Appendix B – Natural Buffer Zone Requirements

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WQ Permitting
700 NE Multnomah St.
Suite 600
Portland, OR 97232
Phone: 503-229-5185
800-452-4011
Fax: 503-229-6124
Contact: Blair Edwards

www.oregon.gov/DEQ

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State of Oregon
Department of
Environmental
Quality

This report prepared by:

Oregon Department of Environmental Quality
700 NE Multnomah Street, Suite 600
Portland, OR 97232
1-800-452-4011
www.oregon.gov/deq

Contact:
Blair Edwards
503-229-5185

The purpose of this appendix is to assist the 1200-C permit registrant in complying with the requirements in Section 2.2.4 of the 1200-C permit regarding the establishment of natural buffer zones and/or equivalent sediment controls. This appendix is organized as follows:

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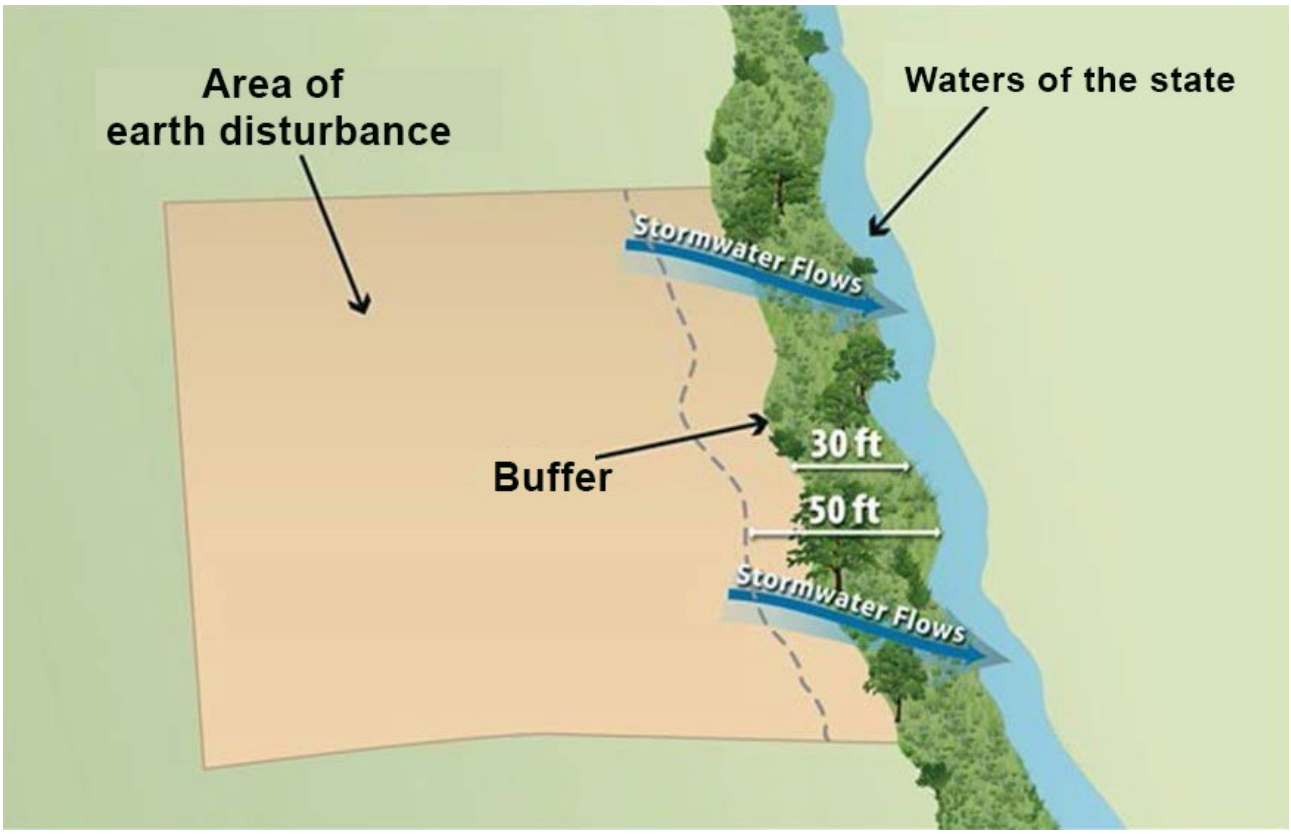
Sites that are required to provide and maintain natural buffer zones and/or equivalent erosion and sediment controls

The requirement in Section 2.2.4 to provide and maintain natural buffer zones and/or equivalent erosion and sediment controls applies for any discharges to surface waters of the state located within 50 feet of the site's earth disturbances. If the surface water of the state is not located within 50 feet of earth disturbing activities, Section 2.2.4 does not apply. See Figure B-1.



B.1 Compliance alternatives and exceptions

B.1.1 Compliance alternatives

If Section 2.2.4 of the 1200-C permit applies to the project site, there are three compliance alternatives from which the registrant can choose, unless the project qualifies for any of the exceptions of Section B.1.2 (below) and permit Section 2.2.4.a:

1. Provide and maintain a 50-foot undisturbed natural buffer zone (See 2.2.4.b to determine natural buffer zone encroachment authorization on 401 Water Quality Certification (WQC) projects); or

2. Provide and maintain an undisturbed natural buffer zone that is less than 50 feet and is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer zone; or

3. If infeasible to provide and maintain an undisturbed natural buffer zone of any size, implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer zone.

The compliance alternative selected must be maintained throughout the duration of permit coverage.

See Section B.1.2 below for exceptions to the compliance alternatives

See Section B.1.3 for requirements applicable to providing and maintaining natural buffer zones under compliance alternatives 1 and 2 above.

See Section B.1.4 for requirements applicable to providing erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot undisturbed natural buffer zone under compliance alternatives 2 and 3 above.

B.1.2 Exceptions to the compliance alternatives

The following exceptions apply to the requirement to implement one of the alternatives of section 2.2.4.a of the 1200-C permit:

- The following disturbances within 50 feet of a surface water of the state may not claim the natural buffer zone alternatives of 2.2.4.a:
  - Construction approved under a CWA Section 404 permit or 401 WQC; or
  - Construction of a water-dependent structure or water access areas *(e.g., pier, boat ramp, trail)*.
- If there is no discharge of stormwater to waters of the state through the area between the disturbed portions of the site and any waters of the state located within 50 feet of the project site, permit registrants are not required to comply with the requirements in Section 2.2.4 and this Appendix.
- Where no natural buffer zone exists due to preexisting development disturbances *(e.g., structures, impervious surfaces)* that occurred prior to the initiation of planning for the current development of the site, registrants are not required to comply with the requirements in Section 2.2.4 and this Appendix.

  Where some natural buffer zone exists but portions of the area within 50 feet of the surface water of the state are occupied by preexisting development disturbances, the registrant is required to comply with the requirements in Section 2.2.4 and this Appendix. For the purposes of calculating the sediment load reduction for either compliance alternative 2 or 3, registrants are not expected to compensate for the reduction in buffer function that would have resulted from the area covered by these preexisting disturbances. Clarity about how to implement the compliance alternatives for these situations is provided in B.1.3 and B.1.4 below.

  If during the duration of the project, a registrant will disturb any portion of these preexisting disturbances, the area removed will be deducted from the area treated as a "natural buffer zone."
- For "linear construction sites", the registrant is not required to comply with this requirement if site constraints *(e.g., limited right-of-way)* make it infeasible to implement one of the Section 2.2.4.a compliance alternatives, provided that, to the extent feasible, disturbances are limited

within 50 feet of any waters of the state and/or supplemental erosion and sediment controls are provided to treat stormwater discharges from earth disturbances within 50 feet of the surface water ofthe state. The registrant must also document in the ESCP the rationale for why it is infeasible to implement one of the Section 2.2.4.a compliance alternatives and describe any buffer width retained and supplemental erosion and sediment controls installed.

- For "small residential lot" construction *(i.e., a lot being developed for residential purposes that will disturb less than 1 acre of land but is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre),* the registrant has the option of complying with one of the "small residential lot" compliance alternatives in Section B.2 of this Appendix.

Note that registrants must document in the ESCP if any disturbances related to any of the above exceptions occurs within the buffer area on the project site.

B.1.3 Requirements for providing and maintaining natural buffer zones

This Section of the appendix applies if the registrant chooses compliance alternative 1 (50-foot buffer), compliance alternative 2 (a buffer of < 50 feet supplemented by additional erosion and sediment controls that achieve the equivalent sediment load reduction as the 50-foot buffer), or if a buffer is provided in compliance with one of the "small residential lot" compliance alternatives in Section B.2.

Buffer width measurement

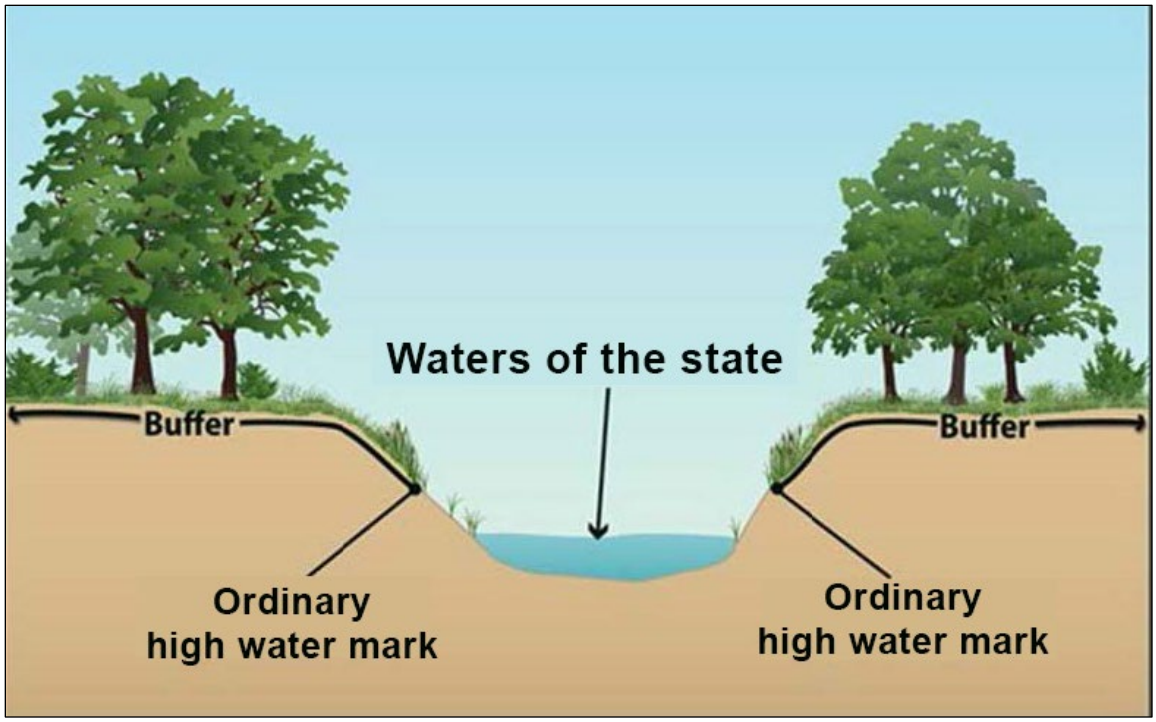
Where a buffer of any size is maintained, the buffer should be measured perpendicularly from any of the following points, whichever is further landward from the waterbody:

1. The ordinary high-water mark of the waterbody, 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 riverbank, bluff, or cliff, whichever is applicable.

Refer to Figure B-2 and Figure B-3. The registrant may find that specifically measuring these points is challenging if the flow path of the surface water of the state 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 the measurement. For instance, the registrant may elect to conduct buffer measurements every 5 to 10 feet along the length of the water.

Additionally, note that if earth disturbing activities will take place on both sides of a surface water of the state that flows through the project site, to the extent that a buffer is established around this water, it must be established on both sides. For example, if the registrant chooses compliance alternative 1, and the project calls for disturbances on both sides of a small stream, the registrant will need to retain the full 50 feet of buffer on both sides of the water.

However, if construction activities will only occur on one side of the stream, the registrant will only need to retain the 50-foot buffer on the side of the stream where the earth disturbance will occur.



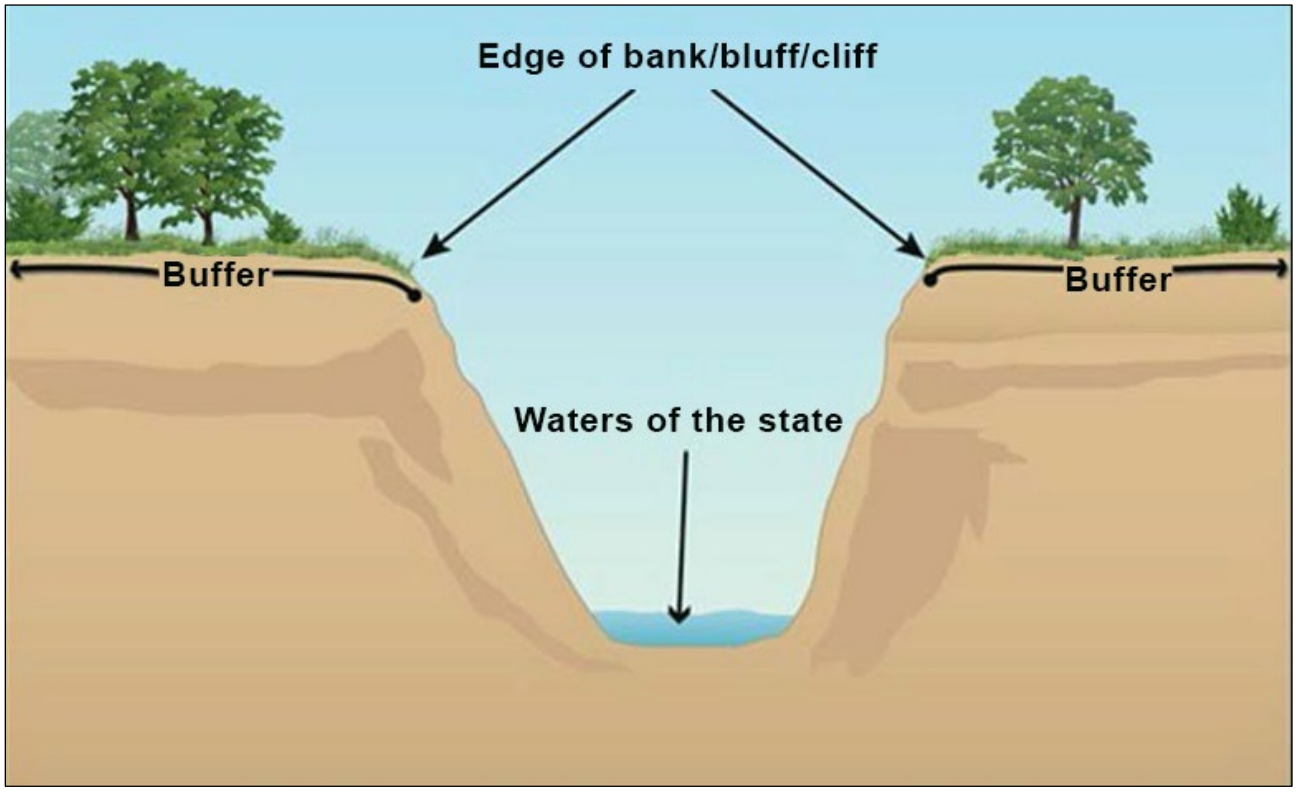


Figure B-3. Buffer measurement from the edge of the bank, bluff, or cliff, whichever is applicable.

Limits to disturbance within the buffer

A registrant is in compliance with the requirement to provide and maintain a natural buffer zone if the natural buffer zone that existed prior to the commencement of construction is retained and protected from construction activities. If the buffer area contains no vegetation prior to the commencement of construction (e.g., sand or rocky surface), the registrant is not required to plant vegetation. As noted above, any preexisting structures or impervious surfaces may occur in the natural buffer zone provided the registrant retain and protect from disturbance the buffer areas outside of the preexisting disturbance.

To ensure that the water quality protection benefits of the buffer are retained during construction, registrants are prohibited from conducting any earth disturbing activities within the buffer during permit coverage. In furtherance of this requirement, **prior to commencing earth disturbing activities on the project site, registrants must delineate, and clearly mark off, with flags, tape, or a similar marking device, the buffer area on the project site.** The purpose of this requirement is to make the buffer area clearly visible to the people working on site so that unintended disturbances are avoided.

While registrants are not required to enhance the quality of the vegetation that already exists within the buffer, registrants are encouraged to do so where such improvements will enhance the water quality protection benefits of the buffer. (Note that any disturbances within the buffer related to buffer enhancement are permitted and do not constitute construction disturbances.) For instance, the registrant may want to target plantings where limited vegetation exists or replace existing vegetation where invasive or noxious plant species (see http://plants.usda.gov/java/noxiousDriver) have taken over. In the case of invasive or noxious species, the registrant may want to remove and replace them with a diversity of native trees, shrubs, and herbaceous plants that are well-adapted to the climatic, soil, and hydrologic conditions on the site. Registrants are also encouraged to limit the removal of naturally deposited leaf litter, woody debris, and other biomass, as this material contributes to the ability of the buffer to retain water and filter pollutants.

If a portion of the buffer area adjacent to the surface water of the state is owned by another party and is not under the registrant's control, the registrant is only required to retain and protect from construction activities the portion of the buffer area that is under their control. For example, if the registrant complies with compliance alternative 1 (provide and maintain a 50-foot buffer), but 10 feet of land immediately adjacent to the surface water of the state is owned by a different party than the land on which the construction activities are taking place and the registrant does not have control over that land, only the 40-foot buffer area that occurs adjacent to the property on which construction activities are taking place must be retained and protected from construction activities. DEQ would consider the registrant to be in compliance with this requirement regardless of the activities that are taking place in the 10-foot area that is owned by a different party than the land on which construction activities are taking place that the registrant has no control over.

Discharges to the buffer

The registrant must ensure that all discharges from the area of earth disturbance to the natural buffer zone are first treated by the site's erosion and sediment controls (*for example, the registrant must comply with the requirement of Section 2.2.6 to install sediment controls along any perimeter areas of the site that will receive pollutant discharges*), **and if necessary, to prevent erosion caused by stormwater flows within the buffer, velocity dissipation devices must be used**. The purpose of this requirement is to decrease the rate of stormwater flow and encourage infiltration so that the pollutant filtering functions of the buffer will be achieved. To comply with this requirement, a registrant typically will use devices that physically dissipate stormwater flows so that the discharge entering the buffer is spread out and slowed down.

ESCP documentation

Registrants are required to document in their ESCP the natural buffer zone width that is retained. For example, if complying with alternative 1, the registrant must specify in their ESCP that a 50-foot buffer is provided. Or, if complying with alternative 2, the registrant must document the reduced width of the buffer that will be retained (and must also describe the erosion and sediment controls that will be used to achieve an equivalent sediment reduction, as required in Section B.1.4 below). Note that the registrant must also show any buffers on the site map in their ESCP. Additionally, if any disturbances related to the exceptions in Section B.2.2 occur within the buffer area, it must documented in the ESCP.

B.1.4 Guidance for providing the equivalent sediment reduction as a 50-foot buffer

This Section of the appendix applies if compliance alternative 2 is selected (provide and maintain a buffer that is less than 50 feet that is supplemented by erosion and sediment controls that achieve the sediment load reduction equivalent to a 50-foot buffer) or compliance alternative 3 (implement erosion and sediment controls to achieve the sediment load reduction equivalent to a 50-foot buffer).

Determine whether it is feasible to provide a reduced buffer

DEQ recognizes that there will be a few situations in which it will be infeasible to provide and maintain a buffer of any width. While some of these situations may exempt the registrant from the buffer requirement entirely (see B.2.2), if the project site does not qualify for one of these exemptions, there still may be conditions or circumstances at the site that make it infeasible to provide a natural buffer zone. 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 zone areas.

Therefore, the registrant should choose compliance alternative 2 if it is feasible to retain some natural buffer zone on the project site. (Note: For any buffer width retained, the registrant is required to comply with the requirements in Section B.1.3, above, concerning the retention of vegetation and restricting earth disturbances). Similarly, if it is determined that it is infeasible to provide a natural buffer zone of any size during construction, the registrant should choose alternative 3.

Design controls that provide equivalent sediment reduction as 50-foot buffer

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

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

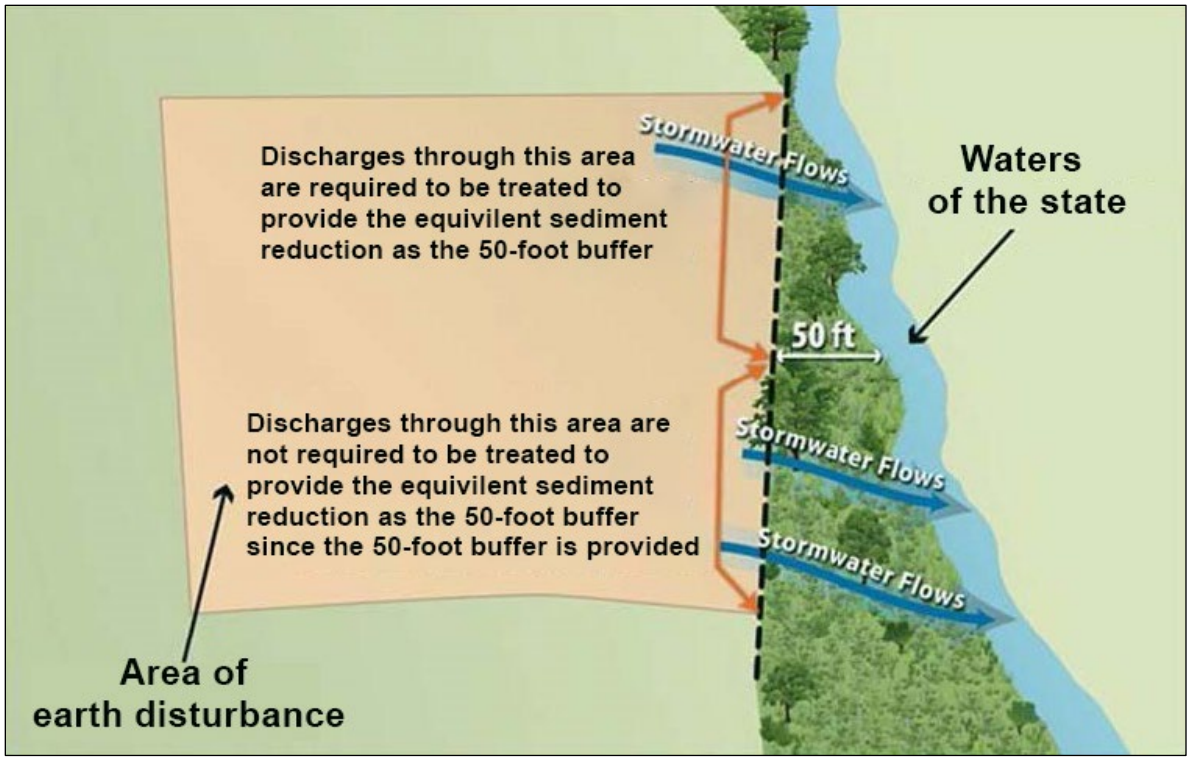


Figure B-4. Example of how to comply with the requirement to provide the equivalent sediment reduction when only a portion of the earth disturbances discharge to a buffer of less than 50- feet.

Step 1 - Estimate the sediment reduction from the 50-foot buffer

In order to design controls that match the sediment removal efficiency of a 50-foot buffer, the registrant first needs to know what this efficiency is for the project site. The sediment removal efficiencies of natural buffer zones vary according to a few site-specific factors, including precipitation, soil type, land cover, slope length, width, steepness, and the types of erosion and 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 1200-C General Permit. See Attachment 1 of this Appendix, Tables B-8 and B-9. Note: buffer performance values in Tables B-8 and B-9 represent the percent of sediment captured through the use of perimeter controls (e.g., silt fences) and 50-foot buffers at disturbed sites of fixed proportions and slope[1].

Using Tables B-8 and B-9 (see Attachment 1 of this Appendix), a registrant can determine the sediment removal efficiency of a 50-foot buffer for the site's geographic area by matching the vegetative cover type that best describes the natural buffer area and the type of soils that predominate at the site. For example, if the site is located in Western Oregon (Table B-9), and the buffer vegetation corresponds most closely with that of tall fescue grass, and the soil type at the site is best typified as sand, the site's sediment removal efficiency would be 81 percent.

In this step, the registrant should choose the vegetation type in the tables that most closely matches the vegetation that would exist naturally in the buffer area on their project site regardless of the condition of

the buffer. However, because the registrant is 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, the registrant will be able to take credit for this area as a fully vegetated "natural buffer zone."

Similarly, if a portion of the buffer area adjacent to the surface water of the state is owned by another party and is not under the registrant's control, the registrant can treat the area of land not under their control as having the equivalent vegetative cover and soil type that predominates on the portion of the property on which the construction activities are occurring.

- For example, if the earth disturbances occur within 50 feet of a surface water of the state, but the 10 feet of land immediately adjacent to the surface water of the state is owned by a different party than the land on which the construction activities are taking place and the registrant does not have control over that land, the 10 foot area adjacent to the stream can be treated as having the equivalent soil and vegetation type that predominates in the 40 foot area under registrant control. The registrant would then make the same assumption in Step 2 for purposes of determining the equivalent sediment removal.

Alternatively, the registrant may do their own calculation of the effectiveness of the 50-foot buffer based upon site-specific conditions and may use this number as the sediment removal equivalency standard to meet instead of using Tables B-8 and B-9. This calculation must be documented in the ESCP.

Step 2 - Design controls that match the sediment removal efficiency of the 50-foot buffer

Once the registrant determines the estimated sediment removal efficiency of a 50-foot buffer for the site in Step 1, the registrant must next select stormwater controls that will provide an equivalent sediment load reduction. These controls can include the installation of a single control, such as a sediment pond or additional perimeter controls, or a combination of stormwater controls. Whichever control(s) the registrant selects, the registrant must demonstrate in the ESCP that the controls will provide at a minimum the same sediment removal capability as a 50-foot natural buffer zone (Step 1). The registrant may take credit for the removal efficiencies of the required perimeter controls in the calculation of equivalency, because these were included in calculating the buffer removal efficiencies in Tables B-8 and B-9. (Note: The registrant is reminded that the controls must be kept in effective operating condition until complete final stabilization on the disturbed portions of the site discharging to the surface water of the state).

To make the determination that the controls and/or buffer area achieve an equivalent sediment load reduction as a 50-foot buffer, the registrant should use a model or other type of calculation. As mentioned above, there are a variety of models available that can be used to support the calculation, including USDA's RUSLE-series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other models. A couple of examples are provided in Attachment 2 to help illustrate how this determination could be made.

If the registrant retains a buffer of less than 50 feet, credit may be taken 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 50-foot buffer and the removal efficiency of the narrower buffer. For example, if a registrant retains a 30-foot buffer and can account for the sediment removal provided by the 30-foot buffer retained, the registrant will only need to design controls to make up for the additional removal provided by the 20 feet of buffer that is not being provided. To do this, the registrant 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, the registrant can take credit for the area retained as a "natural buffer zone" as being fully vegetated, regardless of the condition of the buffer area.

- For example, if the earth disturbances occur 30 feet from a surface water of the state, but the 10 feet of land immediately adjacent to the surface water of the state is owned by a different party than the land on which the construction activities are taking place and the registrant does not have control over that land, the registrant can treat the 10-foot area as a natural buffer zone, regardless of the activities that are taking place in the area. Therefore, the registrant can assume (for purposes of the equivalency calculation) that the site is providing the sediment removal equivalent of a 30-foot buffer, and the registrant 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 50-foot buffer

In Steps 1 and 2, the registrant determined both the expected sediment removal efficiency of a 50-foot buffer at the site and used this number as a performance standard to design controls to be installed at the site, which alone or in combination with any retained natural buffer zone, achieves the expected sediment removal efficiency of a 50-foot buffer at the site. The final step is to document in the ESCP the information the registrant relied on to calculate the equivalent sediment reduction as an undisturbed natural buffer zone.

DEQ will consider the documentation to be sufficient if it generally meets the following:

- For Step 1, refer to the table in Attachment 1 used to derive the estimated 50-foot buffer sediment removal efficiency performance. Include information about the buffer vegetation and soil type that predominate at the site, which were used to select the sediment load reduction value in Tables B-8 and B-9. Or, if a site-specific calculation for sediment removal efficiency was conducted, provide the specific removal efficiency, and the information relied on to make the site-specific calculation.
- For Step 2, (1) Specify the model used to estimate sediment load reductions from the site; and (2) the results of calculations showing how the controls will meet or exceed the sediment removal efficiency from Step 1.

If the registrant chose compliance alternative 3, a description must also be included in the ESCP of why it is infeasible to provide and maintain an undisturbed natural buffer zone of any size.

B.2 Small residential lot compliance alternatives

DEQ has developed two additional compliance alternatives applicable only to “small residential lots” that are unable to provide and maintain a 50-foot buffer.

A **small residential lot** is a lot or grouping of lots being developed for residential purposes that will disturb less than 1 acre of land, but that is part of a larger residential project that will ultimately disturb greater than or equal to 1 acre.

The following steps describe how a small residential lot registrant would achieve compliance with one these 2 alternatives.

B.2.1 Small residential lot compliance alternative eligibility

In order to be eligible for the small residential lot compliance alternatives, the following conditions must be met:

a. The lot or grouping of lots meets the definition of "small residential lot"; and

b. The registrant must follow the guidance for providing and maintaining a natural buffer zone in Section B.1.3 of this Appendix, including:

   i. Ensure that all discharges from the area of earth disturbance to the natural buffer zone are first treated by the site's erosion and sediment controls, and use velocity dissipation devices if necessary, to prevent erosion caused by stormwater within the buffer.

   ii. Document in the ESCP the natural buffer zone width retained on the property, and show the buffer boundary on the site plan; and

   iii. Delineate, and clearly mark off, with flags, tape, or other similar marking device, all-natural buffer zone areas.

B.2.2 Small residential lot compliance alternatives

The registrant must next choose from one of two small residential lot compliance alternatives and implement the stormwater control practices associated with that alternative.

> *Note: The compliance alternatives provided below are not mandatory. Registrants of small residential lots can alternatively choose to comply with the any of the options that are available to other sites in Sections 2.2.4.a and B.2.1 of this Appendix.*

Small residential lot compliance alternative 1

Alternative 1 is a straightforward tiered-technology approach that specifies the controls that a small residential lot must implement based on the buffer width retained. To meet the requirements of small residential lot compliance alternative 1, the registrant must implement the controls specified in Table B-1 based on the buffer width to be retained. See footnote 3, below, for a description of the controls that must be implemented.

- For example, if a registrant of a small residential lot will be retaining a 35-foot buffer and chose Small Residential Lot Compliance Alternative 1, the registrant must implement double perimeter controls between earth disturbances and the surface water of the state.

In addition to implementing the applicable control, the registrant must also document in the ESCP how compliance with small residential lot compliance alternative 1 will be achieved.

Table B-1. Alternative 1 Requirements[2]

Retain 50-foot Buffer	Retain <50 and >30-foot Buffer	Retain ≤ 30-foot Buffer
No Additional Requirements	Double Perimeter Controls	Double Perimeter Controls and 7-Day Site Stabilization

Small residential lot compliance alternative 2

Alternative 2 specifies the controls that a builder of a small residential lot must implement based on both the buffer width retained and the site's sediment discharge risk. By incorporating the sediment

risk, this approach may result in the implementation of controls that are more appropriate for the site's specific conditions.

Step 1 – Determine the site's sediment risk level

To meet the requirements of Alternative 2, the registrant must first determine the site's sediment discharge "risk level" based on the site's slope, location, and soil type. To help determine the site's sediment risk level, DEQ developed five different tables for different slope conditions. The registrant should select the table that most closely corresponds to the site's average slope. One source for determining the site's predominant soil type is the USDA's Web Soil Survey located at http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

- For example, if the site's average slope is 7 percent, the registrant should use Table B-4 to determine the site's sediment risk.

After determining which table applies to the site, the registrant must then use the table to determine the "risk level" (e.g., "low", "moderate", or "high") that corresponds to the site's location and predominant soil type.[3]

- For example, based on TableB-3, a site located in Western Oregon with a 4 percent average slope and with predominately sandy clay loam soils would fall into the "moderate" risk level.

Table B-2. Risk Levels for Sites with Average Slopes of ≤ 3 Percent

Location	Soil Type Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Eastern Oregon	Low	Low	Low	Low	Low
Western Oregon	Low	Moderate	Low	Low	Moderate

Table B-3. Risk Levels for Sites with Average Slopes of > 3 Percent and ≤ 6 Percent

Location	Soil Type Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Eastern Oregon	Low	Low	Low	Low	Low
Western Oregon	Moderate	Moderate	Low	Moderate	High

Table B-4. Risk Levels for Sites with Average Slopes of > 6 Percent and ≤ 9 Percent

Location	Soil Type Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Eastern Oregon	Low	Low	Low	Low	Low
Western Oregon	Moderate	Moderate	Moderate	Moderate	High

[2] Description of Additional Controls Applicable to Small Residential Lot Compliance Alternatives 1 and 2:

- **No Additional Requirements:** If a buffer of 50 feet or greater is maintained, then the buffer is not subject to any additional requirements. Note that it is required to install perimeter controls between the disturbed portions of the site and the buffer in accordance with Part 2.2.3.
- **Double Perimeter Control:** In addition to the reduced buffer width retained on the site, the registrant must provide a double row of perimeter controls between the disturbed portion of the site and the water of the U.S. spaced a minimum of 5 feet apart.
- **Double Perimeter Control and 7-Day Site Stabilization:** In addition to the reduced buffer width retained on the site and the perimeter control implemented in accordance, the registrant must provide a double row of perimeter controls between the disturbed portion of the site and the water of the U.S. spaced a minimum of 5 feet apart, and it is required to complete the stabilization activities specified in by the 1200-C within 7 calendar days of the temporary or permanent cessation of earth disturbing activities.

[3] One source for determining your site's predominant soil type is the USDA's Web Soil Survey located at: http://websoilsurvey.nrcs.usda.gov/app/WebSoilSurvey.aspx.

Table B-5. Risk Levels for Sites with Average Slopes of > 9 Percent and ≤ 15 Percent

Location	Soil Type Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Eastern Oregon	Low	Low	Low	Low	Low
Western Oregon	Moderate	Moderate	Moderate	Moderate	High

Table B-6. Risk Levels for Sites with Average Slopes of > 15 Percent

Location	Soil Type Clay	Silty Clay Loam or Clay-Loam	Sand	Sandy Clay Loam, Loamy Sand or Silty Clay	Loam, Silt, Sandy Loam or Silt Loam
Eastern Oregon	Low	Low	Low	Low	Moderate
Western Oregon	High	High	Moderate	High	High

Step 2 – Determine which additional controls apply

Once the registrant determines the site's "risk level", the additional controls that need to be implemented on the site must be determined next, based on the width of buffer that is to be retained. Table B-7 specifies the requirements that apply based on the "risk level" and buffer width retained.

- For example, if the registrant of a small residential lot that falls into the "moderate" risk level and decides to retain a 20-foot buffer, it will be determined using Table B-7 that double perimeter controls need to be implemented to achieve compliance with small residential lot compliance alternative 2.

The registrant must also document in the ESCP compliance with small residential lot compliance alternative 2.

Table B-7. Alternative 2 Requirements

Risk Level Based on Estimated Soil Erosion	Retain ≥ 50' Buffer	Retain <50' and >30' Buffer	Retain ≤30' and >10' Buffer	Retain ≤ 10' Buffer
Low Risk	No Additional Requirements	No Additional Requirements	Double Perimeter Control	Double Perimeter Control
Moderate Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization
High Risk	No Additional Requirements	Double Perimeter Control	Double Perimeter Control and 7-Day Site Stabilization	Double Perimeter Control and 7-Day Site Stabilization

Description of additional controls applicable to small residential lot compliance alternatives 1 and 2:

- **No Additional Requirements:** If a buffer of 50 feet or greater is implemented, then the registrant is not subject to any additional requirements. Note that the registrant is required to install perimeter controls between the disturbed portions of the site and the buffer.
- **Double Perimeter Control:** In addition to the reduced buffer width retained on the site, the registrant must provide a double row of perimeter controls between the disturbed portion of the site and the surface water of the state spaced a minimum of 5 feet apart.
- **Double Perimeter Control and 7-Day Site Stabilization:** In addition to the reduced buffer width retained on the site and the perimeter control implemented, the registrant must provide a double row of perimeter controls between the disturbed portion of the site and the surface water of the state spaced a minimum of 5 feet apart, and is required to complete the stabilization activities specified by the 1200-C permit within 7 calendar days of the temporary or permanent cessation of earth disturbing activities.

Attachment 1: Sediment removal efficiency tables

DEQ recognizes that very high removal efficiencies, even where theoretically achievable by a 50-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. The buffer performances were calculated based on a denuded slope upgradient of a 50-foot buffer and a perimeter controls, as perimeter controls are a standard requirement

Table B-8. Estimated 50-foot Buffer Performance in Eastern Oregon*

	Estimated % Sediment Removal				
Type of Buffer Vegetation**	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Tall Fescue Grass	42	52	44	48	85
Medium-density Weeds	28	30	28	26	60
Low-density Warm-season Native Bunchgrass (i.e., Grama Grass)	25	26	24	24	55
Northern Mixed Prairie Grass	28	30	28	26	50
Northern Range Cold Desert Shrubs	28	28	24	26	50

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Table B-9. Estimated 50-foot Buffer Performance in Western Oregon*

	Estimated % Sediment Removal				
Type of Buffer Vegetation**	**Clay**	**Silty Clay Loam or Clay-Loam**	**Sand**	**Sandy Clay Loam, Loamy Sand or Silty Clay**	**Loam, Silt, Sandy Loam or Silt Loam**
Warm-season Grass (i.e., Switchgrass, Lemongrass)	79	90	90	90	90
Cool-season Dense Grass (Kentucky Bluegrass, Smooth Bromegrass, Timothy)	78	90	90	90	90
Tall Fescue Grass	76	90	81	89	90
Medium-density Weeds	66	76	60	72	66

* Applicable for sites with less than nine percent slope
** Characterization focuses on the under-story vegetation

Sediment removal efficiency tables – questions and answers

- **What if my specific buffer vegetation is not represented in Tables B-8 and B-9?**
  Tables B-8 and B-9 provide a wide range of factors affecting buffer performance; however, there are likely instances where the specific buffer vegetation type on the site is not listed. If the registrant does not see a description of the type of vegetation present at the site, the registrant should choose the vegetation type that most closely matches the vegetation type on the site. Registrants can contact the local Cooperative Extension Service Office (-and-extension-map) for assistance in determining the vegetation type in Tables B-8 and B-9 that most closely matches the site-specific vegetation.
- **What if there is high variability in local soils?**
  DEQ recognizes that there may be a few different soil type(s) on any given construction site. General soil information can be obtained from USDA soil survey reports (http://websoilsurvey.nrcs.usda.gov) or from individual site assessments performed by a certified soil expert. Tables B-8 and B-9 present generic soil texture classes, grouping individual textures where DEQ has determined that performance is similar. If the site contains different soil texture classes, the registrant should use the soil type that best approximates the predominant soil type at the site.
- **What if my site slope is greater than 9 percent after final grade is reached?**
  As indicated in the buffer performance tables, the estimated sediment removal efficiencies are associated with disturbed slopes of up to 9 percent grade. Where the graded site has an average slope of greater than 9 percent, the registrant should calculate a site-specific buffer performance.
- **How do I calculate my own estimates for sediment reduction at my specific site?**
  If the registrant determines that it is necessary to calculate the sediment removal efficiency of the natural buffer zone on the project site using site-specific conditions (e.g., slopes at the site are greater than 9 percent), a range of available models that are available to facilitate this calculation can be utilized, including USDA's RUSLE- series programs and the WEPP erosion model, SEDCAD, SEDIMOT, or other equivalent models.
- **What is my estimated buffer performance if my site location is not represented by Tables B-8 and B-9?**
  If the site is located in an area not represented by Tables B-8 and B-9, the registrant should use the table that most closely approximates conditions at the site (Table B-8 represents conditions typical to Eastern Oregon, Table B-9 represents conditions typical to Western Oregon). The registrant may instead choose to conduct a site-specific calculation of the buffer performance.
- **What if only a portion of my site drains to the buffer area?**
  If only a portion of the site drains to a surface water of the state, where that water is within 50 feet of earth disturbances, the registrant is only required to meet the equivalency requirement for the stormwater flows corresponding to those portions of the site. See Example 2 below for an example of how this is expected to work.

Attachment 2 - Examples of how to use the sediment removal efficiency tables

Example 1. Comparatively wet location (7.5-acre site located in Western Oregon)

The registrant of a 7.5-acre construction site in Western Oregon has determined that it is infeasible to establish a buffer of any size on the site and is now required to select and install controls that will achieve an equivalent sediment load reduction as that estimated in B-9 for their site conditions. The first step is to identify what percentage of eroded sediment is estimated to be retained from a 50-foot buffer. For this example, it is assumed that the site has a relatively uniform gentle slope (3 percent), so Table B-9 can be used to estimate the 50-foot buffer sediment load reduction. If the site's buffer vegetation is best typified by cool-season dense grass and the underlying soil is of a type best described as loamy sand, the 50-foot buffer is projected to capture 90 percent of eroded sediment from the construction site.

The second step is to determine what sediment controls can be selected and installed in combination with the perimeter controls already required to be implemented at the site, which will achieve the 90 percent sediment removal efficiency from Table B-9. For this example, using the RUSLE2 profile model, it was determined that installing a pair of shallow- sloped diversion ditches to convey runoff to a well-designed and maintained sediment basin provides 99 percent sediment removal. Because the estimated sediment reduction is greater than the required 90 percent that a 50-foot buffer provides, the registrant will have met the buffer requirements. See Figure B-5. The registrant could also choose a different set of controls, if at least a 90 percent sediment removal efficiency is achieved.

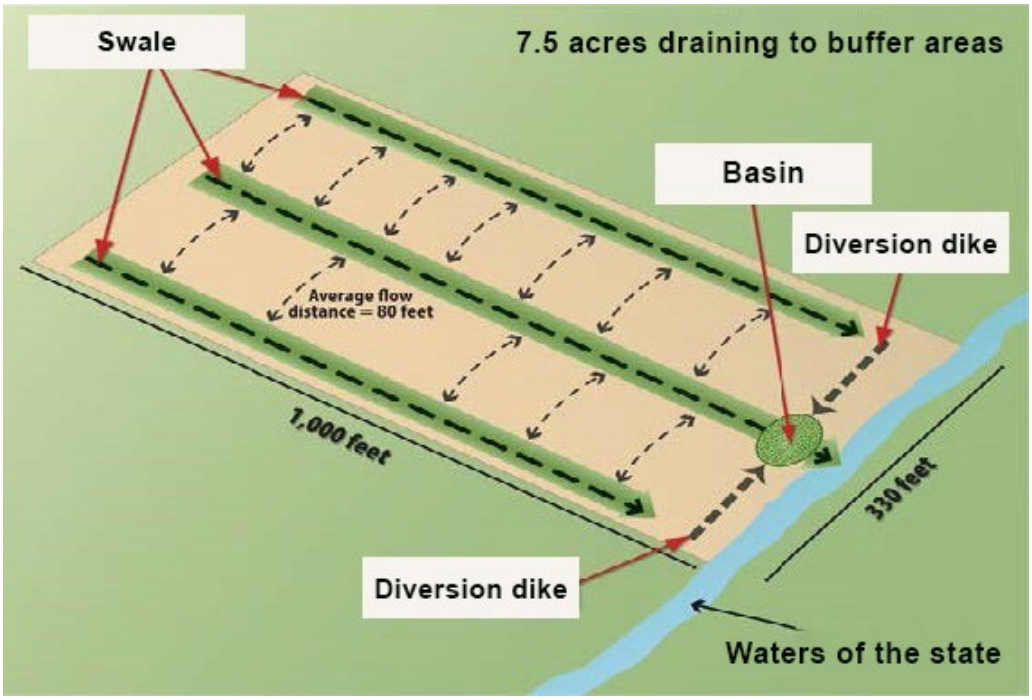


Figure B-5. Example 1 – Equivalent Sediment Load Reductions at a 7.5-acre Site in Western Oregon.

Example 2. Arid location with pre-existing disturbances in the natural buffer zone (6.5-acre site located in Eastern Oregon)

A registrant of a site in Eastern Oregon determines that it is not feasible to provide a 50-foot buffer, but a 28-foot buffer can be provided. Because the registrant will provide a buffer that is less than 50 feet, the registrant must determine which controls, in combination with the 28-foot buffer, achieve a sediment load reduction equivalent to the 50-foot buffer.

In this example, the project will disturb 6.5 acres of land, but only 1.5 acres of the total disturbed area drains to the buffer area. Within the 28-foot buffer area is a preexisting concrete walkway. Like Example 1, the equivalence analysis starts with Step 1in Section B.1.4 of this Appendix with a review of the Eastern Oregon buffer performance (Table B-8).

The registrant determines that the predominate vegetation type in the buffer area is prairie grass, the soil type is like silt, and the site is of a uniform, shallow slope (e.g., 3 percent grade). Although the registrant will take credit for the disturbance caused by the concrete walkway as a natural buffer zone in Step 2, here the registrant can treat the entire buffer area as being naturally vegetated with prairie grass. Based on this information, the registrant refers to Table B-8 to estimate that the 50-foot buffer would retain 50 percent of eroded soil.

The second step is to determine, based on the 50 percent sediment removal efficiency found in Table B-8, what sediment controls, in combination with the 28-foot buffer area, can be implemented to reduce sediment loads by 50 percent or more. The registrant does not have to account the reduction in buffer function caused by the preexisting walkway and can take credit for the entire 28-foot buffer being fully vegetated in the analysis. For this example, using the RUSLE2 profile model, the registrant determined that installing a fiber roll barrier between the silt fence (already required) and the 28-foot buffer will achieve an estimated 84 percent sediment removal efficiency. (See Figure B-6).

Note that this registrant is subject to the requirement in Section B.1.3 of this Appendix to ensure that discharges through the silt fence, fiber roll barrier, and 28-foot buffer do not cause erosion within the buffer. The estimated sediment reduction is greater than the required 50 percent; therefore, the registrant will have met the buffer alternative requirement.

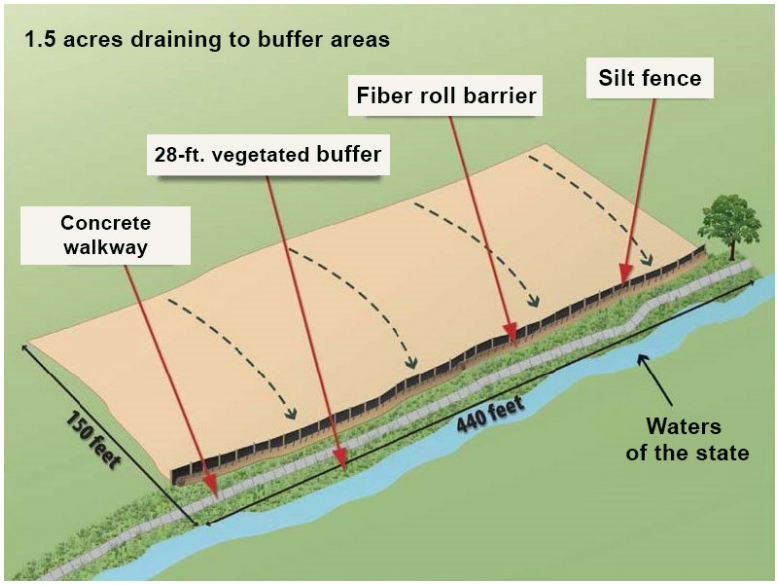


Figure B-6. Example 2 – Equivalent Sediment Load Reductions at a 6.5-acre Site in Eastern Oregon.

Notes

[1] DEQ used the following when developing the buffer performance tables:

- The sediment removal efficiencies are based on the U.S. Department of Agriculture's RUSLE2 ("Revised Universal Soil Loss Equation 2") model for slope profiles using a 100-foot-long denuded slopes.
- Sediment removal was defined as the annual sediment delivered at the downstream end of the 50-foot natural buffer zone (tons/yd/acre) divided by the annual yield from denuded area (tons/yr./acre).
- As perimeter controls are also required by the 1200-C General Permit, sediment removal is in part a function of the reduction due to a perimeter control (i.e., silt fence) located between the disturbed portion of the site and the upstream edge of the natural buffer zone and flow traveling through a 50-foot buffer of undisturbed natural vegetation.
- It was assumed that construction sites have a relatively uniform slope without topographic features that accelerate the concentration for erosive flows.
- It was assumed that vegetation has been removed from the disturbed portion of the site and a combination of cuts and fills have resulted in a smooth soil surface with limited retention of near-surface root mass.

To represent the influence of soil, DEQ presents general soil texture classifications in its evaluation of buffer performance. To represent different types of buffer vegetation, DEQ presents four or more common vegetative types for the State of Oregon covered under the permit. For each vegetation type evaluated, DEQ considered only permanent, non-grazed, and non-harvested vegetation, on the assumption that a natural buffer zone adjacent to the surface water of the state will typically be undisturbed. DEQ also considered slope steepness and found that risk levels present in Tables B-2 through B-6 are achievable for slopes that are less than nine percent.