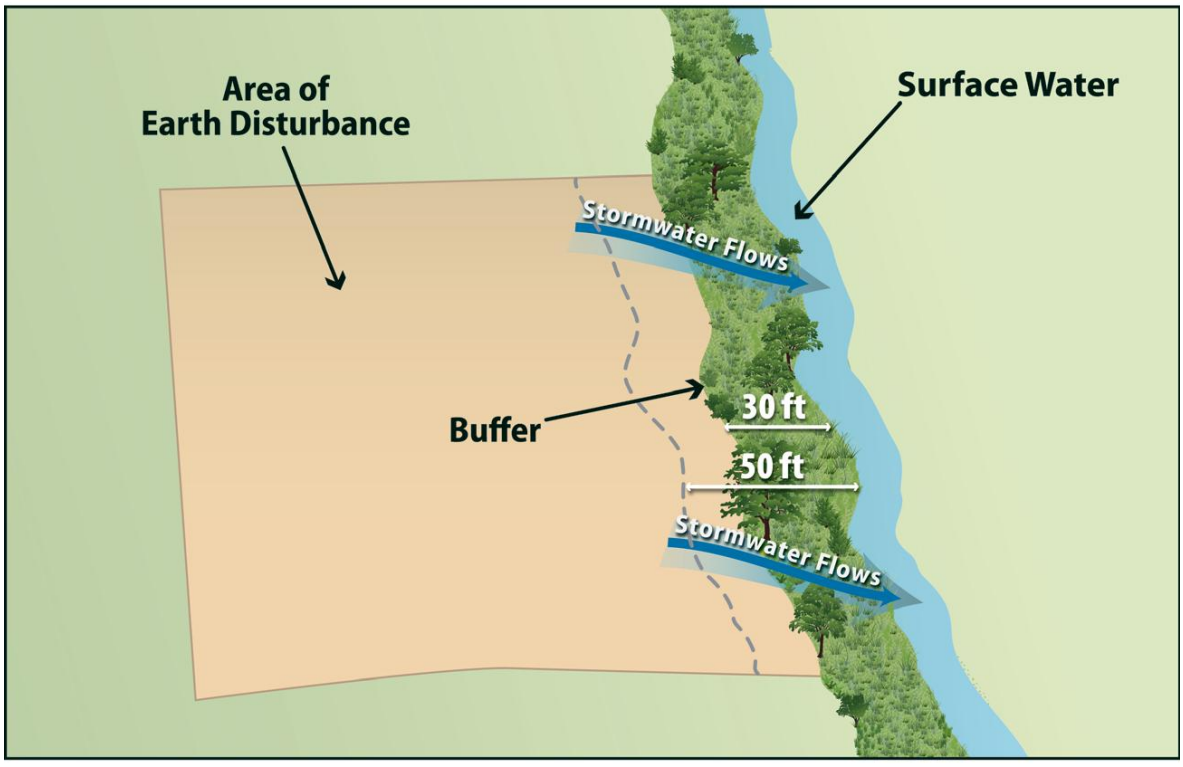
BUFFER GUIDANCE

The purpose of this guidance is to assist you in complying with the requirements in Parts 3.3.1.A and 3.5.2.A of this permit regarding the establishment of natural buffers or equivalent sediment controls.

Step 1 - Determine Whether 100 Feet or 50 Feet of Natural Buffer Is Required

If your land disturbing activities will occur within the Aquatic Resources of Concern which are identified by USFWS and ODWC, a vegetated buffer of at least 100 feet is required between the area disturbed and all perennial or intermittent streams on or adjacent to the construction site, or a vegetated buffer of at least 50 feet is required between the area disturbed and all ephemeral streams. If your disturbing activities will be adjacent to the waters of the State, a vegetated buffer of at least 50 feet is required. Figure I – 1 illustrates when a site would be required to comply with the requirements in Part 3.3.1.D due to their proximity to surface waters. If the surface water is not located within 50 feet of the earth-disturbing activities, Part 3.3.1 does not apply. If you determine that the buffer requirements apply to your site and those buffer requirements cannot be met, you may continue on to Step 2.

Figure I - 1. Example of Earth-Disturbing Activities within 50 feet of a Surface Water



Step 2 - Determine Compliance Alternatives to the Buffer Requirements

You have three compliance alternatives from which you can choose:

Alternative 1. Provide and maintain a 100-foot or 50-foot undisturbed natural buffer; or

Alternative 2. Provide and maintain an undisturbed natural buffer that is less than 100-feet or 50-feet and is supplemented by additional erosion and sediment controls, which in

combination achieves the sediment load reduction equivalent to a 100-foot or 50-foot undisturbed natural buffer; or

Alternative 3. If it is infeasible to provide and maintain an undisturbed natural buffer of any size, you must implement erosion and sediment controls that achieve the sediment load reduction equivalent to a 100-foot or 50-foot undisturbed natural buffer.

The compliance alternative selected above must be maintained throughout the duration of permit coverage. The following provides detailed guidance for how you can comply with each of the compliance alternatives. Part I.1 below provides guidance on how to provide and maintain natural buffers consistent with the Alternatives 1 and 2. Part I.2 below provides guidance on how to comply with the requirement to provide a 100-foot or 50-foot buffer equivalent through erosion and sediment controls consistent with Alternative 2 and 3.

I.1 Guidance for Providing and Maintaining Natural Buffers

The following guidance is intended to assist you in complying with the requirements to provide and maintain a natural buffer during construction. This part of the guidance applies to you if you choose either Alternative 1 (100-foot or 50-foot buffer) or Alternative 2 (a buffer of < 100 feet or < 50 feet supplemented by additional erosion and sediment controls that achieve the equivalent sediment load reduction as the 100-foot or 50-foot buffer).

A. ***Buffer Width Measurement.*** Where you are retaining a buffer of any size, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the water:

1. The ordinary high water mark of the water body, defined as the line on the shore established by fluctuations of water and indicated by physical characteristics such as a clear, natural line impressed on the bank, shelving, changes in the character of soil, destruction of terrestrial vegetation, and/or the presence of litter and debris; or

2. The edge of the stream or river bank, bluff, or cliff, whichever is applicable.

Refer to Figure I – 2 and Figure I - 3. You may find that specifically measuring these points is challenging if the flow path of the surface water changes frequently, thereby causing the measurement line for the buffer to fluctuate continuously along the path of the waterbody. Where this is the case, DEQ suggests that rather than measuring each change or deviation along the water's edge, it may be easier to select regular intervals from which to conduct your measurement. For instance, you may elect to conduct your buffer measurement every 5 to 10 feet along the length of the water.

Figure I - 2. This image shows buffer measurement from the ordinary high water mark of the water body, as indicated by a clear natural line impressed on the bank, shelving, changes in the character of the soil, destruction of terrestrial vegetation, and/or the presence of litter/debris

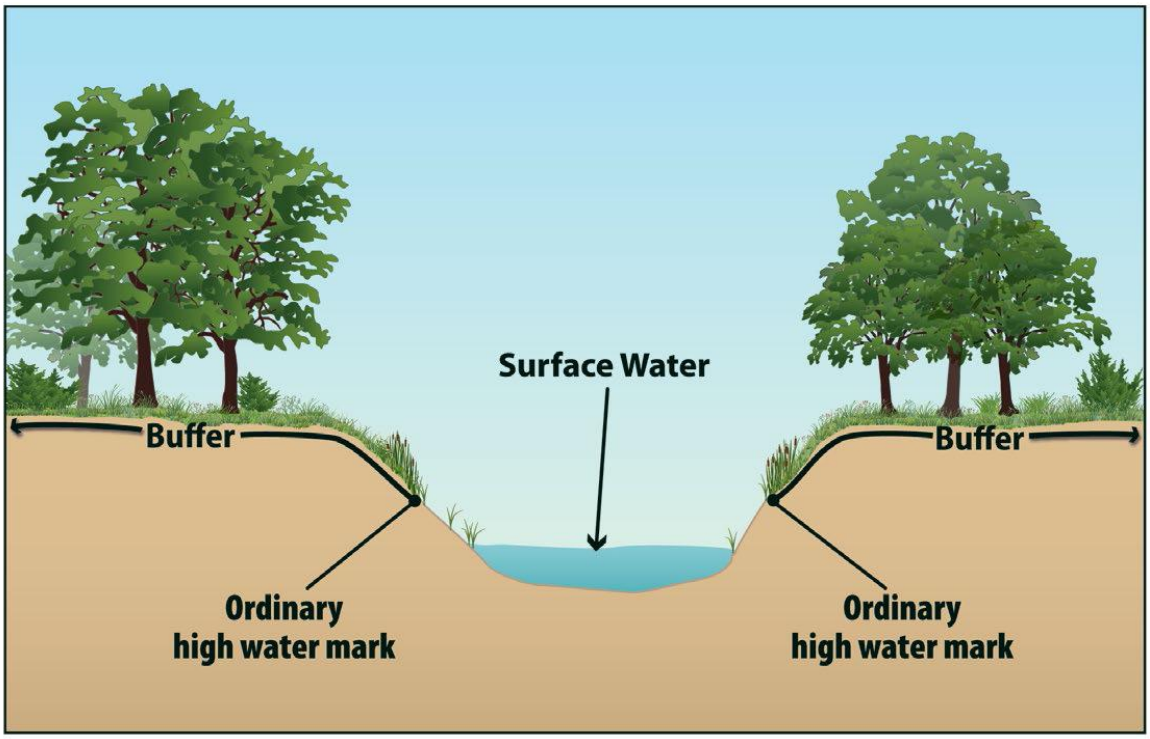
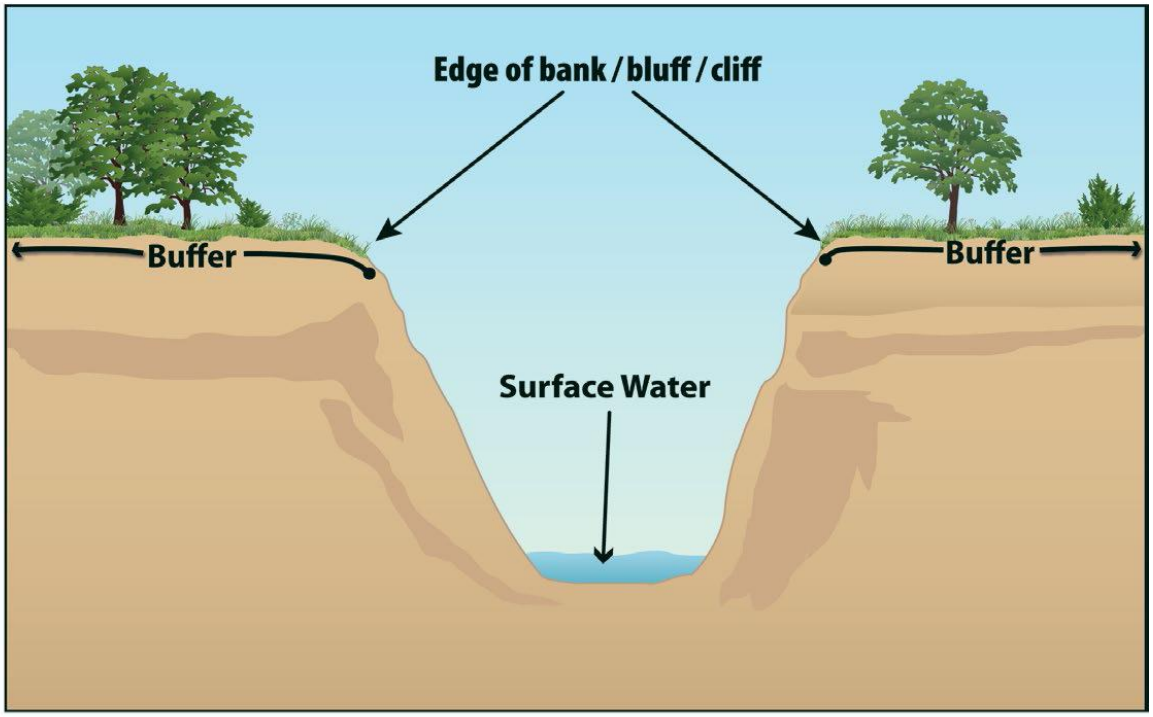


Figure I - 3. This image shows buffer measurement from the edge of the bank, bluff, or cliff, whichever is applicable



B. ***Limits to Disturbance within the Buffer.*** You are considered to be in compliance with this requirement if you retain and protect from construction activities the natural buffer that existed prior to the commencement of construction. If the buffer area contains no vegetation prior to the commencement of construction (e.g., sand or rocky surface), you are not required to plant any additional vegetation. As noted above, any preexisting structures or impervious surfaces are allowed in the buffer provided you retain and protect from disturbance the vegetation in the buffer outside the preexisting disturbance.

To ensure that the water quality protection benefits of the buffer are retained during construction, you are prohibited from conducting any earth-disturbing activities within the buffer during permit coverage.

C. ***Discharges to the Buffer.*** You must ensure that all discharges from the area of earth disturbance to the natural buffer are first treated by the site's erosion and sediment controls (*for example, you must comply with the Part 3.3.1.F.2 requirement to establish sediment controls around the downslope perimeter of your site disturbances*), and if necessary to prevent erosion caused by stormwater flows within the buffer, you must use velocity dissipation devices.

D. ***SWP3 Documentation.*** You must document the reduced width of the buffer you will be retaining and you must also describe the erosion and sediment controls you will use to achieve an equivalent sediment reduction, as described in Part I.2 below. Note that you must also show any buffers on your site plan in your SWP3. Additionally, if any disturbances related to the exceptions in Part 3.3.1.A (also see Step 2 of Part 11) occur within the buffer area, you must document this in the SWP3.

I.2 Guidance for Providing the Equivalent Sediment Reduction as the 100-foot or 50-foot Buffer

If you are selecting Alternative 2 (provide and maintain a buffer that is less than 100feet or 50 feet that is supplemented by additional erosion and sediment controls that, together, achieve the equivalent sediment load reduction as the 100-foot or 50-foot buffer) or Alternative 3 (implement erosion and sediment controls that achieve the equivalent sediment load reduction as the 100-foot or 50-foot buffer), the following guidance is intended to assist you in demonstrating that you will achieve the equivalent sediment reduction as the 100-foot or 50-foot buffer.

A. ***Determine Whether It Is Feasible to Provide a Reduced Buffer.*** DEQ recognizes that there will be a number of situations in which it will be infeasible to provide and maintain a buffer of any width. While some of these situations may exempt you from the buffer requirement entirely (See Part 3.3.1.A), if you do not qualify for one of these exemptions, there still may be conditions or circumstances at your site that make it infeasible to provide a natural buffer. For example, there may be sites where a significant portion of the property on which the earth-disturbing activities will occur is located within the buffer area, thereby precluding the retention of natural buffer areas. DEQ believes there are likely to be other examples of situations that make it infeasible to provide any buffer area.

Therefore, in choosing between the 2 different compliance alternatives (Alternative 2 or 3), you should only elect to comply with Alternative 2 if it is feasible for you to retain any natural buffer

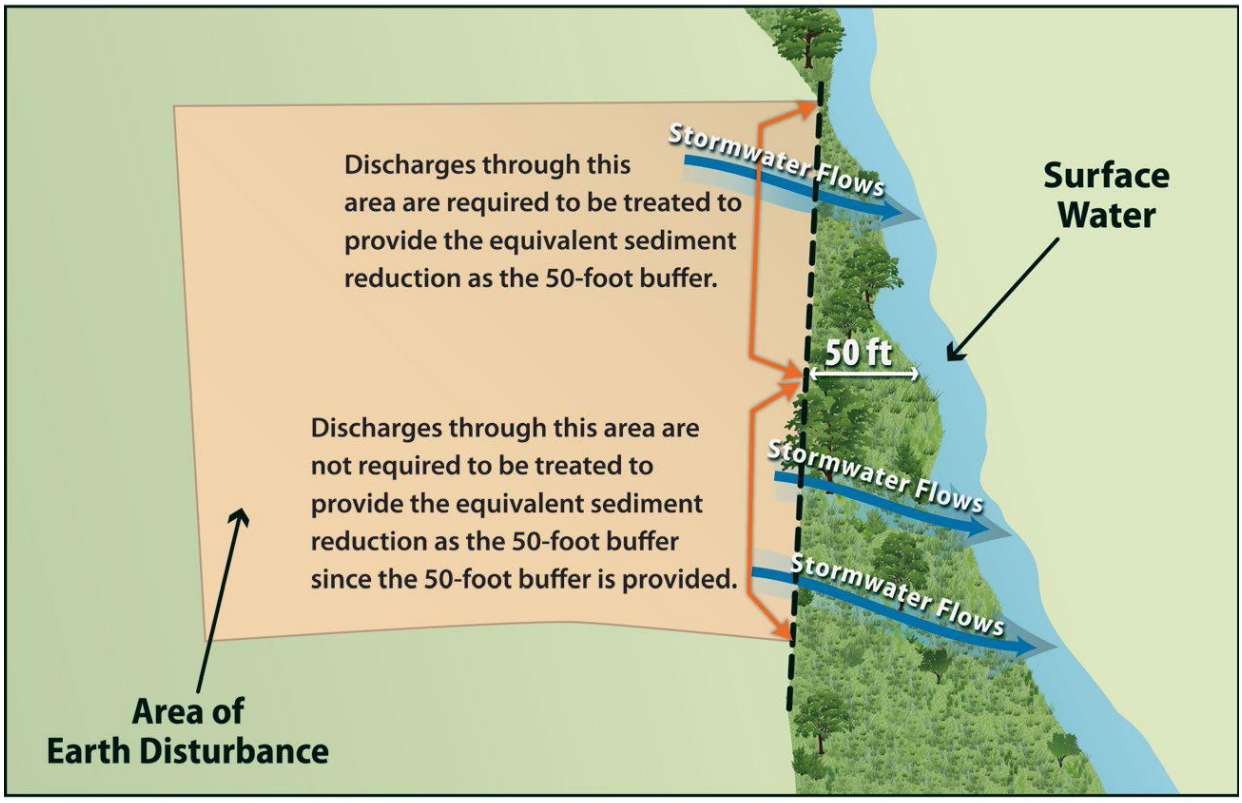
on your site. (Note: For any buffer width retained, you are required to comply with the requirements in Part I.1, above, concerning the retention of vegetation and restricting earth disturbances.) Similarly, if you determine that it is infeasible to provide a natural buffer of any size during construction, you should elect to comply with Alternative 3. After making this determination, you should proceed to Part I.2 to determine how to provide controls that, together with any buffer areas that is being retained, if applicable, will achieve an equivalent sediment load reduction as the 100-foot or 50-foot buffer. You must describe why it is infeasible to provide and maintain an undisturbed natural buffer of any size in the SWP3.

B. ***Design Controls That Provide Equivalent Sediment Reduction as 100-foot or 50-foot Buffer***

You must next determine what additional controls must be implemented on your site alone or in combination with any retained natural buffer, to achieve a reduction in sediment equivalent to that achieved by a 100-foot or 50-foot buffer.

Note that if only a portion of the natural buffer is less than 50 feet, you are only required to implement erosion and sediment controls that achieve the sediment load reduction equivalent to the 100-foot or 50-foot buffer for discharges through that area. You would not be required to provide treatment of stormwater discharges that flow through 100 feet 50 feet or more of natural buffer. See Figure I - 4.

Figure I - 4 Example of how to comply with the requirement to provide the equivalent sediment reduction when only a portion of your earth-disturbances discharge to a buffer of less than 100 feet or 50 feet



Guidelines to help you work through these requirements are provided below.

Step 1 - Estimate the Sediment Reduction from Your Site if You Had Retained a 100-foot or 50-foot Natural Buffer

In order to design controls that match the sediment removal efficiency of a 100-foot or 50- foot buffer, you first need to know what this efficiency is for your site. The sediment removal efficiencies of natural buffers vary according to a number of site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of sediment controls used to reduce the discharge of sediment prior to the buffer. DEQ has simplified this calculation by developing buffer performance tables covering a range of vegetation and soil types for the areas covered by the permit. See Attachment 1, Tables I - 1 through I - 4.

Note: buffer performance values in Tables I - 1 through I - 4 represent the percent of sediment captured through the use of perimeter controls (e.g., silt fences) and 100-foot or 50-foot buffers at disturbed sites of fixed proportions and slopes. Using Tables I - 1 through I - 4 (see Attachment 1), you can determine the sediment removal efficiency of a 100-foot or 50-foot buffer for your geographic area by matching the vegetative cover type and the type of soils that predominate at your site. For example, if your site is located in Oklahoma City (see Table I - 1), and your buffer vegetation corresponds most closely with that of fescue grass, and the soil type at your site is best typified as sand, your site's sediment removal efficiency would be 90 percent.

In this step, you should choose the vegetation type in the tables that most closely matches the vegetation that would exist naturally in the buffer area on your site regardless of the condition of the buffer. However, because you are not required to plant any additional vegetation in the buffer area, in determining what controls are necessary to meet this sediment removal equivalency in Step 2 below, you will be able to take credit for this area as a fully vegetated "natural buffer."

Similarly, if a portion of the buffer area adjacent to the surface water is owned by another party and is not under your control, you can treat the area of land not under control as having the equivalent vegetative cover and soil type that predominates on the portion of the property on which your construction activities are occurring. *For example, if your earth-disturbances occur within 50 feet of a surface water, but the 10 feet of land immediately adjacent to the surface water is owned by a different party than the land on which your construction activities are taking place and you do not have control over that land, you can treat the 10 foot area adjacent to the stream as having the equivalent soil and vegetation type as predominates in the 40 foot area under your control. You would then make the same assumption in Step 2 for purposes of determining the equivalent sediment removal.*

Alternatively, you may do your own calculation of the effectiveness of the 50-foot buffer based upon your site-specific conditions, and may use this number as your sediment removal equivalency standard to meet instead of using Tables I – 1 through I - 4. This calculation must be documented in your SWP3.

Step 2 - Design Controls That Match the Sediment Removal Efficiency of the 100-foot or 50-foot Buffer

Once you have determined the estimated sediment removal efficiency of a 100-foot or 50-foot buffer for your site in Step 1, you will be required to select stormwater controls that will provide an equivalent sediment load reductions.

To make the determination that your controls and/or buffer area achieve an equivalent sediment load reduction as the 100-foot or 50-foot buffer, you may use stormwater controls listed in Tables I-1 through I-4 to select a single designed control, such as 12" or 6" waddle, roll material, silt fence or straw mulch (see Attachment 1), or you will need to use a model or other type of calculator. There are a variety of models available that can be used to support your calculation, including USDA's RUSLE-series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other models.

Alternatively, you may elect to install a combination of stormwater controls and to retain some amount of a buffer. Whichever control(s) you select, you must demonstrate in your SWP3 that the controls will provide at a minimum the same sediment removal capabilities as the 100-foot or 50-foot buffer (Step 1). You are allowed to take credit for the removal efficiencies of your required perimeter controls in your calculation of equivalency, because these were included in calculating the buffer removal efficiencies in Tables I - 1 through I - 4. (Note: You are reminded that the controls must be kept in effective operating condition until you have completed final stabilization on the disturbed portions of the site discharging to the surface water.)

If you are retaining a buffer of less than 100 feet or 50 feet, you may take credit for the removal that will occur from the reduced buffer and only need to provide additional controls to make up the difference between the removal efficiency of a 100-foot or 50-foot buffer and the removal efficiency of the narrower buffer. For example, if you are retaining a 30 foot buffer, you can account for the sediment removal provided by the 30-foot buffer retained, and you will only need to design controls to make up for the additional removal provided by the 20-foot of buffer that is not being provided. To do this, you would plug the width of the buffer that is retained into RUSLE or another model, along with other stormwater controls that will together achieve a sediment reduction equivalent to a natural 50-foot buffer.

As described in Step 1 above, you can take credit for the area you have retained as a "natural buffer" as being fully vegetated, regardless of the condition of the buffer area. *For example, if your earth-disturbances occur 30 feet from a surface water, but the 10 feet of land immediately adjacent to the surface water is owned by a different party than the land on which your construction activities are taking place and you do not have control over that land, you can treat the 10-foot area as a natural buffer, regardless of the activities that are taking place in the area. Therefore, you can assume (for purposes of your equivalency calculation) that your site is providing the sediment removal equivalent of a 30-foot buffer, and you will only need to design controls to make up for the additional removal provided by the 20- foot of buffer that is not being provided.*

Step 3 - Document How Site-Specific Controls Will Achieve the Sediment Removal Efficiency of the 100-foot or 50-foot Buffer

In Steps 1 and 2, you determined both the expected sediment removal efficiency of a 100-foot or 50-foot buffer at your site, and you used this number as a performance standard to design controls to be installed at your site, which alone or in combination with any retained natural buffer, achieves the expected sediment removal efficiency of a 100-foot or 50-foot buffer at your site. The final step is to document in your SWP3 the information you relied on to calculate the equivalent sediment reduction as an undisturbed natural buffer. DEQ will consider your documentation to be sufficient if it generally meets the following:

For Step 1: refer to the Table in Attachment 1 that you used to derive your estimated 100-foot or 50-foot buffer sediment removal efficiency performance. Include information about the buffer vegetation and soil type that predominate at your site, which you used to select the sediment load reduction value in Tables I - 1 through I - 4. Or, if you conducted a site-specific calculation for sediment removal efficiency, provide the specific removal efficiency, and the information you relied on to make your site-specific calculation.

For Step 2: (1) Specify a single designed stormwater control (see Table I-1 thru I-4) or other stormwater controls that you used to estimate sediment load reductions from your site. Specify a model or other type of calculator that you used to support your calculation if any; and (2) the results of calculations showing how your controls will meet or exceed the sediment removal efficiency from Step 1. If you choose Alternative 3, you must also include in your SWP3 a description of why it is infeasible for you to provide and maintain an undisturbed natural buffer of any size.

ATTACHMENT 1

Sediment Removal Efficiency Tables: Percent of sediment removal was calculated for a 200-foot runoff area with a 100-foot buffer, and a 100-foot runoff area with a 50-foot buffer. DEQ recognizes that very high removal efficiencies, even where theoretically achievable by a 50-foot or 100-foot buffer, may be very difficult to achieve in practice using alternative controls. Therefore in the tables below, DEQ has limited the removal efficiencies to a maximum of 90%. Efficiencies that were calculated at greater than 90% are shown as 90%, and this is the minimum percent removal that must be achieved by alternative controls.

Best Management Practices Defined

- Fescue: Buffer strip (100 feet or 50 feet) at the end of the overland flow path of Fescue grass, the area has not been grazed
- Grama Grass: Buffer strip (100 feet or 50 feet) at the end of the overland flow path of Grama grass, at least the third year after seeding
- Range Grass: Buffer zone (100 feet or 50 feet) at the end of the overland flow path of a generic low production range grass
- Switchgrass: Buffer zone (100 feet or 50 feet) at the end of the overland flow path of Switchgrass growth
- Weeds: Buffer zone (100 feet or 50 feet) at the end of the overland flow path of at least 5 years of growth of generic weeds started from volunteer germination
- 12” Waddle: 12 inch straw sock or wattle installed at the base of the runoff area
- 6” Waddle: 6 inch straw sock or wattle installed at the end of the overland flow path
- Roll Material: Erosion control blanket placed over the disturbed area
- Silt Fence: Full retardance fabric silt fence installed at the end of the overland flow path
- Straw Mulch: Straw mulch applied over the disturbed area, 4000 lbs/acre

Soils Defined

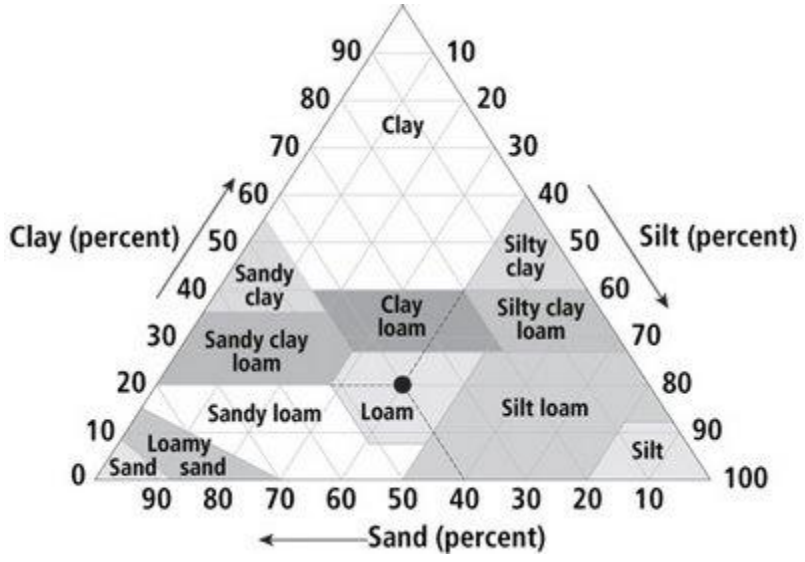


Table I-1 Estimated Estimated Buffer Performance of Blade Fill in Oklahoma City, Oklahoma *

Best Management Practices**	Estimated % Sediment Removal										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Fescue (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Grama Grass (100' Buffer)	74	79	79	79	78	78	78	76	78	74	71
Grama Grass (50' Buffer)	65	77	78	78	78	78	77	76	74	67	50
Range Grass (100' Buffer)	89	90	92	90	90	90	90	90	90	90	90
Range Grass (50' Buffer)	89	90	90	90	90	90	90	90	90	90	89
Switchgrass (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Switchgrass (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Weeds (100' Buffer)	47	49	48	50	48	49	50	46	50	50	48
Weeds (50' Buffer)	42	47	47	48	47	49	48	46	48	45	41
12" Waddle	86	74	72	84	56	72	82	27	86	90	90
6" Waddle	38	58	56	67	45	62	69	20	62	55	24
Roll Material	90	90	90	90	90	90	90	90	90	90	90
Silt Fence	86	77	80	90	70	83	89	43	90	90	90
Straw Mulch	85	87	87	86	88	87	83	90	87	89	89

Table I-2 Estimated Buffer Performance of Blade Cut in Oklahoma City, Oklahoma *

Best Management Practices**	Estimated % Sediment Removal										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	88	90	90	90	90	90	90	90	90	90	88
Fescue (50' Buffer)	87	88	90	90	90	90	90	90	90	89	84
Grama Grass (100' Buffer)	24	52	70	63	74	72	70	71	48	33	11
Grama Grass (50' Buffer)	24	39	65	54	71	70	60	70	39	15	10
Range Grass (100' Buffer)	78	85	89	90	90	90	90	89	88	84	24
Range Grass (50' Buffer)	77	83	89	89	90	90	90	89	85	80	68
Switchgrass (100' Buffer)	86	89	90	90	90	90	90	90	90	90	85
Switchgrass (50' Buffer)	85	88	90	90	90	90	90	90	90	88	81
Weeds (100' Buffer)	18	26	33	31	33	34	35	28	26	22	15
Weeds (50' Buffer)	23	22	32	31	31	35	31	28	22	15	14
12" Waddle	80	72	71	81	55	70	80	25	84	83	73
6" Waddle	9	11	47	35	43	57	51	19	17	0	1
Roll Material	90	90	90	90	90	90	90	90	90	90	90
Silt Fence	86	76	80	90	69	82	88	40	90	90	90
Straw Mulch	90	90	90	90	90	90	90	90	90	90	90

Table I-3 Estimated Buffer Performance of Blade Fill Tulsa, Oklahoma *

Best Management Practices**	Estimated % Sediment Removal										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Fescue (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Grama Grass (100' Buffer)	74	80	79	79	78	78	77	76	79	76	69
Grama Grass (50' Buffer)	65	76	79	79	78	77	77	75	76	67	52
Range Grass (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Range Grass (50' Buffer)	89	89	90	90	90	90	90	90	90	90	90
Switchgrass (100' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Switchgrass (50' Buffer)	90	90	90	90	90	90	90	90	90	90	90
Weeds (100' Buffer)	50	50	48	51	50	50	49	47	51	51	48
Weeds (50' Buffer)	43	48	47	49	48	47	49	45	49	44	40
12" Waddle	86	74	71	83	55	70	81	24	86	90	90
6" Waddle	39	60	55	67	44	59	69	18	65	53	25
Roll Material	90	90	90	90	90	90	90	90	90	90	90
Silt Fence	86	76	79	90	69	82	89	41	90	90	90
Straw Mulch	84	86	87	86	87	86	86	89	86	87	88

Table I-4 Estimated Buffer Performance of Blade Cut in Tulsa, Oklahoma *

Best Management Practices**	Estimated % Sediment Removal										
	Clay	Silty Clay	Silty Clay Loam	Clay Loam	Silt Loam	Loam	Sandy Loam	Silt	Sandy Clay Loam	Loamy Sand	Sand
Fescue (100' Buffer)	88	90	90	90	90	90	90	90	90	90	87
Fescue (50' Buffer)	87	89	90	90	90	90	90	90	90	90	83
Grama Grass (100' Buffer)	29	52	73	62	75	74	70	70	52	33	9
Grama Grass (50' Buffer)	18	45	64	57	73	72	63	70	38	25	10
Range Grass (100' Buffer)	79	85	89	90	90	90	90	87	89	85	72
Range Grass (50' Buffer)	76	84	88	90	90	90	90	88	86	81	69
Switchgrass (100' Buffer)	86	89	90	90	90	90	90	90	90	90	85
Switchgrass (50' Buffer)	84	88	90	90	90	90	90	90	90	89	81
Weeds (100' Buffer)	21	30	33	32	34	35	34	26	30	24	15
Weeds (50' Buffer)	19	27	31	30	33	34	32	28	24	19	14
12" Waddle	79	74	69	80	55	70	80	26	84	84	73
6" Waddle	0	18	46	37	43	58	54	19	14	6	0
Roll Material	90	90	90	90	90	90	90	90	90	90	90
Silt Fence	86	77	79	89	68	81	88	39	90	90	90
Straw Mulch	90	90	90	90	90	90	90	90	90	90	90

* Applicable for sites less than nine percent slope

** Characterization focuses on the under-story vegetation