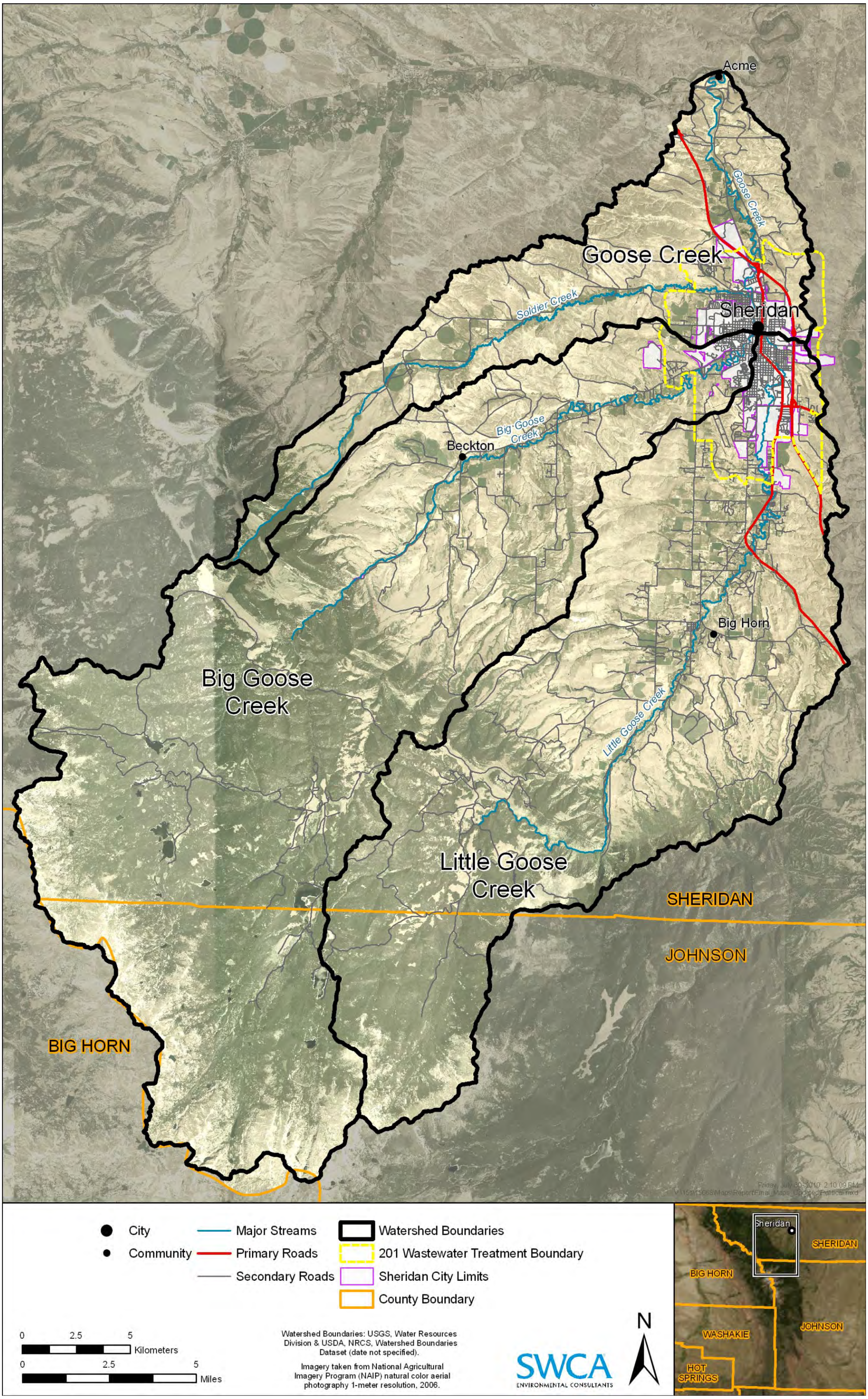
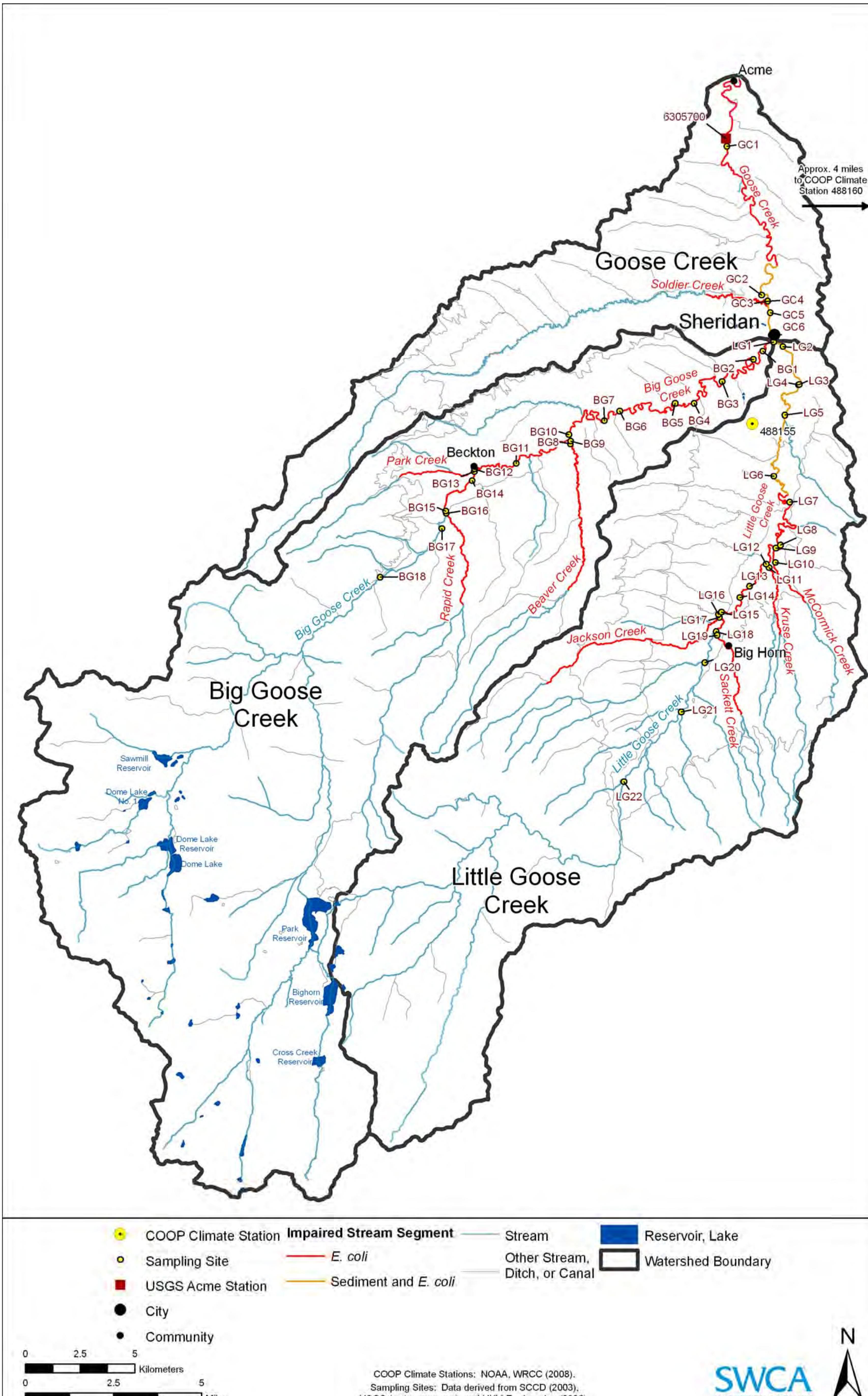
Appendix 1. Maps

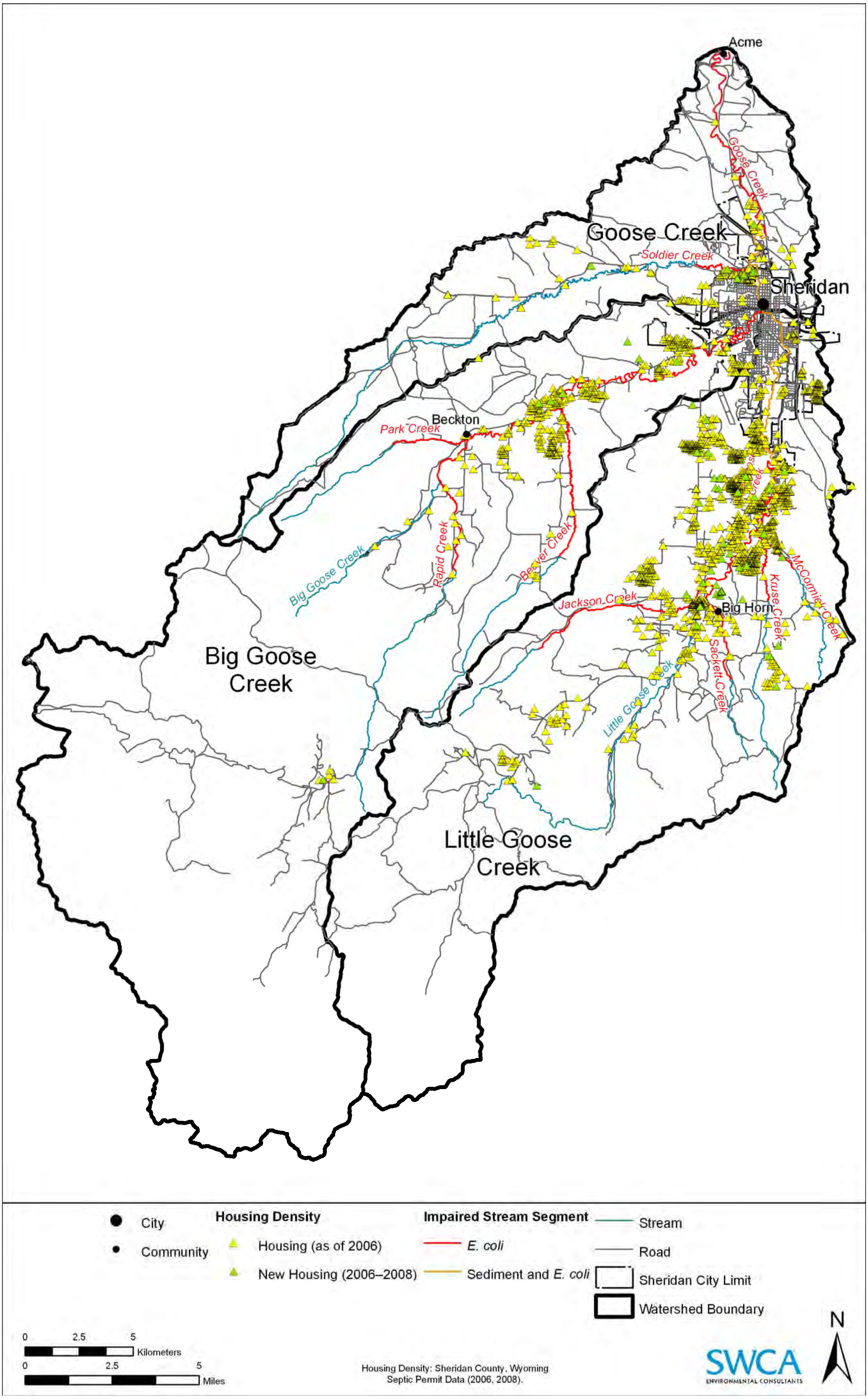
DEQ Exhibit 26



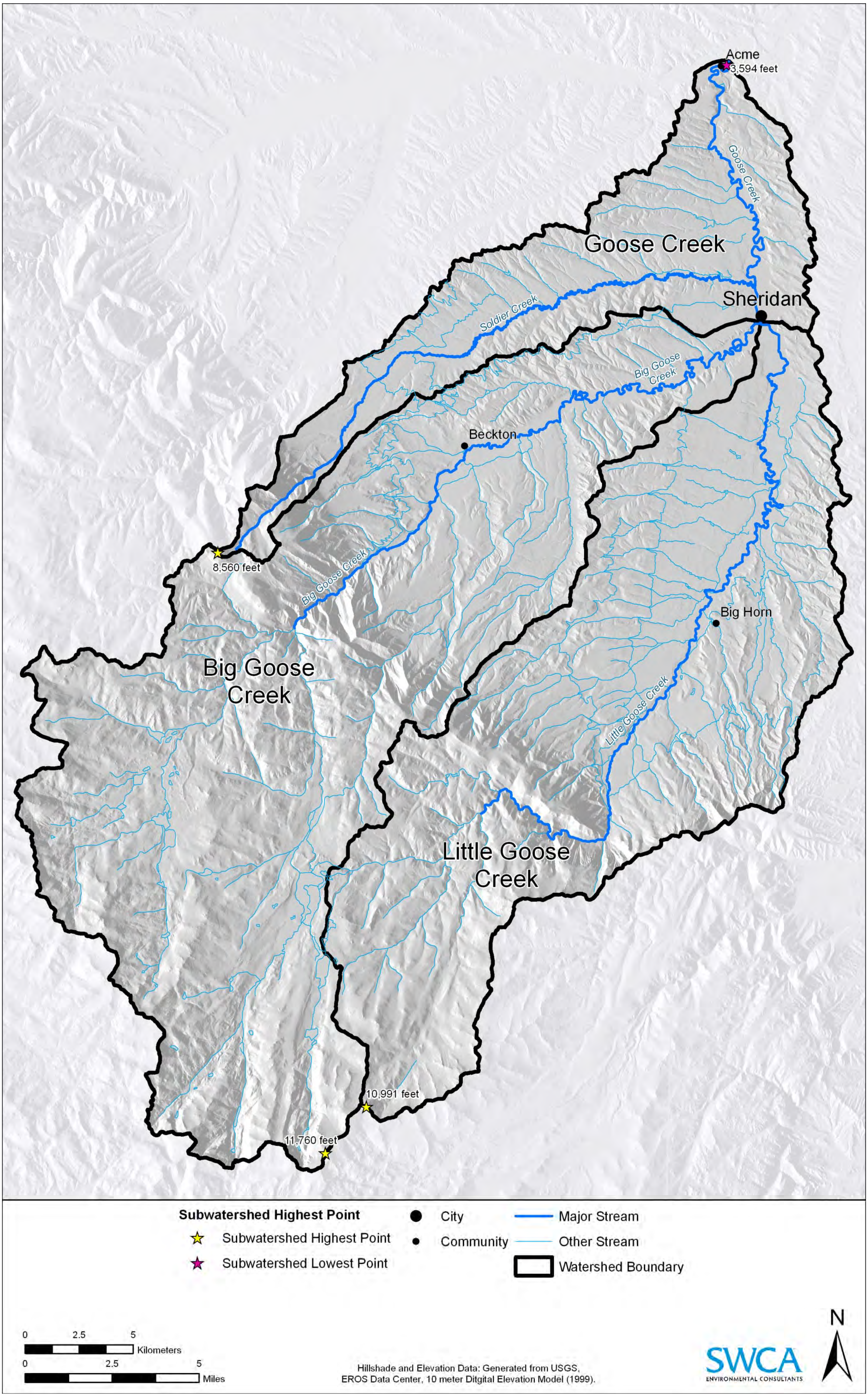
Map 1. Political boundaries.



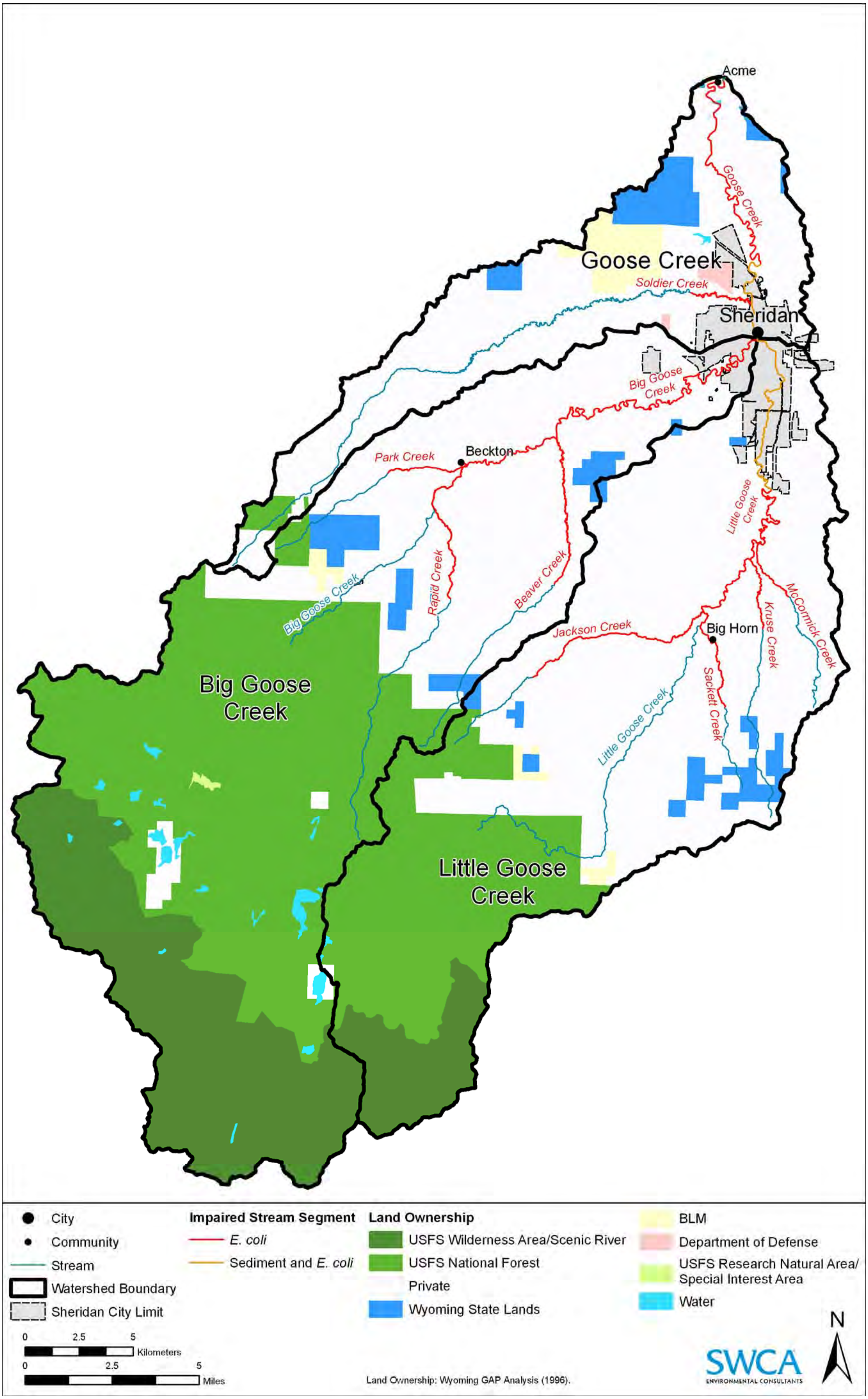
Map 2. Impaired stream segments.



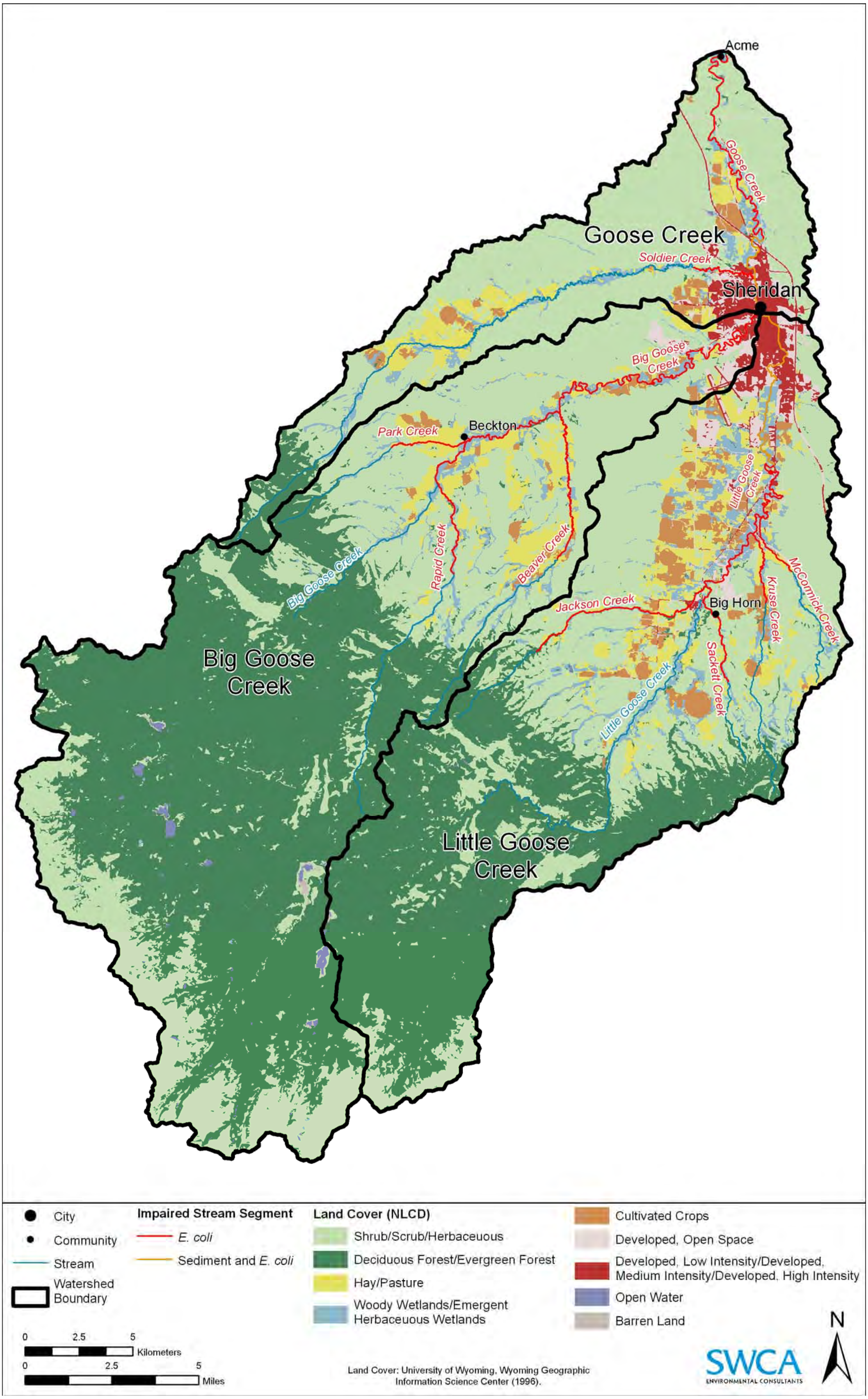
Map 3. Housing density.



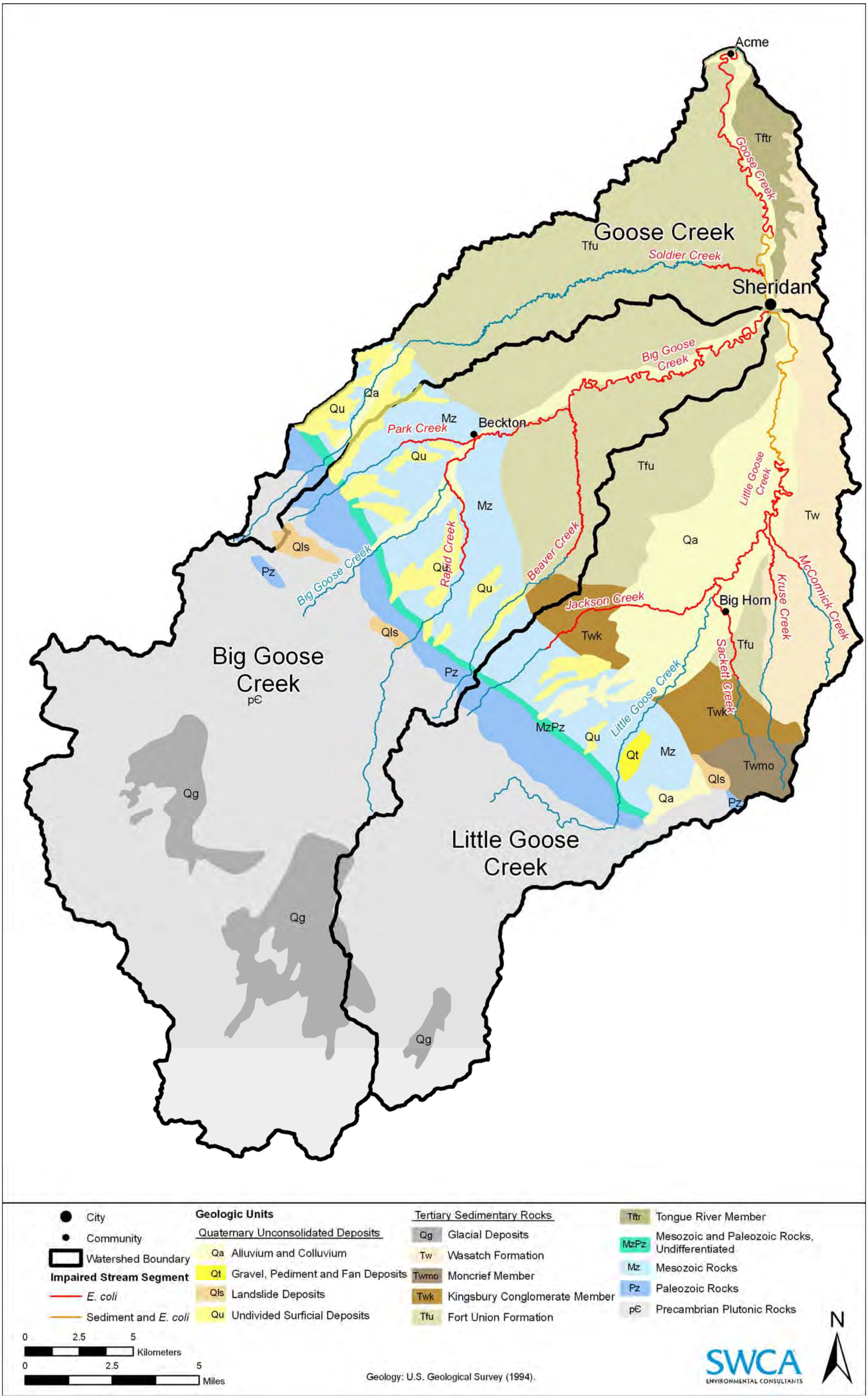
Map 4. Topography.



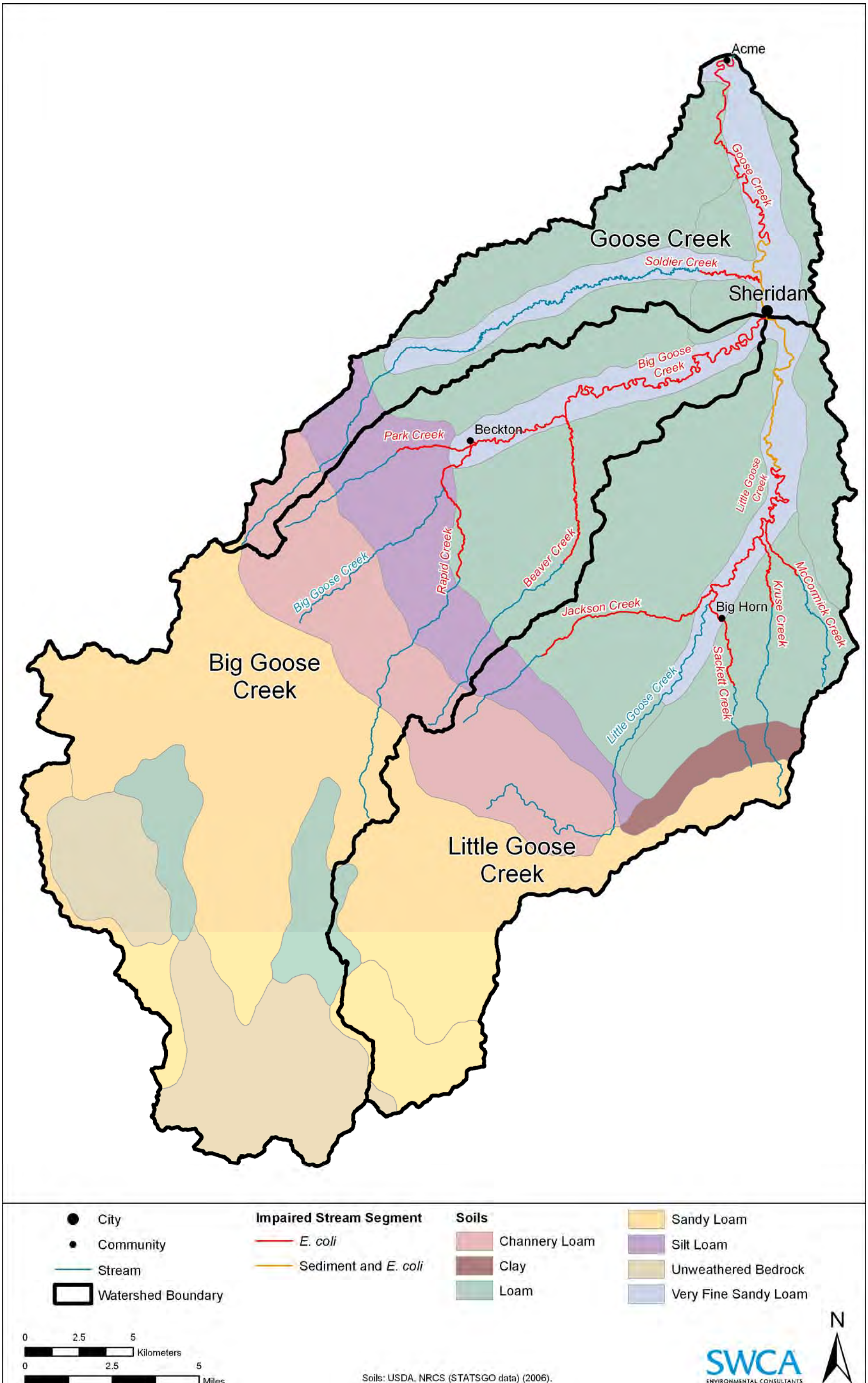
Map 5. Land ownership.



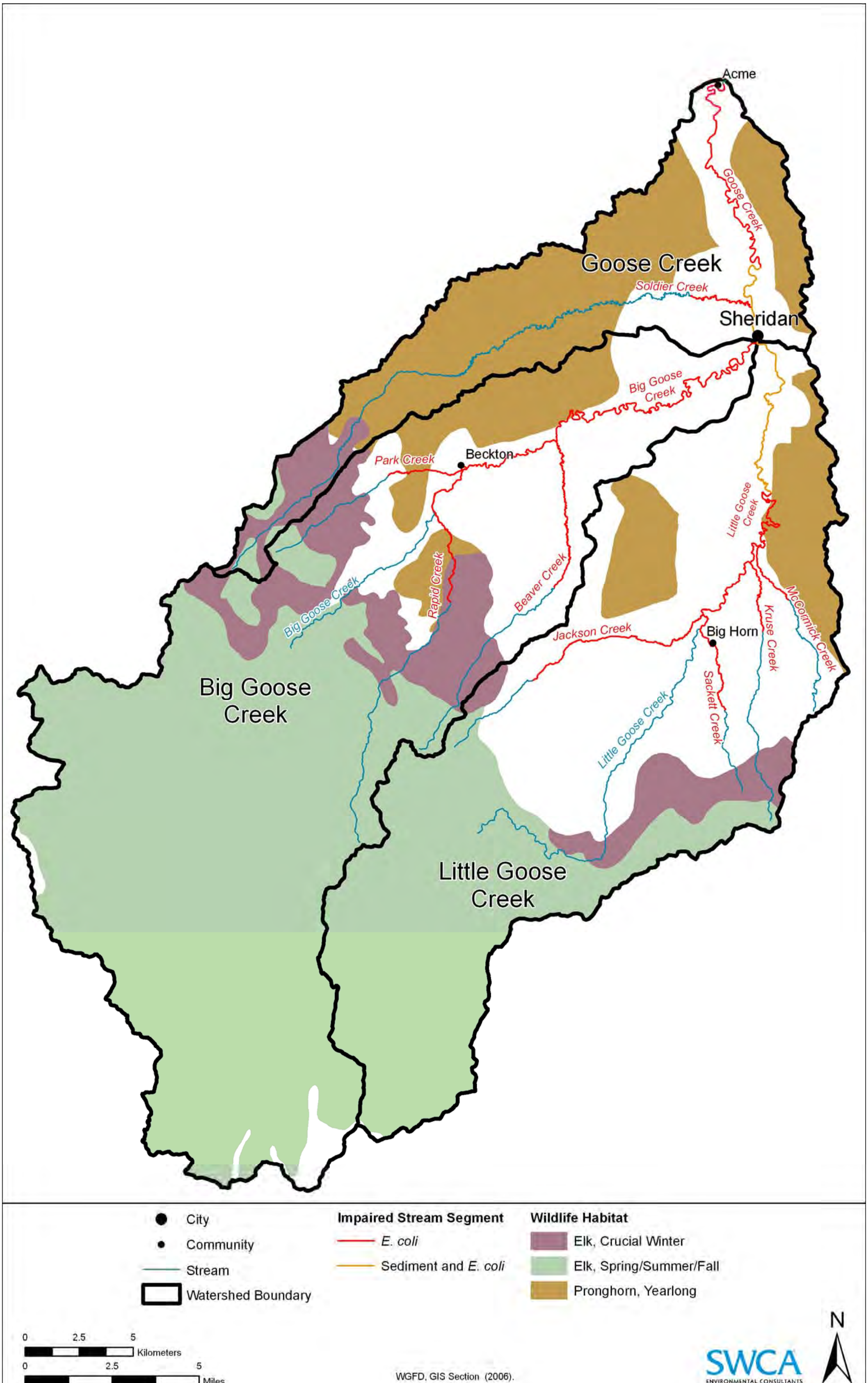
Map 6. Land cover.



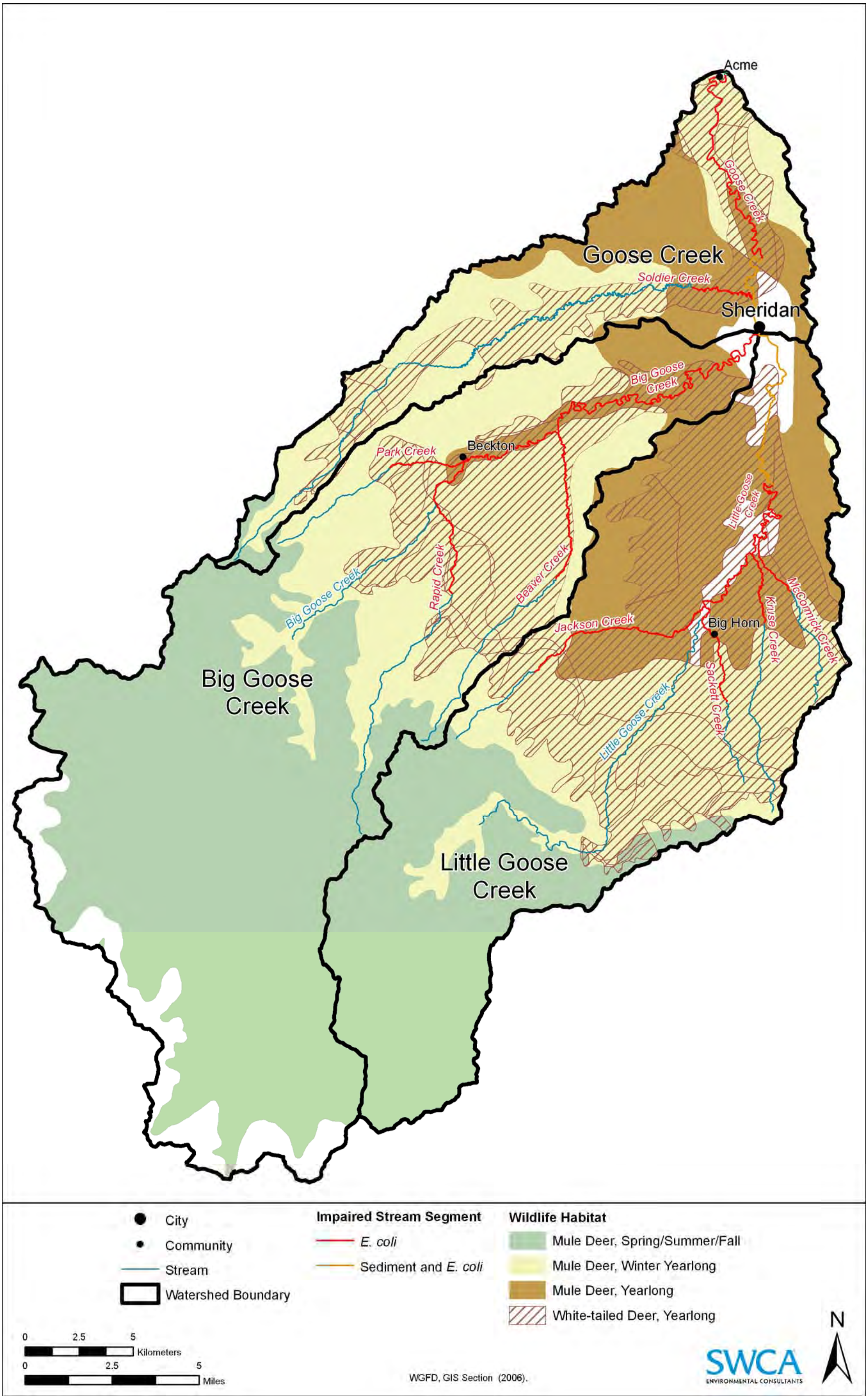
Map 7. Geology.


Acme
Goose Creek
Goose Creek
Soldier Creek
Sheridan
Big Goose Creek
Park Creek
Beckton
Little Goose Creek
Big Goose Creek
Rapid Creek
Beaver Creek
Jackson Creek
Big Horn
Kruse Creek
McCormick Creek
Sackett Creek
Little Goose Creek
Big Goose Creek
Little Goose Creek
City
Community
Stream
Watershed Boundary
Impaired Stream Segment
E. coli
Sediment and E. coli
Soils
Channery Loam
Clay
Loam
Sandy Loam
Silt Loam
Unweathered Bedrock
Very Fine Sandy Loam
0 2.5 5 Kilometers
0 2.5 5 Miles
Soils: USDA, NRCS (STATSGO data) (2006).
SWCA
ENVIRONMENTAL CONSULTANTS
N

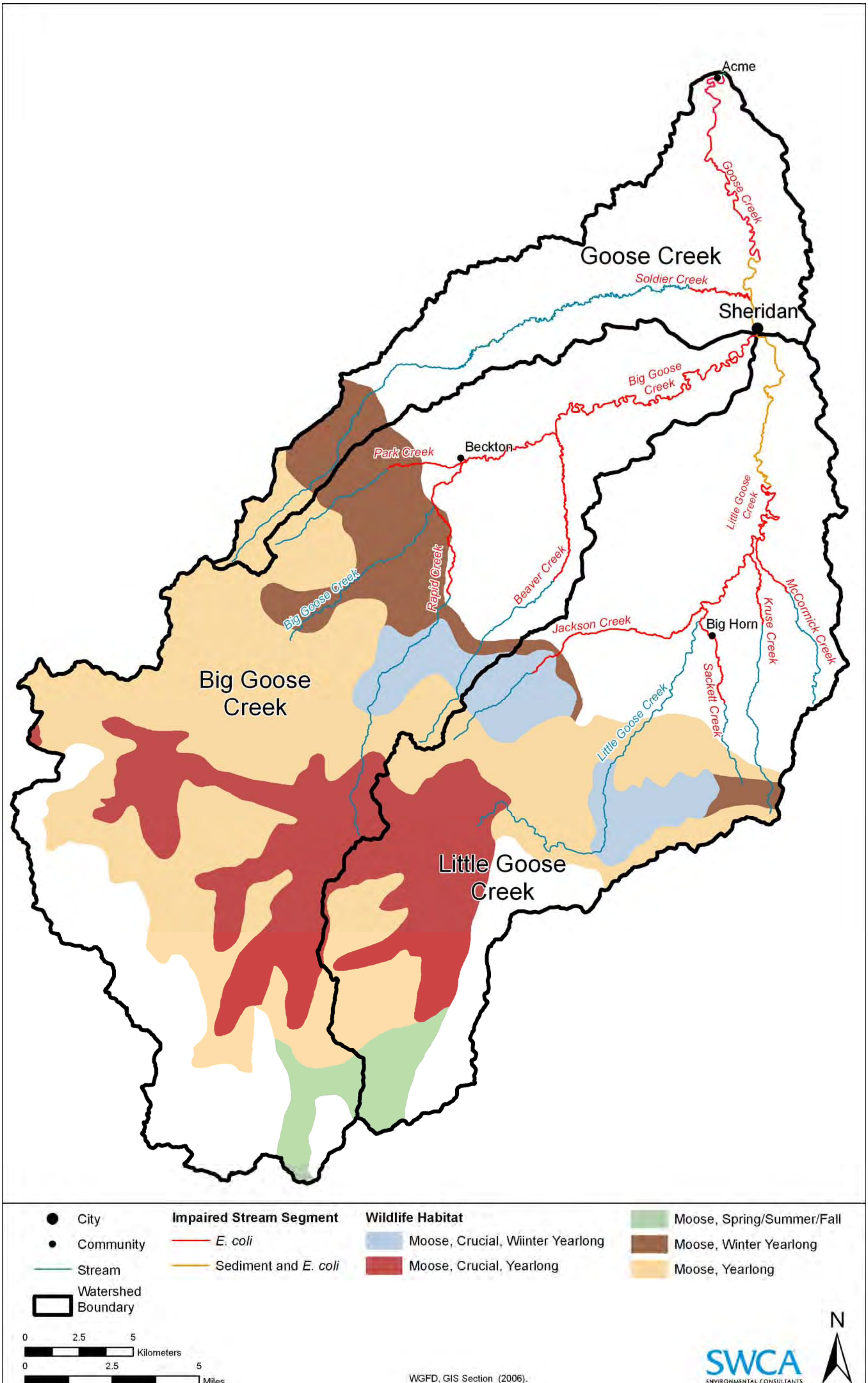
Map 8. Soils



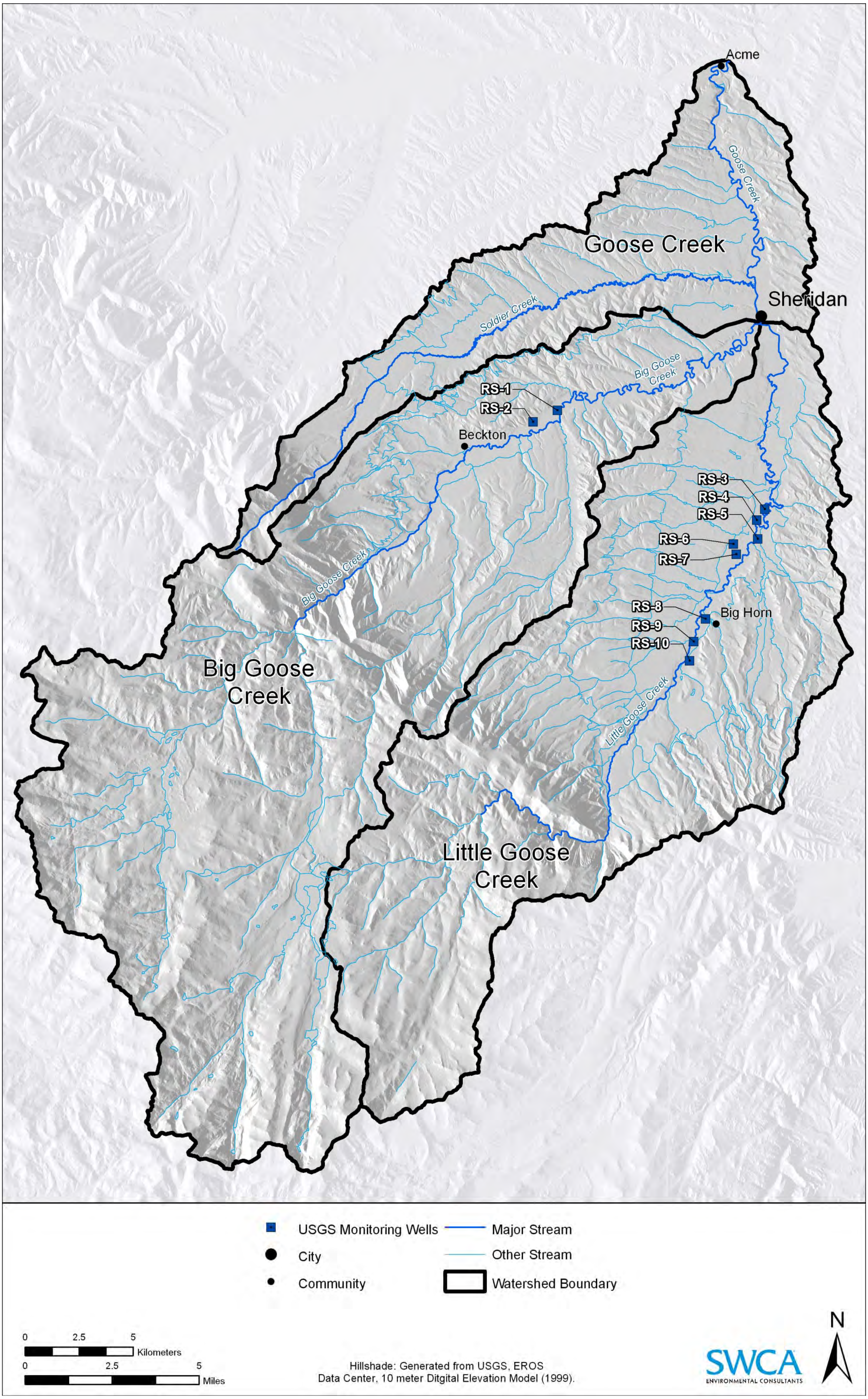
Map 9a. Wildlife habitat.



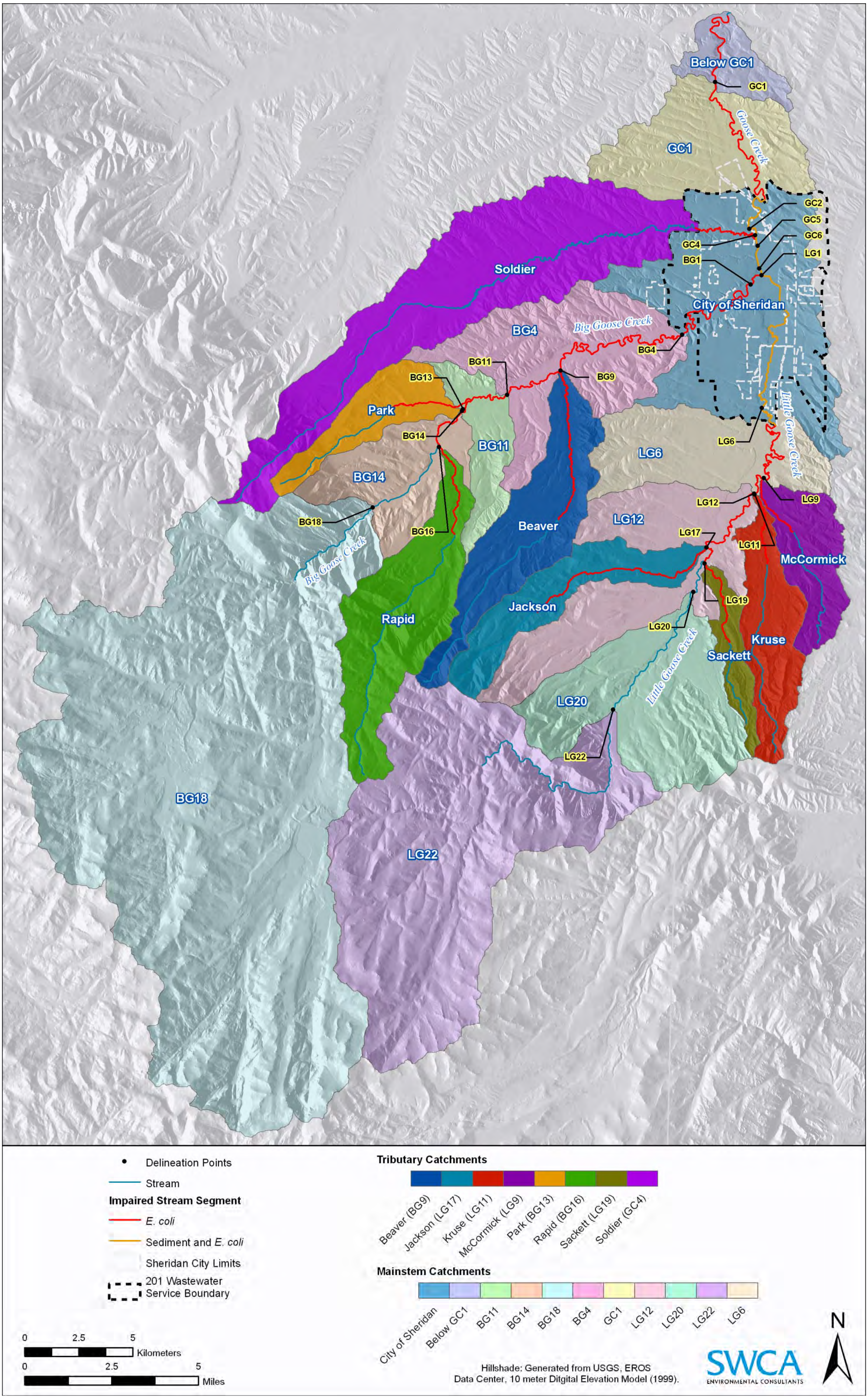
Map 9b. Wildlife habitat.



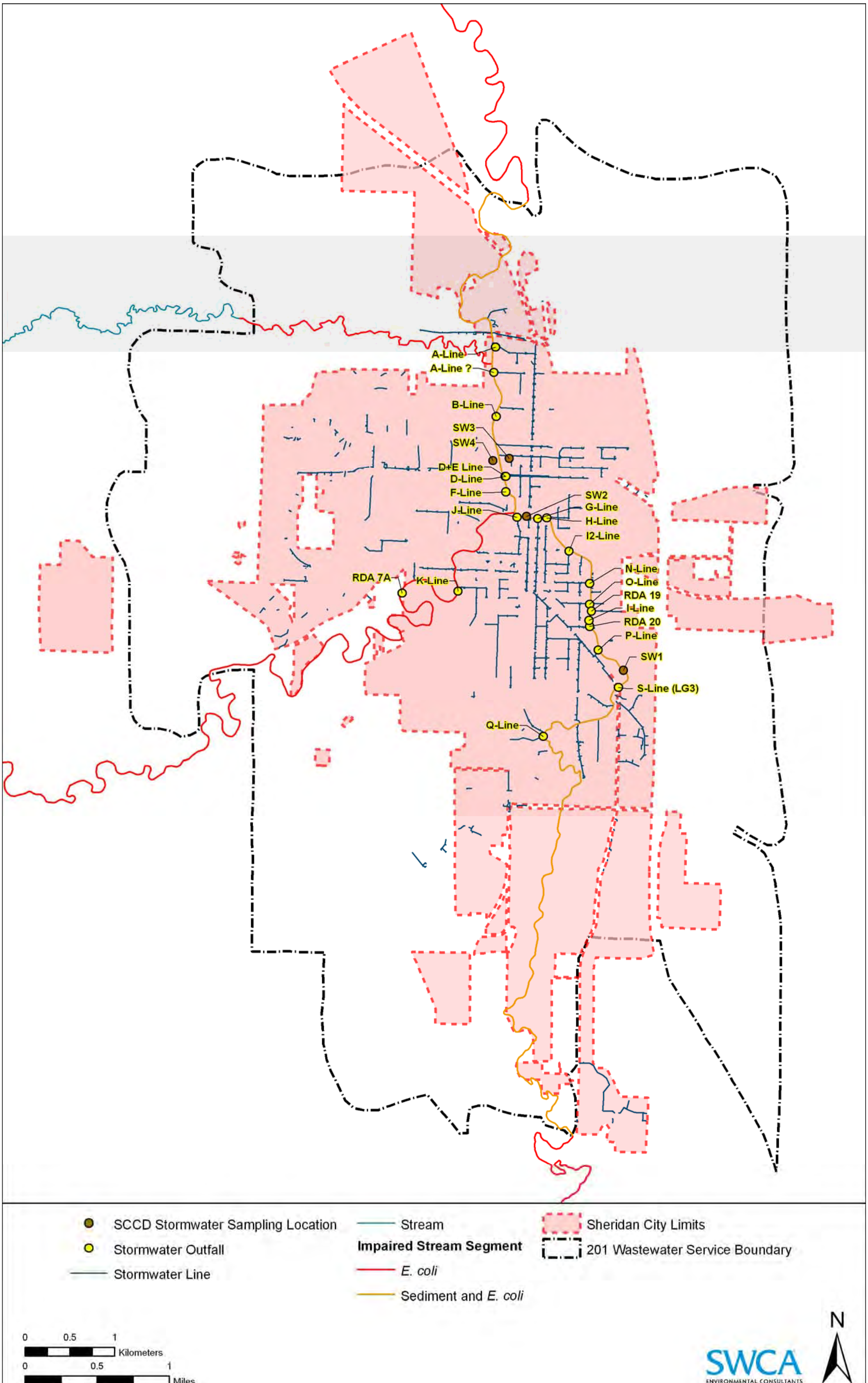
Map 9c. Wildlife habitat.



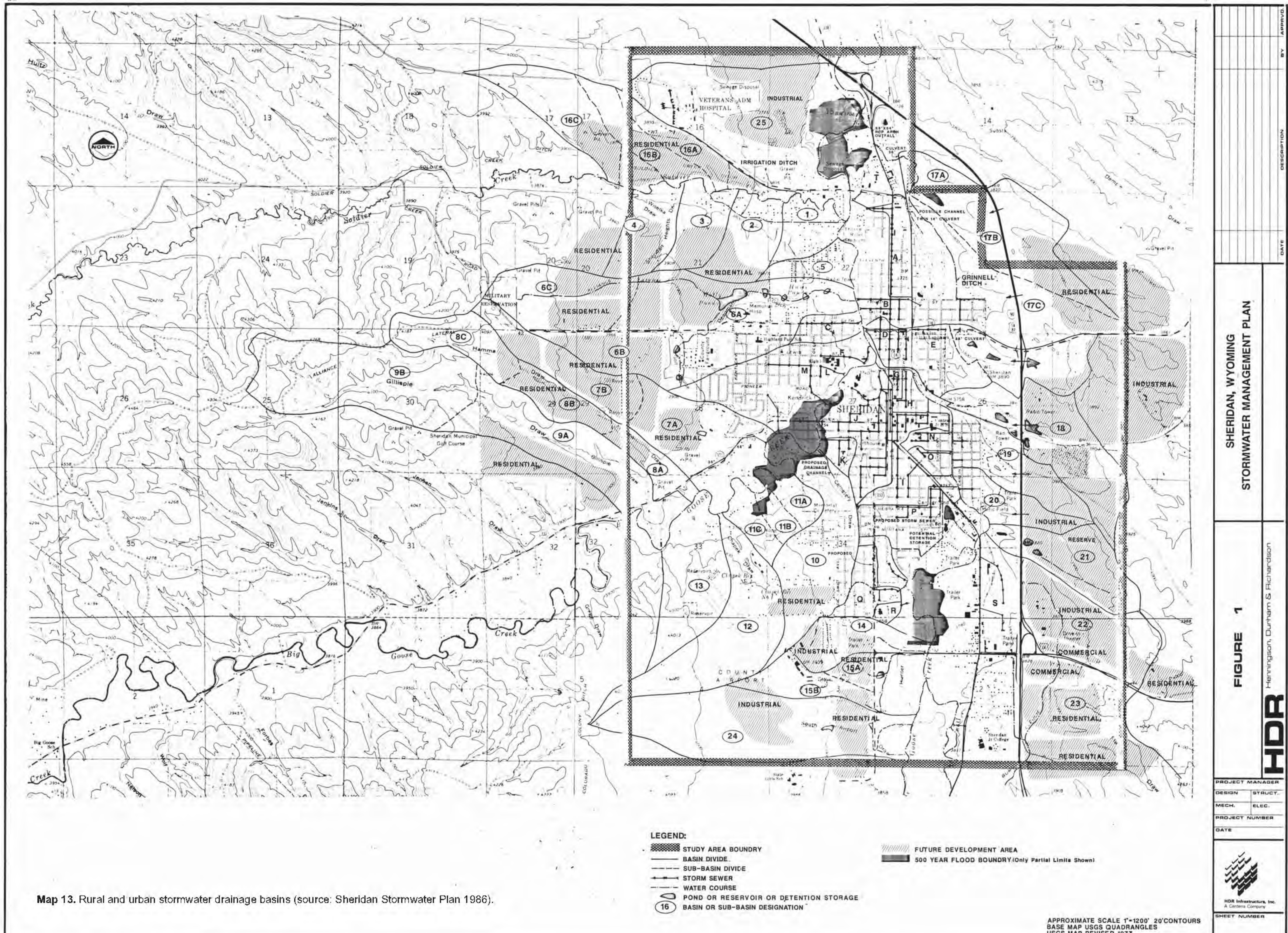
Map 10. Groundwater sampling locations.



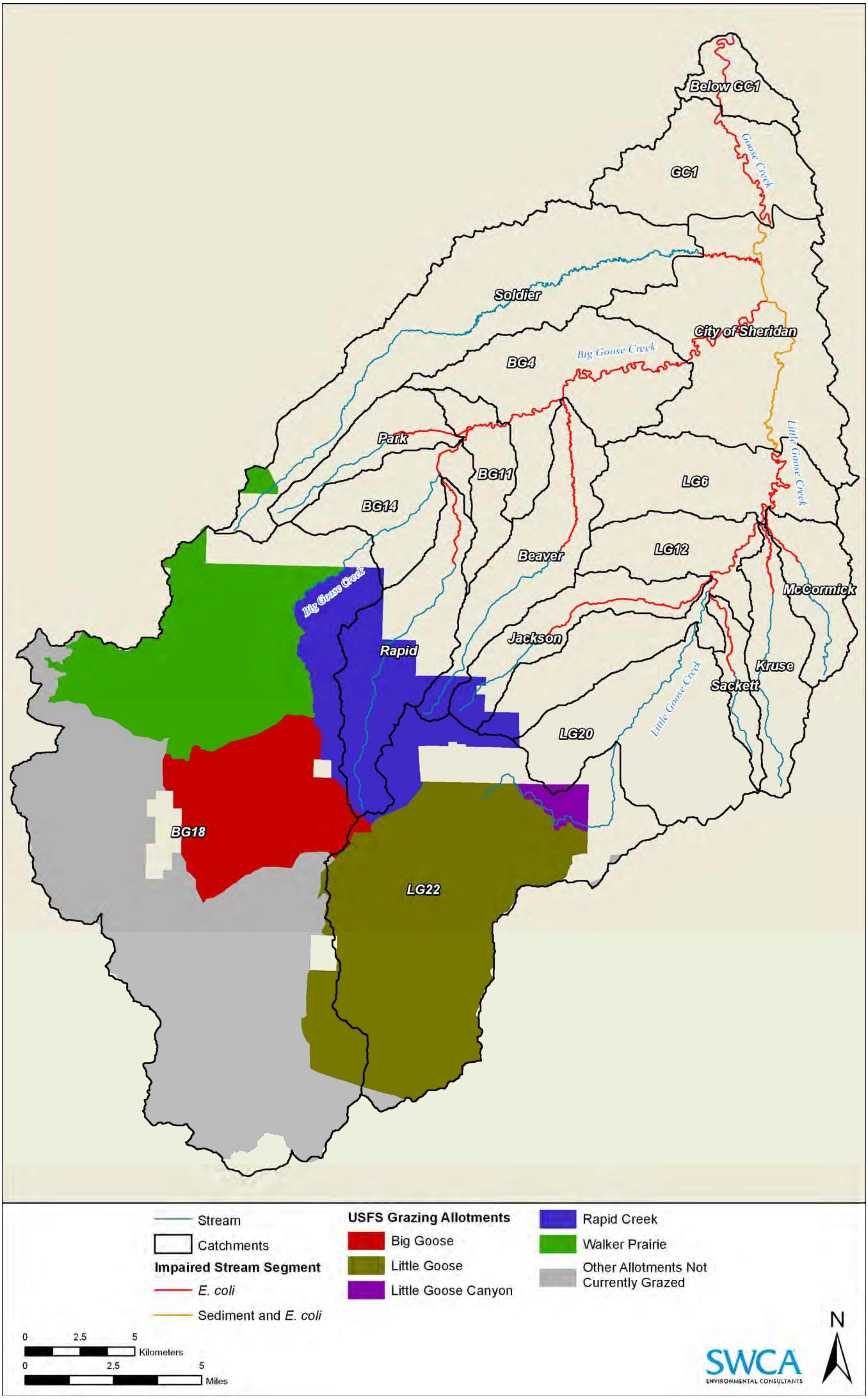
Map 11. Delineation points and associate catchment areas.



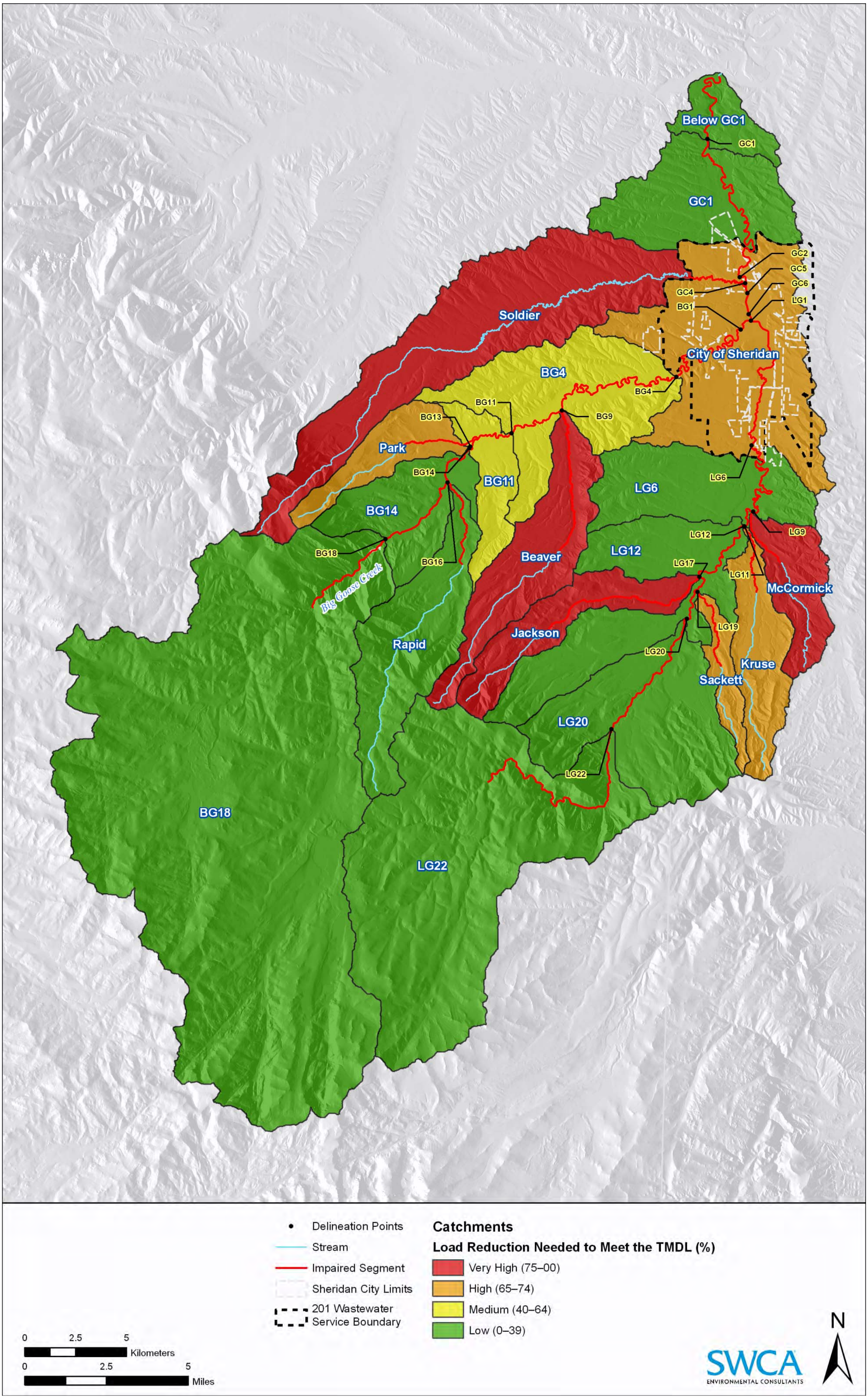
Map 12. Stormwater drainage network and outfalls for the City of Sheridan.



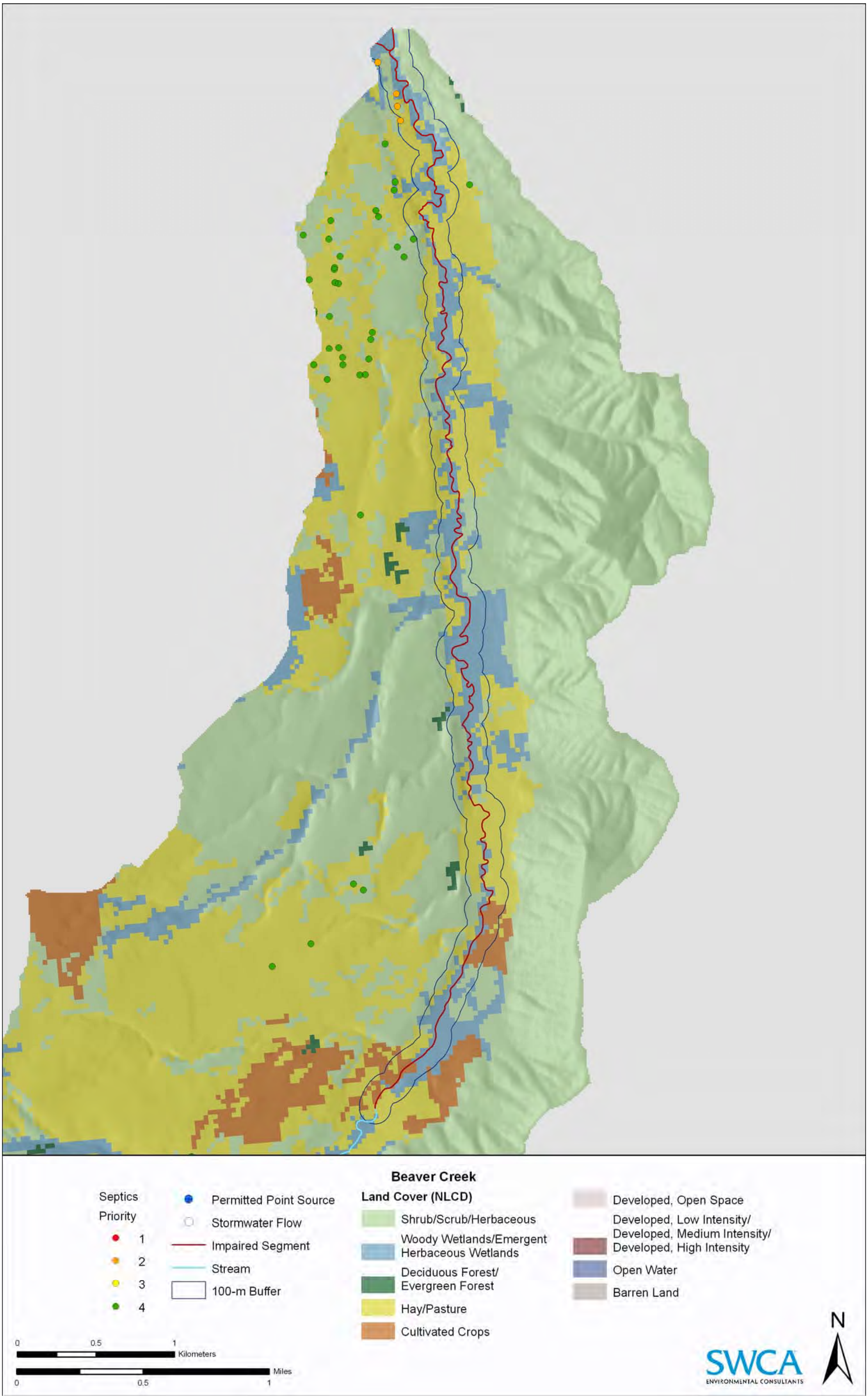
Map 13. Rural and urban stormwater drainage basins (source: Sheridan Stormwater Plan 1986).



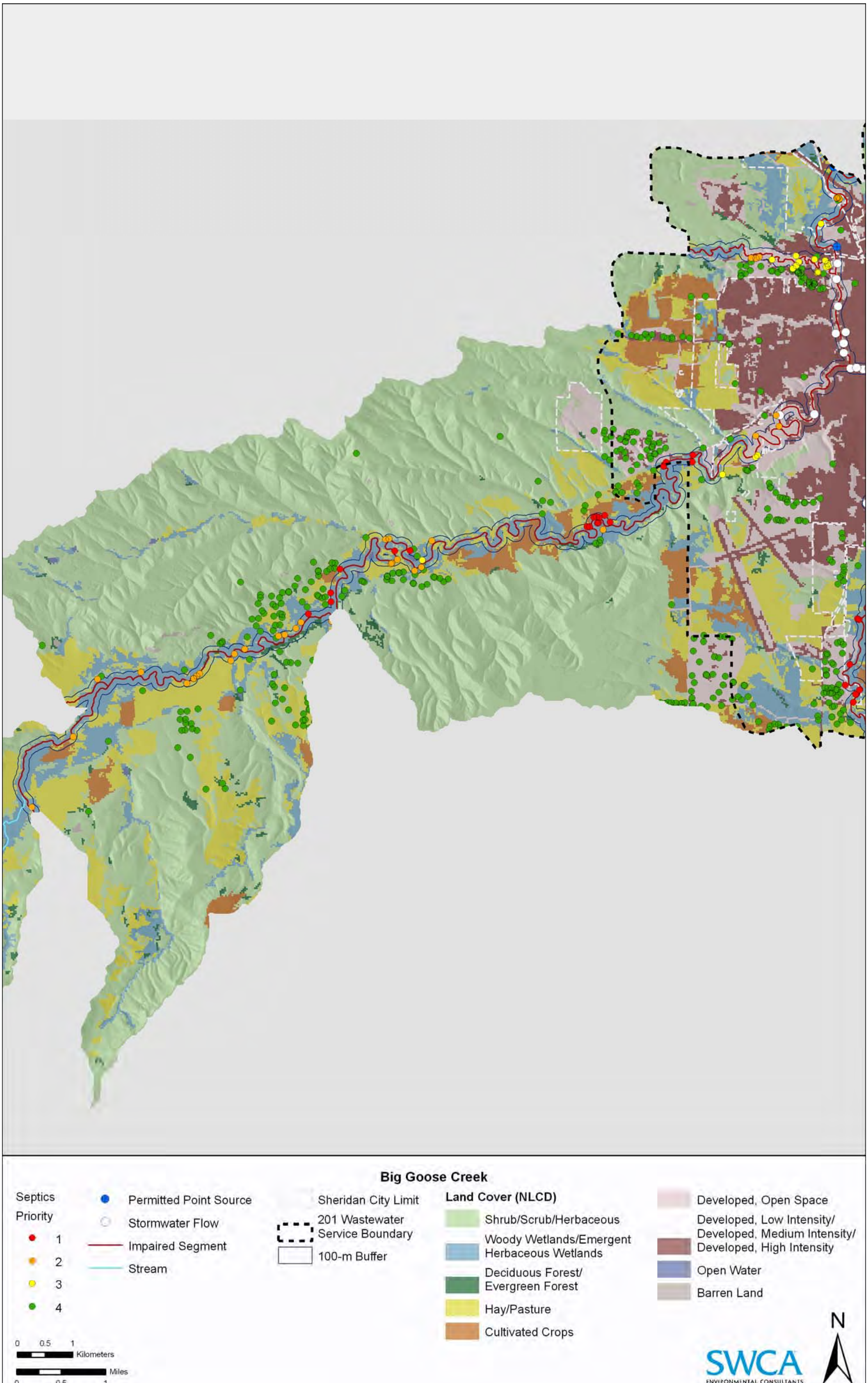
Map 14. USFS grazing allotments.



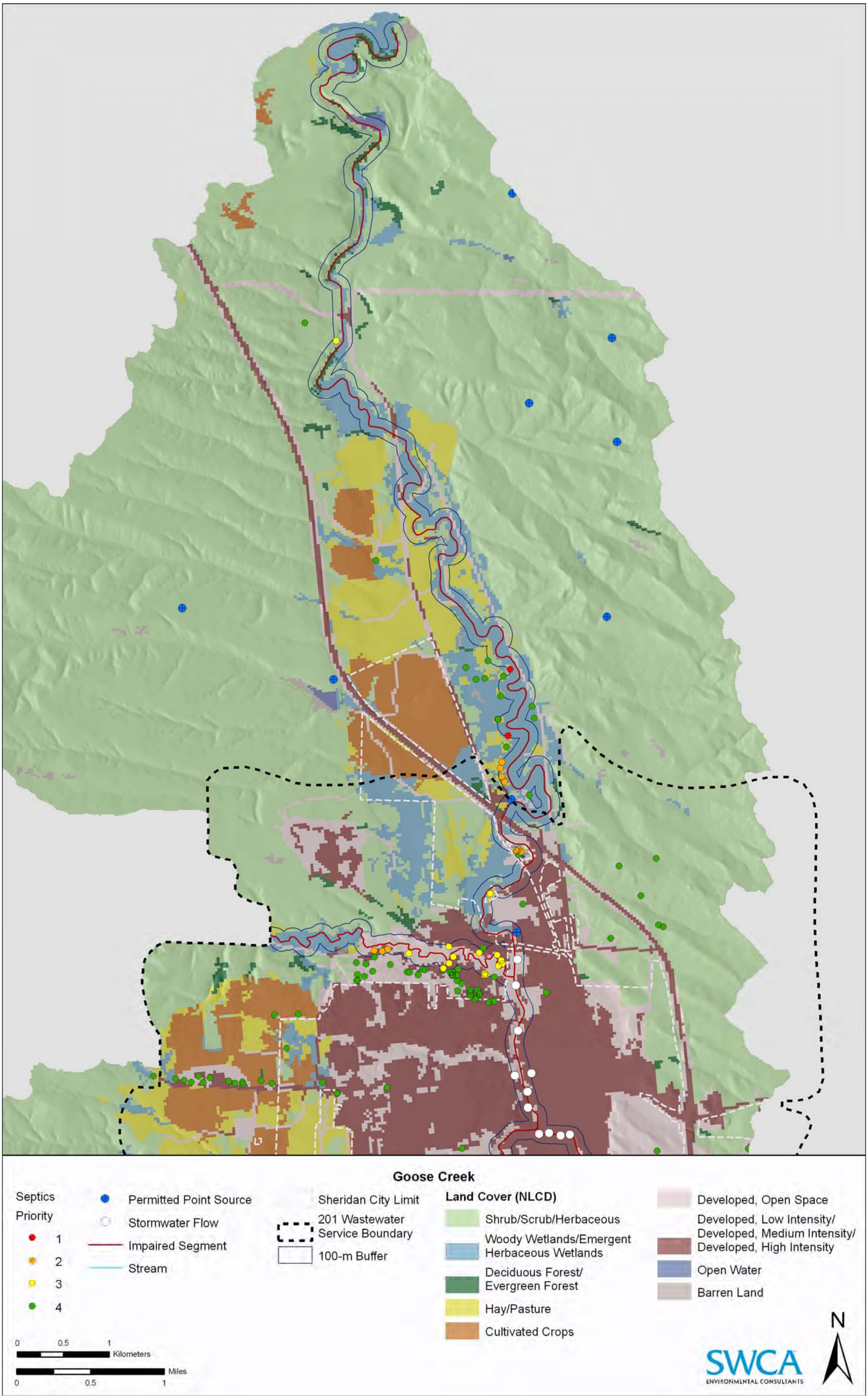
Map 15. Pathogen load reduction required by catchment.



Map 16. Beaver Creek implementation.

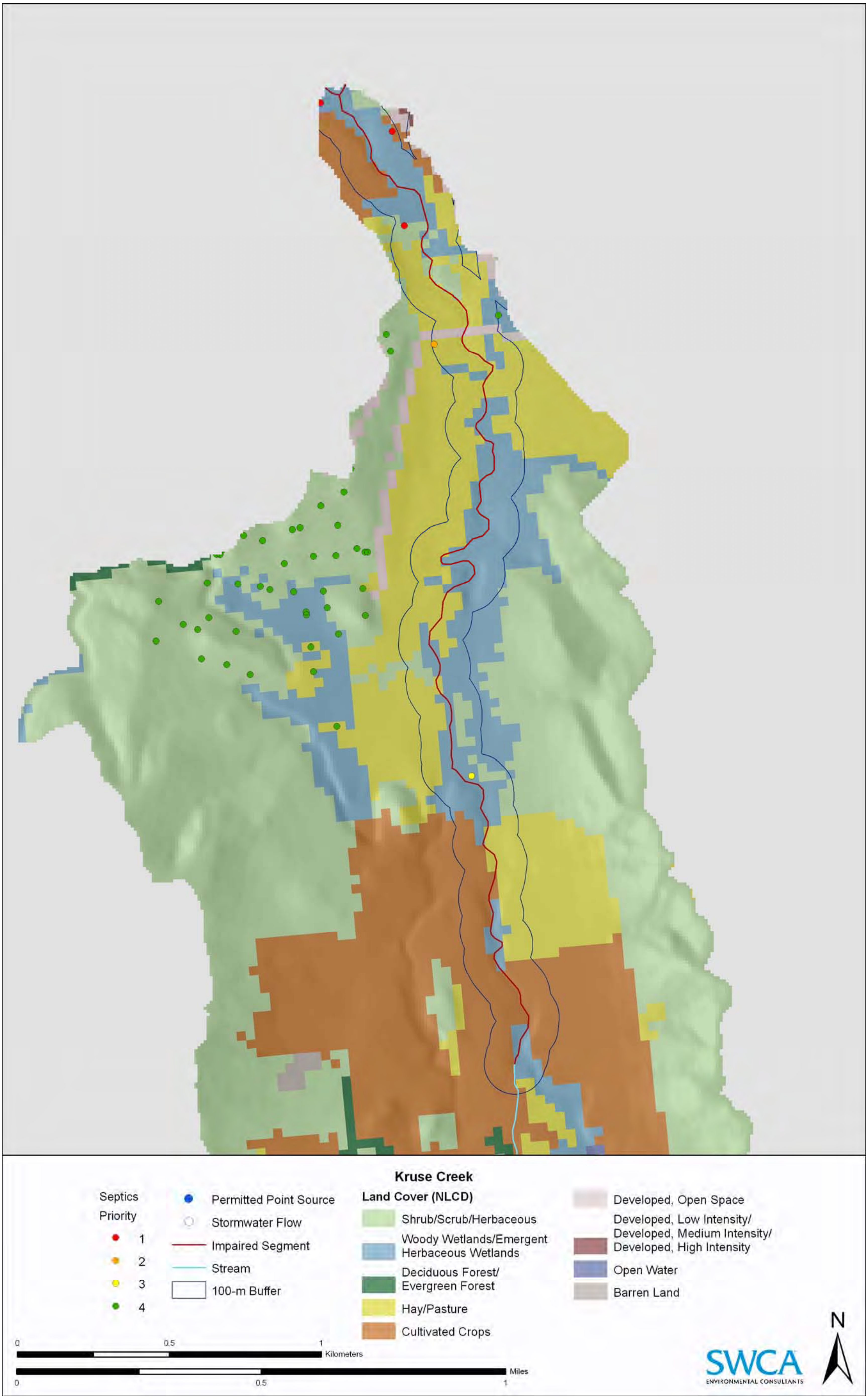


Map 17. Big Goose Creek implementation.

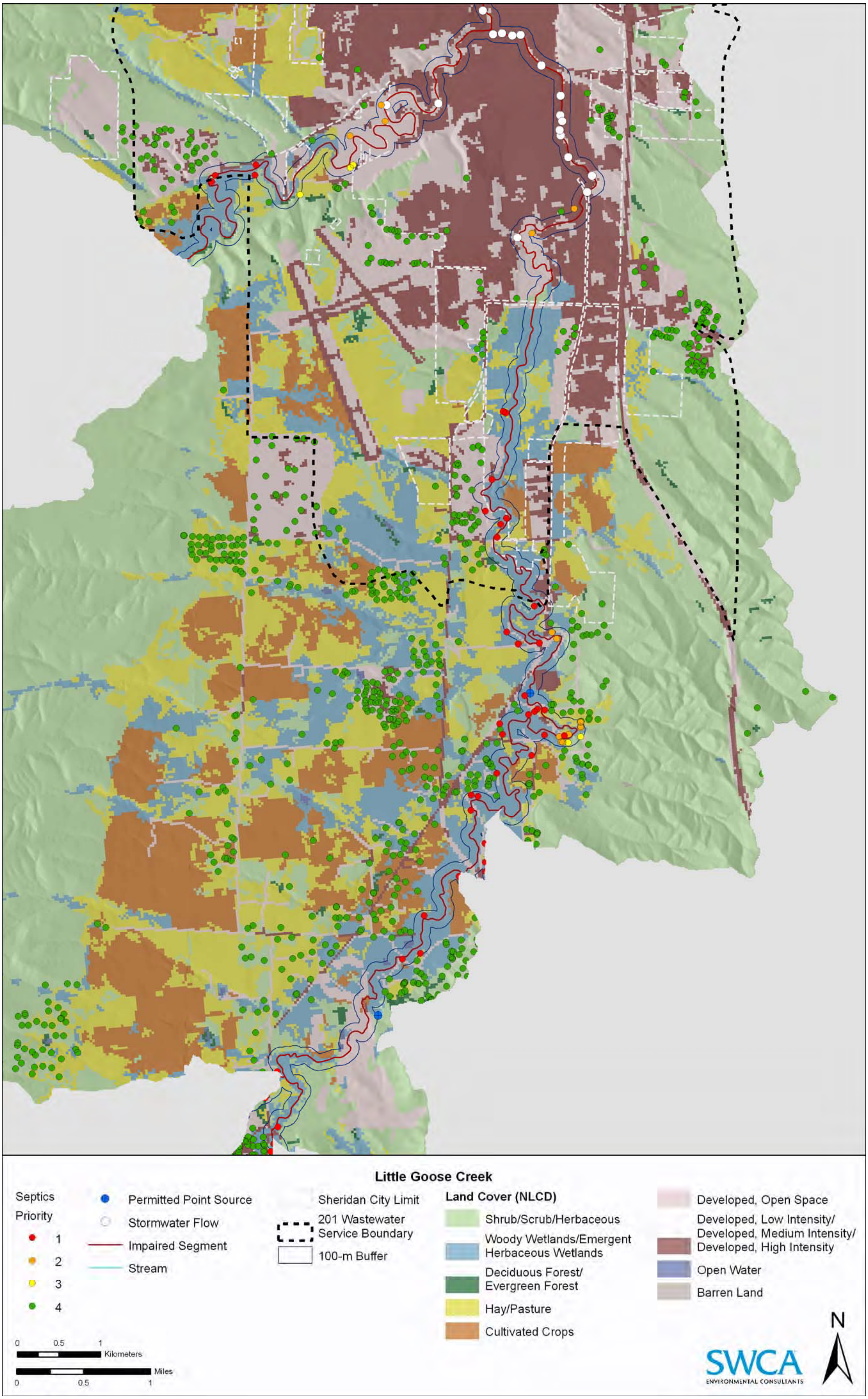


Map 18. Goose Creek implementation.

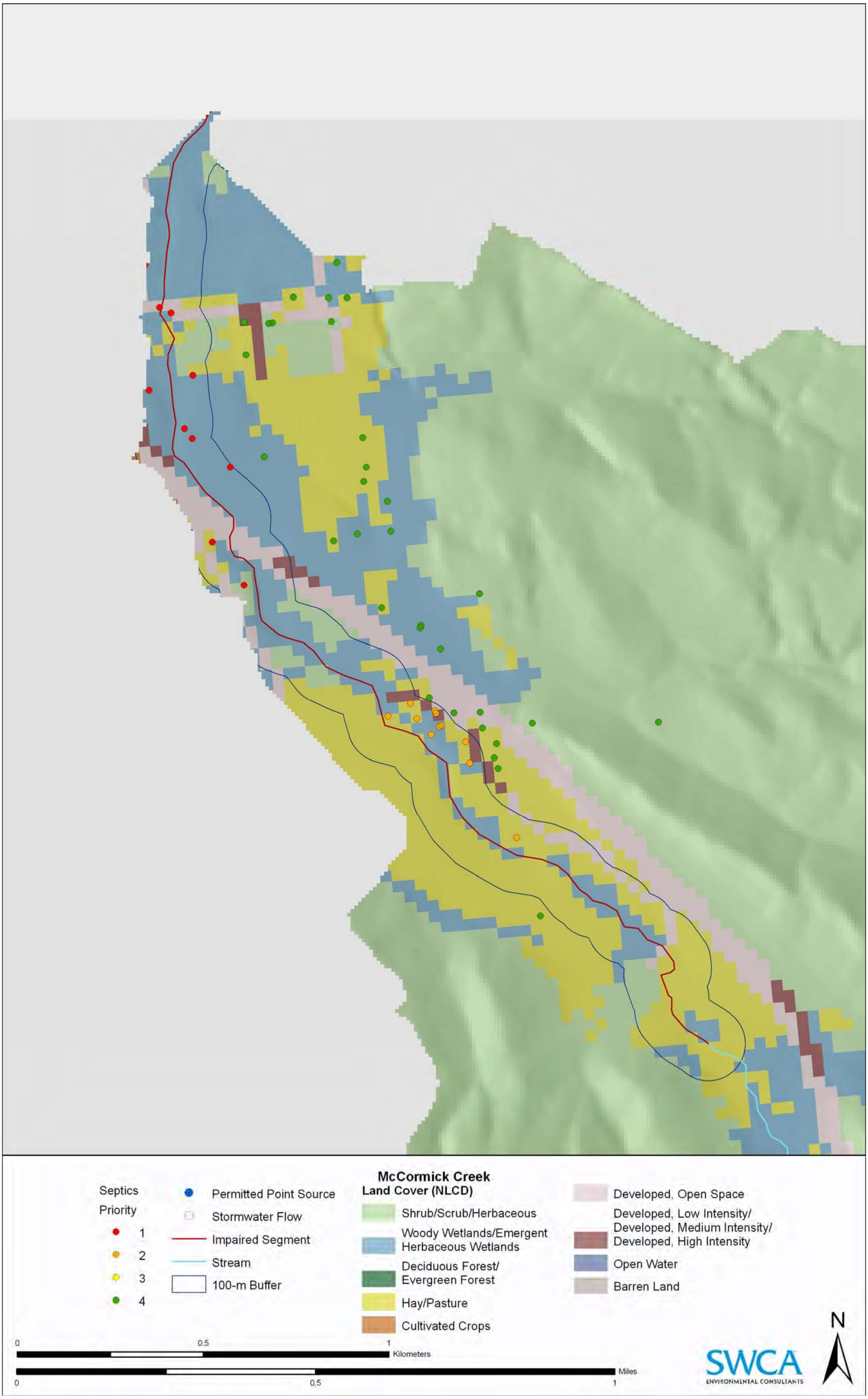
Map 19. Jackson Creek implementation.



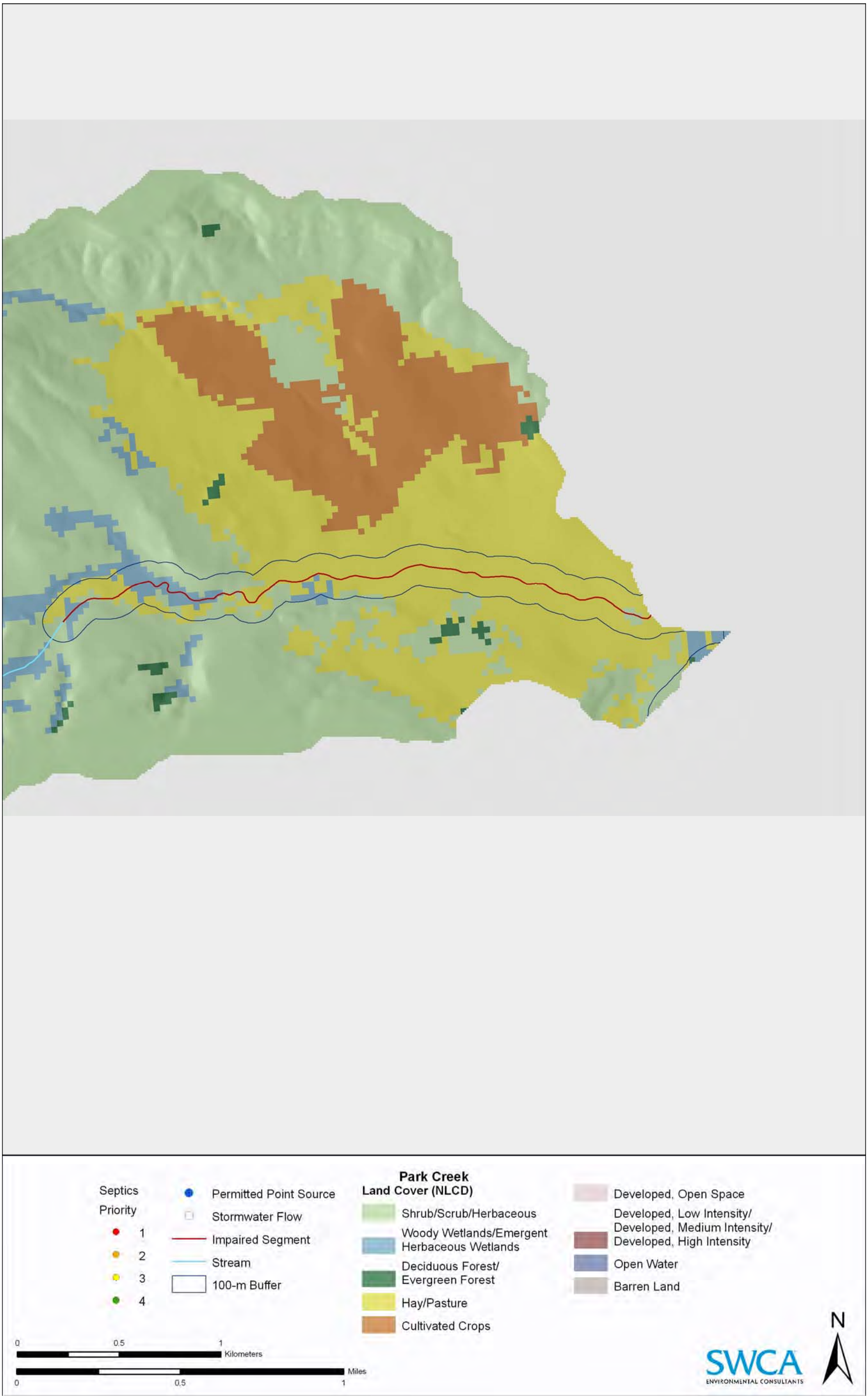
Map 20. Kruse Creek implementation.



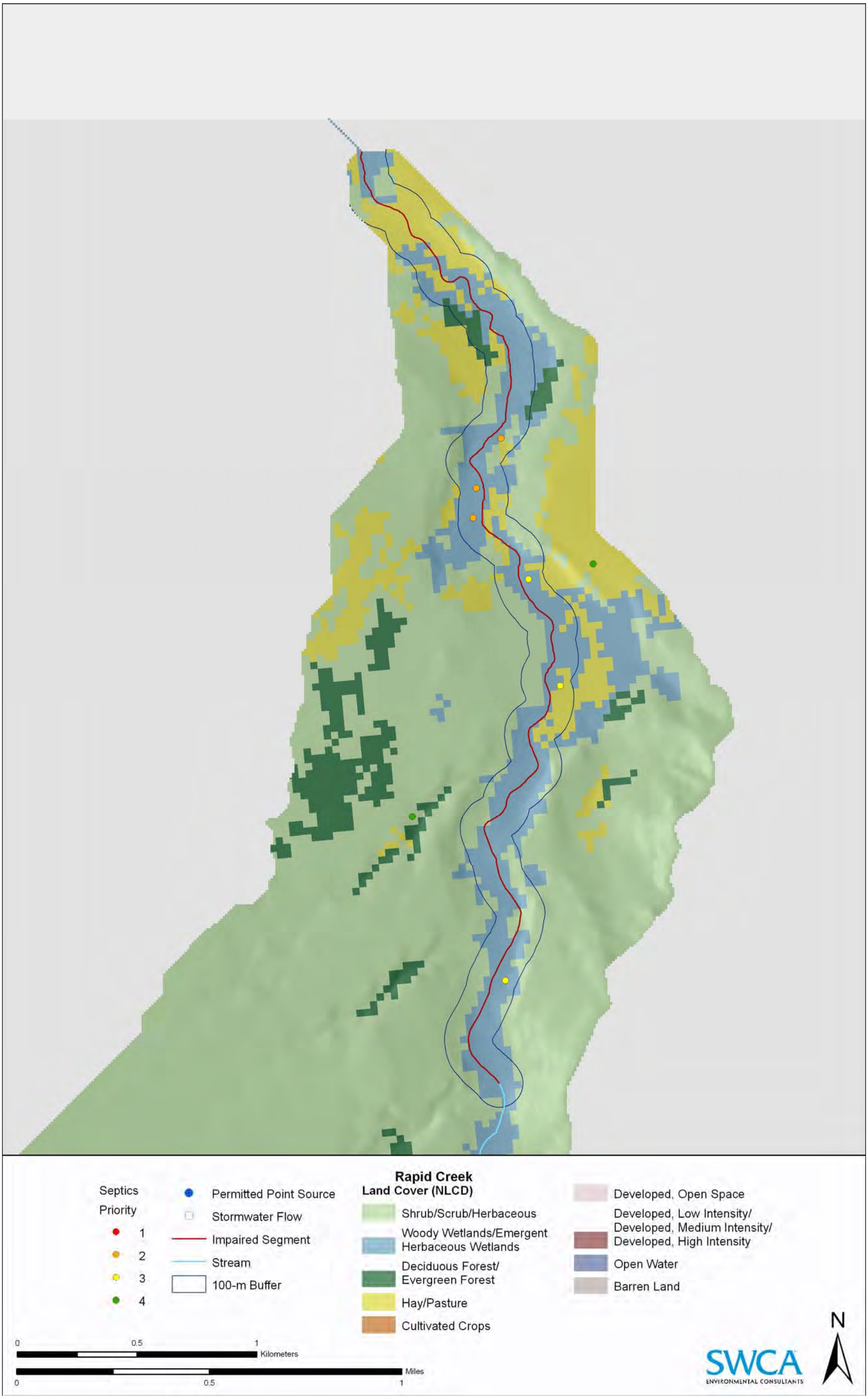
Map 21. Lower Goose Creek implementation.



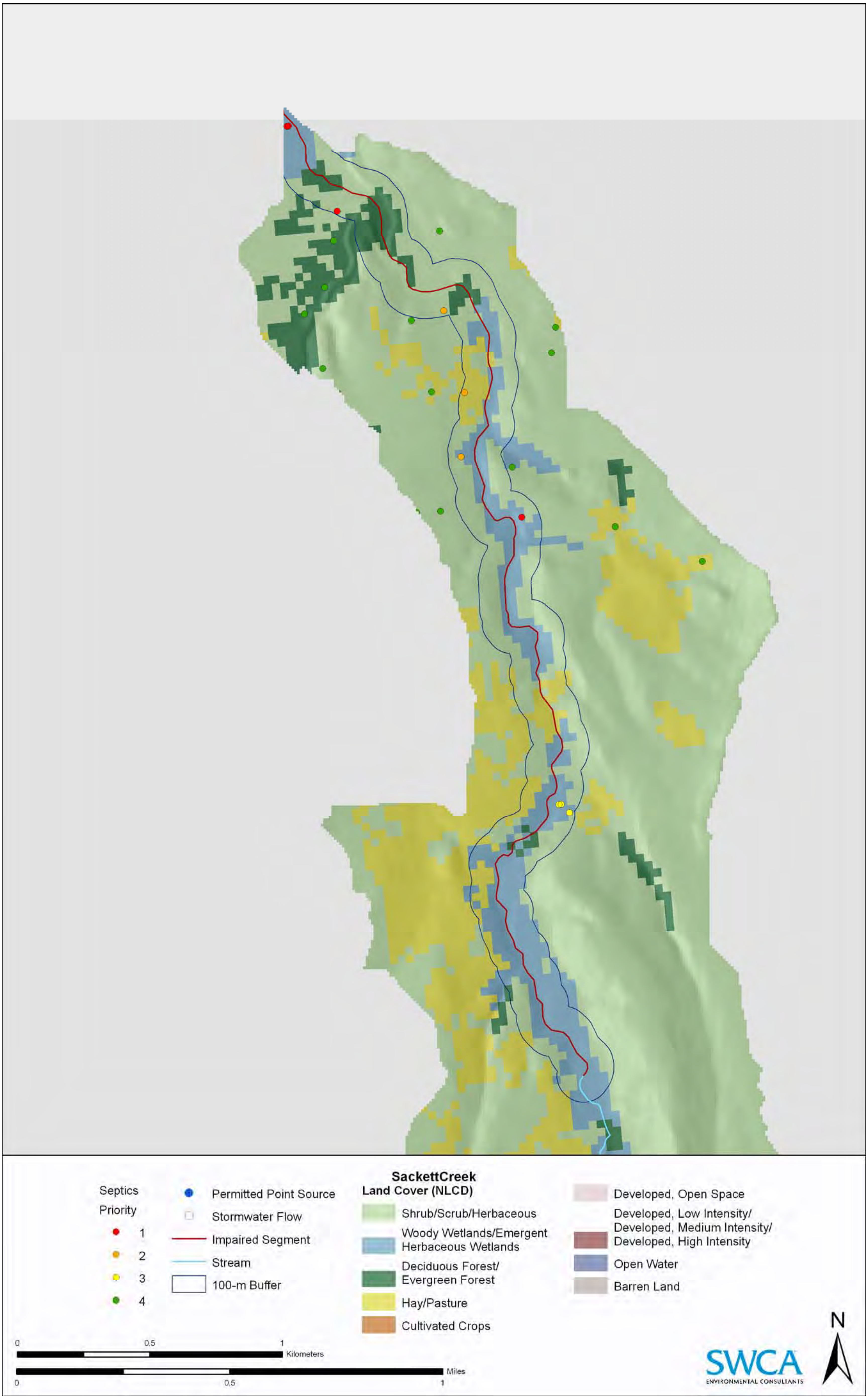
Map 22. McCormick Creek implementation.



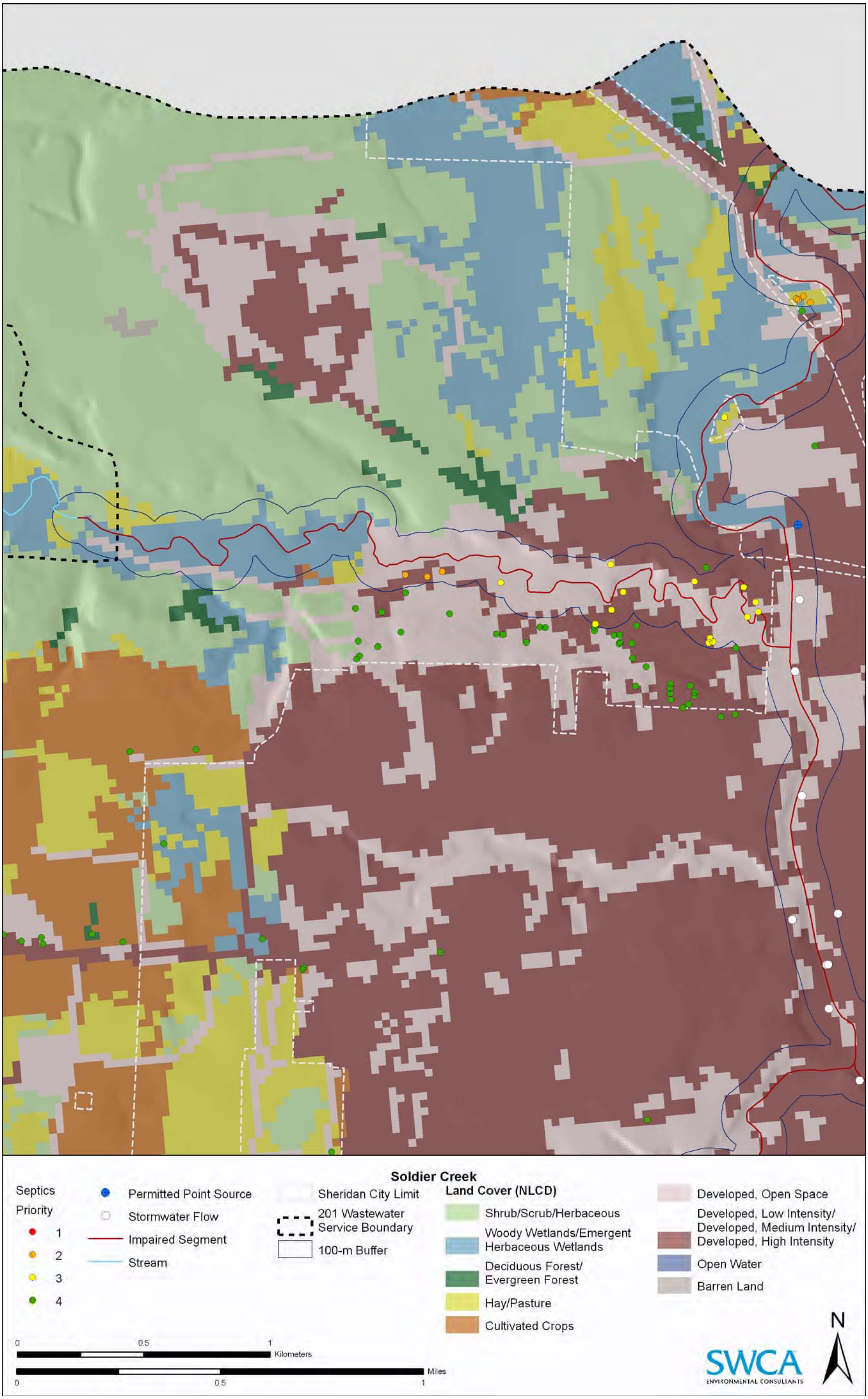
Map 23. Park Creek implementation.



Map 24. Rapid Creek implementation.

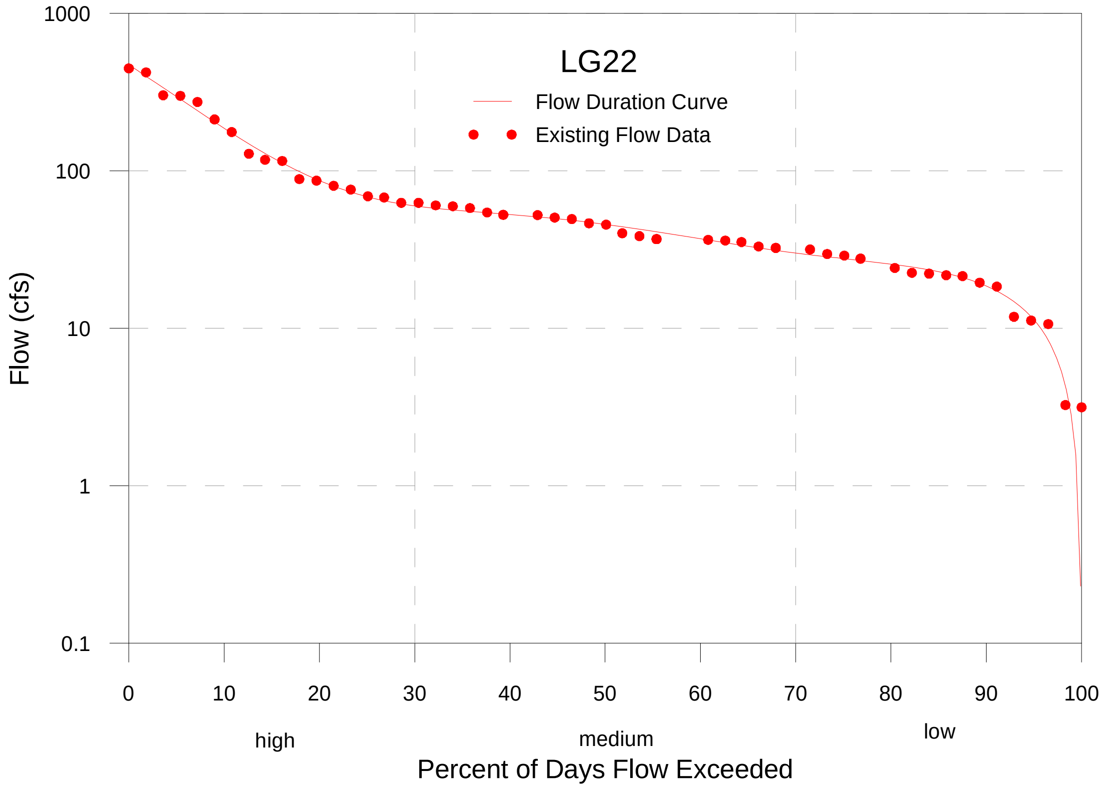


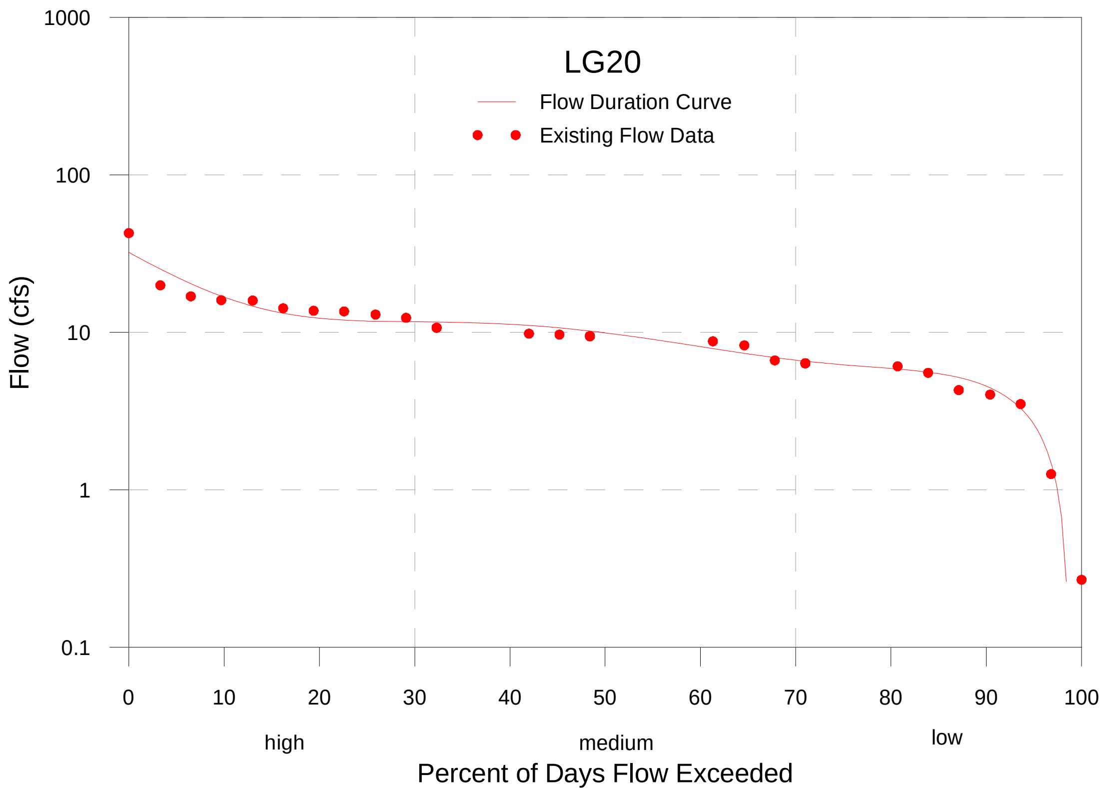
Map 25. Sackett Creek implementation.

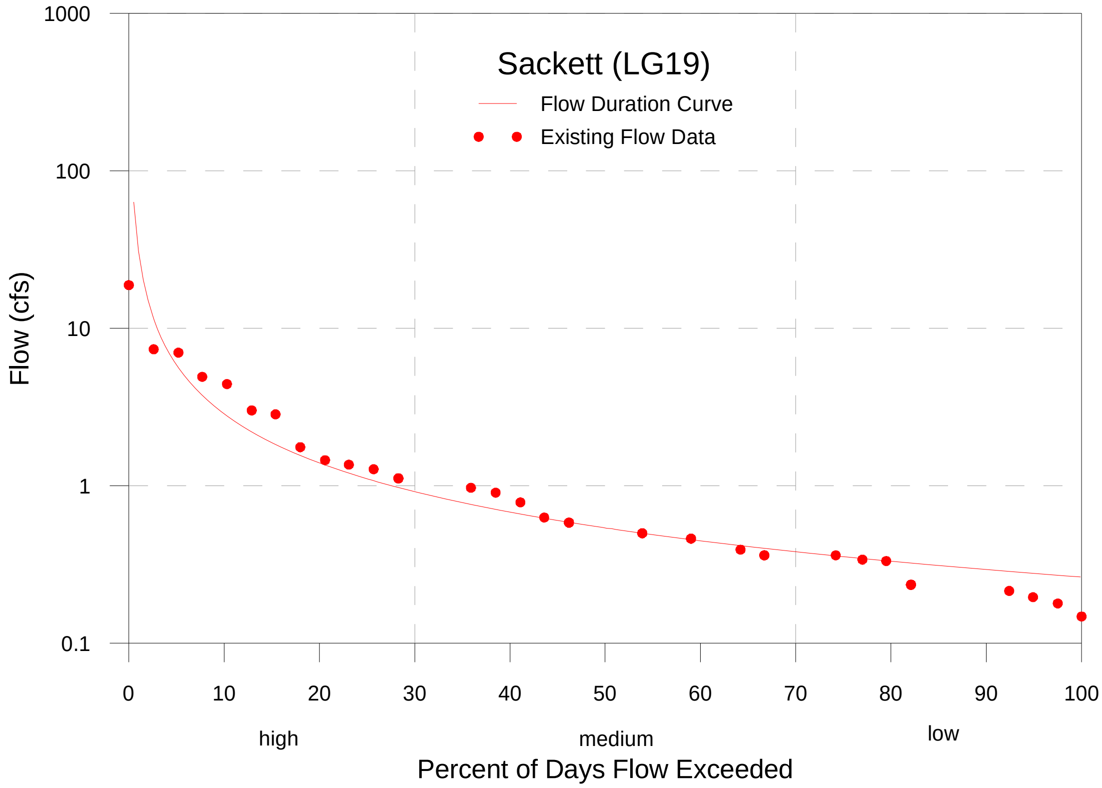


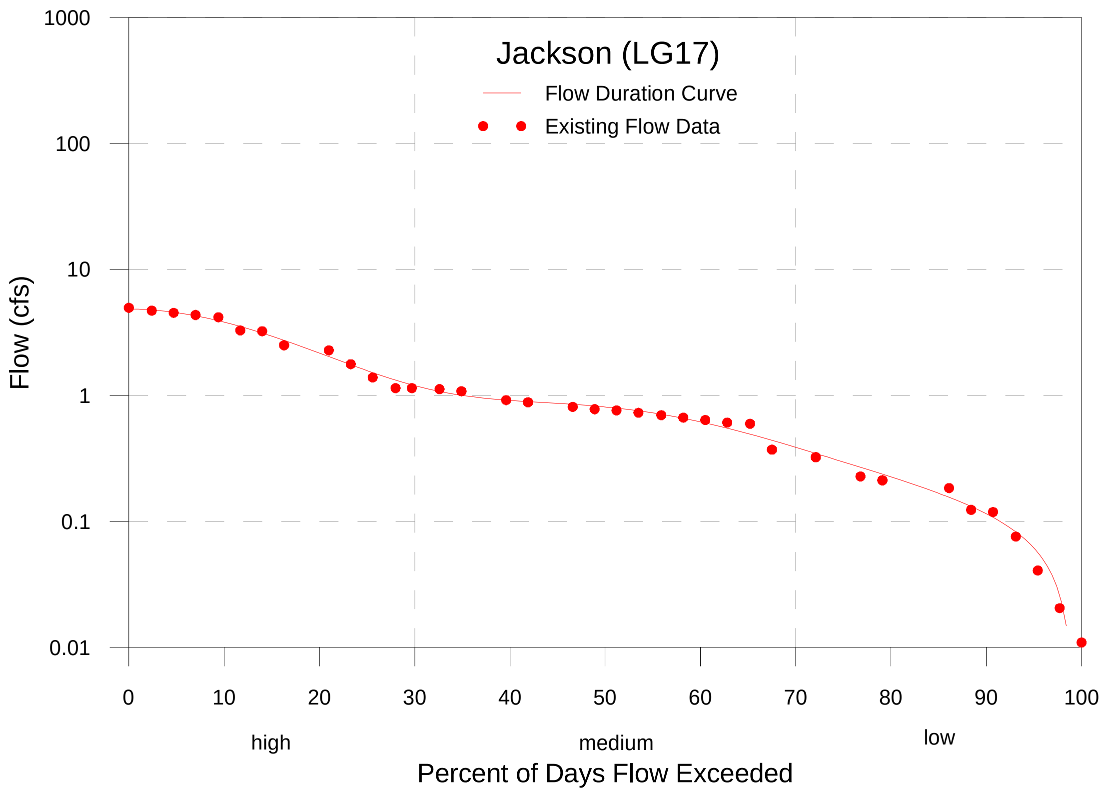
Map 26. Soldier Creek implementation.

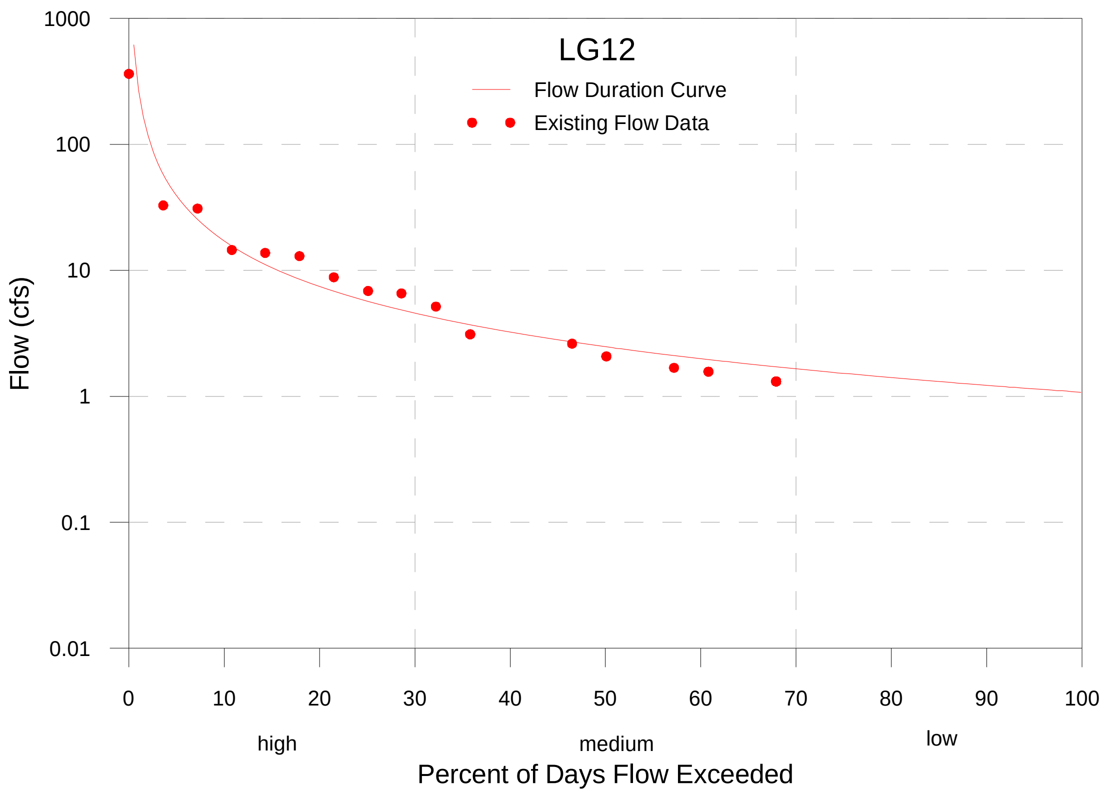
Appendix 2. Flow Duration Curves and Load Duration Curves

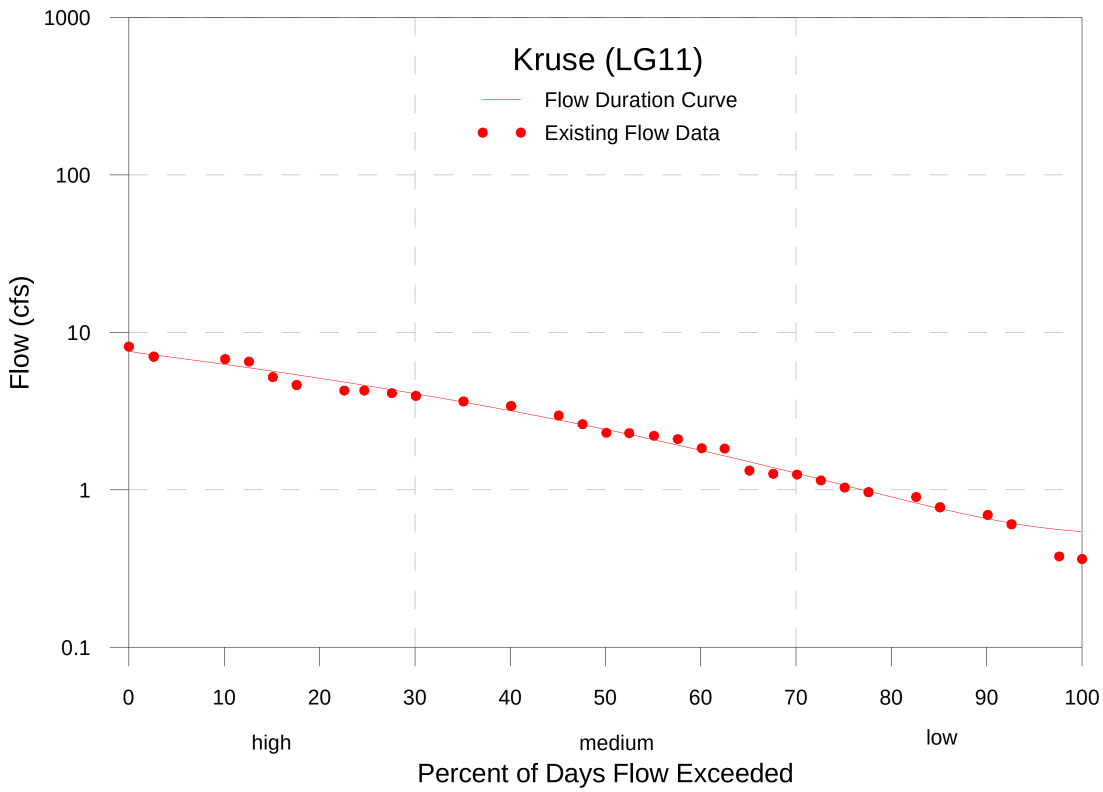

LG22
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0 10 20 30 40 50 60 70 80 90 100
high
medium
low
Percent of Days Flow Exceeded

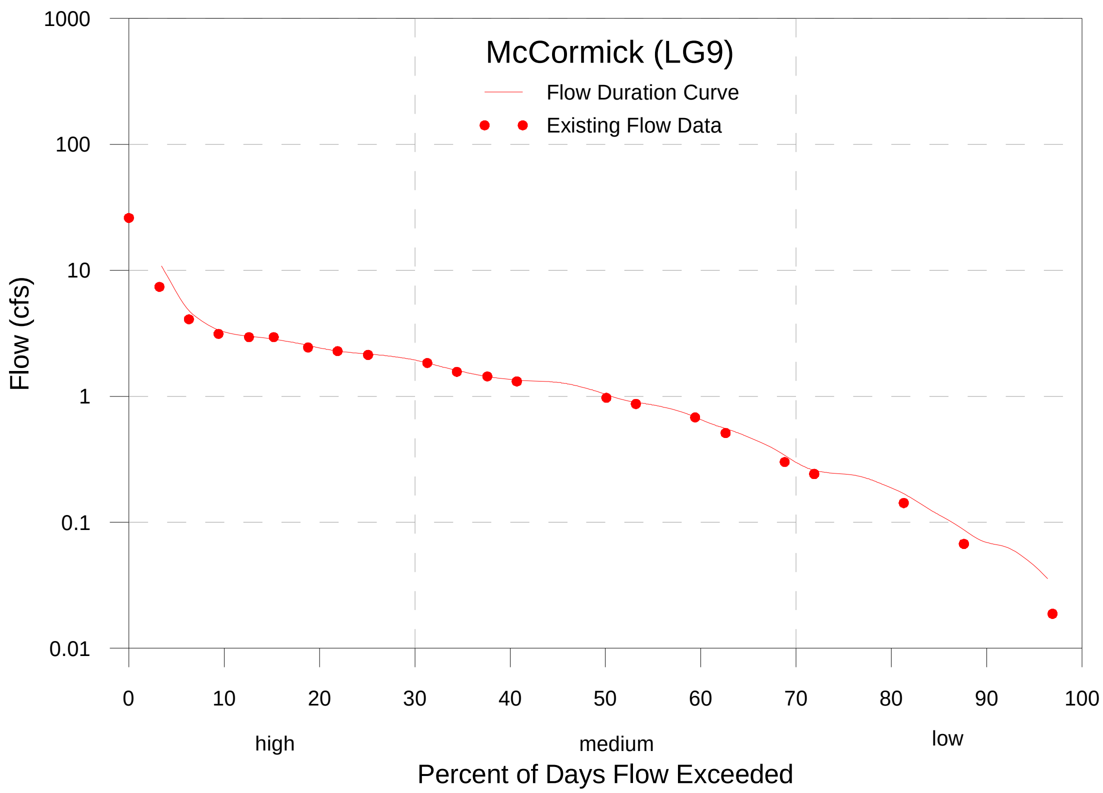

LG20
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0 10 20 30 40 50 60 70 80 90 100
high
medium
low
Percent of Days Flow Exceeded

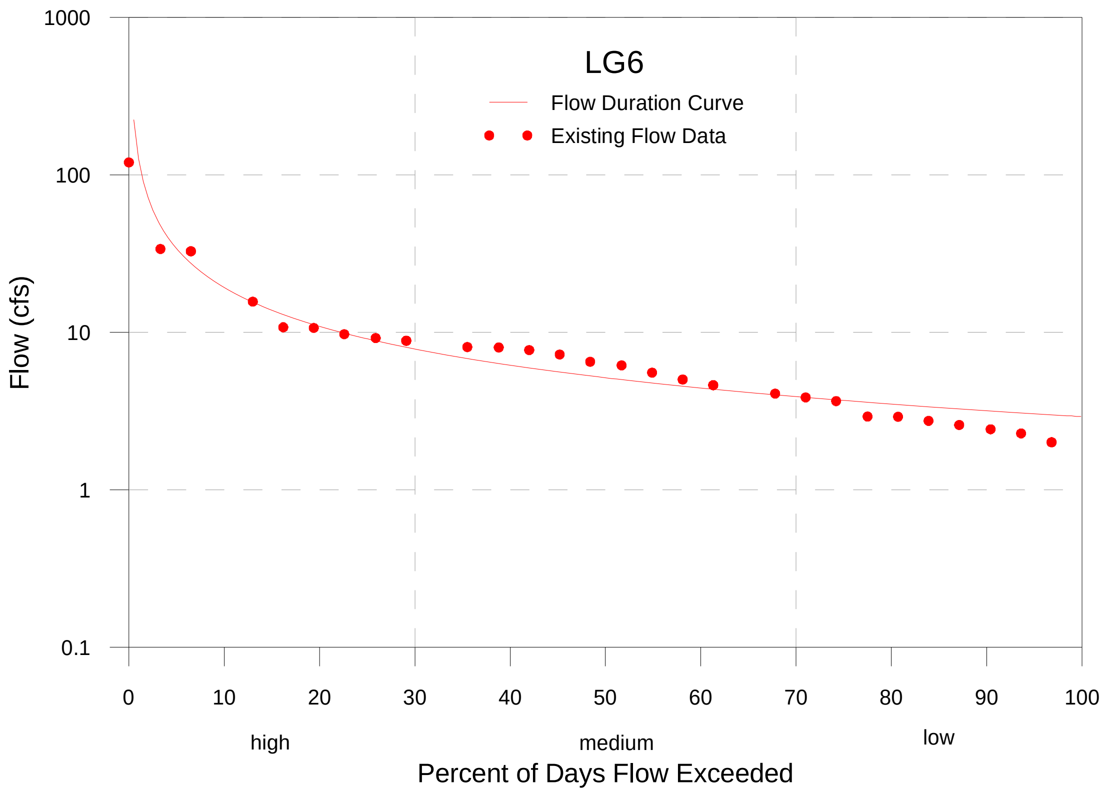

Sackett (LG19)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

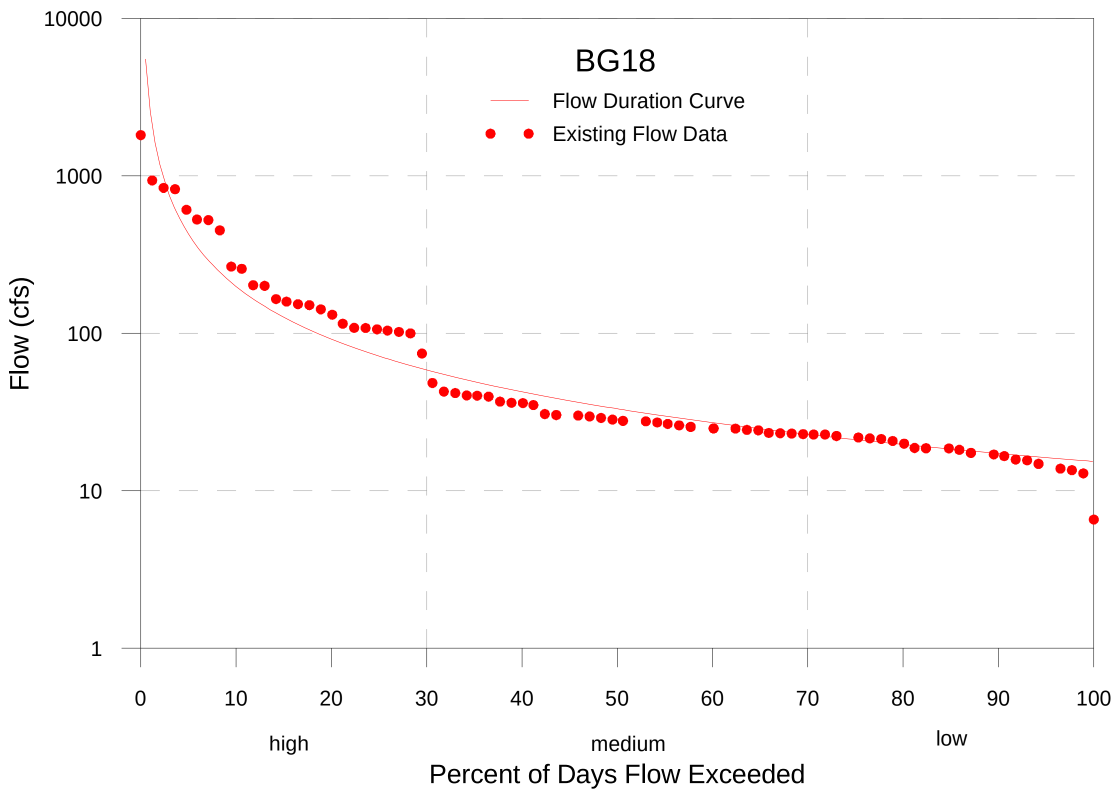

Jackson (LG17)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

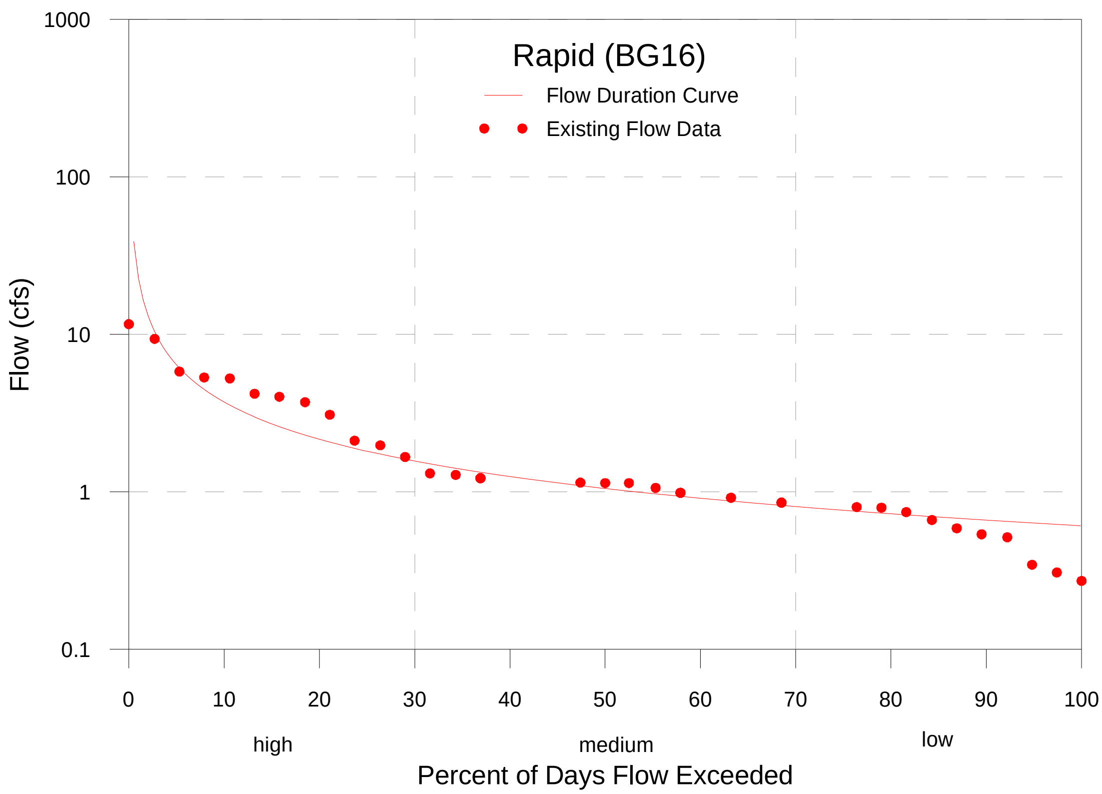

LG12
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

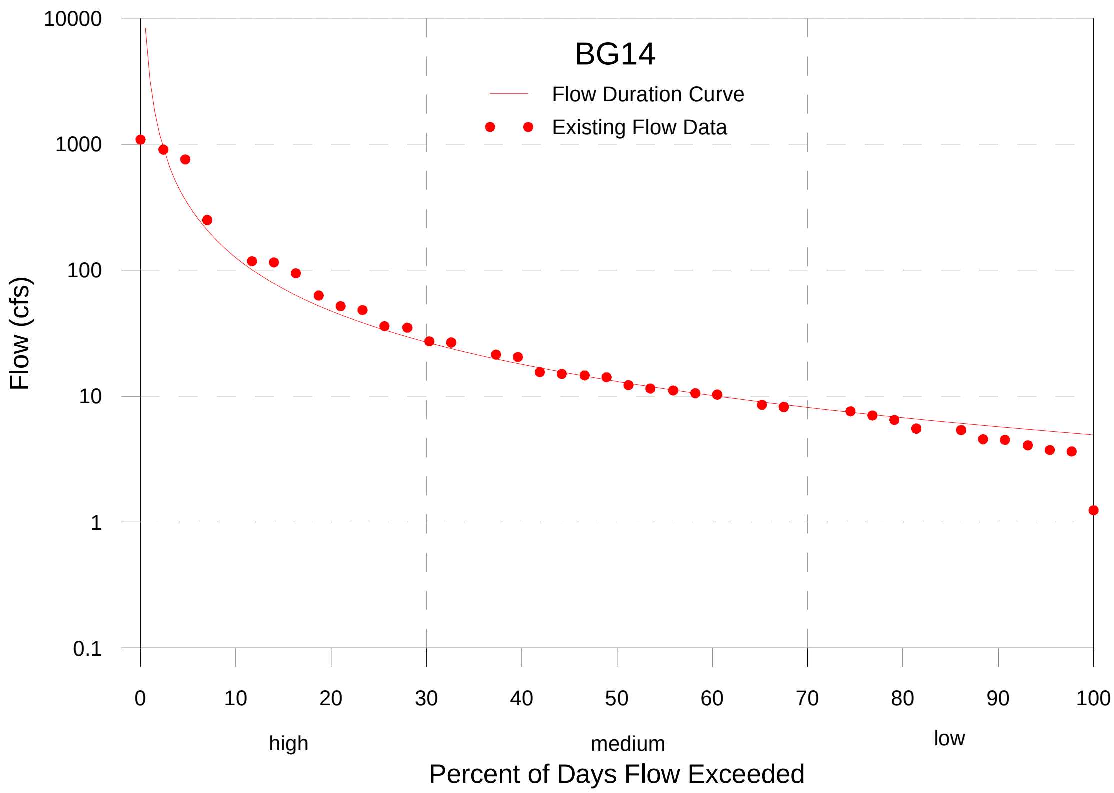

Kruse (LG11)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

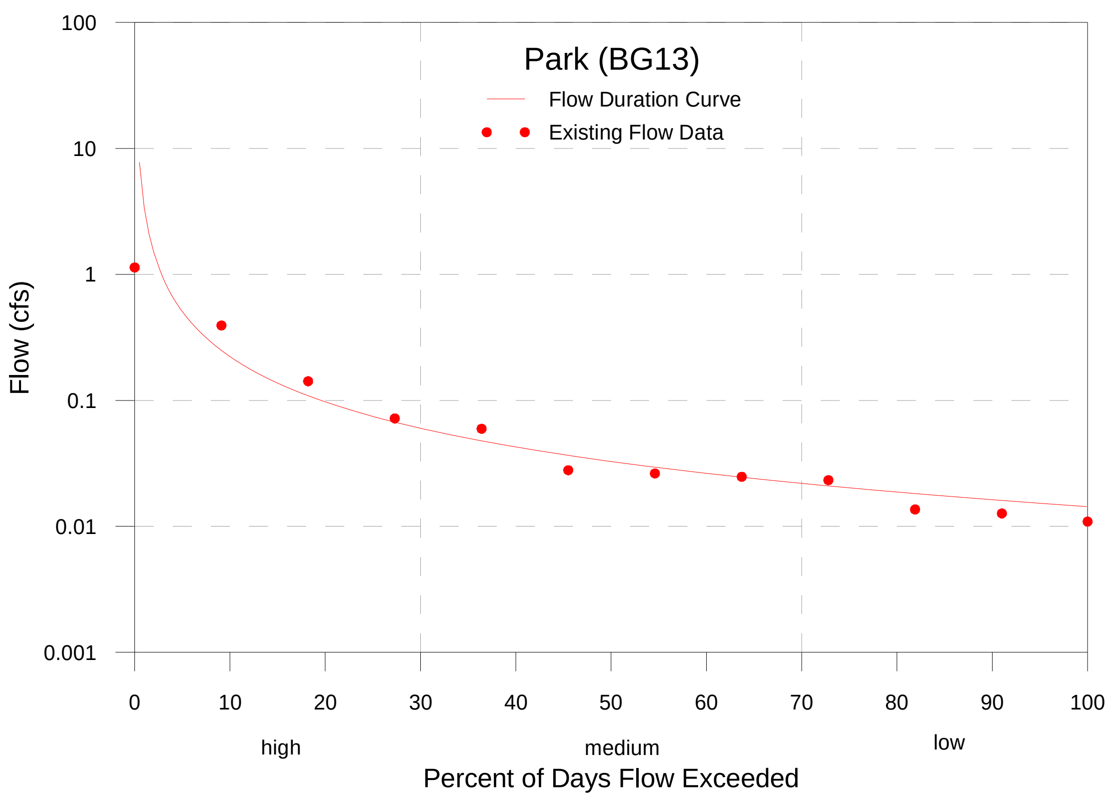

McCormick (LG9)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

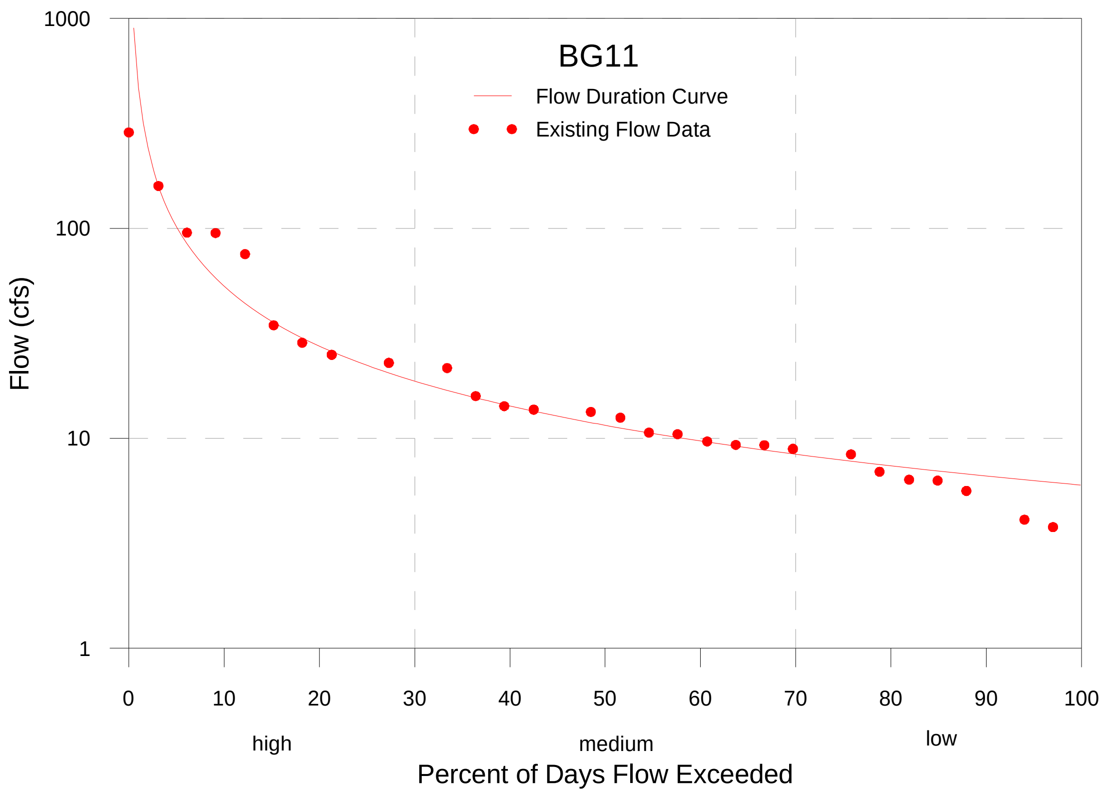

LG6
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

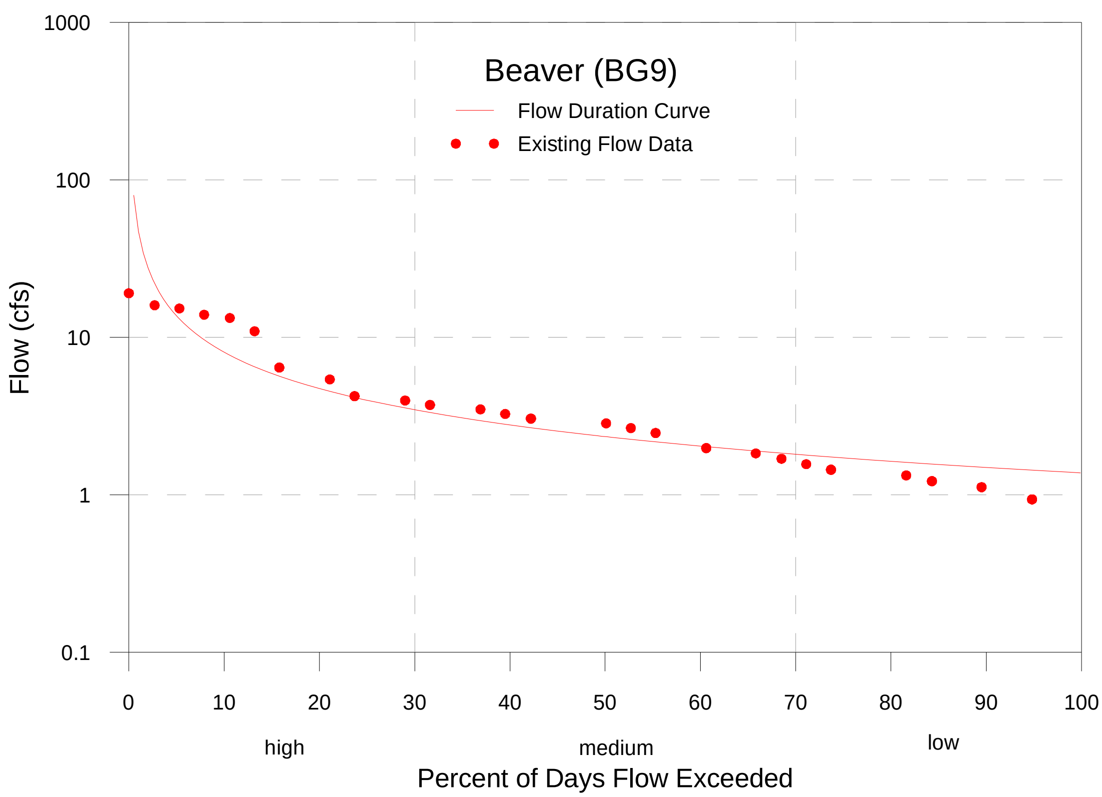

BG18
Flow Duration Curve
Existing Flow Data
Flow (cfs)
10000
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

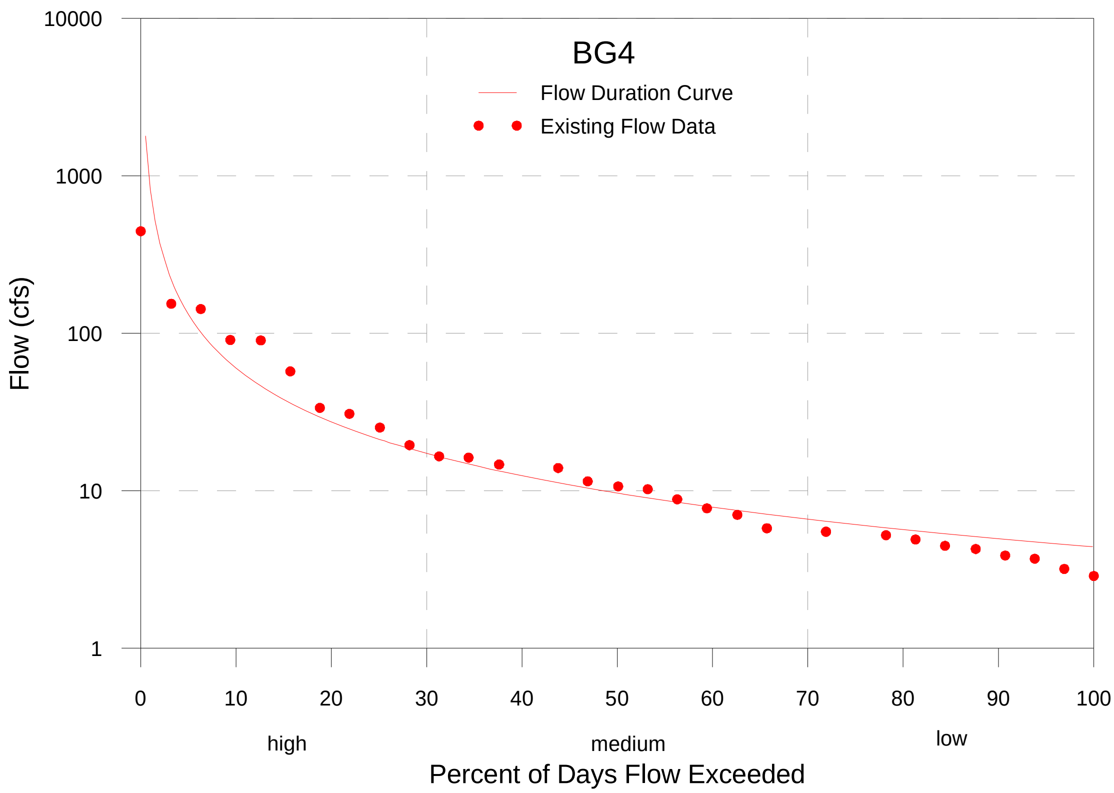

Rapid (BG16)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

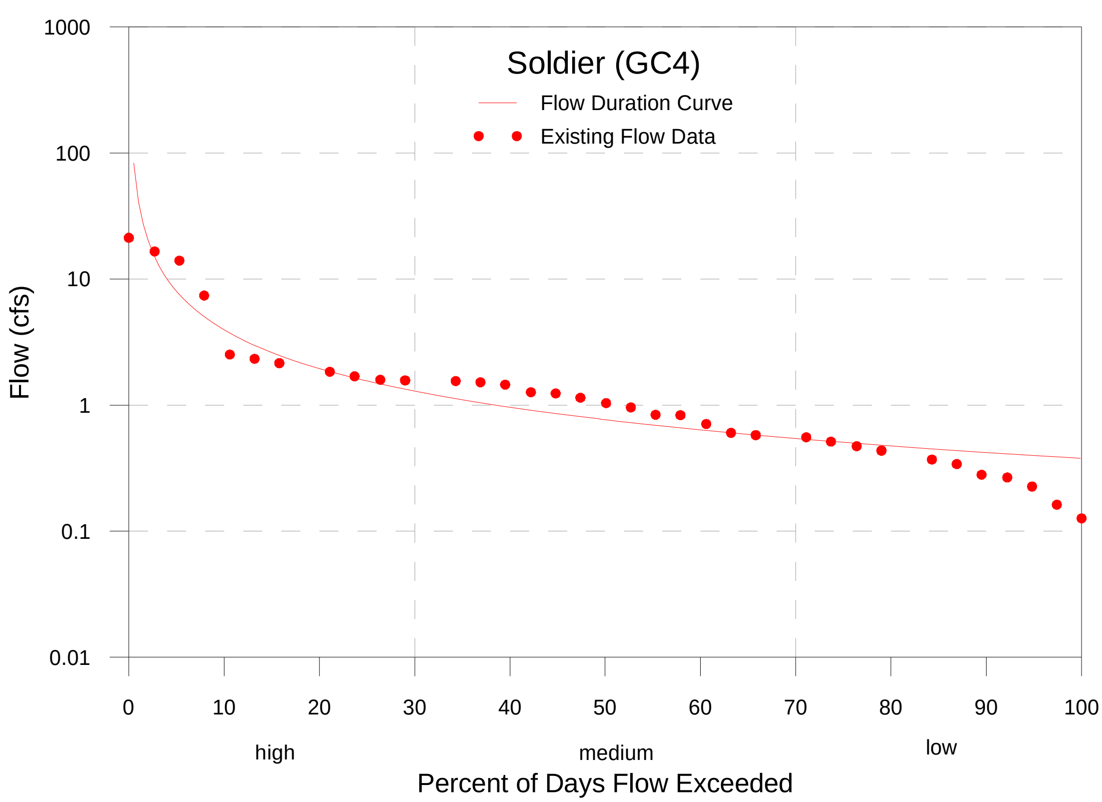

BG14
Flow Duration Curve
Existing Flow Data
Flow (cfs)
10000
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

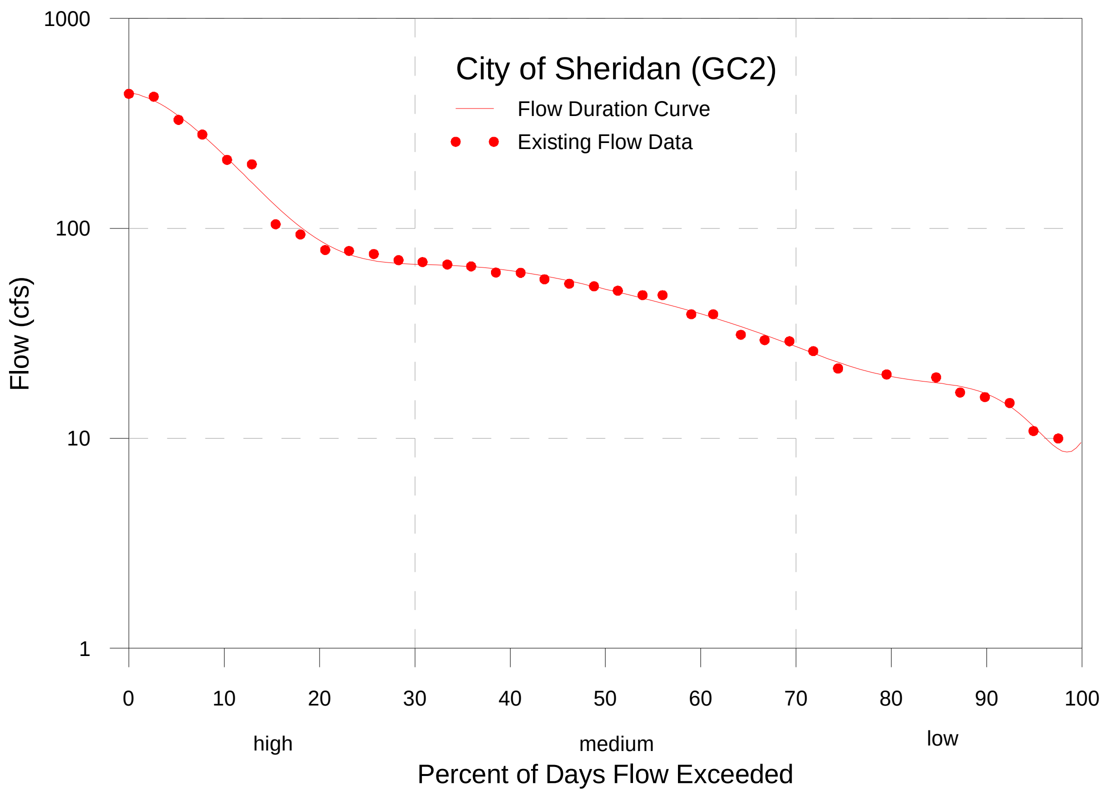

Park (BG13)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
100
10
1
0.1
0.01
0.001
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

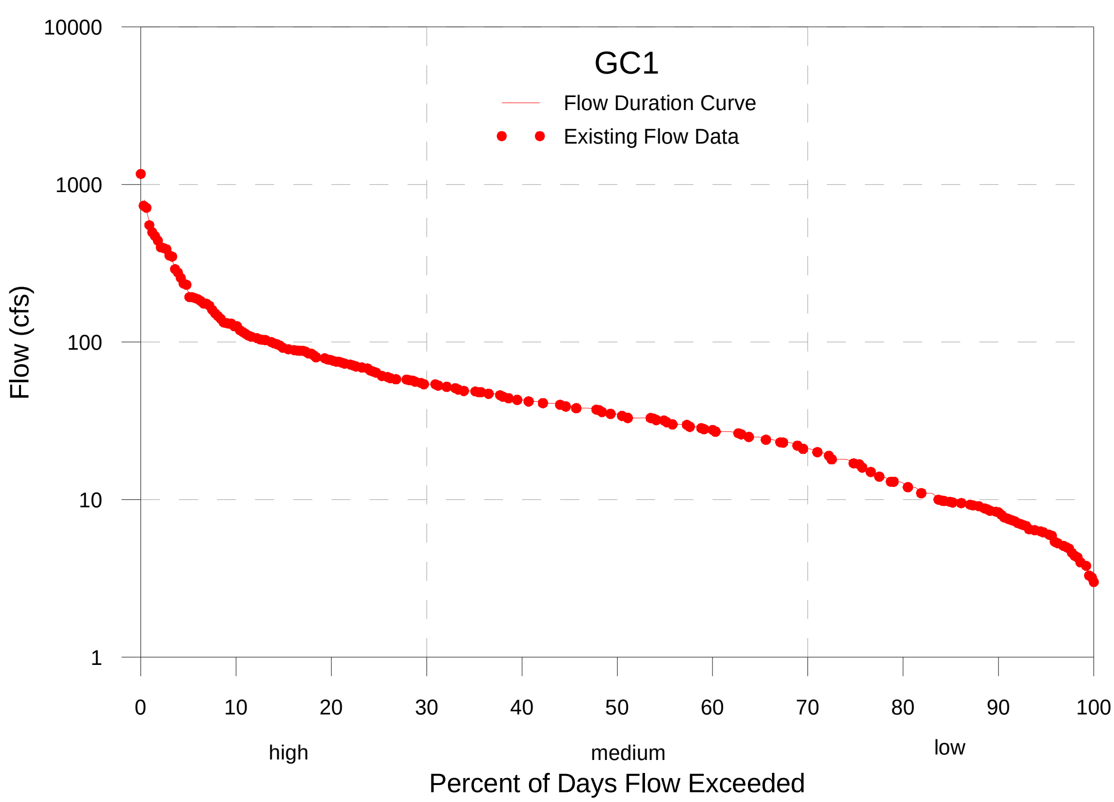

BG11
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

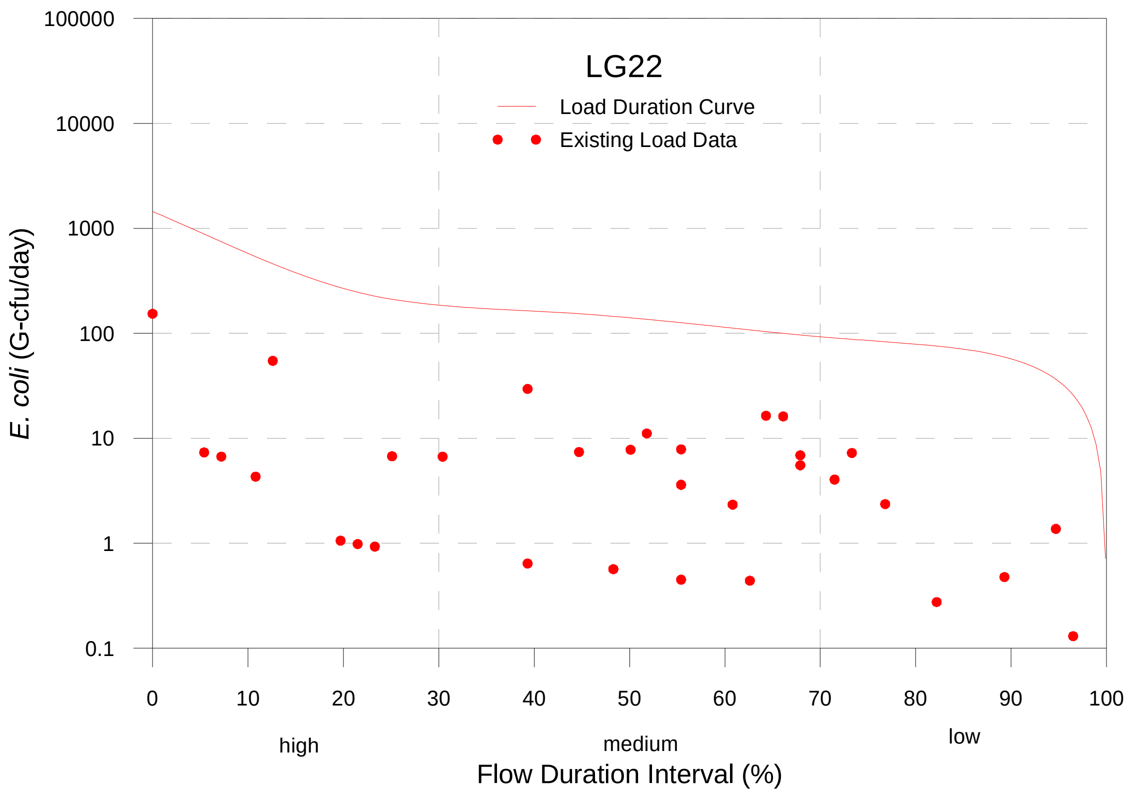

Beaver (BG9)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

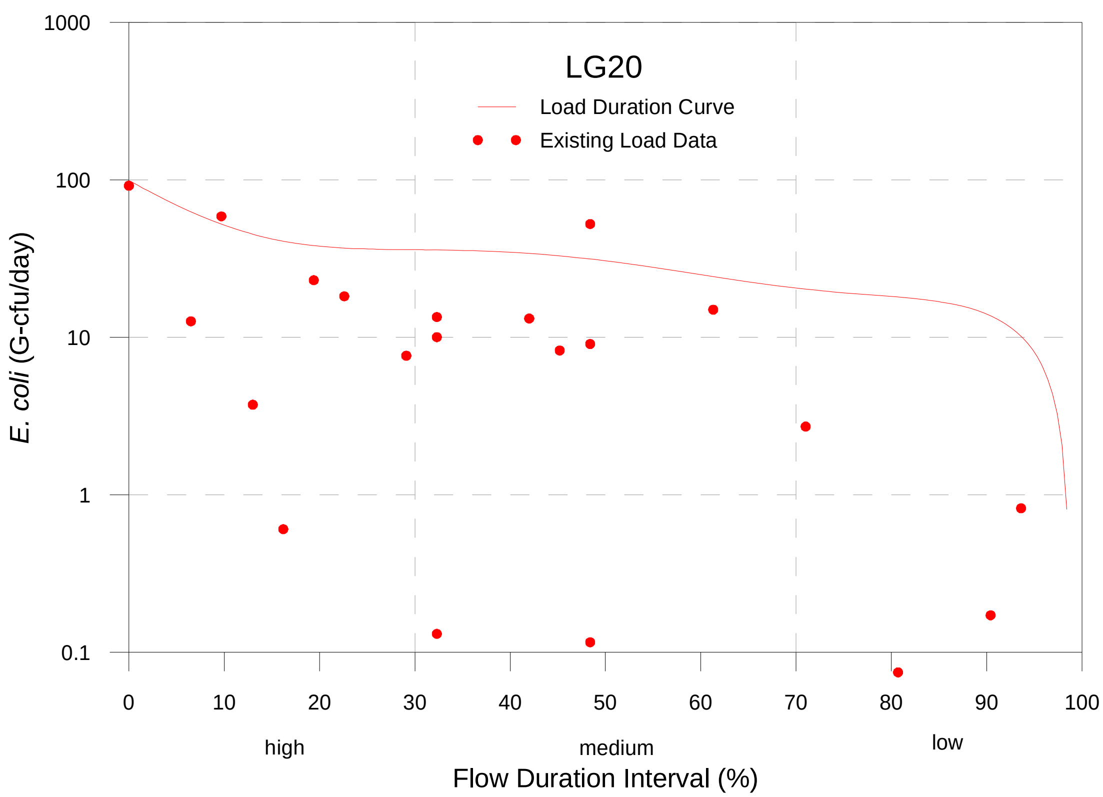

BG4
Flow Duration Curve
Existing Flow Data
Flow (cfs)
10000
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

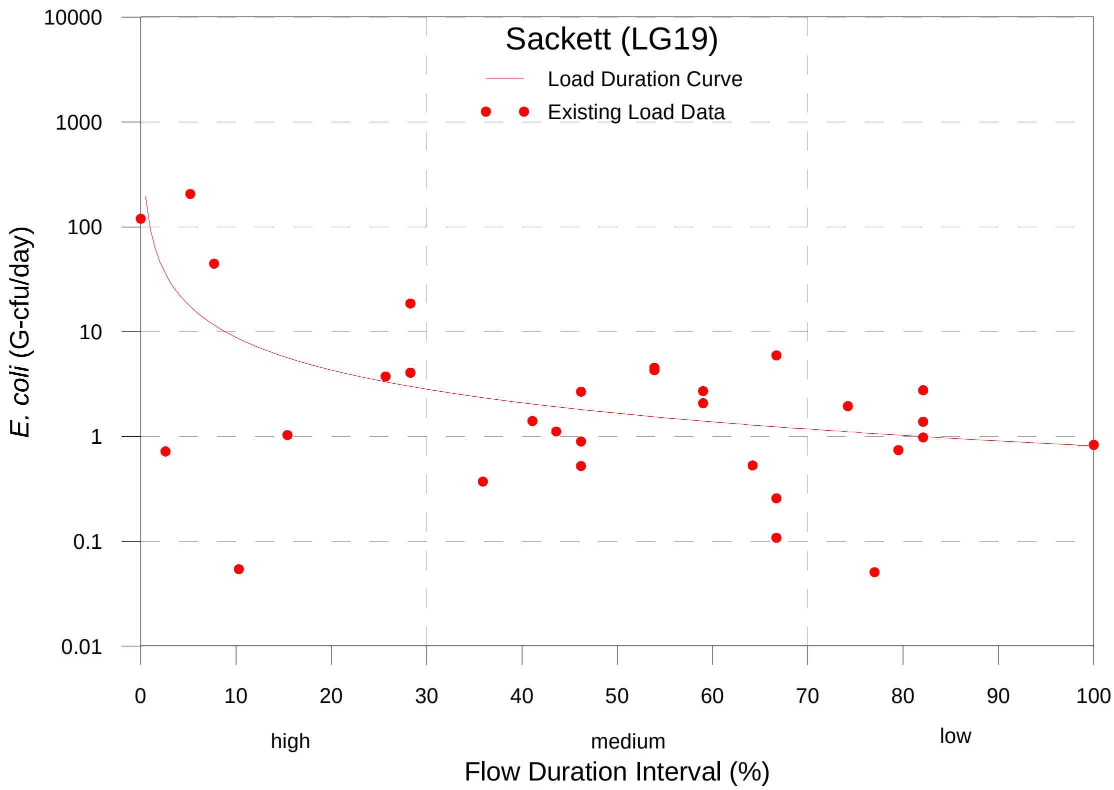

Soldier (GC4)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded


City of Sheridan (GC2)
Flow Duration Curve
Existing Flow Data
Flow (cfs)
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded

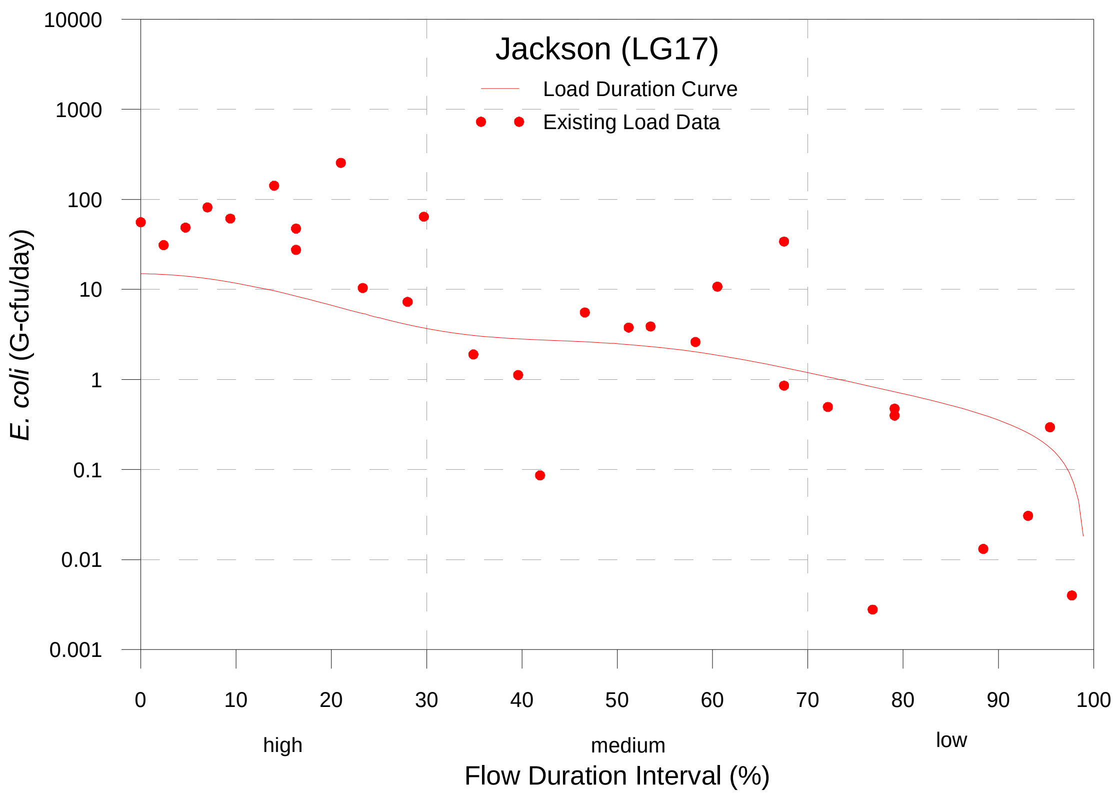

GC1
Flow Duration Curve
Existing Flow Data
Flow (cfs)
10000
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Percent of Days Flow Exceeded


LG22
Load Duration Curve
Existing Load Data
100000
10000
1000
100
10
1
0.1
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

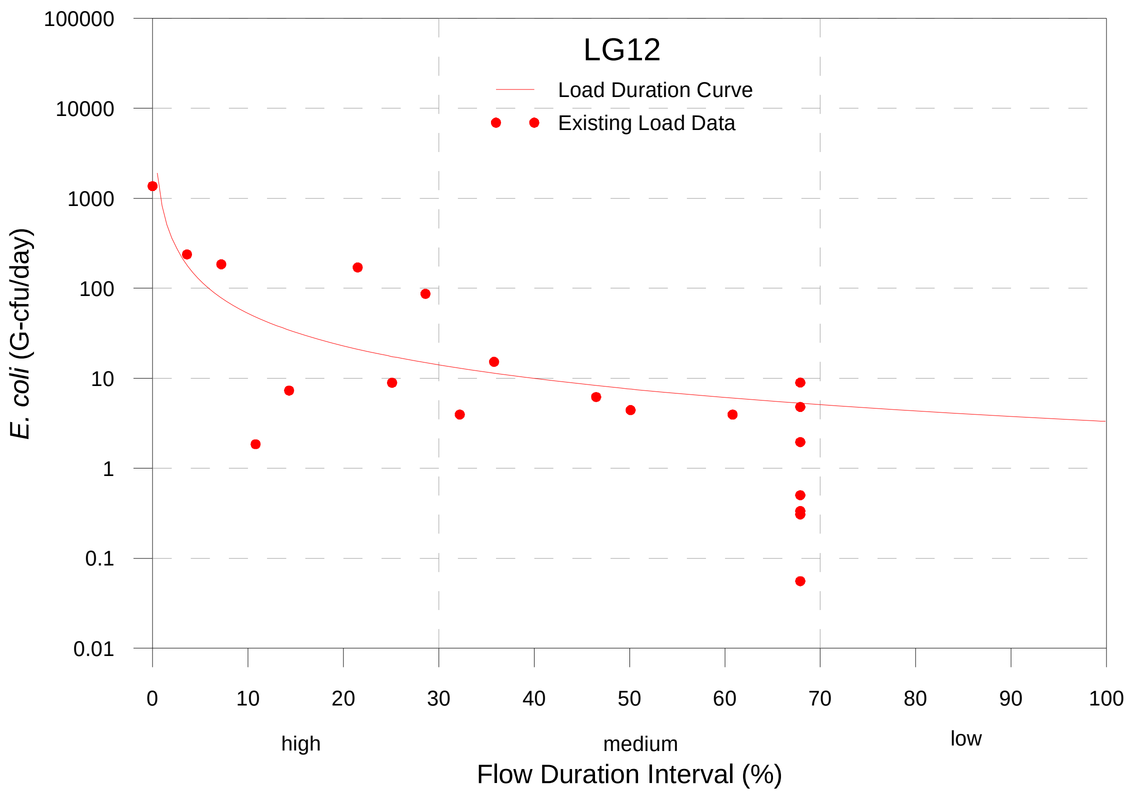

LG20
Load Duration Curve
Existing Load Data
1000
100
10
1
0.1
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

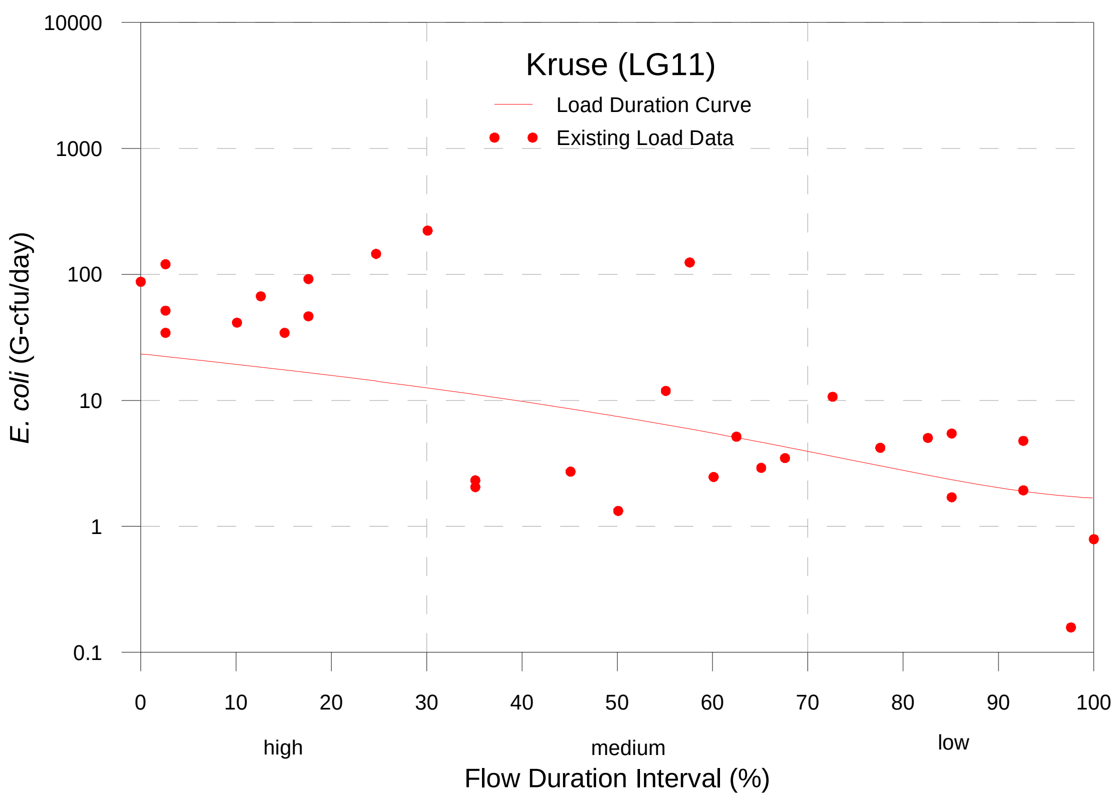


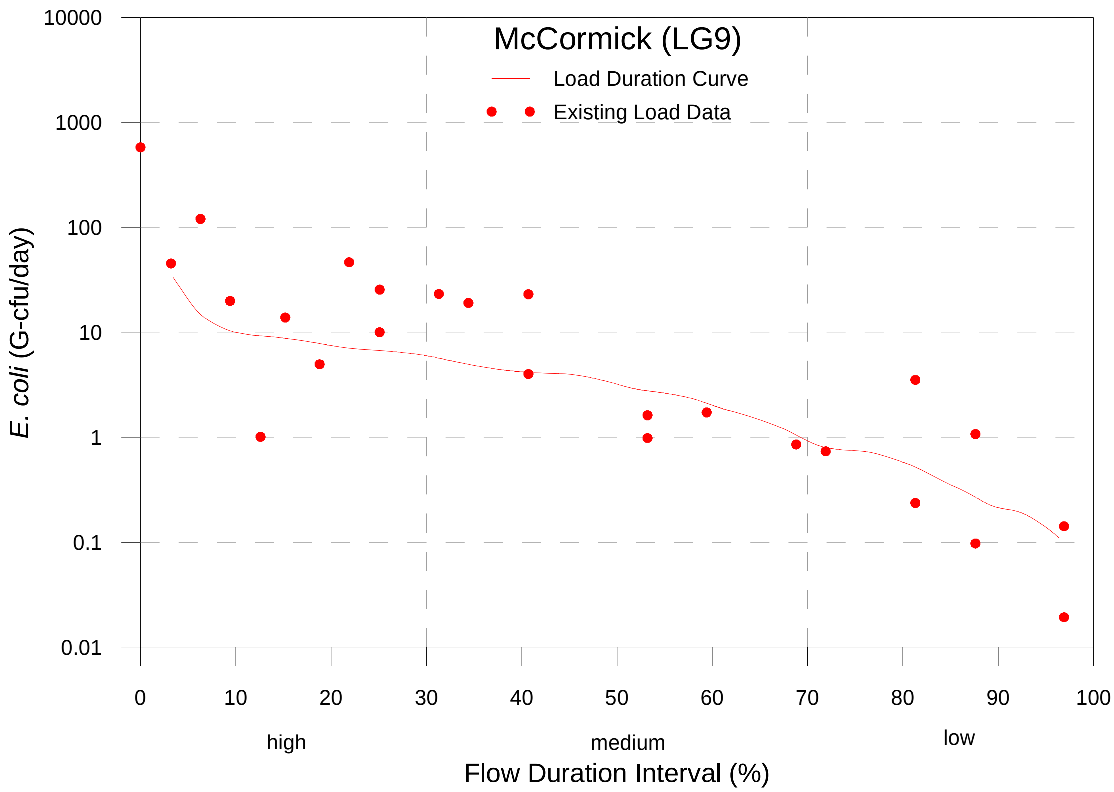
Sackett (LG19)
Load Duration Curve
Existing Load Data
10000
1000
100
10
1
0.1
0.01
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

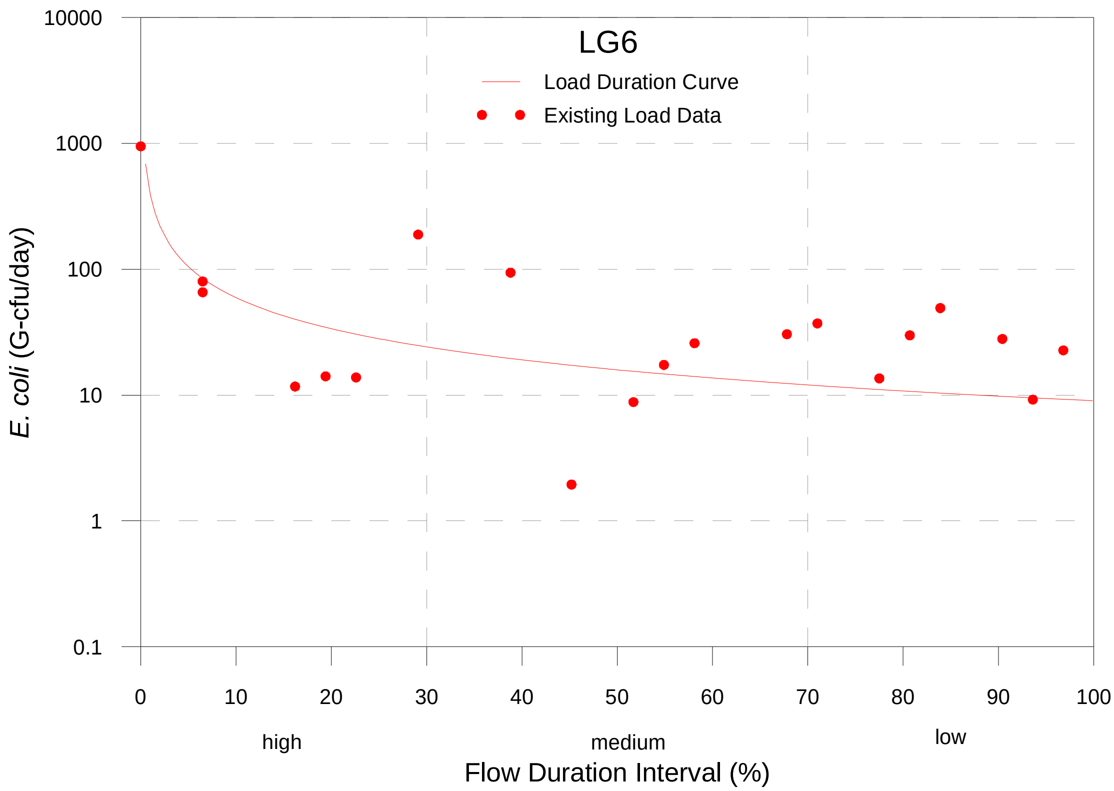


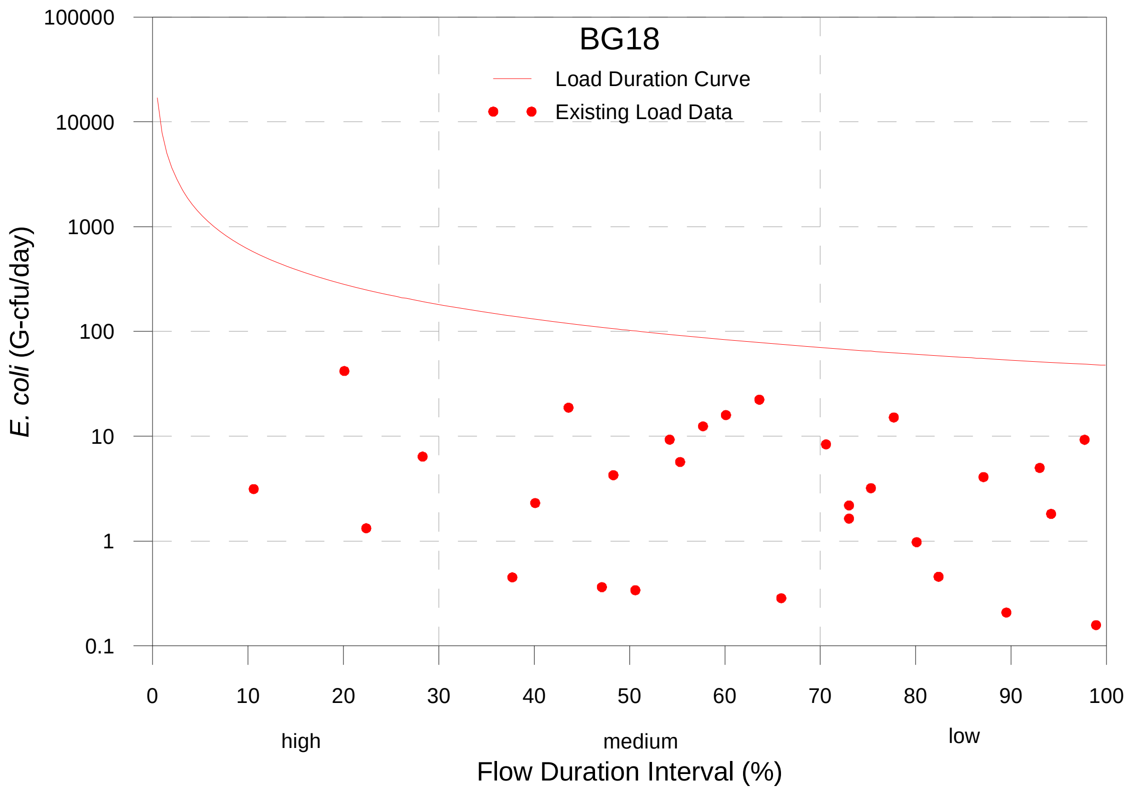
Jackson (LG17)
Load Duration Curve
Existing Load Data
10000
1000
100
10
1
0.1
0.01
0.001
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

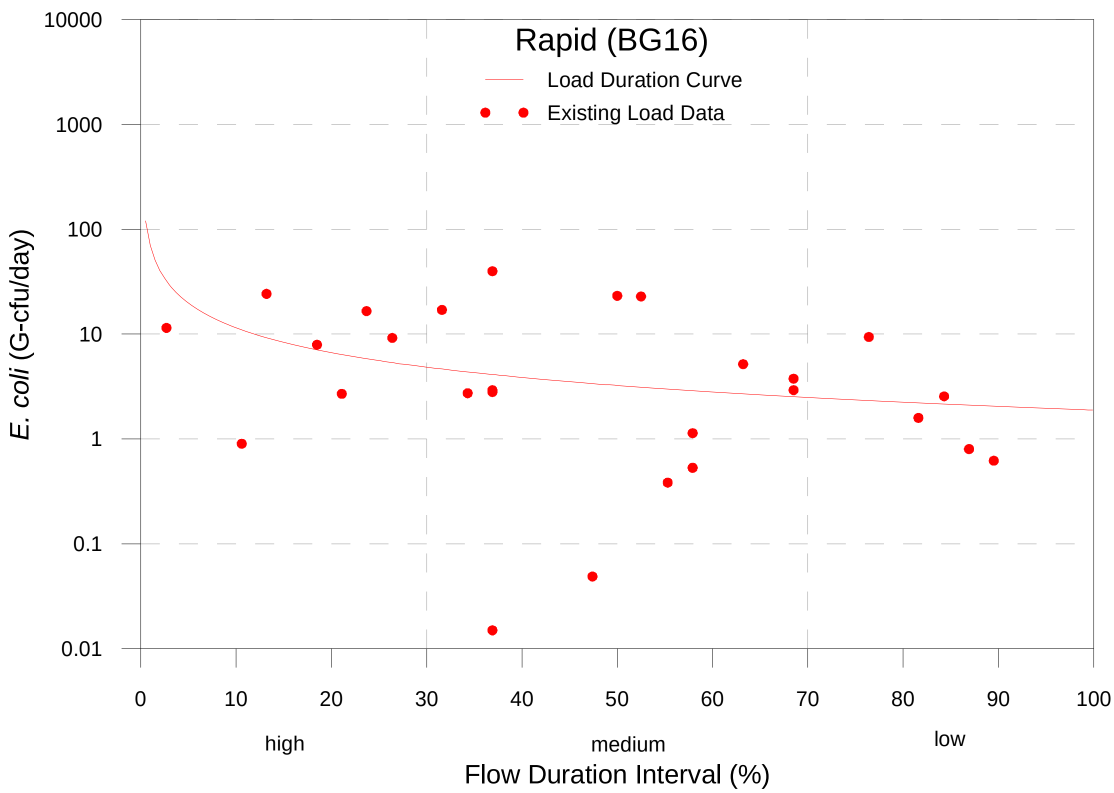

LG12
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
100000
10000
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

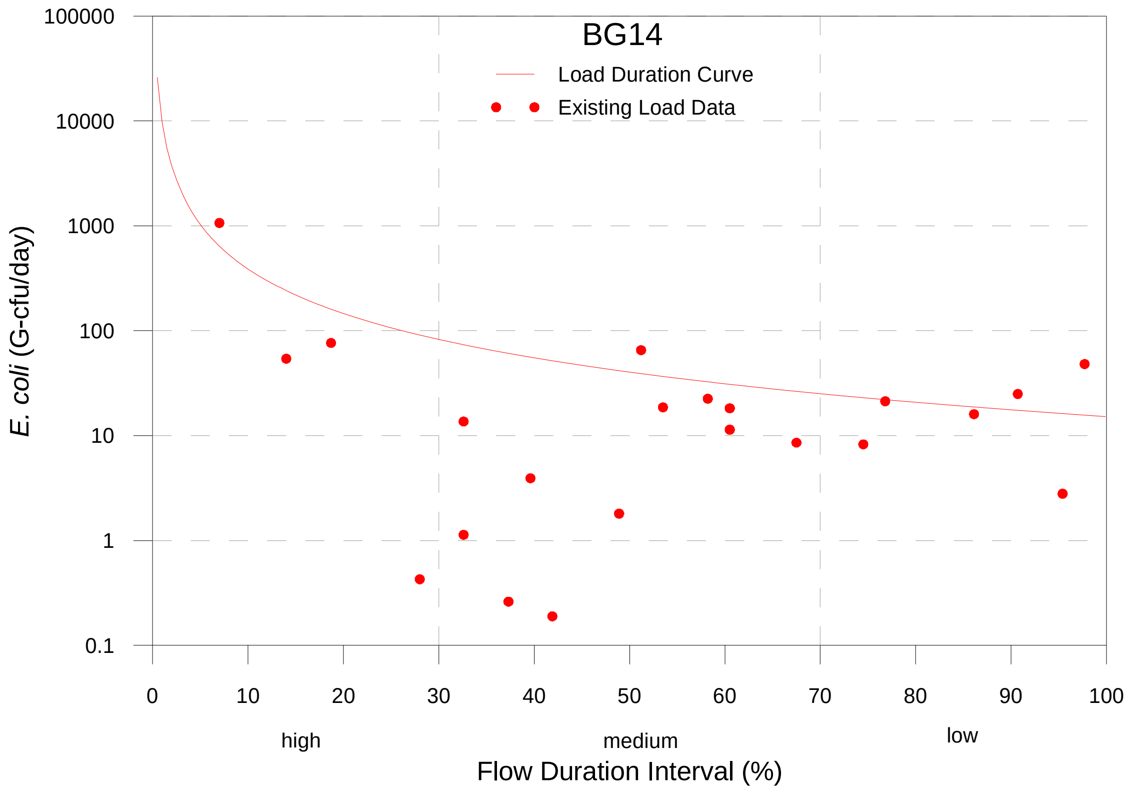

Kruse (LG11)
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
10000
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

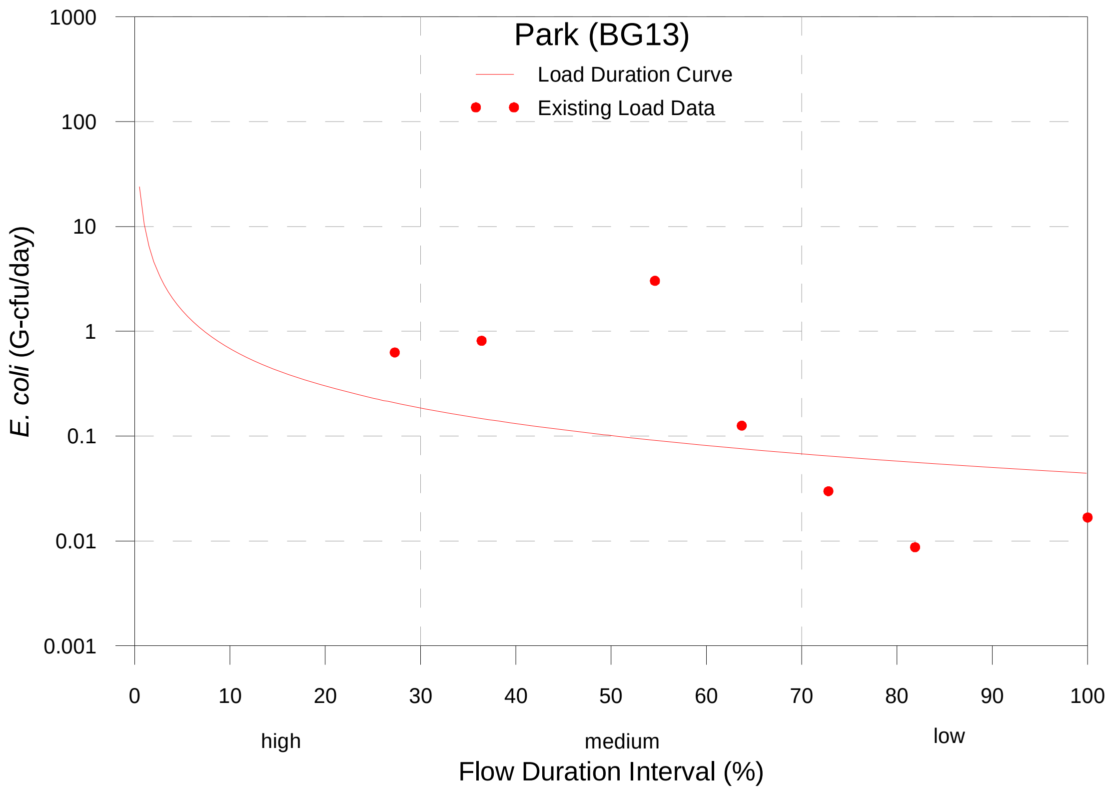

McCormick (LG9)
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
10000
1000
100
10
1
0.1
0.01
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

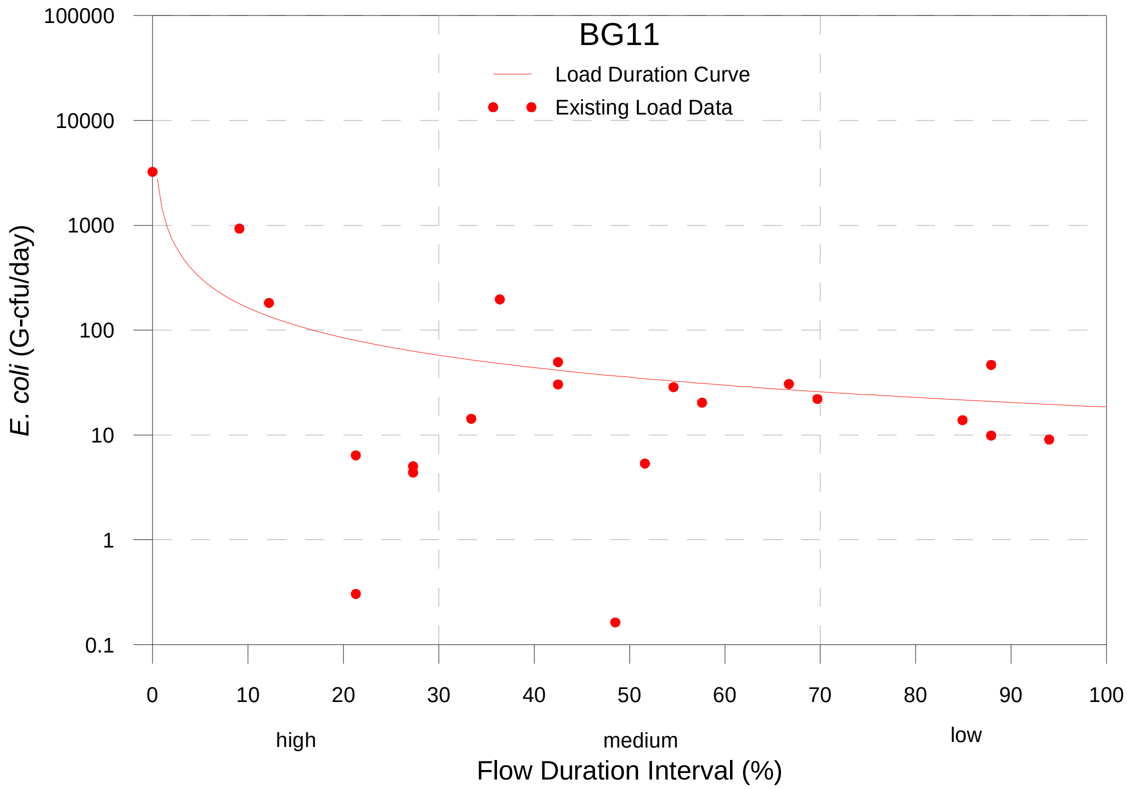

LG6
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
10000
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

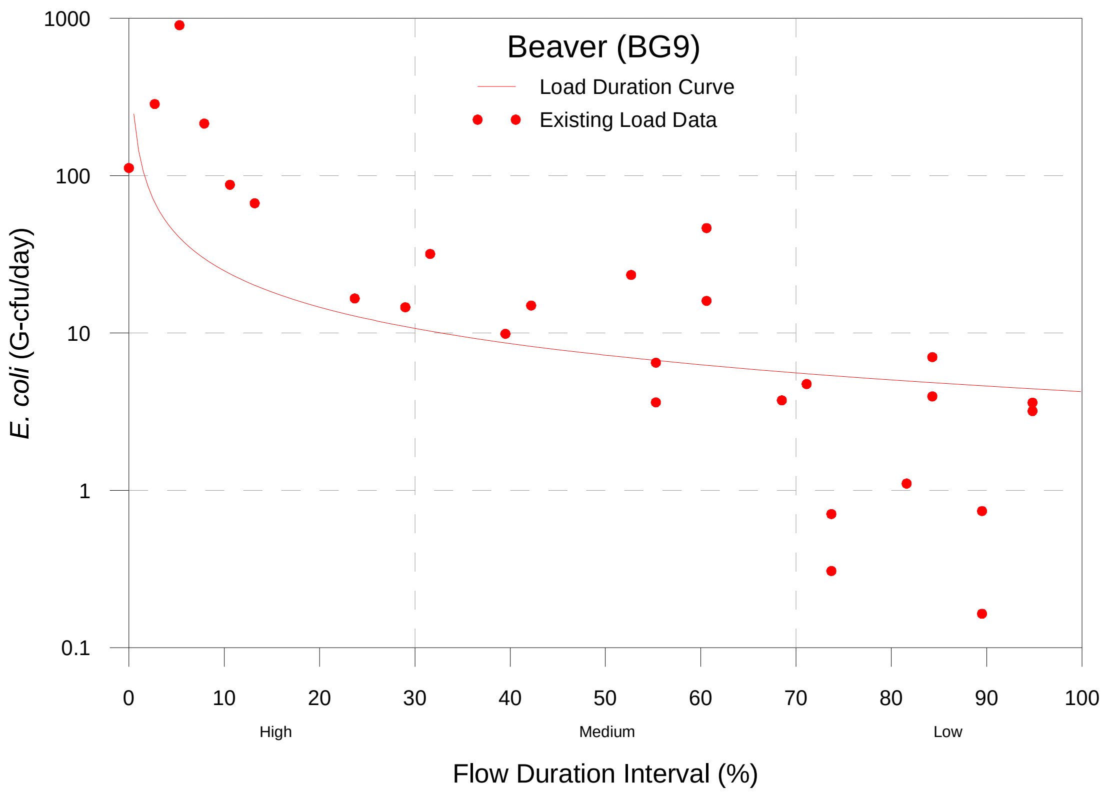

BG18
Load Duration Curve
Existing Load Data
100000
10000
1000
100
10
1
0.1
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

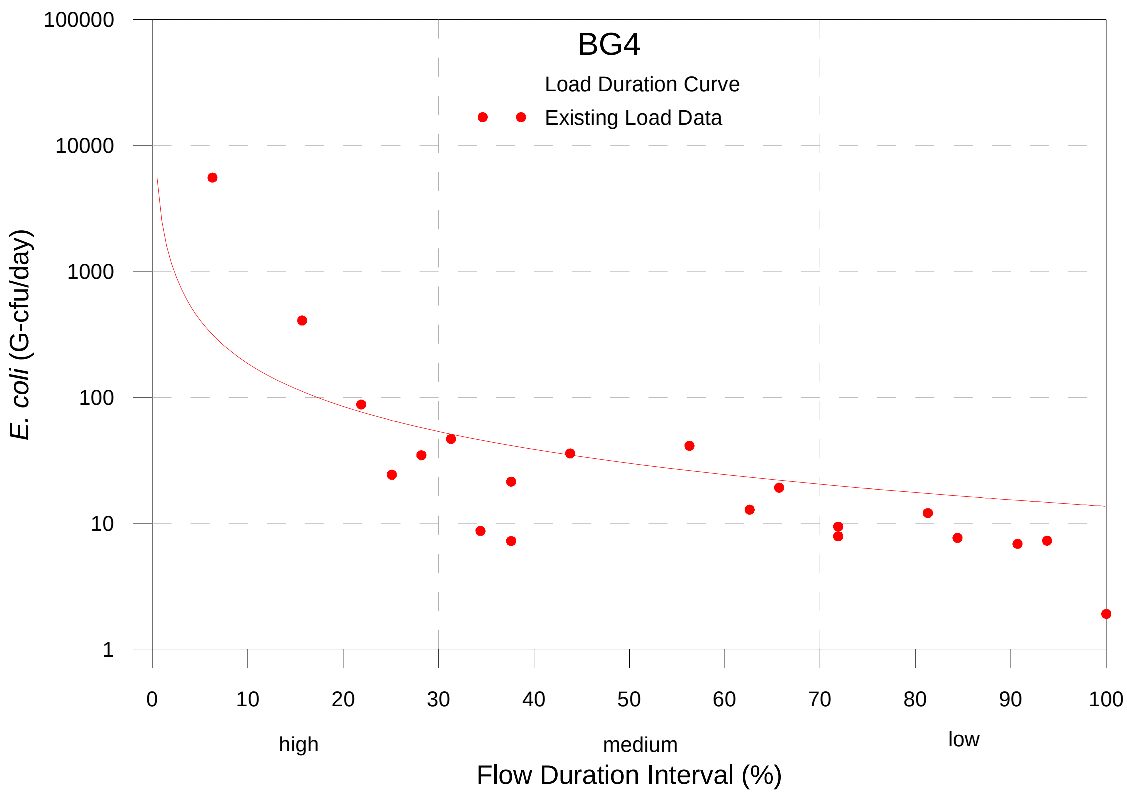

Rapid (BG16)
Load Duration Curve
Existing Load Data
10000
1000
100
10
1
0.1
0.01
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

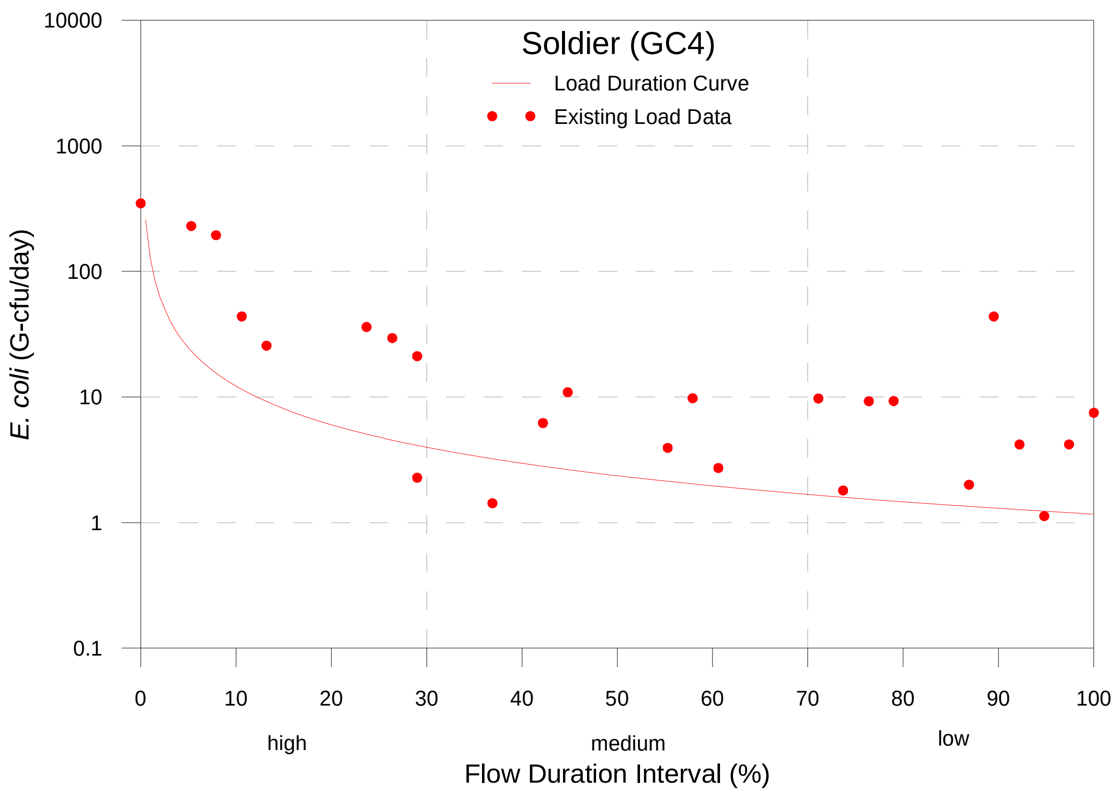

BG14
Load Duration Curve
Existing Load Data
100000
10000
1000
100
10
1
0.1
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

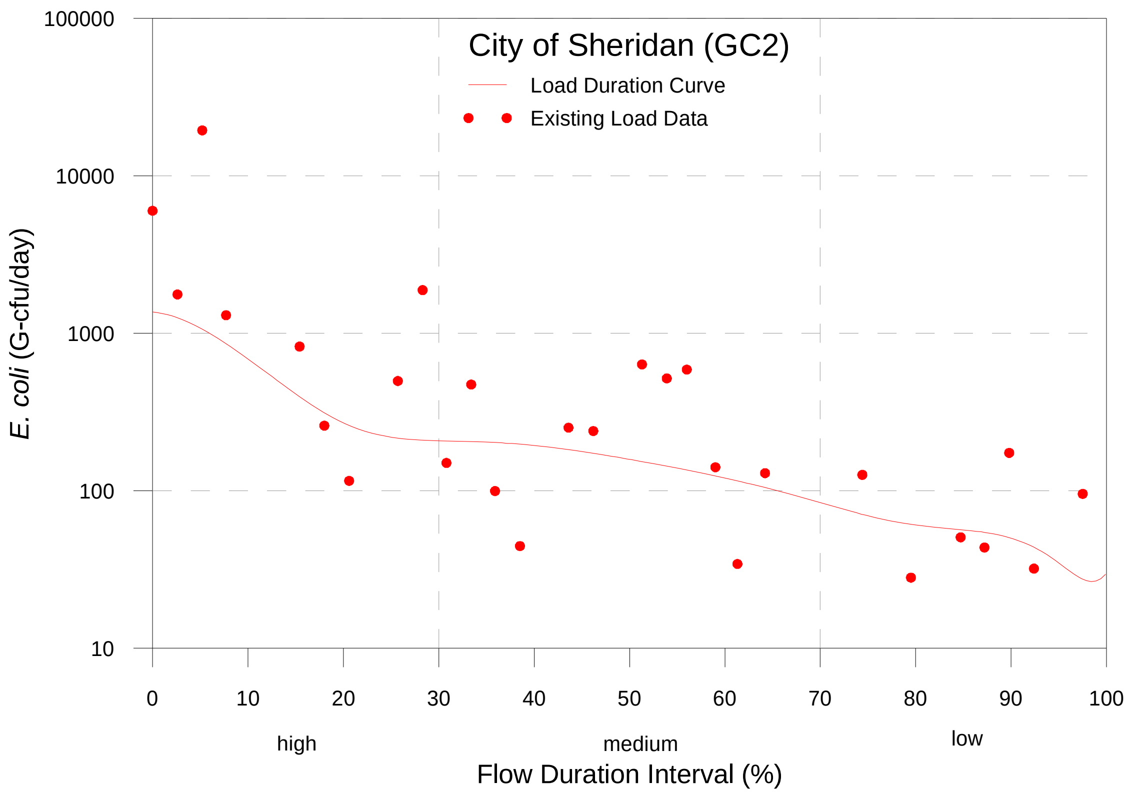

Park (BG13)
Load Duration Curve
Existing Load Data
1000
100
10
1
0.1
0.01
0.001
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

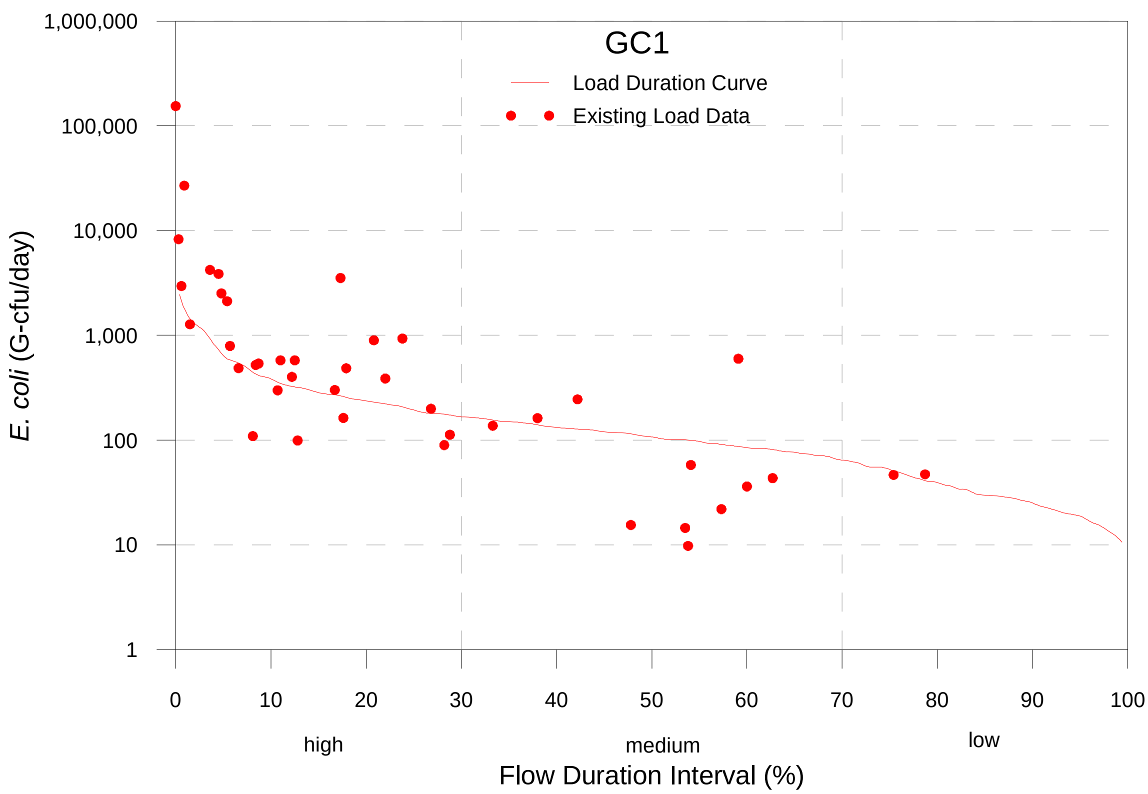

BG11
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
100000
10000
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)


Beaver (BG9)
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
High
Medium
Low
Flow Duration Interval (%)


BG4
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
100000
10000
1000
100
10
1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)


Soldier (GC4)
Load Duration Curve
Existing Load Data
E. coli (G-cfu/day)
10000
1000
100
10
1
0.1
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)


City of Sheridan (GC2)
Load Duration Curve
Existing Load Data
100000
10000
1000
100
10
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)


GC1
Load Duration Curve
Existing Load Data
1,000,000
100,000
10,000
1,000
100
10
1
E. coli (G-cfu/day)
0
10
20
30
40
50
60
70
80
90
100
high
medium
low
Flow Duration Interval (%)

Appendix 3. Bacteria Source Load Calculator Model Assumptions

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
Beef cattle	Cow calf pairs	City			
		County	6406	Total cattle estimated using Sheridan County Agricultural Census (NASS) and scaled based on % acreage of Sheridan County hay and pasture acreage that is found in Goose Creek Watershed. Subtracted the cattle estimated for USFS assuming that these cows spend their winters in the valley and summers in the forest.	http://www.agcensus.usda.gov/
		USFS	750	Derived from USFS allotment information for summer season.	Supplied by USFS.
Chickens (layers)	Quantity	City			
		County	68	Estimated using Sheridan County Agricultural Census (NASS) and scaled based on % acreage of Sheridan County hay and pasture acreage that is found in Goose Creek Watershed.	http://www.agcensus.usda.gov/
		USFS			
Turkeys	Quantity	City			
		County	13	Estimated using Sheridan County Agricultural Census (NASS) and scaled based on % acreage of Sheridan County hay and pasture acreage that is found in Goose Creek Watershed.	http://www.agcensus.usda.gov/
		USFS			
		City			

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
Horses	Quantity	County	461	Estimated using Sheridan County Agricultural Census (NASS) and scaled based on % acreage of Sheridan County hay and pasture acreage that is found in Goose Creek Watershed.	http://www.agcensus.usda.gov/
		USFS			
		City			
Ewes	Quantity	County	29	Estimated using Sheridan County Agricultural Census (NASS) and scaled based on % acreage of Sheridan County hay and pasture acreage that is found in Goose Creek Watershed.	http://www.agcensus.usda.gov/
		USFS			
		City			
Goats	Quantity	County	16	Estimated using Sheridan County Agricultural Census (NASS) and scaled based on % acreage of Sheridan County hay and pasture acreage that is found in Goose Creek Watershed.	http://www.agcensus.usda.gov/
		USFS			
Deer	Quantity	City	438	WGFD provided an as estimate of 18 to 20 white tail deer per square mile and 7 to 8 mule deer per square mile. Using the habitat acreages available in Chapter 3, we estimated total deer population for the County potion of the watershed. An overall assumption was 28 deer per square mile.	Tim Thomas, Wyoming Game and Fish Department. Personal communication with John Christensen, SWCA on June 29, 2010.

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
		County	3978	WGFD estimated 500 pronghorn all year. Also provided as estimate of 18 to 20 white tail deer per square mile and 7 to 8 mule deer per square mile. Using the habitat acreages available in Chapter 3, we estimated total deer population for the County potion of the watershed. An overall assumption was 28 deer per square mile.	Tim Thomas, Wyoming Game and Fish Department. Personal communication with John Christensen, SWCA on June 29, 2010.
		USFS	1389	WGFD provided an as estimate of 18 to 20 white tail deer per square mile and 7 to 8 mule deer per square mile. Using the habitat acreages available in Chapter 3, we estimated total deer population for the County potion of the watershed. An overall assumption was 28 deer per square mile.	Tim Thomas, Wyoming Game and Fish Department. Personal communication with John Christensen, SWCA on June 29, 2010.
Geese (seasonal)		City	48	Assumed a density of 0.27 geese per hectare of habitat during peak season. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating geese when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
		County	274	Assumed a density of 0.27 geese per hectare of habitat during peak season. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating geese when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
		USFS	261	Assumed a density of 0.27 geese per hectare of habitat during peak season. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating geese when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
Geese (year round)		City	22	Assumed a density of 0.13 geese per hectare of habitat. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating geese when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
		County	127	Assumed a density of 0.13 geese per hectare of habitat. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating geese when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
		USFS	121	Assumed a density of 0.13 geese per hectare of habitat. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating geese when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
Ducks (seasonal)		City	39	Assumed a density of 0.23 ducks per hectare of habitat during peak season. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating ducks when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
		County	225	Assumed a density of 0.23 ducks per hectare of habitat during peak season. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating ducks when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
		USFS	214	Assumed a density of 0.23 ducks per hectare of habitat during peak season. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating ducks when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
Ducks (year round)		City	26	Assumed a density of 0.15 ducks per hectare of habitat. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating ducks when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
		County	140	Assumed a density of 0.15 ducks per hectare of habitat. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating ducks when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
		USFS	147	Assumed a density of 0.15 ducks per hectare of habitat. Habitat estimates were based on a 91-meter buffer around main stem streams. This the default method for calculating ducks when no other estimates are available. WGFD could not provide an estimate of waterfowl in the watershed.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
Wild turkeys		City	150	Estimate of 150 to 200 in city provided by Wyoming Game and Fish.	Tim Thomas, Wyoming Game and Fish Department. Personal communication with John Christensen, SWCA on June 29, 2010.
		County	0		
		USFS	0		
Elk		City	0		
		County	50	Estimate of 50 provided by Tim Thomas of Wyoming Game and Fish.	Tim Thomas, Wyoming Game and Fish Department. Personal communication with John Christensen, SWCA on June 29, 2010.
		USFS	350	WGFD gave an estimate of 400 to 500 in Little Goose valley in the winter. The herd moves to the forest during the summer. We assumed most of them stay on the Goose Creek side of the Big Horn Mountains.	Tim Thomas, Wyoming Game and Fish Department. Personal communication with John Christensen, SWCA on June 29, 2010.
Total forest acreage		City	115	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
		County	86207	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
		USFS	19191	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
Total cropland acreage		City	894	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
		County	5515	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
		USFS	16	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
Total pasture acreage		City	1684	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
		County	14201	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
		USFS	2	Landuse dataset (see Chapter 3)	National Landcover Dataset (NLCD) available from USGS (2001).
Persons per unsewered household		City	2.3	US Census 2000	http://quickfacts.census.gov/qfd/states/56/56033.html
		County	2.3	US Census 2000	http://quickfacts.census.gov/qfd/states/56/56033.html
		USFS	2.3	US Census 2000	http://quickfacts.census.gov/qfd/states/56/56033.html
Persons pe sewered household		City	2.3	US Census 2000	http://quickfacts.census.gov/qfd/states/56/56033.html
		County	2.3	US Census 2000	http://quickfacts.census.gov/qfd/states/56/56033.html
		USFS	2.3	US Census 2000	http://quickfacts.census.gov/qfd/states/56/56033.html
Number of unsewered households		City	377	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
		County	1149	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	**Units**	**Area of Watershed**	**Value**	**Rationale**	**References**
		USFS	32	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
Number of sewered households		City	5818	Based on population estimates for City of Sheridan divided by persons per household (2.3). Septic permitted households were then subtracted to estimate the remaining sewered households.	http://quickfacts.census.gov/qfd/states/56/56033.html
		County	0		
		USFS	0		
Old septic systems (pre-1975)		City	0	No data.	
		County	0	No data.	
		USFS	0	No data.	
Mid-age septic systems (1975-1984)		City	140	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
		County	253	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
		USFS	6	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	**Units**	**Area of Watershed**	**Value**	**Rationale**	**References**
New septic systems (1984 – present)		City	234	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
		County	891	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
		USFS	24	Extracted from septic permit database provided by Sheridan County and HKM. Overlaid with jurisdictions used in implementation plan.	HKM Engineering. 2006. Septic System Impact Study: Goose Creek Watershed. City of Sheridan, Wyoming.
Straight pipes		City	3	Estimated using EPA guidance	
		County	5	Estimated using EPA guidance	
		USFS	2	Estimated using EPA guidance	
Faction of cows defecating in streams			0.3	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007-0002
Fecal coliform production by 1000-lb beef cow	total cfu/day-animal		1.60E+09		
Fecal coliform production by 60-lb sheep	total cfu/day-animal		1.20E+10	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Fecal coliform production by 1000-lb horse	total cfu/day-animal		4.20E+08	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Fecal coliform production by layers	cfu/day-bird		1.40E+08	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
Fecal coliform production by turkeys	cfu/day-bird		9.30E+07	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Deer fecal coliform produced	total cfu/day-animal		3.50E+08	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Fraction of deer defecating in stream	Ratio		0.01	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Goose fecal coliform produced	total cfu/day-animal		8.00E+08	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Fraction of geese defecating in stream	ratio		0.25	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Duck fecal coliform produced	total cfu/day-animal		2.40E+09	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Fraction of ducks defecating in stream	ratio		0.25	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Wild Turkey fecal coliform produced	total cfu/day-animal		9.30E+07	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Fraction of wild turkeys defecating in stream	ratio		0.01	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007

Appendix 3. Bacteria Source Load Calculator (BSLC) Model Assumptions

Parameter	Units	Area of Watershed	Value	Rationale	References
Human fecal coliform production	total cfu/day-animal		2.00E+09	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Pets per household			1	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007
Pet fecal coliform production	total cfu/day-animal		4.50E+08	Default BSLC value.	Bacteria Source Load Calculator Users Manual. BSE Document No. 2007

Appendix 4. EPA Comments

Enclosure 2

EPA REGION VIII TMDL REVIEW

TMDL Document Info:

Document Name:	**Goose Creek Watershed TMDLs** **Draft** **Prepared by SWCA Environmental Consultants** **Prepared for Wyoming department of Environmental Quality** **August 2010**
Submitted by:	**Wyoming Dept. of Environmental Quality (as made available for public comment via download from SWCA FTP Site.)**
Date Received:	**Downloaded from WWW Site: August 19th, 2010**
Review Date:	**August 31, 2010**
Reviewer:	**James Ruppel**
Rough Draft / Public Notice / Final Draft?	**Public Notice**
Notes:	**This is a review of a draft version of the TMDL, published on-line for public comment. No final approval or disapproval decisions are implied by the summary or comments in this document. All final approval and disapproval decisions will be made by the EPA Administrator (or delegated representative).**

Reviewers Final Recommendation(s) to EPA Administrator (used for final draft review only):

- ☐ Approve
- ☐ Partial Approval
- ☐ Disapprove
- ☐ Insufficient Information

Approval Notes to Administrator:

Review for information and public notice comments purposes only. No final approval or disapproval decision is being made at this stage in the process. Information under the summary heading is for informational purposes only and does not require a response.

This document provides a standard format for EPA Region 8 to provide comments to state TMDL programs on TMDL documents submitted to EPA for either formal or informal review. All TMDL documents are evaluated against the minimum submission requirements and TMDL elements identified in the following 8 sections:

1. Problem Description
   1.1. TMDL Document Submittal Letter
   1.2. Identification of the Waterbody, Impairments, and Study Boundaries
   1.3. Water Quality Standards
2. Water Quality Target

3. Pollutant Source Analysis
4. TMDL Technical Analysis
    4.1. Data Set Description
    4.2. Waste Load Allocations (WLA)
    4.3. Load Allocations (LA)
    4.4. Margin of Safety (MOS)
    4.5. Seasonality and variations in assimilative capacity
5. Public Participation
6. Monitoring Strategy
7. Restoration Strategy
8. Daily Loading Expression

Under Section 303(d) of the Clean Water Act, waterbodies that are not attaining one or more water quality standard (WQS) are considered "impaired." When the cause of the impairment is determined to be a pollutant, a TMDL analysis is required to assess the appropriate maximum allowable pollutant loading rate. A TMDL document consists of a technical analysis conducted to: (1) assess the maximum pollutant loading rate that a waterbody is able to assimilate while maintaining water quality standards; and (2) allocate that assimilative capacity among the known sources of that pollutant**.** A well written TMDL document will describe a path forward that may be used by those who implement the TMDL recommendations to attain and maintain WQS.

Each of the following eight sections describe the factors that EPA Region 8 staff considers when reviewing TMDL documents. Also included in each section is a list of EPA's minimum submission requirements relative to that section, a brief summary of the EPA reviewer's findings, and the reviewer's comments and/or suggestions. Use of the verb "must" in the minimum submission requirements denotes information that is required to be submitted because it relates to elements of the TMDL required by the CWA and by regulation. Use of the term "should" below denotes information that is generally necessary for EPA to determine if a submitted TMDL is approvable.

This review template is intended to ensure compliance with the Clean Water Act and that the reviewed documents are technically sound and the conclusions are technically defensible.

1. Problem Description

A TMDL document needs to provide a clear explanation of the problem it is intended to address. Included in that description should be a definitive portrayal of the physical boundaries to which the TMDL applies, as well as a clear description of the impairments that the TMDL intends to address and the associated pollutant(s) causing those impairments. While the existence of one or more impairment and stressor may be known, it is important that a comprehensive evaluation of the water quality be conducted prior to development of the TMDL to ensure that all water quality problems and associated stressors are identified. Typically, this step is conducted prior to the 303(d) listing of a waterbody through the monitoring and assessment program. The designated uses and water quality criteria for the waterbody should be examined against available data to provide an evaluation of the water quality relative to all applicable water quality standards. If, as part of this exercise, additional WQS problems are discovered and additional stressor pollutants are identified, consideration should be given to concurrently evaluating TMDLs for those additional pollutants. If it is determined that insufficient data is available to make such an evaluation, this should be noted in the TMDL document.

1.1 TMDL Document Submittal Letter

When a TMDL document is submitted to EPA requesting formal comments or a final review and approval, the submittal package should include a letter identifying the document being submitted and the purpose of the submission.

Minimum Submission Requirements.

☐ A TMDL submittal letter should be included with each TMDL document submitted to EPA requesting a formal review.

☐ The submittal letter should specify whether the TMDL document is being submitted for initial review and comments, public review and comments, or final review and approval.

☐ Each TMDL document submitted to EPA for final review and approval should be accompanied by a submittal letter that explicitly states that the submittal is a final TMDL submitted under Section 303(d) of the Clean Water Act for EPA review and approval. This clearly establishes the State's/Tribe's intent to submit, and EPA's duty to review, the TMDL under the statute**.** The submittal letter should contain such identifying information as the name and location of the waterbody and the pollutant(s) of concern, which matches similar identifying information in the TMDL document for which a review is being requested.

Recommendation:
☐ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
Since this is a public notice review, no formal submittal letter is required from WY DEQ.

Comments:
To ensure a smooth and timely process, when submitting the final TMDL for EPA approval, EPA recommends following the guidelines above.

1.2 Identification of the Waterbody, Impairments, and Study Boundaries

The TMDL document should provide an unambiguous description of the waterbody to which the TMDL is intended to apply and the impairments the TMDL is intended to address. The document should also clearly delineate the physical boundaries of the waterbody and the geographical extent of the watershed area studied. Any additional information needed to tie the TMDL document back to a current 303(d) listing should also be included.

Minimum Submission Requirements:

☒ The TMDL document should clearly identify the pollutant and waterbody segment(s) for which the TMDL is being established. If the TMDL document is submitted to fulfill a TMDL development requirement for a waterbody on the state's current EPA approved 303(d) list, the TMDL document submittal should clearly identify the waterbody and associated impairment(s) as they appear on the State's/Tribe's current EPA approved 303(d) list, including a full waterbody description, assessment unit/waterbody ID, and the priority ranking of the waterbody. This information is necessary to ensure that the administrative record and the national TMDL tracking database properly link the TMDL document to the 303(d) listed waterbody and impairment(s).

☒ One or more maps should be included in the TMDL document showing the general location of the waterbody and, to the maximum extent practical, any other features necessary and/or relevant to the understanding of the TMDL analysis, including but not limited to: watershed boundaries, locations of major pollutant sources, major tributaries included in the analysis, location of sampling points, location of discharge gauges, land use patterns, and the location of nearby waterbodies used to provide surrogate information or reference conditions. Clear and concise descriptions of all key features and their relationship to the waterbody and water quality data should be provided for all key and/or relevant features not represented on the map

☒ If information is available, the waterbody segment to which the TMDL applies should be identified/geo-referenced using the National Hydrography Dataset (NHD). If the boundaries of the TMDL do not correspond to the Waterbody ID(s) (WBID), Entity_ID information or reach code (RCH_Code) information should be provided. If NHD data is not available for the waterbody, an alternative geographical referencing system that unambiguously identifies the physical boundaries to which the TMDL applies may be substituted.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
Tables on pages i through xiii (summarized below) clearly identify the waterbody ID for each of the impaired waterbodies as well as the pollutants addressed.

Waterbody Name Waterbody ID	**Pollutants addressed**
Goose Creek WYTR100901010209_01	E. coli Sediment
Little Goose Creek WYTR100901010208_01	E. coli Sedment
McCormick Creek WYTR100901010208_02	E. coli
Park Creek WYTR100901010204_01	E. coli
WYTR100901010204_02	E. coli
Big Goose Creek WYTR100901010205_01	E. coli
Beaver Creek WYTR100901010205_02	E. coli
Sackett Creek WYTR100901010207_01	E. coli
Jackson Creek WYTR100901010207_02	E. coli
Kruse Creek WYTR100901010208_03	E. coli
Soldier Creek WYTR100901010209_02	E. coli

Map 1 provided in appendix 1 clearly delineate the boundaries of the Goose Creek, Big Goose Creek, and Little Goose Creek watersheds. Map 2 provides clear identification of the impaired segments within those watersheds and includes the location of sampling stations. Map 3 provides information on the housing density in the watershed. Maps 4 – 10 provide geographical information on the topography, land ownership, land cover, geology, soil types, wildlife habitat, and groundwater sampling locations. Map 11 on page A1-13 shows the boundaries for the individual sub-watersheds of the impaired tributaries addressed.
Map 12 on page A1-14 delineates the stormwater drainage network including the location of the major outfalls.
Page A1-15 includes a map of the City of Sheridan Stormwater Management Plan.
Maps 14 – 26 provide additional information for implementation planning purposes.
Detailed geographical information for the watershed and affected streams is provided in figures 3.2 and 3.3 and described in detail throughout section 3 of the report.

Comments:

1.3 Water Quality Standards

TMDL documents should provide a complete description of the water quality standards for the waterbodies addressed, including a listing of the designated uses and an indication of whether the uses are being met, not being met, or not assessed. If a designated use was not assessed as part of the TMDL analysis (or not otherwise recently assessed), the documents should provide a reason for the lack of assessment (e.g., sufficient data was not available at this time to assess whether or not this designated use was being met).

Water quality criteria (WQC) are established as a component of water quality standard at levels considered necessary to protect the designated uses assigned to that waterbody. WQC identify quantifiable targets and/or qualitative water quality goals which, if attained and maintained, are intended to ensure that the designated uses for the waterbody are protected. TMDLs result in maintaining and attaining water quality standards by determining the appropriate maximum pollutant loading rate to meet water quality criteria, either directly, or through a surrogate measurable target. The TMDL document should include a description of all applicable water quality criteria for the impaired designated uses and address whether or not the criteria are being attained, not attained, or not evaluated as part of the analysis. If the criteria were not evaluated as part of the analysis, a reason should be cited (e.g. insufficient data were available to determine if this water quality criterion is being attained).

Minimum Submission Requirements:

☒ The TMDL must include a description of the applicable State/Tribal water quality standard, including the designated use(s) of the waterbody, the applicable numeric or narrative water quality criterion, and the anti-degradation policy. (40 C.F.R. §130.7(c)(1)).

☒ The purpose of a TMDL analysis is to determine the assimilative capacity of the waterbody that corresponds to the existing water quality standards for that waterbody, and to allocate that assimilative capacity between the significant sources. Therefore, <u>all TMDL documents must be written to meet the existing water quality standards</u> for that waterbody (CWA §303(d)(1)(C)).

Note: In some circumstances, the load reductions determined to be necessary by the TMDL analysis may prove to be infeasible and may possibly indicate that the existing water quality standards and/or assessment methodologies may be erroneous. However, the TMDL must still be determined based on existing water quality standards. Adjustments to water quality standards and/or assessment methodologies may be evaluated separately, from the TMDL.

☒ The TMDL document should describe the relationship between the pollutant of concern and the water quality standard the pollutant load is intended to meet. This information is necessary for EPA to evaluate whether or not attainment of the prescribed pollutant loadings will result in attainment of the water quality standard in question.

☒ If a standard includes multiple criteria for the pollutant of concern, the document should demonstrate that the TMDL value will result in attainment of all related criteria for the pollutant. For example, both acute and chronic values (if present in the WQS) should be addressed in the document, including consideration of magnitude, frequency and duration requirements.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:

Detailed information on the designated uses and associated water quality standards addressed is presented in section 1.2.1

The impaired designated uses for each impaired segment are identified in the respective summary tables on pages i through xiii of the document. Additional discussion of the impact of the impairments is provided in sections 1.2.2.1 through 4.

E-coli standard:
Table 7.1 on page 114, clearly identifies an E-coli target of 126 cfu per 100 ml as a 5 sample 30 day geometric mean as the numeric WQ Criterion.

Sediment Standard:
WY WQS do not include numeric criterion for sediment, however they do include narrative criteria that require sediment quantities that will be protective of designated uses. Section 8.2 of the document provides a rational for translating the narrative criteria to a sediment target of 50 mg/l based on the translation of narrative criteria in TMDLs for neighboring states with similar designated uses.

Comments:

2. Water Quality Targets

TMDL analyses establish numeric targets that are used to determine whether water quality standards are being achieved. Quantified water quality targets or endpoints should be provided to evaluate each listed pollutant/water body combination addressed by the TMDL, and should represent achievement of applicable water quality standards and support of associated beneficial uses. For pollutants with numeric water quality standards, the numeric criteria are generally used as the water quality target. For pollutants with narrative standards, the narrative standard should be translated into a measurable value. At a minimum, one target is required for each pollutant/water body combination. It is generally desirable, however, to include several targets that represent achievement of the standard and support of beneficial uses (e.g., for a sediment impairment issue it may be appropriate to include a variety of targets representing water column sediment such as TSS, embeddeness, stream morphology, up-slope conditions and a measure of biota).

Minimum Submission Requirements:

☒ The TMDL should identify a numeric water quality target(s) for each waterbody pollutant combination. The TMDL target is a quantitative value used to measure whether or not the applicable water quality standard is attained.

Generally, the pollutant of concern and the numeric water quality target are, respectively, the chemical causing the impairment and the numeric criteria for that chemical (e.g., chromium) contained in the water quality standard. Occasionally, the pollutant of concern is different from the parameter that is the subject of the numeric water quality target (e.g., when the pollutant of concern is phosphorus and the numeric water quality target is expressed as a numerical dissolved oxygen criterion). In such cases, the TMDL should explain the linkage between the pollutant(s) of concern, and express the quantitative relationship between the TMDL target and pollutant of concern. In all cases, TMDL targets must represent the attainment of current water quality standards.

☒ When a numeric TMDL target is established to ensure the attainment of a narrative water quality criterion, the numeric target, the methodology used to determine the numeric target, and the link between the pollutant of concern and the narrative water quality criterion should all be described in the TMDL document. Any additional information supporting the numeric target and linkage should also be included in the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
E-Coli:
The numeric water quality target for E-coli is identified as the numeric water quality criterion of 126 CFU per 100/ml as a 5 sample / 30 day geometric mean.

Sediment:
The selection of 50 mg/l as the sediment water quality target is supported in section 8.2 of the document. The effects of sediment on the biological community of the stream (and hence the impact on the narrative standards to protect those communities) is addressed in Section 5.3.2 of the document.

Comments:

3. Pollutant Source Analysis

A TMDL analysis is conducted when a pollutant load is known or suspected to be exceeding the loading capacity of the waterbody. Logically then, a TMDL analysis should consider all sources of the pollutant of concern in some manner. The detail provided in the source assessment step drives the rigor of the pollutant load allocation. In other words, it is only possible to specifically allocate quantifiable loads or load reductions to each significant source (or source category) when the relative load contribution from each source has been estimated. Therefore, the pollutant load from each significant source (or source category) should be identified and quantified to the maximum practical extent. This may be accomplished using site-specific monitoring data, modeling, or application of other assessment techniques. If insufficient time or resources are available to accomplish this step, a phased/adaptive management approach may be appropriate. The approach should be clearly defined in the document.

Minimum Submission Requirements:

☒ The TMDL should include an identification of all potentially significant point and nonpoint sources of the pollutant of concern, including the geographical location of the source(s) and the quantity of the loading, e.g., lbs/per day. This information is necessary for EPA to evaluate the WLA, LA and MOS components of the TMDL.

☒ The level of detail provided in the source assessment should be commensurate with the nature of the watershed and the nature of the pollutant being studied. Where it is possible to separate natural background from nonpoint sources, the TMDL should include a description of both the natural background loads and the nonpoint source loads.

☒ Natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g. measured in stream) unless it can be demonstrated that all significant anthropogenic sources of the pollutant of concern have been identified, characterized, and properly quantified.

☒ The sampling data relied upon to discover, characterize, and quantify the pollutant sources should be included in the document (e.g. a data appendix) along with a description of how the data were analyzed to characterize and quantify the pollutant sources. A discussion of the known deficiencies and/or gaps in the data set and their potential implications should also be included.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:

E-Coli:
A comprehensive source identification and current load analysis is included in section 6, "Pathogen Load Analysis and Source Identification". Major point sources are identified, including available monitoring data for recent years. Non-point sources are identified including natural background sources such as wildlife.

Sediment:
A comprehensive source identification and load analysis is presented in sections 8.1 through 8.3 of the document. Note that WWTP are not identified as a source of sediment to Little Goose Creek, this may or may not be an error.

Comments:

EPA notes that no WWTP are identified as sediment sources to Little Goose Creek, nor are sediment WLAs provided for any WWTP discharging into Little Goose Creek. Table 6.3 of the document identifies two permitted sources of waste water to Little Goose Creek, Powder Horn Ranch, LLC (WY0036251) and Royal Elk Properties, LLC (WY0054399).

It should be understood that any permitted point source discharging sediment <u>directly into the impaired segment</u> of Little Goose Creek must be identified and given a separate waste load allocation for sediment, <u>if it is intended</u> that a sediment load is to be included in the discharge permit for that facility. If no WLA is provided for a point source in the TMDL, no discharge of the pollutant can be allowed in the discharge permit for that facility (*again, this applies to facilities discharging the pollutant of concern directly into the impaired segment which are to include the pollutant in their discharge permits).*

While these two facilities are identified in Table 6.3 as sources of E-coli only, they are noted here to ensure that it is understood that a WLA for sediment would be required for these facilities if it is intended that their discharge permits are to include an allowance to discharge sediment now or in the future. It should be further understood, that the impaired segment is understood to be the entire assessment unit identified as impaired and as defined in the TMDL by the water body ID WYTR100901010208_01. Based on the maps provided in the document, it appears that the waterbody ID given is intended to apply to the entire length of Goose Creek. If this is not he case, and the discharges in question discharge above the segment identified as impaired, it is the option of the TMDL developer whether or not to include specific WLA for those discharges (or alternatively include those discharged loads in the upstream load allocation), and is generally dependent upon the need to affect the WLAs of those dischargers to attain the overall load reductions needed.

4. TMDL Technical Analysis

TMDL determinations should be supported by a robust data set and an appropriate level of technical analysis**.** This applies to **all** of the components of a TMDL document. It is vitally important that the technical basis for **all** conclusions be articulated in a manner that is easily understandable and readily apparent to the reader.

A TMDL analysis determines the maximum pollutant loading rate that may be allowed to a waterbody without violating water quality standards. The TMDL analysis should demonstrate an understanding of the relationship between the rate of pollutant loading into the waterbody and the resultant water quality impacts. This stressor → response relationship between the pollutant and impairment and between the selected targets, sources, TMDLs, and load allocations needs to be clearly articulated and supported by an appropriate level of technical analysis. Every effort should be made to be as detailed as possible, and to base all conclusions on the best available scientific principles.

The pollutant loading allocation is at the heart of the TMDL analysis. TMDLs apportion responsibility for taking actions by allocating the available assimilative capacity among the various point, nonpoint, and natural pollutant sources. Allocations may be expressed in a variety of ways, such as by individual discharger, by tributary watershed, by source or land use category, by land parcel, or other appropriate scale or division of responsibility.

The pollutant loading allocation that will result in achievement of the water quality target is expressed in the form of the standard TMDL equation:

$$TMDL = \sum LAs + \sum WLAs + MOS$$

Where:

TMDL = Total Pollutant Loading Capacity of the waterbody

LAs = Pollutant Load Allocations

WLAs = Pollutant Wasteload Allocations

MOS = The portion of the Load Capacity allocated to the Margin of safety.

Minimum Submission Requirements:

☒ A TMDL must identify the loading capacity of a waterbody for the applicable pollutant, taking into consideration temporal variations in that capacity. EPA regulations define loading capacity as the greatest amount of a pollutant that a water can receive without violating water quality standards (40 C.F.R. §130.2(f)).

☐ The total loading capacity of the waterbody should be clearly demonstrated to equate back to the pollutant load allocations through a balanced TMDL equation (or table). In instances where numerous LA, WLA and seasonal TMDL capacities make expression in the form of an equation cumbersome, a table may be substituted as long as it is clear that the total TMDL capacity equates to the sum of the allocations.

☒ The TMDL document should describe the methodology and technical analysis used to establish and quantify the cause-and-effect relationship between the numeric target and the identified pollutant sources. In many instances, this method will be a water quality model.

☒ It is necessary for EPA staff to be aware of any assumptions used in the technical analysis to understand and evaluate the methodology used to derive the TMDL value and associated loading allocations. Therefore, the

TMDL document should contain a description of any important assumptions (including the basis for those assumptions) made in developing the TMDL, including but not limited to:

(1) the spatial extent of the watershed in which the impaired waterbody is located and the spatial extent of the TMDL technical analysis;
(2) the distribution of land use in the watershed (e.g., urban, forested, agriculture);
(3) a presentation of relevant information affecting the characterization of the pollutant of concern and its allocation to sources such as population characteristics, wildlife resources, industrial activities etc…;
(4) present and future growth trends, if taken into consideration in determining the TMDL and preparing the TMDL document (e.g., the TMDL could include the design capacity of an existing or planned wastewater treatment facility);
(5) an explanation and analytical basis for expressing the TMDL through surrogate measures, if applicable. Surrogate measures are parameters such as percent fines and turbidity for sediment impairments; chlorophyll *a* and phosphorus loadings for excess algae; length of riparian buffer; or number of acres of best management practices.

☒ The TMDL document should contain documentation supporting the TMDL analysis, including an inventory of the data set used, a description of the methodology used to analyze the data, a discussion of strengths and weaknesses in the analytical process, and the results from any water quality modeling used. This information is necessary for EPA to review the loading capacity determination, and the associated load, wasteload, and margin of safety allocations.

☒ TMDLs must take critical conditions (e.g., steam flow, loading, and water quality parameters, seasonality, etc…) into account as part of the analysis of loading capacity (40 C.F.R. §130.7(c)(1)). TMDLs should define applicable critical conditions and describe the approach used to determine both point and nonpoint source loadings under such critical conditions. In particular, the document should discuss the approach used to compute and allocate nonpoint source loadings, e.g., meteorological conditions and land use distribution.

☐ Where both nonpoint sources and NPDES permitted point sources are included in the TMDL loading allocation, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document must include a demonstration that nonpoint source loading reductions needed to implement the load allocations are actually practicable [40 CFR 130.2(i) and 122.44(d)].

Recommendation:
☐ Approve ☒ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
E Coli:
E Coli loading capacity was determined and represented using flow duration curves. Average values were also determined for high, medium and low hydrologic regimes. Methods, data and results are discussed in chapters 6 and 7 of the document. Critical conditions studied included Dry Years, Wet Years, as well as spring storms and individual storm events.

Sediment:
The technical write up for the sediment TMDLs occurs in Chapter 8. Stormwater was identified as contributing 94% and 93.7% of the sediment load to Little Goose Creek and Goose Creek respectively. The in stream water quality target of 50 mg/l was backed up and applied to the stormwater outfalls to provide conservative load reductions in the stream that would be further diluted in the stream channel itself.

Comments:

Sediment:
EPA noted errors and inconsistencies with the TMDL allocations for sediment on Goose Creek and Little Goose Creek. A conference call was subsequently held between EPA, WY

DEQ and SWCA Environmental Consultants on August 19th 2010. EPA reiterated to WY DEQ and SWCA that the sum of the TMDL allocations must always equal the capacity of the waterbody to assimilate the pollutant, as illustrated by the TMDL equation (see above). Also, the Total Load allocation must ensure that the water quality standard(s) will be attained. SWCA and WDEQ indicated their intent to revise the document to address the above concerns. The inclusion of a balance TMDL equation or sum(Σ) table, would be helpful in both representing the total load allocation picture, as well as ensuring no mathematical or other errors of omission are present.

EPA notes that no Sediment WLAs are given to WWTPs discharging into Little Goose Creek. See comment in section 3.

Section 8.4 of the document states that:

> ***"The loading capacity of sediment to Little Goose Creek and Goose Creek includes stormwater loads, wastewater loads, and water column loads from upstream nonpoint sources. Bed load from upstream sources is not included because no bed load data or sediment particle size data were available for the analysis. However, there are no sediment impairments on the creeks upstream of the City of Sheridan, therefore the upstream sediment bed load from these streams was not considered a major source to the impairment in the City."***

The purpose of the TMDL is to account for all loads of the pollutant to the impaired waterbody and ensure that the total sum of the loads does not exceed the assimilative capacity of the waterbody for the pollutant of concern. The fact that the upstream waterbody is not impaired for sediment, and the lack of data on bed load sediment contributions, should not be used to justify not including this contribution to the stream. If data are not available to calculate the bed load sediment contribution, a conservative assumption based on the bed load from similar streams can be used as an acceptable alternative. If it is intended that the upstream bed load contributions are assumed to be included in the overall upstream sediment load estimates, this should be more clearly stated in the document. In either case, an attempt must be made to identify and quantify all sources of the pollutant to the impaired waterbody. If a load cannot be reasonably estimated, the error introduced by not including the load should be addressed in the MOS. If the MOS afforded by applying the sediment target directly to the stormwater is intended to account for any uncertainty introduced by not estimating the bed load contribution, then an argument should be presented to justify this assumption.

4.1 Data Set Description

TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis. An inventory of the data used for the TMDL analysis should be provided to document, for the record, the data used in decision making. This also provides the reader with the opportunity to independently review the data. The TMDL analysis should make use of all readily available data for the waterbody under analysis unless the TMDL writer determines that the data are not relevant or appropriate. For relevant data that were known but rejected, an explanation of why the data were not utilized should be provided (e.g., samples exceeded holding times, data collected prior to a specific date were not considered timely, etc…).

Minimum Submission Requirements:

☒ TMDL documents should include a thorough description and summary of all available water quality data that are relevant to the water quality assessment and TMDL analysis such that the water quality impairments are clearly defined and linked to the impaired beneficial uses and appropriate water quality criteria.

☒ The TMDL document submitted should be accompanied by the data set utilized during the TMDL analysis. If possible, it is preferred that the data set be provided in an electronic format and referenced in the document. If electronic submission of the data is not possible, the data set may be included as an appendix to the document.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
Hydrologic data is described in Section 4.1 of the document.
Water quality data is discussed in Sections 5.1 and 5.2 of the document and summarized it table 5.1 of the document.
A discussion of the sediment data is provided in section 8.3.1.1
The project data was also made available for download over the WWW.

Comments:

4.2 Waste Load Allocations (WLA):

Waste Load Allocations represent point source pollutant loads to the waterbody. Point source loads are typically better understood and more easily monitored and quantified than nonpoint source loads. Whenever practical, each point source should be given a separate waste load allocation. All NPDES permitted dischargers that discharge the pollutant under analysis directly to the waterbody should be identified and given separate waste load allocations. The finalized WLAs are required to be incorporated into future NPDES permit renewals.

Minimum Submission Requirements:

☒ EPA regulations require that a TMDL include WLAs for all significant and/or NPDES permitted point sources of the pollutant. TMDLs must identify the portion of the loading capacity allocated to individual existing and/or future point source(s) (40 C.F.R. §130.2(h), 40 C.F.R. §130.2(i)). In some cases, WLAs may cover more than one discharger, e.g., if the source is contained within a general permit. If no allocations are to be made to point sources, then the TMDL should include a value of zero for the WLA.

☒ All NPDES permitted dischargers given WLA as part of the TMDL should be identified in the TMDL, including the specific NPDES permit numbers, their geographical locations, and their associated waste load allocations.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☒ Insufficient Information

Summary:
E-Coli TMDLs:
Table 7.5 includes a listing of point sources allocated waste loads as part of the TMDLs, including the permit number, permit holder name, WLAs for High, Medium and Low flows as well as the flow weighted average WLA, and the receiving waterbody.

Table 7.5 Summary of WLAs in the Goose Creek Watershed

Permit No.	Permit Holder	Use Type	Flow Capacity (gallons/day)	WLA (high flow)	WLA (medium flow)	WLA (low flow)	Weighted WLA	Receiving water	Catchment
WY0020010	City of Sheridan	Municipal wastewater	4,400,000	21.0	21.0	15.8	21	Goose Creek	City of Sheridan
WY0026441	Sheridan Big Horn Mountain KOA	Commercial wastewater	16,000	0.1	0.1	0.1	0.1	Goose Creek	GC1
WY0036251	Powder Horn Ranch, LLC	Commercial wastewater	49,520	0.2	0.2	0.2	0.2	Little Goose Creek	LG12
WY0054399	Royal Elk Properties, LLC	Commercial wastewater	42,000	0.2	0.2	0.2	0.2	Little Goose Creek	LG6
WY0056308	Sheridan County School District	Wastewater	20,000	0.1	0.1	0.1	0.1	Jackson Creek	Jackson
WYR04-0000	City of Sheridan MS4 discharge to Little Goose Creek	MS4 stormwater	2,953,225	14.1	0	0	—	Little Goose Creek	City of Sheridan
WYR04-0000	City of Sheridan MS4 discharge to Big Goose Creek	MS4 stormwater	619,600	3.0	0	0	—	Big Goose Creek	City of Sheridan
WYR04-0000	City of Sheridan MS4 discharge to Goose Creek	MS4 stormwater	1,615,016	7.7	0	0	—	Goose Creek	City of Sheridan

Sediment:
A target of 50 mg/l TSS was applied directly to the stormwater to determine the WLA for stormwater. By applying this target directly to the stormwater discharge rather then to the waterbody itself, an additional margin of safety should be provided by the additional dilution provided by the water within the stream.

Comments:

The summary tables at the beginning of the document are helpful in presenting an overview of the required elements of the TMDL. EPA recommends that in addition to the combined WLA for WWTPs, the tables include the specific permitted facilities, individual WLAs, and permit numbers of the points source discharges affected by the TMDL. This change will aid the usefulness of the tables by presenting a even more complete summary of the required elements of the TMDL.

As discussed in the comments under Section 3 above, care should be exercised to make sure all that discharge of a pollutant directly to a waterbody segment impaired or threatened by that pollutant, are provided individual WLAs as part of the TMDL, and that their identifying information be included in the TMDL report. All permitted point sources of a pollutant, that discharge the pollutant covered by the TMDL, directly into the impaired segments, must have an individual WLA provided in the TMDL and the permitted load discharged in the waster water discharge permit must be consistent with that WLA.

4.3 Load Allocations (LA):

Load allocations include the nonpoint source, natural, and background loads. These types of loads are typically more difficult to quantify than point source loads, and may include a significant degree of uncertainty. Often it is necessary to group these loads into larger categories and estimate the loading rates based on limited monitoring data and/or modeling results. The background load represents a composite of all upstream pollutant loads into the waterbody. In addition to the upstream nonpoint and upstream natural load, the background load often includes upstream point source loads that are not given specific waste load allocations in this particular TMDL analysis. In instances where nonpoint source loading rates are particularly difficult to quantify, a performance-based allocation approach, in which a detailed monitoring plan and adaptive management strategy are employed for the application of BMPs, may be appropriate.

Minimum Submission Requirements:

☒ EPA regulations require that TMDL expressions include LAs which identify the portion of the loading capacity attributed to nonpoint sources and to natural background. Load allocations may range from reasonably accurate estimates to gross allotments (40 C.F.R. §130.2(g)). Load allocations may be included for both existing and future nonpoint source loads. Where possible, load allocations should be described separately for natural background and nonpoint sources.

☒ Load allocations assigned to natural background loads should not be assumed to be the difference between the sum of known and quantified anthropogenic sources and the existing *in situ* loads (e.g., measured in stream) unless it can be demonstrated that all significant anthropogenic sources of the pollutant of concern have been identified and given proper load or waste load allocations.

Recommendation:
☐ Approve ☐ Partial Approval ☐ Disapprove ☒ Insufficient Information

Summary:
E Coli:
Load Allocations are identified for the eleven impaired reaches and summarized in Table 7.4

Sediment:
Load allocations consisted of existing upstream loads and are provided in the summary tables at the beginning of the document as well as in Tables 8.9 and 8.10.

Comments:

Sediment Loads in the document did not match up between the summary tables and Tables 8.9 and 8.10. This issue was addressed during the August 19th Conf Call (see comment under technical analysis – section 4).

4.4 Margin of Safety (MOS):

Natural systems are inherently complex. Any mathematical relationship used to quantify the stressor → response relationship between pollutant loading rates and the resultant water quality impacts, no matter how rigorous, will include some level of uncertainty and error. To compensate for this uncertainty and ensure water quality standards will be attained, a margin of safety is required as a component of each TMDL. The MOS may take the form of a explicit load allocation (e.g., 10 lbs/day), or may be implicitly built into the TMDL analysis through the use of conservative assumptions and values for the various factors that determine the TMDL pollutant load → water quality effect relationship. Whether explicit or implicit, the MOS should be supported by an appropriate level of discussion that addresses the level of uncertainty in the various components of the TMDL technical analysis, the assumptions used in that analysis, and the relative effect of those assumptions on the final TMDL. The discussion should demonstrate that the MOS used is sufficient to ensure that the water quality standards would be attained if the TMDL pollutant loading rates are met. In cases where there is substantial uncertainty regarding the linkage between the proposed allocations and achievement of water quality standards, it may be necessary to employ a phased or adaptive management approach (e.g., establish a monitoring plan to determine if the proposed allocations are, in fact, leading to the desired water quality improvements).

Minimum Submission Requirements:

☒ TMDLs must include a margin of safety (MOS) to account for any lack of knowledge concerning the relationship between load and wasteload allocations and water quality (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)). EPA's 1991 TMDL Guidance explains that the MOS may be implicit (i.e., incorporated into the TMDL through conservative assumptions in the analysis) or explicit (i.e., expressed in the TMDL as loadings set aside for the MOS).

- ☒ If the MOS is implicit, the conservative assumptions in the analysis that account for the MOS should be identified and described. The document should discuss why the assumptions are considered conservative and the effect of the assumption on the final TMDL value determined.
- ☒ If the MOS is explicit, the loading set aside for the MOS should be identified. The document should discuss how the explicit MOS chosen is related to the uncertainty and/or potential error in the linkage analysis between the WQS, the TMDL target, and the TMDL loading rate.
- ☐ If, rather than an explicit or implicit MOS, the TMDL relies upon a phased approach to deal with large and/or unquantifiable uncertainties in the linkage analysis, the document should include a description of the planned phases for the TMDL as well as a monitoring plan and adaptive management strategy.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
E-Coli:
The E-Coli Margin of Safety is addressed is section 7.6.3 of the document.
An explicit Margin of Safety of 5% was applied and is summarized in table 7.3.

Sediment:

The Sediment Margin of Safety is addressed in section 8.4.3 of the document. An explicit Margin of Safety of 10% was applied. This MOS was applied to the stormwater WLA since this is where the water quality target of 50 mg/l is also to be applied. Additional implicit margin of safety is noted from the following four factors.

1. **Selection of a water quality target (50 mg/L) for stormwater WLAs. This target is typically applied as an in-stream value. Therefore, the dilution of stormwater in the creek was not accounted for in the TMDL, thereby providing assurance that if the WLAs for stormwater are attained the sediment impairment in the creek will be achieved.**
2. **The TSS sediment target for acute events is typically 80 mg/L in other states, and less than or equal to 50 mg/L as a monthly average. This TMDL uses 50 mg/L for acute events.**

3. **Existing point sources in the City of Sheridan have an existing TSS effluent target of 30 mg/L, which is protective of the 50 mg/L water quality target identified for point sources to the stream.**
4. **No impairments on stream segments upstream of the City of Sheridan have been identified, providing confidence that addressing the stormwater load in the city will result in attainment of water quality standards.**

Comments:
Note: That the text in section 7.6.3 incorrectly references Table 8.3 instead of 7.3.

4.5 Seasonality and variations in assimilative capacity:

The TMDL relationship is a factor of both the loading rate of the pollutant to the waterbody and the amount of pollutant the waterbody can assimilate and still attain water quality standards. Water quality standards often vary based on seasonal considerations. Therefore, it is appropriate that the TMDL analysis consider seasonal variations, such as critical flow periods (high flow, low flow), when establishing TMDLs, targets, and allocations.

Minimum Submission Requirements:

☐ The statute and regulations require that a TMDL be established with consideration of seasonal variations. The TMDL must describe the method chosen for including seasonal variability as a factor. (CWA §303(d)(1)(C), 40 C.F.R. §130.7(c)(1)).

Recommendation:
☐ Approve ☒ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:

E-Coli:
The impact of seasonality on the E-Coli impairment is addressed in Sections 6.2 and 7.3 of the document. The target of 126 cfu/ml was applied to load duration curves giving a continuous flow dependent representation of the TMDL load. Individual TMDL analyses were then developed for High, Med and Low flow regimes.

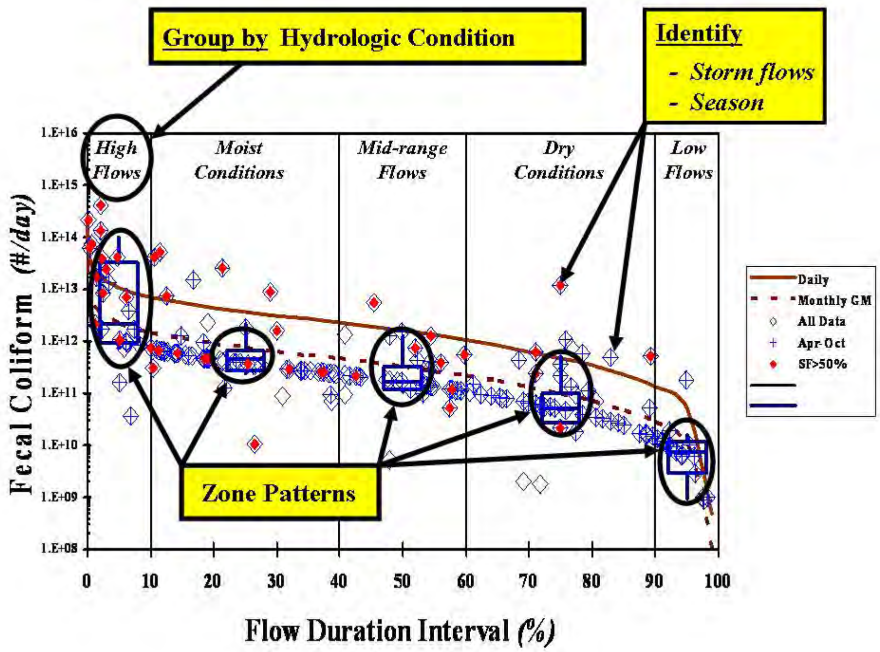
Sediment:
Seasonality in calculating the sediment load is accounted for by addressing storm water runoff flows which accounted for 93+ percent of the load to the impaired streams. The sediment TMDL load was based on the 2 year 24 hour design storm.

Comments:

E-Coli
The analysis includes high flow, medium flow and low flow TMDL information derived from load duration curves for all impaired stream segments. This type of practical information is helpful when it comes time to implement the TMDL. However, in truth, the TMDL is continuously dependent on the flow at any given time making the WQS value load duration curve itself the actual TMDL. Figure 6.2 of the document does present one example of a load duration curve for Beaver Creek, however Appendix 2 only provides flow duration curves, and existing data points and corresponding loads are not plotted.

EPA recommends that the load duration curves for all of the impaired segments be included in the document, and that the actual load and flow be represented on the graph on primary and secondary axis. While the load duration curves represent the flow dependent maximum allowable load, typically, additional selected loads are included in the document to aid in implementation planning. In this case, the high, medium, low and weighted average loads provided in the document will serve that purpose.

The below example is taken from "An Approach for Using Load Duration Curves in the Development of TMDLs", http://www.epa.gov/owow/tmdl/duration_curve_guide_aug2007.pdf Figure 2.2



5. Public Participation

EPA regulations require that the establishment of TMDLs be conducted in a process open to the public, and that the public be afforded an opportunity to participate. To meaningfully participate in the TMDL process it is necessary that stakeholders, including members of the general public, be able to understand the problem and the proposed solution. TMDL documents should include language that explains the issues to the general public in understandable terms, as well as provides additional detailed technical information for the scientific community. Notifications or solicitations for comments regarding the TMDL should be made available to the general public, widely circulated, and clearly identify the product as a TMDL and the fact that it will be submitted to EPA for review. When the final TMDL is submitted to EPA for approval, a copy of the comments received by the state and the state responses to those comments should be included with the document.

Minimum Submission Requirements:

☐ The TMDL must include a description of the public participation process used during the development of the TMDL (40 C.F.R. §130.7(c)(1)(ii)).

☐ TMDLs submitted to EPA for review and approval should include a summary of significant comments and the State's/Tribe's responses to those comments.

Recommendation:

☐ Approve ☐ Partial Approval ☐ Disapprove ☒ Insufficient Information

Summary:
At the time of review this document was out for a 30 day public comment period.

Comments:
No specific section of the document is included to provide a summary of the opportunities provided for public participation during the development of this TMDL. EPA recommends that a section to summarize the public participation process used during the development for this TMDL and TMDL report be included in the final submission. EPA also requires that the final submission include a inventory of the public comments received, and the associated responses to those comments (and if applicable, actions taken to address those comments) be included in the final submission.

6. Monitoring Strategy

TMDLs may have significant uncertainty associated with the selection of appropriate numeric targets and estimates of source loadings and assimilative capacity. In these cases, a phased TMDL approach may be necessary. For Phased TMDLs, it is EPA's expectation that a monitoring plan will be included as a component of the TMDL document to articulate the means by which the TMDL will be evaluated in the field, and to provide for future supplemental data that will address any uncertainties that may exist when the document is prepared.

Minimum Submission Requirements:

☐ When a TMDL involves both NPDES permitted point source(s) and nonpoint source(s) allocations, and attainment of the TMDL target depends on reductions in the nonpoint source loads, the TMDL document should include a monitoring plan that describes the additional data to be collected to determine if the load reductions provided for in the TMDL are occurring.

☐ Under certain circumstances, a phased TMDL approach may be utilized when limited existing data are relied upon to develop a TMDL, and the State believes that the use of additional data or data based on better analytical techniques would likely increase the accuracy of the TMDL load calculation and merit development of a second phase TMDL. EPA recommends that a phased TMDL document or its implementation plan include a monitoring plan and a scheduled timeframe for revision of the TMDL. These elements would not be an intrinsic part of the TMDL and would not be approved by EPA, but may be necessary to support a rationale for approving the TMDL. http://www.epa.gov/owow/tmdl/tmdl_clarification_letter.pdf

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
Section 9.12 of the document addresses the need for follow up monitoring to assess both the implementation of pollutant load reduction activities as well as the effectiveness of those activities. While section 9.12 does not include a specific schedule of monitoring activities and responsible parties, it does go into detail about both the need for additional monitoring as well as provided detailed recommendations for the type and frequency of monitoring needed. This TMDL is not submitted as a phased TMDL, a monitoring and decision schedule as a condition of approval.

Comments:

7. Restoration Strategy

The overall purpose of the TMDL analysis is to determine what actions are necessary to ensure that the pollutant load in a waterbody does not result in water quality impairment. Adding additional detail regarding the proposed approach for the restoration of water quality is not currently a regulatory requirement, but is considered a value added component of a TMDL document. During the TMDL analytical process, information is often gained that may serve to point restoration efforts in the right direction and help ensure that resources are spent in the most efficient manner possible. For example, watershed models used to analyze the linkage between the pollutant loading rates and resultant water quality impacts might also be used to conduct "what if" scenarios to help direct BMP installations to locations that provide the greatest pollutant reductions. Once a TMDL has been written and approved, it is often the responsibility of other water quality programs to see that it is implemented. The level of quality and detail provided in the restoration strategy will greatly influence the future success in achieving the needed pollutant load reductions.

Minimum Submission Requirements:

☐ EPA is not required to and does not approve TMDL implementation plans. However, in cases where a WLA is dependent upon the achievement of a LA, "reasonable assurance" is required to demonstrate the necessary LA called for in the document is practicable). A discussion of the BMPs (or other load reduction measures) that are to be relied upon to achieve the LA(s), and programs and funding sources that will be relied upon to implement the load reductions called for in the document, may be included in the implementation/restoration section of the TMDL document to support a demonstration of "reasonable assurance".

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
A detailed watershed based implementation plan is included in Chapter 9 of the document.

Comments:

8. Daily Loading Expression

The goal of a TMDL analysis is to determine what actions are necessary to attain and maintain WQS. The appropriate averaging period that corresponds to this goal will vary depending on the pollutant and the nature of the waterbody under analysis. When selecting an appropriate averaging period for a TMDL analysis, primary concern should be given to the nature of the pollutant in question and the achievement of the underlying WQS. However, recent federal appeals court decisions have pointed out that the title TMDL implies a "daily" loading rate. While the most appropriate averaging period to be used for developing a TMDL analysis may vary according to the pollutant, a daily loading rate can provide a more practical indication of whether or not the overall needed load reductions are being achieved. When limited monitoring resources are available, a daily loading target that takes into account the natural variability of the system can serve as a useful indicator for whether or not the overall load reductions are likely to be met. Therefore, a daily expression of the required pollutant loading rate is a required element in all TMDLs, in addition to any other load averaging periods that may have been used to conduct the TMDL analysis. The level of effort spent to develop the daily load indicator should be based on the overall utility it can provide as an indicator for the total load reductions needed.

Minimum Submission Requirements:

☐ The document should include an expression of the TMDL in terms of a daily load. However, the TMDL may also be expressed in temporal terms other than daily (e.g., an annual or monthly load). If the document expresses the TMDL in additional "non-daily" terms the document should explain why it is appropriate or advantageous to express the TMDL in the additional unit of measurement chosen.

Recommendation:
☒ Approve ☐ Partial Approval ☐ Disapprove ☐ Insufficient Information

Summary:
All TMDL loads are given in daily terms.

Comments: