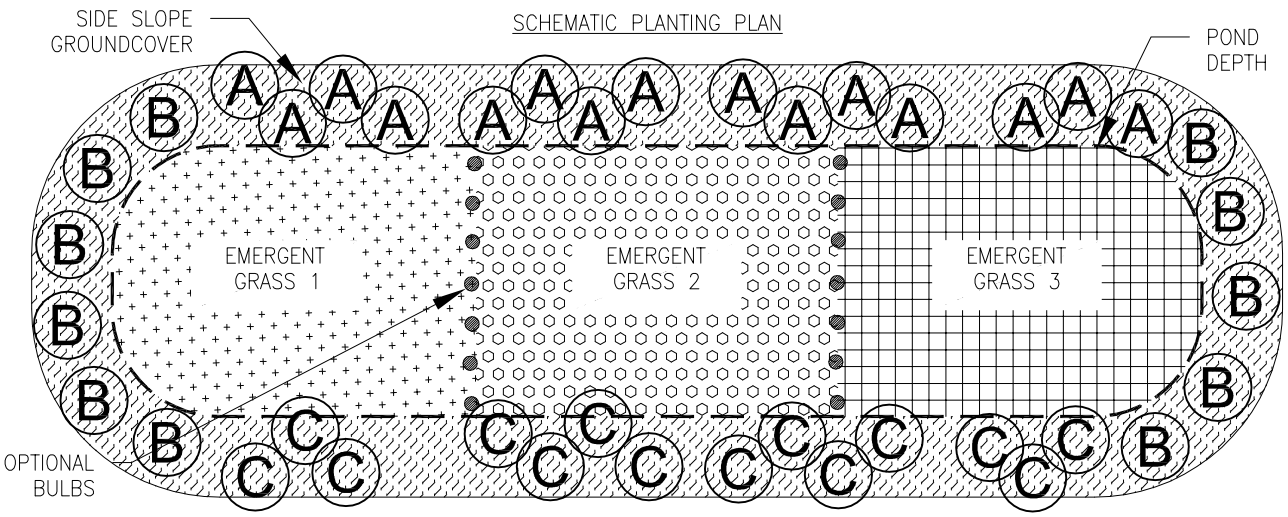
PLAN VIEW

ZONE 1 PLANTS:

	PLANT NAME	QUANTITY	CONTAINER SIZE
A.			
B.			
C.			
D.			

ZONE 2 PLANTS:

	PLANT NAME	QUANTITY	CONTAINER SIZE
E.			
F.			
G.			
H.			



SECTION ONE: INSTRUCTIONS TO ENGINEER/DESIGNER/HOMEOWNER:

FILL OUT PLANT SELECTION AND QUANTITY IN SECTION 2 PER THESE NOTES:

1) SELECT PLANTS ACCORDING TO ZONE FROM ADOPTED CITY OF KELSO BIORETENTION PLANT LIST.
2) ZONE 1, WET TO MOIST: PLANT (3) SPECIES OF EMERGENTS FROM THE ZONE 1 PLANT LIST, 1/3 OF THE TOTAL AREA PER SPECIES. PLANT AT A RATE OF 115 PER 100 SF.
3) ZONE 2, MOIST TO DRY: PLANT AT LEAST (3) SPECIES OF SHRUBS FROM THE ZONE 2 PLANT LIST AT A RATE OF 13 SHRUBS PER 100 SF (APPROX. 3' O.C.) DISTRIBUTE SHRUBS EVENLY THROUGHOUT ZONE 2 AREA.
4) NO HEAVY EQUIPMENT SHALL BE USED WITHIN THE PERIMETER OF THE BIORETENTION FACILITY BEFORE, DURING, OR AFTER THE PLACEMENT OF THE BIORETENTION SOIL MIX.

SECTION TWO: INSTRUCTIONS TO CONTRACTOR:

PLANT SELECTION AND QUANTITIES

ZONE 1 AREA IN SF: _____ (AREA AT POND DEPTH)

ZONE 1 NUMBER OF REQ'D PLANTS (@115 /100 SF):_____

	NAME	% TOT	QTY	SIZE
GRASS 1				#1 CONT
GRASS 2				#1 CONT
GRASS 3				#1 CONT

ZONE 2 AREA IN SF: _____

ZONE 2 NUMBER OF REQ'D SHRUBS (@18 /100 SF):_____

	NAME	% TOT	QTY	SIZE
SHRUB A				#1 CONT
SHRUB B				#1 CONT
SHRUB C				#1 CONT
GROUND COVER	KINNIKINNICK (20 PER 100 SF) Arctostaphylos uva-ursi			#1 CONT

PLANTING LEGEND

SYMBOL	DESCRIPTION
	EMERGENT GRASS 1 FROM ZONE 1 LIST
	EMERGENT GRASS 2 FROM ZONE 1 LIST
	EMERGENT GRASS 3 FROM ZONE 1 LIST
	KINNIKINNICK Arctostaphylos uva-ursi 20 PER 100 SF, TRIANGULAR SPACING, #1 CONT.
A	SHRUB A FROM ZONE 2 LIST
B	SHRUB B FROM ZONE 2 LIST
C	SHRUB C FROM ZONE 2 LIST
	OPTIONAL BULB FROM ZONE 1, 2 PLANT LIST

OPTIONAL SCHEMATIC RAIN GARDEN PLANTING PLAN AND WORKSHEET FOR PRIVATE PROPERTY

PROJECT ADDRESS: _____

DATE: _____