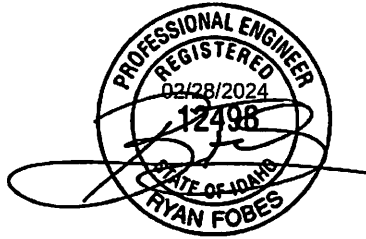


**FORESITE**  
ENGINEERING

## HAWTHORNE BUSINESS PARK

STORMWATER CALCULATIONS  
WEDNESDAY, FEBRUARY 28, 2024

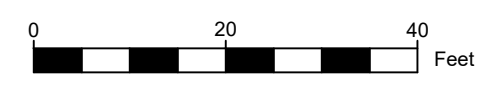


PREPARED BY: RYAN FOBES, P.E.  
FORESITE ENGINEERING, PLLC



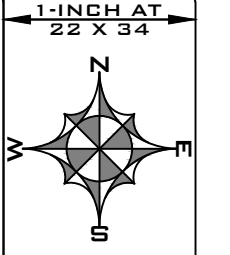
**KEY LEGEND:**

- 1 STORMWATER BASIN 1
- 2 STORMWATER BASIN 2
- 3 STORMWATER BASIN 3

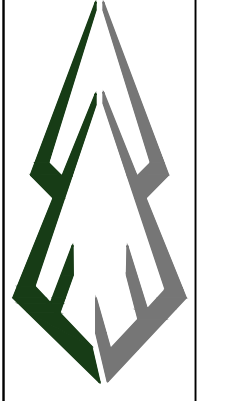


**SITE PLAN 20-SCALE**

N.T.S.



FORESITE ENGINEERING  
4118 E. LAKESIDE AVE. #01  
COEUR D'ALENE, IDAHO 83814



**HAWTHORNE BUSINESS PARK**  
STORMWATER BASINS  
CITY OF PONDERAY, IDAHO

JOB #: 23.011.01  
SCALE: AS SHOWN  
DATE: 04-12-2024  
SHEET 01

# BASIN 1 Stormwater Calculation

*Revised*  
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**Pre-Developed Condition**

|                                |      |
|--------------------------------|------|
| Area (acres)                   | 0.19 |
| Pre-Developed "C" Factor       | 0.61 |
| Design Storm Intensity (in/hr) | 2.85 |
| Pre-Developed Outflow (c.f.s.) | 0.32 |

**Developed Condition**

|                                |       |
|--------------------------------|-------|
| Time Increment (min)           | 5.00  |
| # of 600 Gallon Dry Wells      | 0     |
| # of 1000 Gallon Dry Wells     | 0     |
| Post-Developed Outflow (cfs)   | 0.42  |
| Design Year Flow (yr)          | 25.00 |
| Area (acres)                   | 0.19  |
| Developed "C" Factor           | 0.79  |
| Area x "C"                     | 0.15  |
| Soil infiltration rate (in/hr) | 0.03  |

**Flow Calcs:**

|                         |      |     |
|-------------------------|------|-----|
| Q <sub>INFILTRATE</sub> | 0.00 | CFS |
| Q <sub>DRYWELL</sub>    | 0.00 | CFS |

| #1<br>Time Inc.<br>(min.) | #2 t<br>Time Inc.<br>(sec.)<br>(#1*60) | #3<br>Intensity<br>(in./hr.) | #4<br>Q <sub>dev</sub><br>(cfs) | #5<br>V <sub>in</sub> (1)<br>(ft <sup>3</sup> ) | #6<br>V <sub>out</sub><br>(ft <sup>3</sup> ) | Required<br>Storage<br>Volume (ft <sup>3</sup> ) |
|---------------------------|----------------------------------------|------------------------------|---------------------------------|-------------------------------------------------|----------------------------------------------|--------------------------------------------------|
|                           |                                        |                              | (see below)                     | (see below)                                     |                                              |                                                  |
| 0                         | 0.00                                   | 0                            | 0                               | 0                                               | 0                                            | 0                                                |
| 5                         | 300.00                                 | 2.85                         | 0.42                            | 169                                             | 97                                           | 72                                               |
| 10                        | 600.00                                 | 2.21                         | 0.33                            | 230                                             | 150                                          | 80                                               |
| 15                        | 900.00                                 | 1.87                         | 0.27                            | 276                                             | 190                                          | 86                                               |
| 20                        | 1,200.00                               | 1.68                         | 0.25                            | 322                                             | 228                                          | 94                                               |
| 25                        | 1,500.00                               | 1.49                         | 0.22                            | 351                                             | 252                                          | 99                                               |
| 30                        | 1,800.00                               | 1.29                         | 0.19                            | 362                                             | 264                                          | 99                                               |
| 35                        | 2,100.00                               | 1.22                         | 0.18                            | 394                                             | 289                                          | 105                                              |
| 40                        | 2,400.00                               | 1.14                         | 0.17                            | 418                                             | 308                                          | 110                                              |
| 45                        | 2,700.00                               | 1.06                         | 0.16                            | 435                                             | 323                                          | 113                                              |
| 50                        | 3,000.00                               | 0.98                         | 0.14                            | 446                                             | 332                                          | 114                                              |
| 55                        | 3,300.00                               | 0.90                         | 0.13                            | 449                                             | 335                                          | 114                                              |
| 60                        | 3,600.00                               | 0.82                         | 0.12                            | 445                                             | 334                                          | 112                                              |
| 65                        | 3,900.00                               | 0.79                         | 0.12                            | 465                                             | 349                                          | 116                                              |
| 70                        | 4,200.00                               | 0.77                         | 0.11                            | 483                                             | 363                                          | 120                                              |
| 75                        | 4,500.00                               | 0.74                         | 0.11                            | 498                                             | 376                                          | 123                                              |
| 80                        | 4,800.00                               | 0.71                         | 0.10                            | 511                                             | 386                                          | 125                                              |
| 85                        | 5,100.00                               | 0.68                         | 0.10                            | 522                                             | 395                                          | 127                                              |
| 90                        | 5,400.00                               | 0.66                         | 0.10                            | 530                                             | 401                                          | 129                                              |
| 95                        | 5,700.00                               | 0.63                         | 0.09                            | 536                                             | 406                                          | 130                                              |
| 100                       | 6,000.00                               | 0.60                         | 0.09                            | 539                                             | 409                                          | 130                                              |
| 105                       | 6,300.00                               | 0.58                         | 0.08                            | 540                                             | 410                                          | 130                                              |
| 110                       | 6,600.00                               | 0.55                         | 0.08                            | 539                                             | 410                                          | 129                                              |
| 115                       | 6,900.00                               | 0.52                         | 0.08                            | 535                                             | 407                                          | 128                                              |
| 120                       | 7,200.00                               | 0.49                         | 0.07                            | 529                                             | 403                                          | 126                                              |

(1)  $V_{in} = 1.34 * Q_{Dev} * t$  for  $t < T_c$   
 $V_{in} = (Q_{Dev} * t) + (.34 * Q_{Dev} * T_c)$  for  $t > T_c$   
 $Q_{dev} = CIA - Q_{DRYWELL} - Q_{INFILTRATE}$

**Pre-Development:**

Tributary Area:

| Description: | Area (ft <sup>2</sup> ) | Area (Ac.) | CN         | Runoff Coefficients |
|--------------|-------------------------|------------|------------|---------------------|
| Trees/Brush  | 0.00                    | 0.00       | 55         | 0.15                |
| Gravel       | 6,834.00                | 0.16       | 76         | 0.55                |
| Pavement     | 1,297.00                | 0.03       | 98         | 0.9                 |
| Grass        | 0.00                    | 0.00       | 50         | 0.5                 |
| 0            | 0.00                    | 0.00       | 0          | 0                   |
| Totals:      | 8,131.00                | 0.19       | 79.5092855 | 0.605829541         |

**Post-Development:**

Tributary Area:

| Description:       | Area (ft <sup>2</sup> ) | Area (Ac.) | CN | Runoff Coefficients |
|--------------------|-------------------------|------------|----|---------------------|
| Driveway / Parking | 5,120.00                | 0.12       | 98 | 0.9                 |
| Grass              | 3,011.00                | 0.07       | 50 | 0.6                 |
| Roof               | 0.00                    | 0.00       | 98 | 0.9                 |
| Concrete           | 0.00                    | 0.00       | 98 | 0.9                 |
| 0                  | 0.00                    | 0.00       | 0  | 0                   |
| 0                  | 0.00                    | 0.00       | 0  | 0                   |
| Totals:            | 8,131.00                | 0.19       | 80 | 0.79                |

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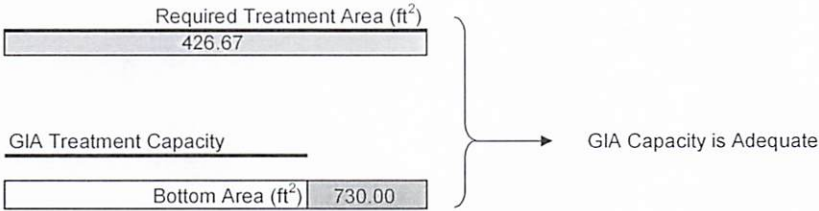
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CITY OF PONDERAY**

**Impervious Area:**

Tributary Area:

| Description:       | Area (ft <sup>2</sup> ) | Area (Ac.)  |
|--------------------|-------------------------|-------------|
| Driveway / Parking | 5,120.00                | 0.12        |
| 0.00               | 0.00                    | 0.00        |
| <b>Totals:</b>     | <b>5,120.00</b>         | <b>0.12</b> |

Required treatment volume calculated for treatment of first 1/2" of a rain event



**Storm Attenuation:**

|                                                    |        |
|----------------------------------------------------|--------|
| Stormwater Detention Basin Area (ft <sup>2</sup> ) | 730.00 |
| Detention Basin Depth (ft)                         | 0.50   |
| Detention Basin Storage Volume (ft <sup>3</sup> )  | 365.00 |

|                                            |        |
|--------------------------------------------|--------|
| Pre-Developed Flow (cfs)                   | 0.32   |
| Post-Developed Flow (cfs)                  | 0.42   |
| Required Storage Volume (ft <sup>3</sup> ) | 140.11 |
| Storage Volume (ft <sup>3</sup> )          | 365.00 |

Capacity is Adequate

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## BASIN 2 Stormwater Calculation

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### Pre-Developed Condition

|                                |      |
|--------------------------------|------|
| Area (acres)                   | 0.59 |
| Pre-Developed "C" Factor       | 0.59 |
| Design Storm Intensity (in/hr) | 2.85 |
| Pre-Developed Outflow (c.f.s.) | 0.99 |

### Developed Condition

|                                |       |
|--------------------------------|-------|
| Time Increment (min)           | 5.00  |
| # of 600 Gallon Dry Wells      | 0     |
| # of 1000 Gallon Dry Wells     | 0     |
| Post-Developed Outflow (cfs)   | 1.40  |
| Design Year Flow (yr)          | 25.00 |
| Area (acres)                   | 0.59  |
| Developed "C" Factor           | 0.83  |
| Area x "C"                     | 0.49  |
| Soil infiltration rate (in/hr) | 0.03  |

### Flow Calcs:

|                         |      |     |
|-------------------------|------|-----|
| Q <sub>INFILTRATE</sub> | 0.00 | CFS |
| Q <sub>DRYWELL</sub>    | 0.00 | CFS |

| #1<br>Time Inc.<br>(min.) | #2 t<br>Time Inc.<br>(sec.)<br>(#1*60) | #3<br>Intensity<br>(in./hr.) | #4<br>Q <sub>dev</sub><br>(cfs) | #5<br>V <sub>in</sub> (1)<br>(ft <sup>3</sup> ) | #6<br>V <sub>out</sub><br>(ft <sup>3</sup> ) | Required<br>Storage<br>Volume (ft <sup>3</sup> ) |
|---------------------------|----------------------------------------|------------------------------|---------------------------------|-------------------------------------------------|----------------------------------------------|--------------------------------------------------|
|                           |                                        |                              | (see below)                     | (see below)                                     |                                              |                                                  |
| 0                         | 0.00                                   | 0                            | 0                               | 0                                               | 0                                            | 0                                                |
| 5                         | 300.00                                 | 2.85                         | 1.39                            | 538                                             | 298                                          | 239                                              |
| 10                        | 600.00                                 | 2.21                         | 1.08                            | 742                                             | 463                                          | 279                                              |
| 15                        | 900.00                                 | 1.87                         | 0.91                            | 900                                             | 586                                          | 314                                              |
| 20                        | 1,200.00                               | 1.68                         | 0.82                            | 1054                                            | 702                                          | 353                                              |
| 25                        | 1,500.00                               | 1.49                         | 0.73                            | 1152                                            | 777                                          | 375                                              |
| 30                        | 1,800.00                               | 1.29                         | 0.63                            | 1193                                            | 812                                          | 381                                              |
| 35                        | 2,100.00                               | 1.22                         | 0.59                            | 1298                                            | 890                                          | 408                                              |
| 40                        | 2,400.00                               | 1.14                         | 0.56                            | 1380                                            | 951                                          | 430                                              |
| 45                        | 2,700.00                               | 1.06                         | 0.52                            | 1439                                            | 995                                          | 444                                              |
| 50                        | 3,000.00                               | 0.98                         | 0.48                            | 1474                                            | 1023                                         | 451                                              |
| 55                        | 3,300.00                               | 0.90                         | 0.44                            | 1486                                            | 1034                                         | 452                                              |
| 60                        | 3,600.00                               | 0.82                         | 0.40                            | 1475                                            | 1028                                         | 447                                              |
| 65                        | 3,900.00                               | 0.79                         | 0.39                            | 1542                                            | 1077                                         | 465                                              |
| 70                        | 4,200.00                               | 0.77                         | 0.37                            | 1602                                            | 1120                                         | 481                                              |
| 75                        | 4,500.00                               | 0.74                         | 0.36                            | 1653                                            | 1158                                         | 495                                              |
| 80                        | 4,800.00                               | 0.71                         | 0.35                            | 1696                                            | 1190                                         | 506                                              |
| 85                        | 5,100.00                               | 0.68                         | 0.33                            | 1732                                            | 1216                                         | 516                                              |
| 90                        | 5,400.00                               | 0.66                         | 0.32                            | 1759                                            | 1237                                         | 522                                              |
| 95                        | 5,700.00                               | 0.63                         | 0.31                            | 1779                                            | 1252                                         | 527                                              |
| 100                       | 6,000.00                               | 0.60                         | 0.29                            | 1791                                            | 1261                                         | 529                                              |
| 105                       | 6,300.00                               | 0.58                         | 0.28                            | 1794                                            | 1265                                         | 530                                              |
| 110                       | 6,600.00                               | 0.55                         | 0.27                            | 1790                                            | 1263                                         | 527                                              |
| 115                       | 6,900.00                               | 0.52                         | 0.25                            | 1778                                            | 1255                                         | 523                                              |
| 120                       | 7,200.00                               | 0.49                         | 0.24                            | 1758                                            | 1242                                         | 516                                              |

$$(1) -V_{in} = 1.34 * Q_{Dev} * t \text{ for } t < T_c$$

$$V_{in} = (Q_{Dev} * t) + (.34 * Q_{Dev} * T_c) \text{ for } t > T_c$$

$$Q_{dev} = CIA - Q_{DRYWELL} - Q_{INFILTRATE}$$

**Pre-Development:**  
Tributary Area:

| Description:   | Area (ft <sup>2</sup> ) | Area (Ac.)  | CN                | Runoff Coefficients |
|----------------|-------------------------|-------------|-------------------|---------------------|
| Trees/Brush    | 0.00                    | 0.00        | 55                | 0.15                |
| Gravel         | 22,700.00               | 0.52        | 76                | 0.55                |
| Pavement       | 3,000.00                | 0.07        | 98                | 0.9                 |
| Grass          | 0.00                    | 0.00        | 50                | 0.5                 |
| 0              | 0.00                    | 0.00        | 0                 | 0                   |
| <b>Totals:</b> | <b>25,700.00</b>        | <b>0.59</b> | <b>78.5680934</b> | <b>0.590856031</b>  |

**Post-Development:**  
Tributary Area:

| Description:       | Area (ft <sup>2</sup> ) | Area (Ac.)  | CN        | Runoff Coefficients |
|--------------------|-------------------------|-------------|-----------|---------------------|
| Driveway / Parking | 13,170.00               | 0.30        | 98        | 0.9                 |
| Grass              | 6,027.00                | 0.14        | 50        | 0.6                 |
| Roof               | 6,503.00                | 0.15        | 98        | 0.9                 |
| Concrete           | 0.00                    | 0.00        | 98        | 0.9                 |
| 0                  | 0.00                    | 0.00        | 0         | 0                   |
| 0                  | 0.00                    | 0.00        | 0         | 0                   |
| <b>Totals:</b>     | <b>25,700.00</b>        | <b>0.59</b> | <b>87</b> | <b>0.83</b>         |

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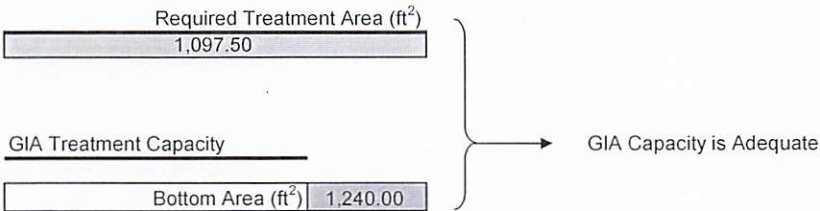
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Impervious Area:  
Tributary Area:

| Description:       | Area (ft <sup>2</sup> ) | Area (Ac.) |
|--------------------|-------------------------|------------|
| Driveway / Parking | 13,170.00               | 0.30       |
| 0.00               | 0.00                    | 0.00       |
| Totals:            | 13,170.00               | 0.30       |

Required treatment volume calculated for treatment of first 1/2" of a rain event



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Storm Attenuation:

|                                                    |          |
|----------------------------------------------------|----------|
| Stormwater Detention Basin Area (ft <sup>2</sup> ) | 1,240.00 |
| Detention Basin Depth (ft)                         | 0.50     |
| Detention Basin Storage Volume (ft <sup>3</sup> )  | 620.00   |

|                                            |        |
|--------------------------------------------|--------|
| Pre-Developed Flow (cfs)                   | 0.99   |
| Post-Developed Flow (cfs)                  | 1.40   |
| Required Storage Volume (ft <sup>3</sup> ) | 582.91 |
| Storage Volume (ft <sup>3</sup> )          | 620.00 |

} Capacity is Adequate



## BASIN 3 Stormwater Calculation

### Pre-Developed Condition

|                                |      |
|--------------------------------|------|
| Area (acres)                   | 1.17 |
| Pre-Developed "C" Factor       | 0.55 |
| Design Storm Intensity (in/hr) | 2.85 |
| Pre-Developed Outflow (c.f.s.) | 1.84 |

### Developed Condition

|                                |       |
|--------------------------------|-------|
| Time Increment (min)           | 5.00  |
| # of 600 Gallon Dry Wells      | 0     |
| # of 1000 Gallon Dry Wells     | 0     |
| Post-Developed Outflow (cfs)   | 2.86  |
| Design Year Flow (yr)          | 25.00 |
| Area (acres)                   | 1.17  |
| Developed "C" Factor           | 0.86  |
| Area x "C"                     | 1.00  |
| Soil infiltration rate (in/hr) | 0.03  |

### Flow Calcs:

|                         |      |     |
|-------------------------|------|-----|
| Q <sub>INFILTRATE</sub> | 0.00 | CFS |
| Q <sub>DRYWELL</sub>    | 0.00 | CFS |

| #1<br>Time Inc.<br>(min.) | #2 t<br>Time Inc.<br>(sec.)<br>(#1*60) | #3<br>Intensity<br>(in./hr.) | #4<br>Q <sub>dev</sub><br>(cfs) | #5<br>V <sub>in</sub> (1)<br>(ft <sup>3</sup> ) | #6<br>V <sub>out</sub><br>(ft <sup>3</sup> ) | Required<br>Storage<br>Volume (ft <sup>3</sup> ) |
|---------------------------|----------------------------------------|------------------------------|---------------------------------|-------------------------------------------------|----------------------------------------------|--------------------------------------------------|
|                           |                                        |                              | (see below)                     | (see below)                                     |                                              |                                                  |
| 0                         | 0.00                                   | 0                            | 0                               | 0                                               | 0                                            | 0                                                |
| 5                         | 300.00                                 | 2.85                         | 2.86                            | 1142                                            | 551                                          | 591                                              |
| 10                        | 600.00                                 | 2.21                         | 2.22                            | 1551                                            | 855                                          | 696                                              |
| 15                        | 900.00                                 | 1.87                         | 1.87                            | 1871                                            | 1083                                         | 788                                              |
| 20                        | 1,200.00                               | 1.68                         | 1.68                            | 2183                                            | 1296                                         | 886                                              |
| 25                        | 1,500.00                               | 1.49                         | 1.49                            | 2380                                            | 1436                                         | 944                                              |
| 30                        | 1,800.00                               | 1.29                         | 1.30                            | 2462                                            | 1501                                         | 960                                              |
| 35                        | 2,100.00                               | 1.22                         | 1.22                            | 2676                                            | 1644                                         | 1031                                             |
| 40                        | 2,400.00                               | 1.14                         | 1.14                            | 2842                                            | 1757                                         | 1085                                             |
| 45                        | 2,700.00                               | 1.06                         | 1.06                            | 2960                                            | 1838                                         | 1122                                             |
| 50                        | 3,000.00                               | 0.98                         | 0.98                            | 3031                                            | 1890                                         | 1142                                             |
| 55                        | 3,300.00                               | 0.90                         | 0.90                            | 3054                                            | 1910                                         | 1144                                             |
| 60                        | 3,600.00                               | 0.82                         | 0.82                            | 3030                                            | 1900                                         | 1130                                             |
| 65                        | 3,900.00                               | 0.79                         | 0.79                            | 3167                                            | 1991                                         | 1176                                             |
| 70                        | 4,200.00                               | 0.77                         | 0.76                            | 3288                                            | 2070                                         | 1217                                             |
| 75                        | 4,500.00                               | 0.74                         | 0.74                            | 3392                                            | 2140                                         | 1252                                             |
| 80                        | 4,800.00                               | 0.71                         | 0.71                            | 3481                                            | 2199                                         | 1282                                             |
| 85                        | 5,100.00                               | 0.68                         | 0.68                            | 3553                                            | 2248                                         | 1305                                             |
| 90                        | 5,400.00                               | 0.66                         | 0.66                            | 3608                                            | 2286                                         | 1323                                             |
| 95                        | 5,700.00                               | 0.63                         | 0.63                            | 3648                                            | 2313                                         | 1334                                             |
| 100                       | 6,000.00                               | 0.60                         | 0.60                            | 3671                                            | 2330                                         | 1340                                             |
| 105                       | 6,300.00                               | 0.58                         | 0.57                            | 3678                                            | 2337                                         | 1340                                             |
| 110                       | 6,600.00                               | 0.55                         | 0.55                            | 3668                                            | 2333                                         | 1335                                             |
| 115                       | 6,900.00                               | 0.52                         | 0.52                            | 3642                                            | 2319                                         | 1323                                             |
| 120                       | 7,200.00                               | 0.49                         | 0.49                            | 3600                                            | 2295                                         | 1306                                             |

(1)  $V_{in} = 1.34 * Q_{dev} * t$  for  $t < T_c$   
 $V_{in} = (Q_{dev} * t) + (.34 * Q_{dev} * T_c)$  for  $t > T_c$   
 $Q_{dev} = CIA - Q_{DRYWELL} - Q_{INFILTRATE}$

**Pre-Development:**

Tributary Area:

| Description: | Area (ft <sup>2</sup> ) | Area (Ac.) | CN | Runoff Coefficients |
|--------------|-------------------------|------------|----|---------------------|
| Trees/Brush  | 0.00                    | 0.00       | 55 | 0.15                |
| Gravel       | 51,016.00               | 1.17       | 76 | 0.55                |
| Pavement     | 0.00                    | 0.00       | 98 | 0.9                 |
| Grass        | 0.00                    | 0.00       | 50 | 0.5                 |
| 0            | 0.00                    | 0.00       | 0  | 0                   |
| Totals:      | 51,016.00               | 1.17       | 76 | 0.55                |

**Post-Development:**

Tributary Area:

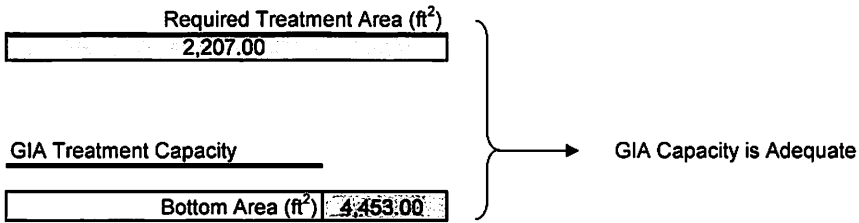
| Description:       | Area (ft <sup>2</sup> ) | Area (Ac.) | CN | Runoff Coefficients |
|--------------------|-------------------------|------------|----|---------------------|
| Driveway / Parking | 26,484.00               | 0.61       | 98 | 0.9                 |
| Grass              | 7,358.00                | 0.17       | 50 | 0.6                 |
| Roof               | 17,174.00               | 0.39       | 98 | 0.9                 |
| Concrete           | 0.00                    | 0.00       | 98 | 0.9                 |
| 0                  | 0.00                    | 0.00       | 0  | 0                   |
| 0                  | 0.00                    | 0.00       | 0  | 0                   |
| Totals:            | 51,016.00               | 1.17       | 91 | 0.86                |

**Impervious Area:**

Tributary Area:

| Description:       | Area (ft <sup>2</sup> ) | Area (Ac.)  |
|--------------------|-------------------------|-------------|
| Driveway / Parking | 26,484.00               | 0.61        |
| 0.00               | 0.00                    | 0.00        |
| <b>Totals:</b>     | <b>26,484.00</b>        | <b>0.61</b> |

Required treatment volume calculated for treatment of first 1/2" of a rain event



**Storm Attenuation:**

|                                                    |          |
|----------------------------------------------------|----------|
| Stormwater Detention Basin Area (ft <sup>2</sup> ) | 4,453.00 |
| Detention Basin Depth (ft)                         | 0.50     |
| Detention Basin Storage Volume (ft <sup>3</sup> )  | 2,226.50 |

|                                            |          |
|--------------------------------------------|----------|
| Pre-Developed Flow (cfs)                   | 1.84     |
| Post-Developed Flow (cfs)                  | 2.86     |
| Required Storage Volume (ft <sup>3</sup> ) | 1,473.59 |
| Storage Volume (ft <sup>3</sup> )          | 2,226.50 |

} Capacity is Adequate

Soil Map—Bonner County Area, Idaho, Parts of Bonner and Boundary Counties



Soil Map may not be valid at this scale.





































Map Scale: 1:1,570 if printed on A landscape (11" x 8.5") sheet.



Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84



## MAP LEGEND

|                                                                                     |                        |                                                                                   |                       |
|-------------------------------------------------------------------------------------|------------------------|-----------------------------------------------------------------------------------|-----------------------|
| <b>Area of Interest (AOI)</b>                                                       |                        |  | Spoil Area            |
|    | Area of Interest (AOI) |  | Stony Spot            |
| <b>Soils</b>                                                                        |                        |  | Very Stony Spot       |
|    | Soil Map Unit Polygons |  | Wet Spot              |
|    | Soil Map Unit Lines    |  | Other                 |
|    | Soil Map Unit Points   |  | Special Line Features |
| <b>Special Point Features</b>                                                       |                        | <b>Water Features</b>                                                             |                       |
|    | Blowout                |  | Streams and Canals    |
|    | Borrow Pit             | <b>Transportation</b>                                                             |                       |
|    | Clay Spot              |  | Rails                 |
|    | Closed Depression      |  | Interstate Highways   |
|    | Gravel Pit             |  | US Routes             |
|    | Gravelly Spot          |  | Major Roads           |
|    | Landfill               |  | Local Roads           |
|    | Lava Flow              | <b>Background</b>                                                                 |                       |
|    | Marsh or swamp         |  | Aerial Photography    |
|    | Mine or Quarry         |                                                                                   |                       |
|    | Miscellaneous Water    |                                                                                   |                       |
|  | Perennial Water        |                                                                                   |                       |
|  | Rock Outcrop           |                                                                                   |                       |
|  | Saline Spot            |                                                                                   |                       |
|  | Sandy Spot             |                                                                                   |                       |
|  | Severely Eroded Spot   |                                                                                   |                       |
|  | Sinkhole               |                                                                                   |                       |
|  | Slide or Slip          |                                                                                   |                       |
|  | Sodic Spot             |                                                                                   |                       |

## MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

**Warning:** Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service  
 Web Soil Survey URL:  
 Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties  
 Survey Area Data: Version 19, Aug 31, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jul 14, 2023—Aug 13, 2023

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

## Map Unit Legend

| Map Unit Symbol                    | Map Unit Name                            | Acres in AOI | Percent of AOI |
|------------------------------------|------------------------------------------|--------------|----------------|
| 31                                 | Mission silt loam, 0 to 2 percent slopes | 6.3          | 100.0%         |
| <b>Totals for Area of Interest</b> |                                          | <b>6.3</b>   | <b>100.0%</b>  |

## Physical Soil Properties

This table shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

*Depth* to the upper and lower boundaries of each layer is indicated.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

*Sand* as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Silt* as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

*Clay* as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, saturated hydraulic conductivity ( $K_{sat}$ ), plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

*Moist bulk density* is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3- or 1/10-bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute linear extensibility, shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

*Saturated hydraulic conductivity (Ksat)* refers to the ease with which pores in a saturated soil transmit water. The estimates in the table are expressed in terms of micrometers per second. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Saturated hydraulic conductivity (Ksat) is considered in the design of soil drainage systems and septic tank absorption fields.

*Available water capacity* refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

*Linear extensibility* refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. The amount and type of clay minerals in the soil influence volume change.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

*Organic matter* is the plant and animal residue in the soil at various stages of decomposition. In this table, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter. The content of organic matter in a soil can be maintained by returning crop residue to the soil.

Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tillage. It is a source of nitrogen and other nutrients for crops and soil organisms.

*Erosion factors* are shown in the table as the K factor (Kw and Kf) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and Ksat. Values of K range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

*Erosion factor Kw* indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

*Erosion factor Kf* indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.



*Erosion factor T* is an estimate of the maximum average annual rate of soil erosion by wind and/or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

*Wind erodibility groups* are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are described in the "National Soil Survey Handbook."

*Wind erodibility index* is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments, organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Reference:

United States Department of Agriculture, Natural Resources Conservation Service. National soil survey handbook, title 430-VI. (<http://soils.usda.gov>)

## Report—Physical Soil Properties

Three values are provided to identify the expected Low (L), Representative Value (R), and High (H).

| Physical Soil Properties—Bonner County Area, Idaho, Parts of Bonner and Boundary Counties |           |            |            |            |                    |                                  |                          |                      |                    |                 |     |   |                        |                        |
|-------------------------------------------------------------------------------------------|-----------|------------|------------|------------|--------------------|----------------------------------|--------------------------|----------------------|--------------------|-----------------|-----|---|------------------------|------------------------|
| Map symbol and soil name                                                                  | Depth     | Sand       | Silt       | Clay       | Moist bulk density | Saturated hydraulic conductivity | Available water capacity | Linear extensibility | Organic matter     | Erosion factors |     |   | Wind erodibility group | Wind erodibility index |
|                                                                                           |           |            |            |            |                    |                                  |                          |                      |                    | Kw              | Kf  | T |                        |                        |
|                                                                                           | <i>In</i> | <i>Pct</i> | <i>Pct</i> | <i>Pct</i> | <i>g/cc</i>        | <i>micro m/sec</i>               | <i>In/In</i>             | <i>Pct</i>           | <i>Pct</i>         |                 |     |   |                        |                        |
| 31—Mission silt loam, 0 to 2 percent slopes                                               |           |            |            |            |                    |                                  |                          |                      |                    |                 |     |   |                        |                        |
| Mission                                                                                   | 0-1       | -35-       | -50-       | 0-15- 25   | 0.10-0.20<br>-0.30 | 42.00-373.00-7<br>05.00          | 0.30-0.45-0.<br>60       | —                    | 60.0-75.0<br>-95.0 |                 |     | 3 | 3                      | 86                     |
|                                                                                           | 1-3       | -28-       | -67-       | 3- 6- 8    | 0.60-0.73<br>-0.85 | 4.00-9.00-14.00                  | 0.19-0.20-0.<br>21       | 0.0- 1.5- 2.9        | 3.0- 4.5-<br>6.0   | .55             | .55 |   |                        |                        |
|                                                                                           | 3-12      | -28-       | -67-       | 3- 6- 8    | 0.60-0.73<br>-0.85 | 4.00-9.00-14.00                  | 0.19-0.20-0.<br>21       | 0.0- 1.5- 2.9        | 3.0- 4.5-<br>6.0   | .55             | .55 |   |                        |                        |
|                                                                                           | 12-21     | -11-       | -68-       | 12-21- 30  | 1.70-1.75<br>-1.80 | 0.01-0.22-0.42                   | 0.07-0.09-0.<br>10       | 0.0- 1.5- 2.9        | 0.0- 0.3-<br>0.5   | .55             | .55 |   |                        |                        |
|                                                                                           | 21-33     | -11-       | -83-       | 2- 6- 10   | 1.50-1.58<br>-1.65 | 1.40-2.70-4.00                   | 0.17-0.19-0.<br>20       | 0.0- 1.5- 2.9        | 0.0- 0.3-<br>0.5   | .64             | .64 |   |                        |                        |
|                                                                                           | 33-48     | - 9-       | -61-       | 15-30- 45  | 1.50-1.60<br>-1.70 | 0.01-0.22-0.42                   | 0.08-0.10-0.<br>12       | 3.0- 4.5- 5.9        | 0.0- 0.3-<br>0.5   | .55             | .55 |   |                        |                        |
|                                                                                           | 48-67     | -96-       | - 1-       | 2- 3- 4    | 1.30-1.45<br>-1.60 | 42.00-92.00-14<br>1.00           | 0.05-0.08-0.<br>10       | 0.0- 1.5- 2.9        | 0.0- 0.3-<br>0.5   | .02             | .02 |   |                        |                        |

## Data Source Information

Soil Survey Area: Bonner County Area, Idaho, Parts of Bonner and Boundary Counties  
 Survey Area Data: Version 19, Aug 31, 2023

# MAINTENANCE STANDARDS FOR PRIVATELY MAINTAINED DRAINAGE FACILITIES

## PIPES, TANKS

| MAINTENANCE COMPONENT | DEFECT                                                          | CONDITIONS WHEN MAINTENANCE IS NEEDED                                                                                                                                                                                                                                                 | RESULTS EXPECTED WHEN MAINTENANCE IS PERFORMED                                                     |
|-----------------------|-----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------|
| STORAGE AREA          | PLUGGED AIR VENTS                                               | ONE-HALF OF THE CROSS SECTION OF A VENT IS BLOCKED AT ANY POINT WITH DEBRIS AND SEDIMENT                                                                                                                                                                                              | VENTS FREE OF DEBRIS AND SEDIMENT                                                                  |
|                       | DEBRIS AND SEDIMENT                                             | ACCUMULATED SEDIMENT DEPTH EXCEEDS 10% OF THE DIAMETER OF THE STORAGE AREA FOR 1/2 LENGTH OF STORAGE VAULT OR ANY POINT DEPTH EXCEEDS 15% OF DIAMETER. EXAMPLE: 72-INCH STORAGE TANK WOULD REQUIRE CLEANING WHEN SEDIMENT REACHES DEPTH OF 7 INCHES FOR MORE THAN 1/2 LENGTH OF TANK. | ALL SEDIMENT AND DEBRIS REMOVED FROM STORAGE AREA.                                                 |
|                       | JOINTS BETWEEN TANK/PIPE SECTION<br>TANK PIPE BENT OUT OF SHAPE | ANY CRACK ALLOWING MATERIAL TO BE TRANSPORTED INTO FACILITY<br><br>ANY PART OF TANK/PIPE IS BENT OUT OF SHAPE MORE THAN 10% OF IT'S DESIGN SHAPE                                                                                                                                      | ALL JOINT BETWEEN TANK /PIPE SECTIONS ARE SEALED<br><br>TANK/ PIPE REPAIRED OR REPLACED TO DESIGN. |

## ENERGY DISSIPATERS

| MAINTENANCE COMPONENTS | DEFECT                | CONDITIONS WHEN MAINTENANCE IS NEEDED                                                                               | RESULTS EXPECTED WHEN MAINTENANCE IS PERFORMED. |
|------------------------|-----------------------|---------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|
| EXTERNAL:<br>ROCK PAD  | MISSING OR MOVED ROCK | ONLY ONE LAYER OF ROCK EXISTS ABOVE NATIVE SOIL IN AREA FIVE SQUARE FEET OR LARGER, OR ANY EXPOSURE OF NATIVE SOIL. | REPLACE ROCKS TO DESIGN STANDARDS.              |

## CONVEYANCE SYSTEMS (PIPES & DITCHES)

| MAINTENANCE COMPONENT | DEFECT                                               | CONDITIONS WHEN MAINTENANCE IS NEEDED                                                                                      | RESULTS EXPECTED WHEN MAINTENANCE IS PERFORMED                                                                                        |
|-----------------------|------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| PIPES                 | SEDIMENT & DEBRIS                                    | ACCUMULATED SEDIMENT THAT EXCEEDS 20% OF THE DIAMETER OF THE PIPE.                                                         | PIPE CLEANED OF ALL SEDIMENT AND DEBRIS.                                                                                              |
|                       | VEGETATION                                           | VEGETATION THAT REDUCES FREE MOVEMENT OF WATER THROUGH PIPES.                                                              | ALL VEGETATION REMOVED SO WATER FLOWS FREELY THROUGH PIPES.                                                                           |
|                       | DAMAGED                                              | PROTECTIVE COATING IS DAMAGED; RUST IS CAUSING MORE THAN 50% DETERIORATION TO ANY PART OF PIPE.                            | PIPE REPAIRED OR REPLACED.                                                                                                            |
|                       |                                                      | ANY DENT THAT DECREASES THE CROSS SECTION AREA OF PIPE BY MORE THAN 20%.                                                   | PIPE REPAIRED OR REPLACED.                                                                                                            |
| OPEN DITCHES          | TRASH & DEBRIS                                       | TRASH AND DEBRIS EXCEEDS 1 CUBIC FOOT PER 1,000 SQUARE FEET OF DITCH AND SLOPES.                                           | TRASH AND DEBRIS CLEARED FROM DITCHES.                                                                                                |
|                       | SEDIMENT                                             | ACCUMULATED SEDIMENT THAT EXCEEDS 20 % OF THE DESIGN DEPTH.                                                                | DITCH CLEANED/ FLUSHED OF ALL SEDIMENT AND DEBRIS SO THAT IT MATCHES DESIGN.                                                          |
|                       | VEGETATION                                           | VEGETATION THAT REDUCES FREE MOVEMENT OF WATER THROUGH DITCHES.                                                            | WATER FLOWS FREELY THROUGH DITCHES.                                                                                                   |
| SIDE SLOPES OF POND   | EROSION                                              | ERODED DAMAGE OVER 2 INCHES DEEP WHERE CAUSE OF DAMAGE IS STILL PRESENT OR WHERE THERE IS POTENTIAL FOR CONTINUED EROSION. | SLOPES SHOULD BE STABILIZED BY USING APPROPRIATE EROSION CONTROL MEASURE(S); E.G., ROCK REINFORCEMENT, PLANTING OF GRASS, COMPACTION. |
|                       | ROCK LINING OUT OF PLACE OR MISSING (IF APPLICABLE). | MAINTENANCE PERSON CAN SEE NATIVE SOIL BENEATH THE ROCK LINING.                                                            | REPLACE ROCKS TO DESIGN STANDARDS.                                                                                                    |

## GROUNDS (LANDSCAPING)

| MAINTENANCE COMPONENT | DEFECT               | CONDITIONS WHEN MAINTENANCE IS NEEDED                                                                                            | RESULTS EXPECTED WHEN MAINTENANCE IS PERFORMED                                      |
|-----------------------|----------------------|----------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------|
| GENERAL               | WEEDS (NONPOISONOUS) | WEEDS GROWING IN MORE THAN 20% OF THE LANDSCAPED AREA (TREES AND SHRUBS ONLY).                                                   | WEEDS PRESENT IN LESS THAN 5% OF THE LANDSCAPED AREA.                               |
|                       | SAFETY HAZARD        | ANY PRESENCE OF POISON IVY OR OTHER POISONOUS VEGETATION.                                                                        | NO POISONOUS VEGETATION PRESENT IN LANDSCAPED AREA.                                 |
|                       | TRASH OR LITTER      | PAPER, CANS, BOTTLES, TOTALING MORE THAN 1 CUBIC FOOT WITHIN A LANDSCAPED AREA (TREES AND SHRUBS ONLY) OF 1,000 SQUARE FEET.     | AREA CLEAR OF LITTER.                                                               |
| TREES AND SHRUBS      | DAMAGED              | LIMBS OR PARTS OF TREES OR SHRUBS THAT ARE SPLIT OR BROKEN WHICH AFFECT MORE THAN 25% OF THE TOTAL FOLIAGE OF THE TREE OR SHRUB. | TREES AND SHRUBS WITH LESS THAN 5% OF TOTAL FOLIAGE WITH SPLIT OR BROKEN LIMBS.     |
|                       |                      | TREES OR SHRUBS THAT HAVE BEEN BLOWN DOWN OR KNOCKED OVER.                                                                       | TREE OR SHRUB IN PLACE FREE OF INJURY.                                              |
|                       |                      | TREES OR SHRUBS WHICH ARE NOT ADEQUATELY SUPPORTED OR ARE LEANING OVER, CAUSING EXPOSURE OF THE ROOTS.                           | TREE OR SHRUB IN PLACE AND ADEQUATELY SUPPORTED; REMOVE ANY DEAD OR DISEASED TREES. |

## WATER QUALITY FACILITIES

### TYPICAL BIOFILTRATION SWALE

| MAINTENANCE COMPONENT | DEFECT OR PROBLEM                                                           | CONDITION WHEN MAINTENANCE IS NEEDED                                                                                                                                                                                                                                                                                                                                                                                              | RECOMMENDED MAINTENANCE TO CORRECT PROBLEM                                                                                                                                                                                                                                                                                                                  |
|-----------------------|-----------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| BIOFILTRATION SWALE   | SEDIMENT ACCUMULATION ON GRASS                                              | SEDIMENT DEPTH EXCEEDS 2-INCHES                                                                                                                                                                                                                                                                                                                                                                                                   | REMOVE SEDIMENT DEPOSITS ON GRASS TREATMENT AREA OF THE BIO-SWALE. WHEN FINISHED, SWALE SHOULD BE LEVEL FROM SIDE TO SIDE AND DRAIN FREELY TOWARD OUTLET. THERE SHOULD BE NO AREAS OF STANDING WATER ONCE INFLOW HAS CEASED.                                                                                                                                |
|                       | STANDING WATER                                                              | WHEN WATER STANDS IN THE SWALE BETWEEN STORMS AND DOES NOT DRAIN FREELY.                                                                                                                                                                                                                                                                                                                                                          | ANY OF THE FOLLOWING MAY APPLY: REMOVE SEDIMENT OR TRASH BLOCKAGES, IMPROVE GRADE FROM HEAD TO FOOT OF SWALE, REMOVE CLOGGED CHECK DAMS, ADD UNDERDRAINS OR CONVERT TO A WET BIOFILTRATION SWALE.                                                                                                                                                           |
|                       | FLOW SPREADER                                                               | FLOW SPREADER UNEVEN OR CLOGGED SO THAT FLOWS ARE NOT UNIFORMLY DISTRIBUTED THROUGH ENTIRE SWALE WIDTH.                                                                                                                                                                                                                                                                                                                           | LEVEL THE SPREADER AND CLEAN SO THAT FLOWS ARE SPREAD EVENLY OVER ENTIRE SWALE WIDTH.                                                                                                                                                                                                                                                                       |
|                       | CONSTANT BASEFLOW                                                           | WHEN SMALL QUANTITIES OF WATER CONTINUALLY FLOW THROUGH THE SWALE, EVEN WHEN IT HAS BEEN DRY FOR WEEKS, AND AN ERODED, MUDDY CHANNEL HAS FORMED IN THE SWALE BOTTOM.                                                                                                                                                                                                                                                              | ADD A LOW-FLOW PEA-GRAVEL DRAIN THE LENGTH OF THE SWALE OR BY-PASS THE BASEFLOW AROUND THE SWALE.                                                                                                                                                                                                                                                           |
|                       | POOR VEGETATION COVERAGE                                                    | WHEN GRASS IS SPARSE OR BARE OR ERODED PATCHES OCCUR IN MORE THAN 10% OF THE SWALE BOTTOM.                                                                                                                                                                                                                                                                                                                                        | DETERMINE WHY GRASS GROWTH IS POOR AND CORRECT THAT CONDITION. RE-PLANT WITH PLUGS OF GRASS FROM THE UPPER SLOPE: PLANT IN THE SWALE BOTTOM AT 8-INCH INTERVALS. OR RESEED INTO LOOSENEED, FERTILE SOIL. MOW VEGETATION OR REMOVE NUISANCE VEGETATION SO THAT FLOW NOT IMPEDED. GRASS SHOULD BE MOWED TO A HEIGHT OF 3 TO 4 INCHES. REMOVE GRASS CLIPPINGS. |
|                       | VEGETATION                                                                  | WHEN THE GRASS BECOMES EXCESSIVELY TALL (GREATER THAN 10-INCHES); WHEN NUISANCE WEEDS AND OTHER VEGETATION STARTS TO TAKE OVER.                                                                                                                                                                                                                                                                                                   | MOW VEGETATION OR REMOVE NUISANCE VEGETATION SO THAT FLOW NOT IMPEDED. GRASS SHOULD BE MOWED TO A HEIGHT OF 3 TO 4 INCHES. REMOVE GRASS CLIPPINGS.                                                                                                                                                                                                          |
|                       | EXCESSIVE SHADING                                                           | GRASS GROWTH IS POOR BECAUSE SUNLIGHT DOES NOT REACH SWALE.                                                                                                                                                                                                                                                                                                                                                                       | IF POSSIBLE, TRIM BACK OVER-HANGING LIMBS, REMOVE BRUSHY VEGETATION ON ADJACENT SLOPES.                                                                                                                                                                                                                                                                     |
|                       | INLET/OUTLET                                                                | INLET/OUTLET AREAS CLOGGED WITH SEDIMENT AND/OR DEBRIS.                                                                                                                                                                                                                                                                                                                                                                           | REMOVE MATERIAL SO THAT THERE IS NO CLOGGING OR BLOCKAGE IN THE INLET AND OUTLET AREA.                                                                                                                                                                                                                                                                      |
|                       | TRASH AND DEBRIS ACCUMULATION                                               | TRASH AND DEBRIS ACCUMULATED IN THE BIO-SWALE.                                                                                                                                                                                                                                                                                                                                                                                    | REMOVE TRASH AND DEBRIS FROM BIOSWALE.                                                                                                                                                                                                                                                                                                                      |
| EROSION/SCOURING      | ERODED OR SCOURED SWALE BOTTOM DUE TO FLOW CHANNELIZATION, OR HIGHER FLOWS. | FOR RUTS OR BARE AREAS LESS THAN 12 INCHES WIDE, REPAIR THE DAMAGED AREA BY FILLING WITH CRUSHED GRAVEL. THE GRASS WILL CREEP IN OVER THE ROCK IN TIME. IF BARE AREAS ARE LARGE, GENERALLY GREATER THAN 12 INCHES WIDE, THE SWALE SHOULD BE RE-GRADED AND RE-SEEDED. FOR SMALLER BARE AREAS, OVERSEED WHEN BARE SPOTS ARE EVIDENT, OR TAKE PLUGS OF GRASS FROM THE UPPER SLOPE AND PLANT IN THE SWALE BOTTOM AT 8-INCH INTERVALS. |                                                                                                                                                                                                                                                                                                                                                             |