Natural Buffer
Define “Natural Buffer”

“Natural Buffer” – for the purposes of this permit, an area of undisturbed natural cover surrounding surface waters within which construction activities are restricted. Natural cover includes the vegetation, exposed rock, or barren ground that exists prior to commencement of earth-disturbing activities. (appendix A)

--“Not required to enhance the quality of the vegetation that already exists within the buffer.” (G.2.3)
Graphic of a natural buffer area

- **Area of Earth Disturbance**
- **Surface Water**
- **Buffer**: 30 ft, 50 ft
- **Stormwater Flows**
Three Compliance Alternatives

1. Provide and maintain a 50ft undisturbed natural buffer.
2. Provide and maintain less than 50ft of buffer and additional controls to equal a 50ft natural buffer.
3. Maintain no natural buffer, implement controls to equal a natural 50ft natural buffer.
Exemptions

• NO stormwater discharge
• Preexisting development disturbances
• Linear Project
• 404 permit
NO stormwater discharge

- Includes controls like berms or barriers
Preexisting development disturbances

- No natural buffer because of prior development, NOT required to comply. (e.g. road right next to river, bridge, etc.)

- Some natural buffer with development, ARE required to comply, but not expected to compensate for reduced buffer outside of your control. (page G-3)
Linear Project

• Not required to comply if site constraints (e.g. limited right-of-way) make infeasible.
• To extent practicable, limit disturbances within 50ft and provide additional controls.
• Document in SWPPP rationale and buffer width retained.
404 permits

- Disturbance exempted if “construction approved under a CWA Section 404 permit.”

- Only 404 impact areas exempted
NOTE

• Only use table G-8

• Tables G-1 – G-7 DO NOT apply to ITD projects.

• Tables G-9 – G-15 DO NOT apply to IDAHO
How to determine buffer width

• Select regular intervals along water’s edge
Buffer width may vary...

Discharges through this area are required to be treated to provide the equivalent sediment reduction as the 50-foot buffer.

Discharges through this area are not required to be treated to provide the equivalent sediment reduction as the 50-foot buffer since the 50-foot buffer is provided.
Example Scenario

- OPEN WATER
- 10 FOOT BUFFER
- PERIMETER CONTROL
- 100 FOOT DISTURBED AREA
Steps

• Step 1. Find the soil loss from a 100 foot disturbed area. (use RUSLE equation).

• Step 2. Subtract the removal efficiency of a 50 foot natural buffer.

• Step 3. Determine efficiency of the maintained natural buffer (10ft).

• Step 4. Add efficiency of BMP.

• Step 5. Compare 50ft efficiency with 10ft + BMP.
RUSLE

RUSLE equation is shown below.

\[ A = R \times K \times LS \times C \times P \]

\( A \) = Annual soil loss in tons/acre/year

\( R \) = Rainfall factor

\( K \) = Soil erodability factor

\( LS \) = Topographic Factor

\( C \) = Cover Factor

\( P \) = Management Factor
R – Rainfall Factor

Use a Isoerodent Map of Western U.S. (USDA)
K – Soil Erodability Factor

Web Soil Survey

http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm
Area of Interest (AOI)

Area of Interest Interactive Map

AOI Properties

Search

Area of Interest

AOI Information

Name:

Map Unit Symbols:
- Use Soil Survey Area Map Unit Symbols
- Use National Map Unit Symbols

Area (acres): 12.5

Soil Data Available from Web Soil Survey

Ada County Area, Idaho (ID666)
- Spatial Data: Version 3, Dec 12, 2005
- Tabular Data: Version 5, Jan 31, 2008

Import AOI
Export AOI

Quick Navigation
<table>
<thead>
<tr>
<th>Map Unit Symbol</th>
<th>Map Unit Name</th>
<th>Acres in AOI</th>
<th>Percent of AOI</th>
</tr>
</thead>
<tbody>
<tr>
<td>136</td>
<td>Power-McCain silt loams, 8 to 12 percent slopes</td>
<td>8.2</td>
<td>65.6%</td>
</tr>
<tr>
<td>158</td>
<td>Rock outcrop-Trevino complex, 5 to 20 percent slopes</td>
<td>1.7</td>
<td>13.4%</td>
</tr>
<tr>
<td>164</td>
<td>Scism silt loam, bedrock substratum, 2 to 4 percent slopes</td>
<td>2.6</td>
<td>21.0%</td>
</tr>
</tbody>
</table>

Totals for Area of Interest: 12.5 acres, 100.0%
LS – Topographic Factor

- Use USDA Charts
  http://www.iwr.msu.edu/rusle/lsfactor.htm

- Must know the slope length and %slope

Example:
- Slope Length = 100 feet
- Slope = 6%
Table 4-11. LS Values for Freshly Prepared Construction and other Highly Disturbed Soil, with Little, or no Cover

<table>
<thead>
<tr>
<th>Slope %</th>
<th>&lt;3</th>
<th>6</th>
<th>9</th>
<th>12</th>
<th>15</th>
<th>25</th>
<th>50</th>
<th>75</th>
<th>100</th>
<th>150</th>
<th>200</th>
<th>250</th>
<th>300</th>
<th>400</th>
<th>600</th>
<th>800</th>
<th>1000</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.2</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.05</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
<td>0.06</td>
</tr>
<tr>
<td>0.5</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.07</td>
<td>0.08</td>
<td>0.08</td>
<td>0.09</td>
<td>0.09</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
<td>0.11</td>
<td>0.12</td>
<td>0.12</td>
<td>0.13</td>
<td>0.13</td>
</tr>
<tr>
<td>1.0</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.09</td>
<td>0.10</td>
<td>0.13</td>
<td>0.14</td>
<td>0.15</td>
<td>0.17</td>
<td>0.18</td>
<td>0.19</td>
<td>0.20</td>
<td>0.22</td>
<td>0.24</td>
<td>0.26</td>
<td>0.27</td>
<td>0.27</td>
</tr>
<tr>
<td>2.0</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
<td>0.13</td>
<td>0.16</td>
<td>0.21</td>
<td>0.25</td>
<td>0.28</td>
<td>0.33</td>
<td>0.37</td>
<td>0.40</td>
<td>0.43</td>
<td>0.48</td>
<td>0.56</td>
<td>0.63</td>
<td>0.69</td>
<td>0.69</td>
</tr>
<tr>
<td>3.0</td>
<td>0.17</td>
<td>0.17</td>
<td>0.17</td>
<td>0.17</td>
<td>0.21</td>
<td>0.30</td>
<td>0.36</td>
<td>0.41</td>
<td>0.50</td>
<td>0.57</td>
<td>0.64</td>
<td>0.69</td>
<td>0.80</td>
<td>0.96</td>
<td>1.10</td>
<td>1.23</td>
<td>1.23</td>
</tr>
<tr>
<td>4.0</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.20</td>
<td>0.26</td>
<td>0.38</td>
<td>0.47</td>
<td>0.55</td>
<td>0.68</td>
<td>0.79</td>
<td>0.89</td>
<td>1.14</td>
<td>1.42</td>
<td>1.65</td>
<td>1.65</td>
<td>1.86</td>
<td>1.86</td>
</tr>
<tr>
<td>5.0</td>
<td>0.23</td>
<td>0.23</td>
<td>0.23</td>
<td>0.23</td>
<td>0.31</td>
<td>0.46</td>
<td>0.58</td>
<td>0.68</td>
<td>0.80</td>
<td>1.02</td>
<td>1.16</td>
<td>1.28</td>
<td>1.51</td>
<td>1.91</td>
<td>2.25</td>
<td>2.55</td>
<td>2.55</td>
</tr>
<tr>
<td>6.0</td>
<td>0.26</td>
<td>0.26</td>
<td>0.26</td>
<td>0.26</td>
<td>0.36</td>
<td>0.54</td>
<td>0.69</td>
<td>0.82</td>
<td>1.05</td>
<td>1.25</td>
<td>1.43</td>
<td>1.60</td>
<td>1.90</td>
<td>2.43</td>
<td>2.89</td>
<td>3.30</td>
<td>3.30</td>
</tr>
<tr>
<td>8.0</td>
<td>0.32</td>
<td>0.32</td>
<td>0.32</td>
<td>0.32</td>
<td>0.45</td>
<td>0.70</td>
<td>0.91</td>
<td>1.10</td>
<td>1.43</td>
<td>1.72</td>
<td>1.99</td>
<td>2.24</td>
<td>2.70</td>
<td>3.52</td>
<td>4.24</td>
<td>4.91</td>
<td>4.91</td>
</tr>
<tr>
<td>10.0</td>
<td>0.35</td>
<td>0.37</td>
<td>0.39</td>
<td>0.39</td>
<td>0.57</td>
<td>0.91</td>
<td>1.20</td>
<td>1.46</td>
<td>1.92</td>
<td>2.34</td>
<td>2.72</td>
<td>3.09</td>
<td>3.75</td>
<td>4.95</td>
<td>6.03</td>
<td>7.02</td>
<td>7.02</td>
</tr>
<tr>
<td>12.0</td>
<td>0.36</td>
<td>0.41</td>
<td>0.45</td>
<td>0.47</td>
<td>0.71</td>
<td>1.15</td>
<td>1.54</td>
<td>1.88</td>
<td>2.51</td>
<td>3.07</td>
<td>3.60</td>
<td>4.09</td>
<td>5.01</td>
<td>6.67</td>
<td>8.17</td>
<td>9.57</td>
<td>9.57</td>
</tr>
<tr>
<td>14.0</td>
<td>0.38</td>
<td>0.45</td>
<td>0.51</td>
<td>0.55</td>
<td>0.85</td>
<td>1.40</td>
<td>1.87</td>
<td>2.31</td>
<td>3.09</td>
<td>3.81</td>
<td>4.48</td>
<td>5.11</td>
<td>6.30</td>
<td>8.45</td>
<td>10.40</td>
<td>12.23</td>
<td>12.23</td>
</tr>
<tr>
<td>16.0</td>
<td>0.39</td>
<td>0.49</td>
<td>0.56</td>
<td>0.62</td>
<td>0.98</td>
<td>1.64</td>
<td>2.21</td>
<td>2.73</td>
<td>3.68</td>
<td>4.56</td>
<td>5.37</td>
<td>6.15</td>
<td>7.60</td>
<td>10.26</td>
<td>12.69</td>
<td>14.96</td>
<td>14.96</td>
</tr>
<tr>
<td>20.0</td>
<td>0.41</td>
<td>0.56</td>
<td>0.67</td>
<td>0.84</td>
<td>1.24</td>
<td>2.10</td>
<td>2.86</td>
<td>3.57</td>
<td>4.85</td>
<td>6.04</td>
<td>7.16</td>
<td>8.23</td>
<td>10.24</td>
<td>13.94</td>
<td>17.35</td>
<td>20.57</td>
<td>20.57</td>
</tr>
<tr>
<td>25.0</td>
<td>0.45</td>
<td>0.64</td>
<td>0.80</td>
<td>1.04</td>
<td>1.56</td>
<td>2.67</td>
<td>3.67</td>
<td>4.59</td>
<td>6.30</td>
<td>7.88</td>
<td>9.38</td>
<td>10.81</td>
<td>13.53</td>
<td>18.57</td>
<td>23.24</td>
<td>27.66</td>
<td>27.66</td>
</tr>
<tr>
<td>30.0</td>
<td>0.48</td>
<td>0.72</td>
<td>0.91</td>
<td>1.08</td>
<td>1.24</td>
<td>1.86</td>
<td>2.62</td>
<td>3.44</td>
<td>5.58</td>
<td>7.70</td>
<td>9.67</td>
<td>11.55</td>
<td>13.35</td>
<td>16.77</td>
<td>23.14</td>
<td>29.07</td>
<td>34.71</td>
</tr>
<tr>
<td>40.0</td>
<td>0.53</td>
<td>0.85</td>
<td>1.13</td>
<td>1.37</td>
<td>1.59</td>
<td>2.41</td>
<td>4.24</td>
<td>5.89</td>
<td>7.44</td>
<td>10.35</td>
<td>13.07</td>
<td>15.67</td>
<td>18.17</td>
<td>22.95</td>
<td>31.89</td>
<td>40.29</td>
<td>48.29</td>
</tr>
<tr>
<td>50.0</td>
<td>0.58</td>
<td>0.97</td>
<td>1.31</td>
<td>1.62</td>
<td>1.91</td>
<td>2.91</td>
<td>5.16</td>
<td>7.20</td>
<td>9.13</td>
<td>12.75</td>
<td>16.16</td>
<td>19.42</td>
<td>22.57</td>
<td>28.60</td>
<td>39.95</td>
<td>50.63</td>
<td>60.84</td>
</tr>
<tr>
<td>60.0</td>
<td>0.63</td>
<td>1.07</td>
<td>1.47</td>
<td>1.84</td>
<td>2.19</td>
<td>3.36</td>
<td>5.97</td>
<td>8.37</td>
<td>10.63</td>
<td>14.89</td>
<td>18.92</td>
<td>22.78</td>
<td>26.51</td>
<td>33.67</td>
<td>47.18</td>
<td>59.93</td>
<td>72.15</td>
</tr>
</tbody>
</table>
C – Cover Factor

C = 1.0 for bare soil

C = Less than 1 for sites with vegetative coverage. Lower number for better (heavier) coverage
P – Management Factor

Use 1.0 for bare soil construction site

P = Less than one with practices (sediment pond, terracing slopes, diversion ditches)
• $R = 10$ (Isoerodent Map)
• $K = 0.43$ (Web Soil Survey)
• $LS = 0.82$
• $C = 1.0$
• $P = 1.0$

$A = 10 \times 0.43 \times 0.82 \times 1 \times 1 = 3.526$

$A = 3.526$ tons/acre/year
• From Web Soil Survey – Silt Loams
• From Site Visit – Medium-density Weeds
  

• Foot note 5: “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 (see Part 2.1.2.2).”
Subtract the removal efficiency for 50 foot natural buffer w/ perimeter controls

2012 CGP Table G-8

60% removal Efficiency

\[ 3.526 \times (1 - 0.60) = 1.41 \text{ tons/acre/year} \] (Sediment Load)

This is the number on which we will base our equivalency calculations.
Removal Efficiency of 10’ Natural Buffer

Option 1: use a model

“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.” – 2012 CGP

http://fargo.nserl.purdue.edu/rusle2_dataweb/RUSLE2_Index.htm

Option 2: use some percentage of the 50 foot efficiency reported by EPA.

60% / 50 ft = x% / 10ft,

x = 12% removal efficiency (assuming equal removal throughout buffer)
Find removal efficiency of BMP

*Have a referenced source for removal efficiency of any BMP

Rice Straw Waddle -- 58%  (http://www.earth-savers.com/)

3.526 x (1-0.58) = 1.48 tons/acre/year
Total removal efficiency of 10’ buffer and BMP

- 58% Waddle
- 12% 10ft buffer
- Total removal 70%
- $3.526 \times (1 - .70) = 1.06$ tons/acre/year

$1.06 < 1.41$, therefore in compliance
In the end..

- “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.” (G.2.3)