

ATTACHMENT A

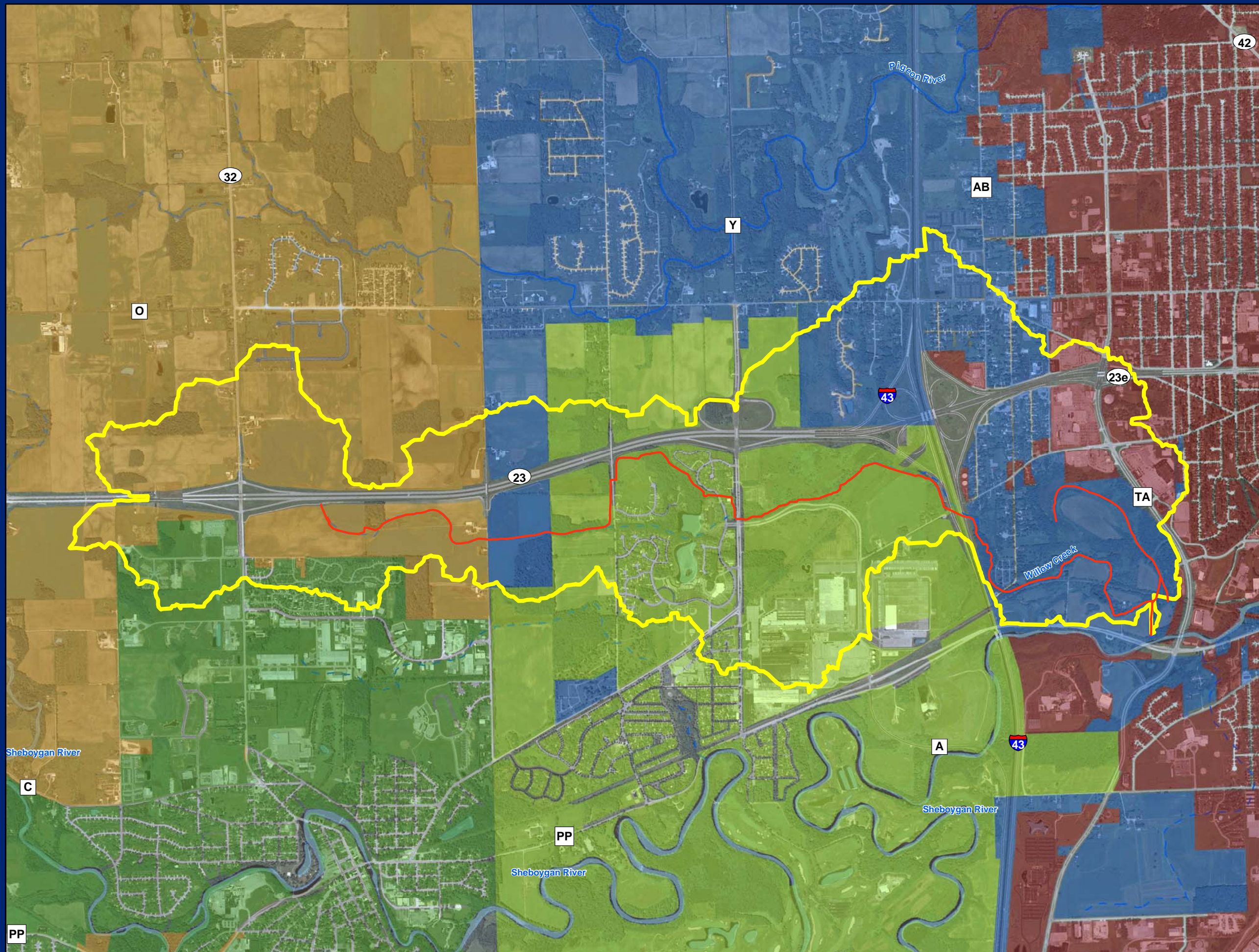
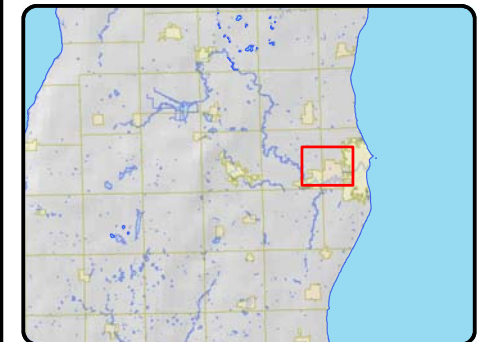


Figure 1. Willow Creek Watershed



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- CITY OF SHEBOYGAN
- TOWN OF SHEBOYGAN
- VILLAGE OF KOHLER
- CITY OF SHEBOYGAN FALLS
- TOWN OF SHEBOYGAN FALLS
- Willow Creek Hydro (UWSP)

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody



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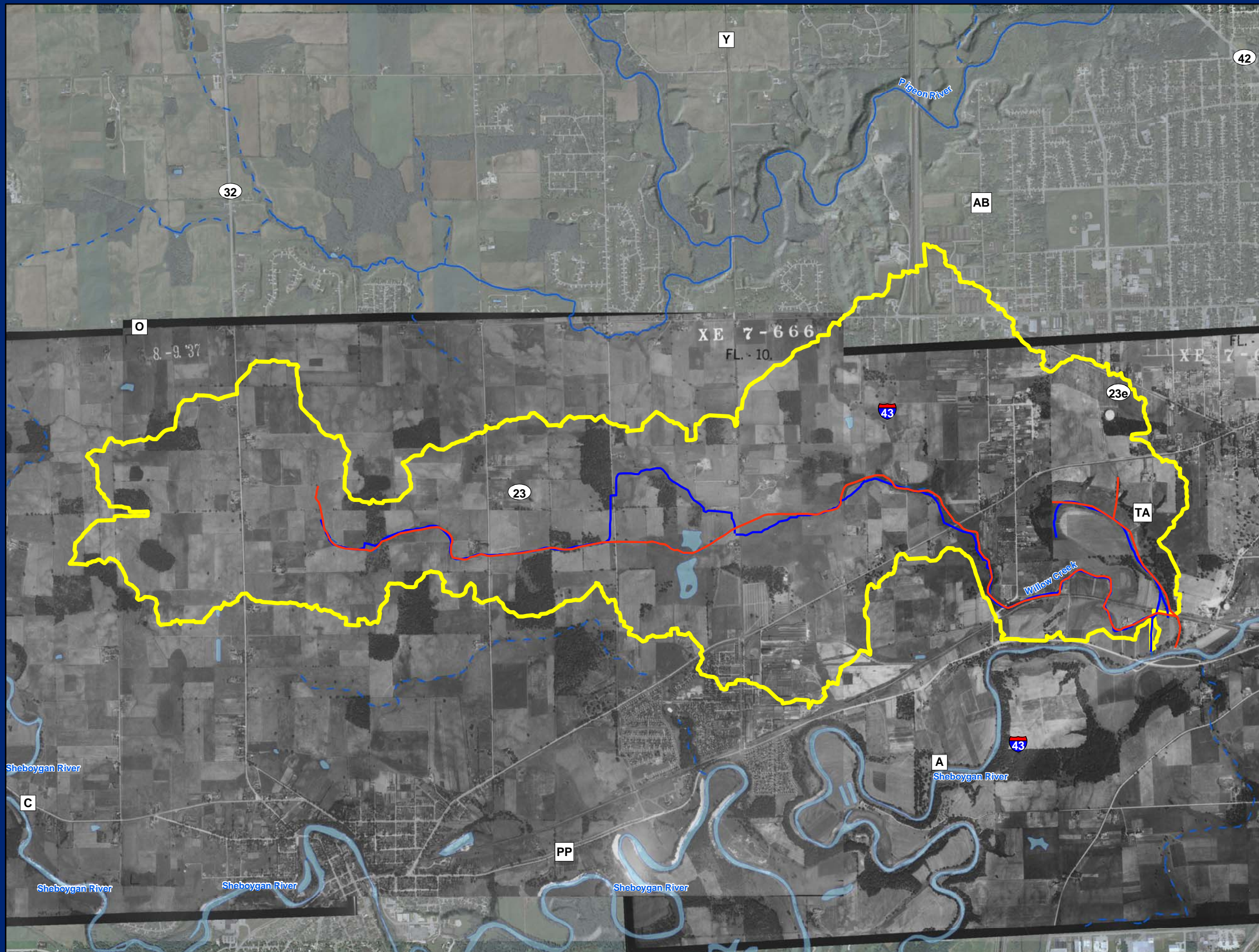
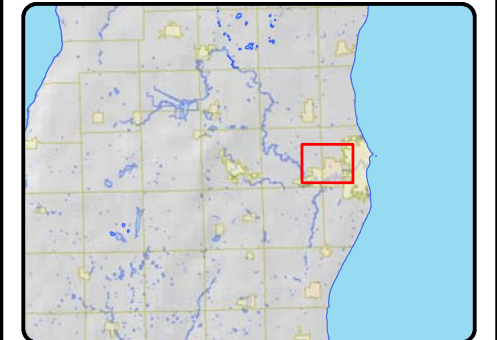


Figure 2. Willow Creek Watershed 1937 Aerial Photography



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- 1937 Channel
- Willow Creek Hydro (UWSP)
- DNR 24k Hydrography**
- Perennial Stream
- - - Intermittent Stream
- Waterbody

Data Sources Include: WDNR, WisDOT, USGS and Stantec.
Orthophotography: 2010 NAIP, 1937 Farm Service Aerial Photography.

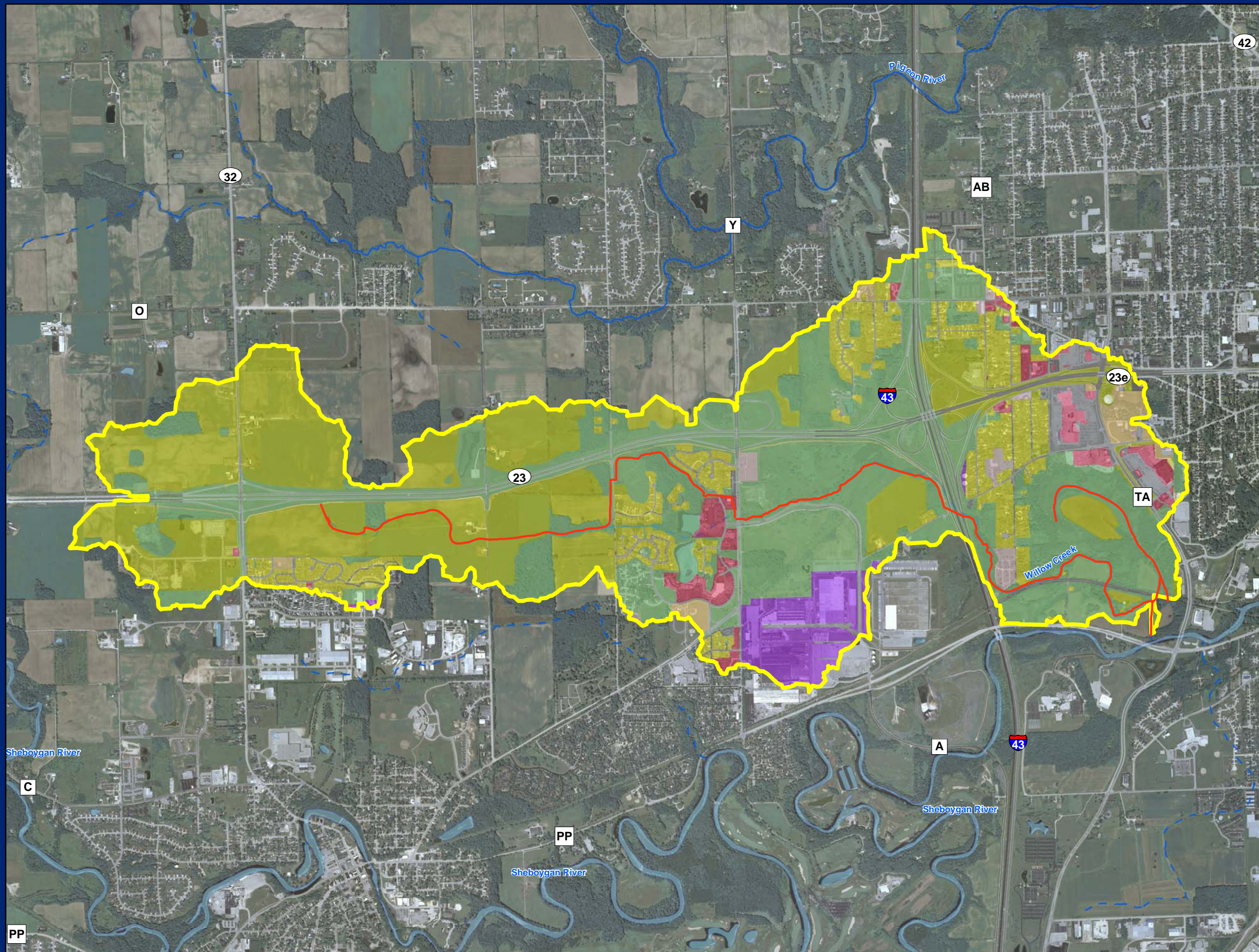


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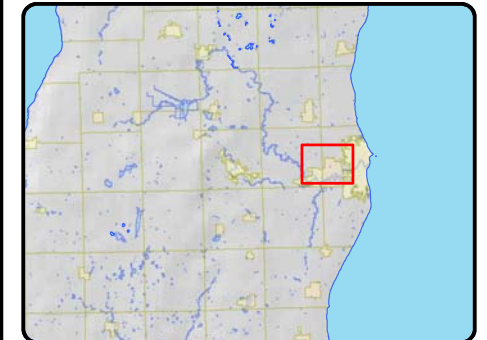


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**Figure 3. Willow Creek Watershed
2002 BLRPC Land Use**



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- Willow Creek Hydro (UWSP)

2002 Land Use

- Agriculture
- Commercial
- Industrial
- Institutional
- Natural Areas
- Outdoor Recreation
- Residential
- Transportation
- Utilities

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

Data Sources Include: WDNR, WisDOT, UWSP, USGS, Stantec and Bay-Lakes RPC
Orthophotography: 2010 NAIP.



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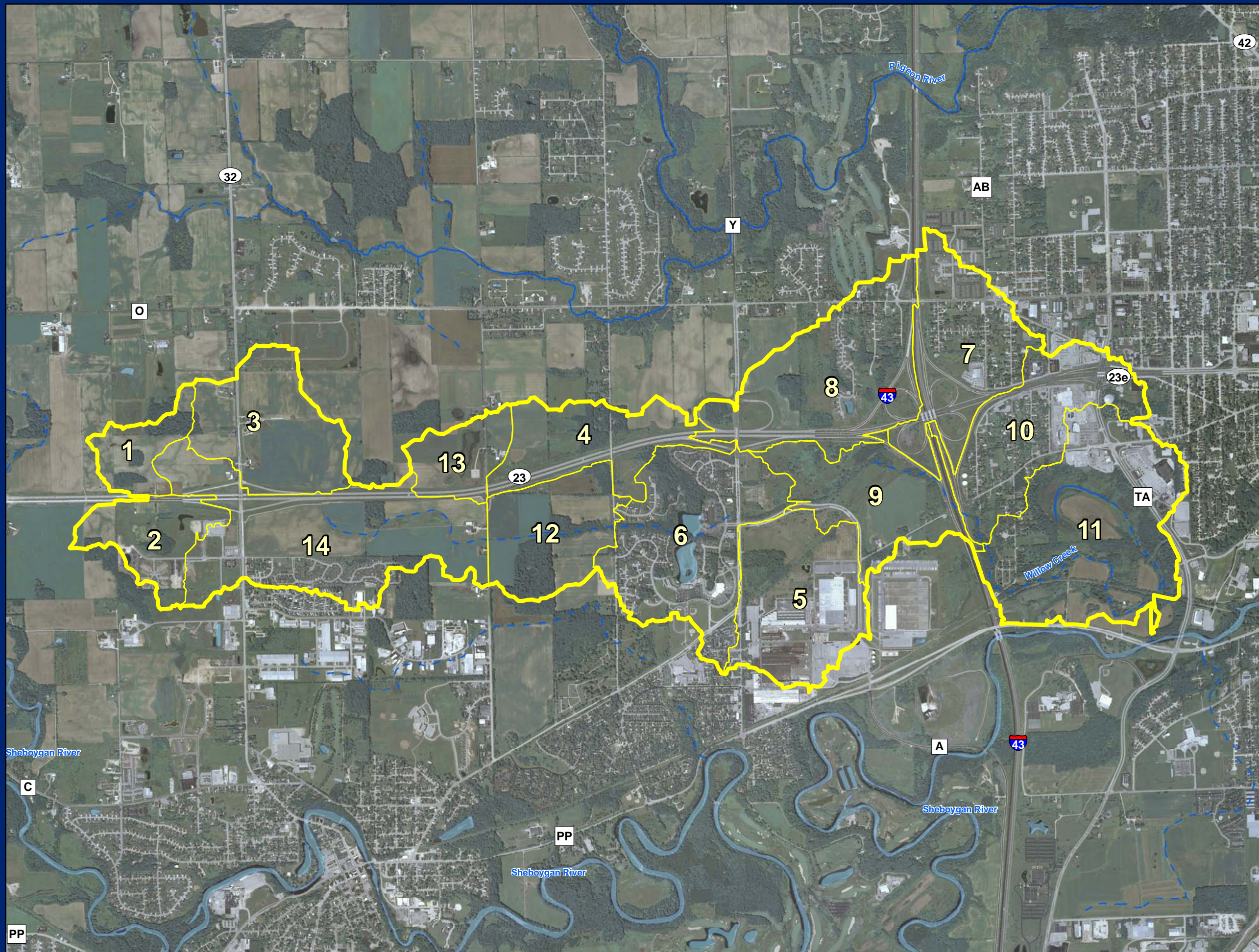
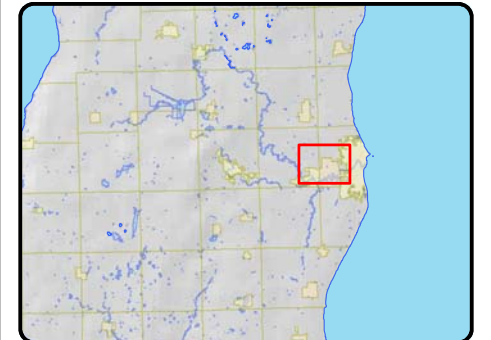


Figure 4. Willow Creek Watershed Revised Subwatersheds



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- Revised Subwatersheds 20101216
- DNR 24k Hydrography**
 - Perennial Stream
 - - - Intermittent Stream
 - Waterbody

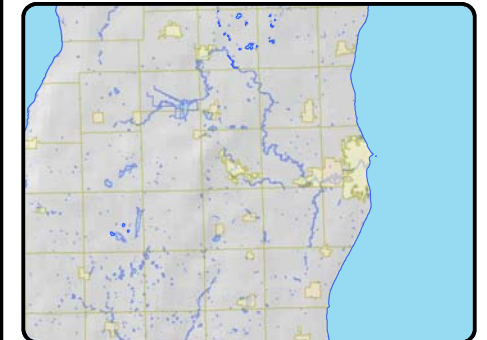
Data Sources Include: WDNR, WisDOT, USGS and Stantec.
Orthophotography: 2010 NAIP.

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Figure 5. Willow Creek Watershed Ecological Landscapes of WI



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 25 50 Miles

Legend

- Willow Cr. Watershed 20101216
- Ecological Landscapes (WDR)**
- Central Lake Michigan Coastal
- Central Sand Hills
- Central Sand Plains
- Forest Transition
- North Central Forest
- Northeast Sands
- Northern Highland
- Northern Lake Michigan Coastal
- Northwest Lowlands
- Northwest Sands
- Southeast Glacial Plains
- Southern Lake Michigan Coastal
- Southwest Savanna
- Superior Coastal Plain
- Western Coulees and Ridges
- Western Prairie

Data Sources Include: WDNR, USGS and Stantec.



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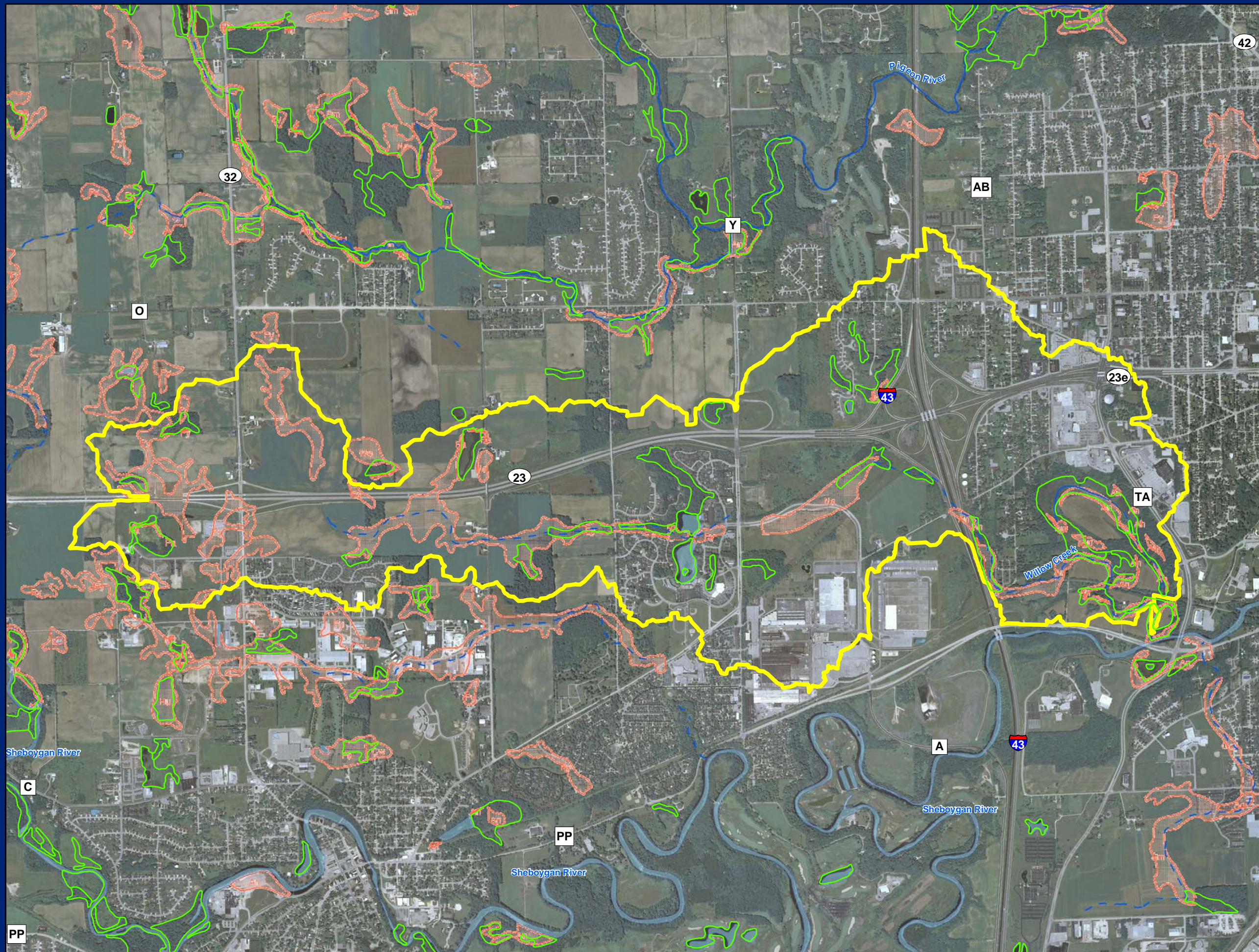
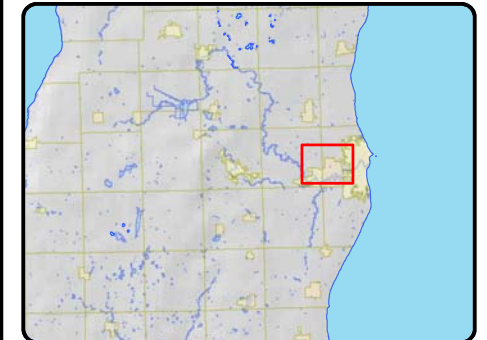


Figure 6. Willow Creek Watershed Potentially Restorable Wetlands



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- Potentially Restorable Wetlands
- WI Wetland Inventory
- DNR 24k Hydrography**
 - Perennial Stream
 - Intermittent Stream
 - Waterbody

Data Sources Include: WDNR, WisDOT, USGS and Stantec.
Orthophotography: 2010 NAIP.

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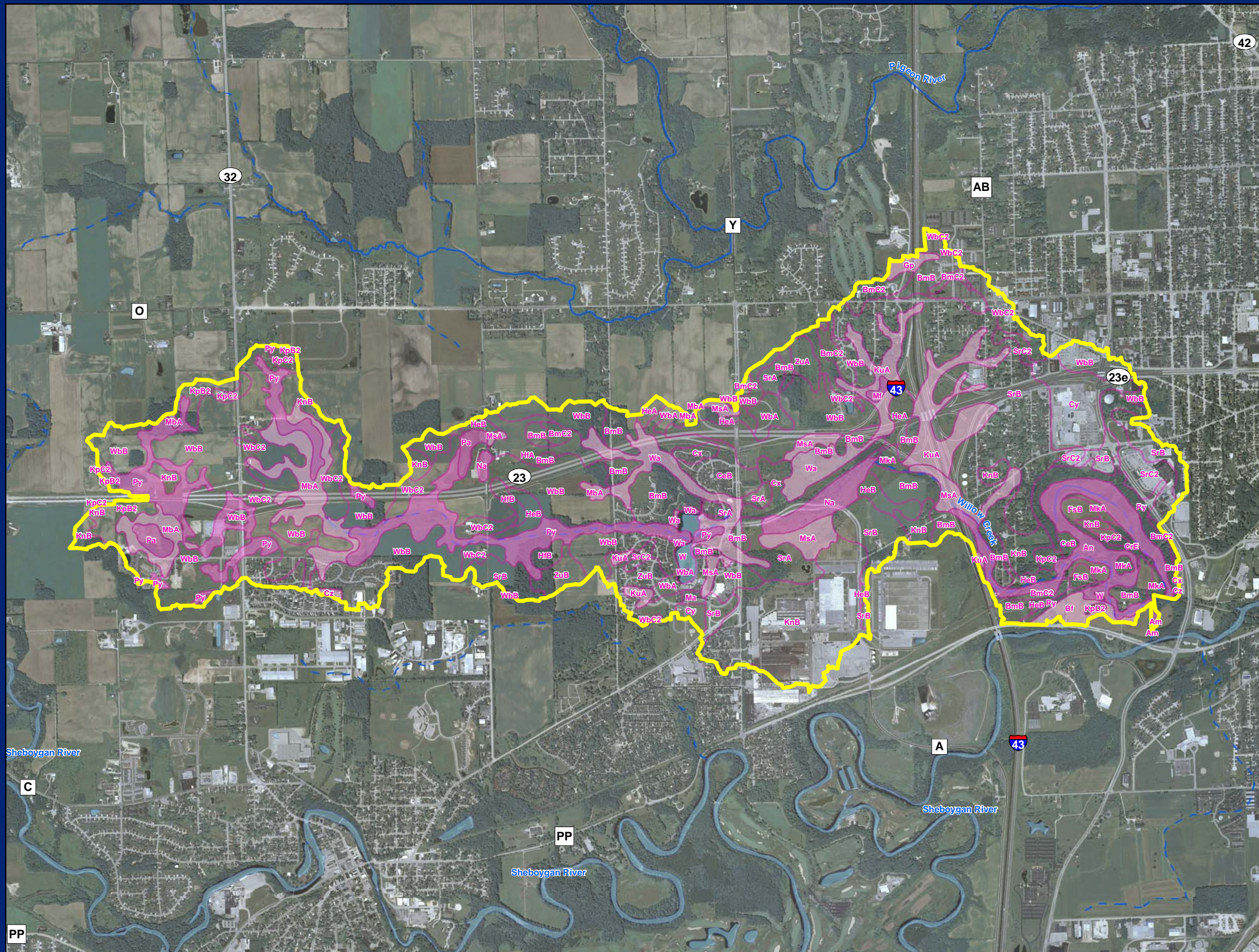
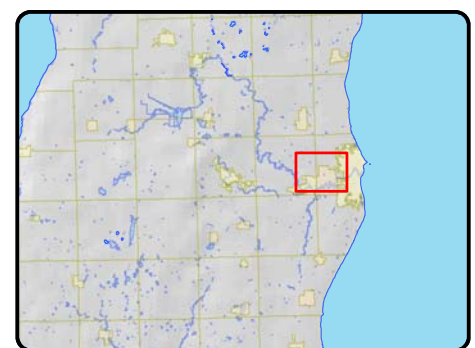


Figure 7. Willow Creek Watershed Hydric Soils



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- NRCS Soil Survey Data**
 - Hydric Soils
 - Poss. Hydric Inclusions
 - Non-Hydric Soils
- DNR 24k Hydrography**
 - Perennial Stream
 - Intermittent Stream
 - Waterbody

Data Sources Include: NRCS, WDNR, WisDOT, USGS and Stantec. Orthophotography: 2010 NAIP.

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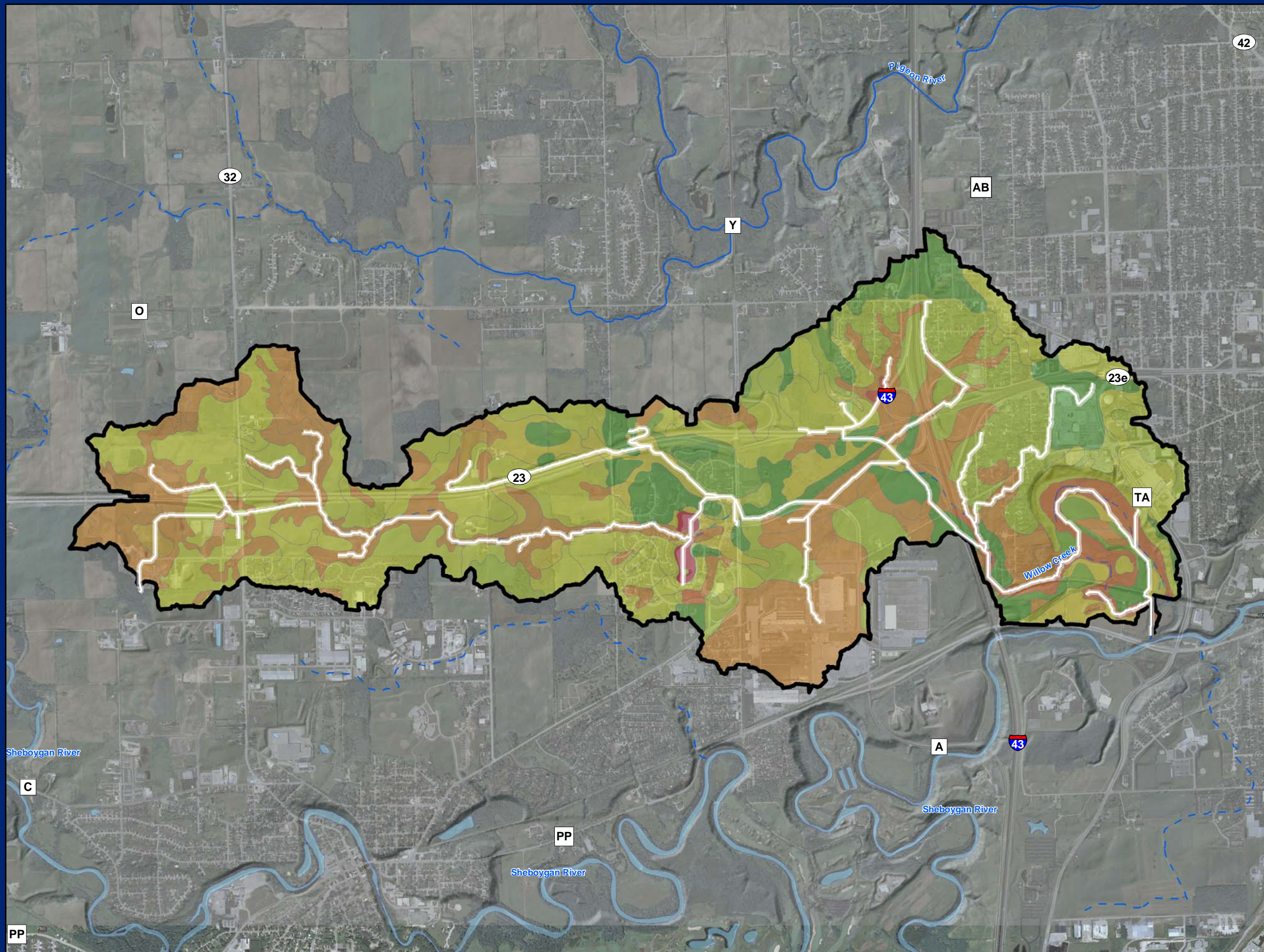
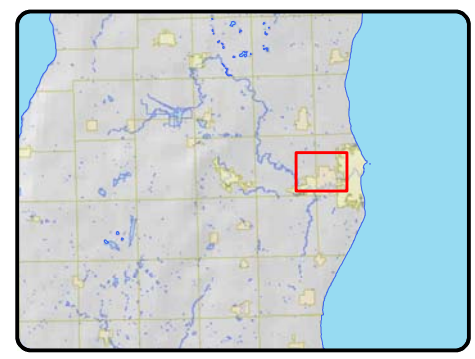


Figure 8. Willow Creek Watershed Groundwater Infiltration



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 23, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- Flow Accumulation

Relative Groundwater Infiltration Potential

- High
- Medium-High
- Medium
- Medium-Low
- Low

DNR 24k Hydrography

- Perennial Stream
- Intermittent Stream
- Waterbody

Data Sources Include: WDNR, WisDOT, USGS and Stantec. Orthophotography: 2010 NAIP.

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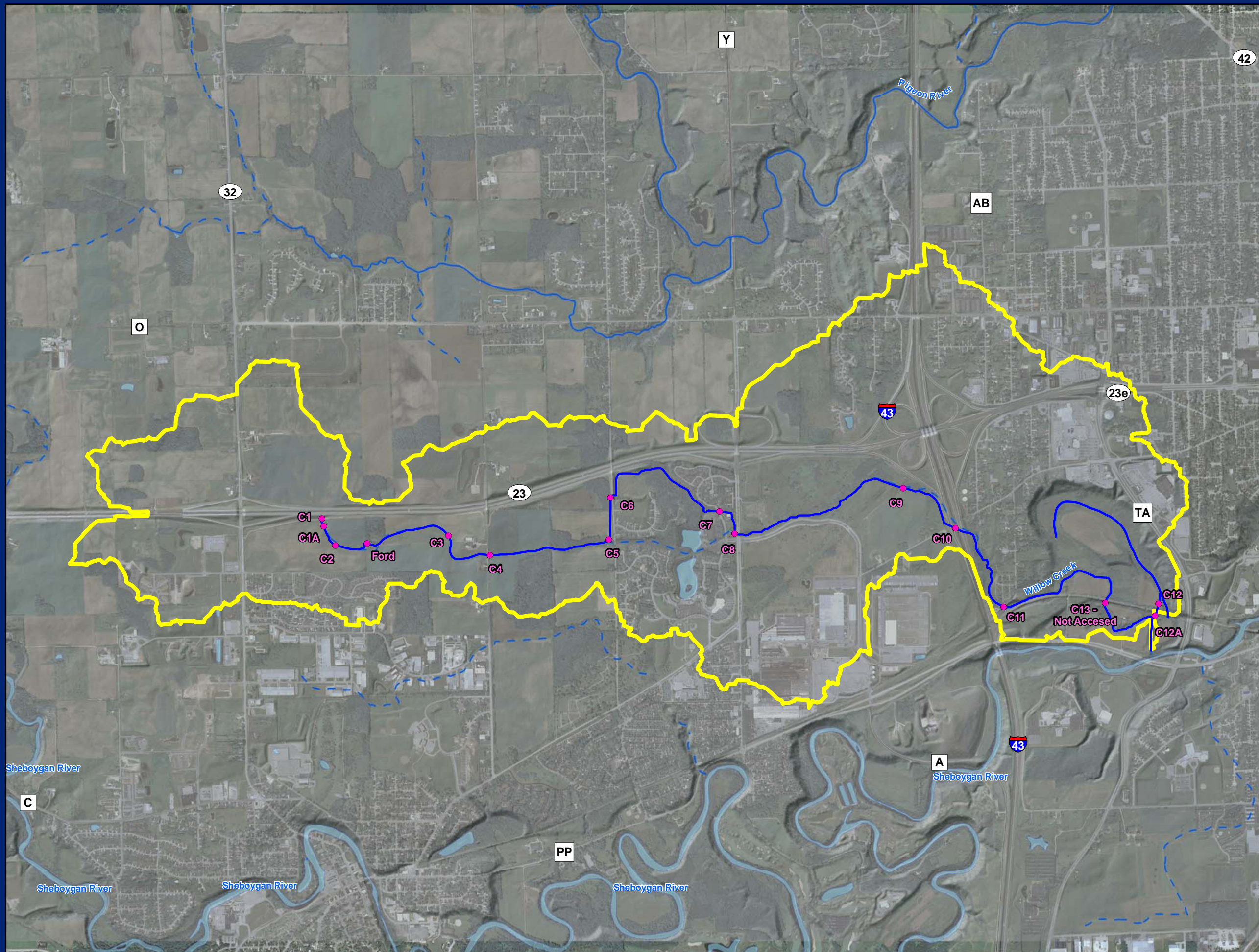
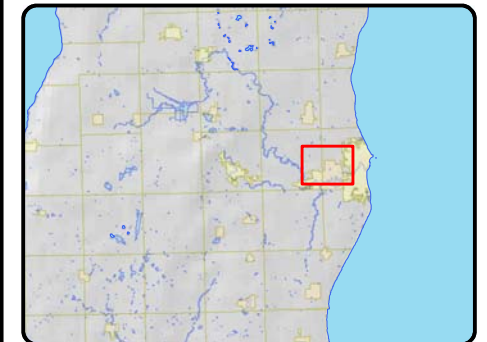


Figure 9. Willow Creek Watershed Fish Passage



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 19, 2011

0 1,000 2,000 Feet

Legend

- Willow Cr. Watershed 20101216
- Willow Creek Hydro (UWSP)
- Culverts
- DNR 24k Hydrography**
- Perennial Stream
- Intermittent Stream
- Waterbody

Data Sources Include: WDNR, WisDOT, USGS and Stantec.
Orthophotography: 2010 NAIP.

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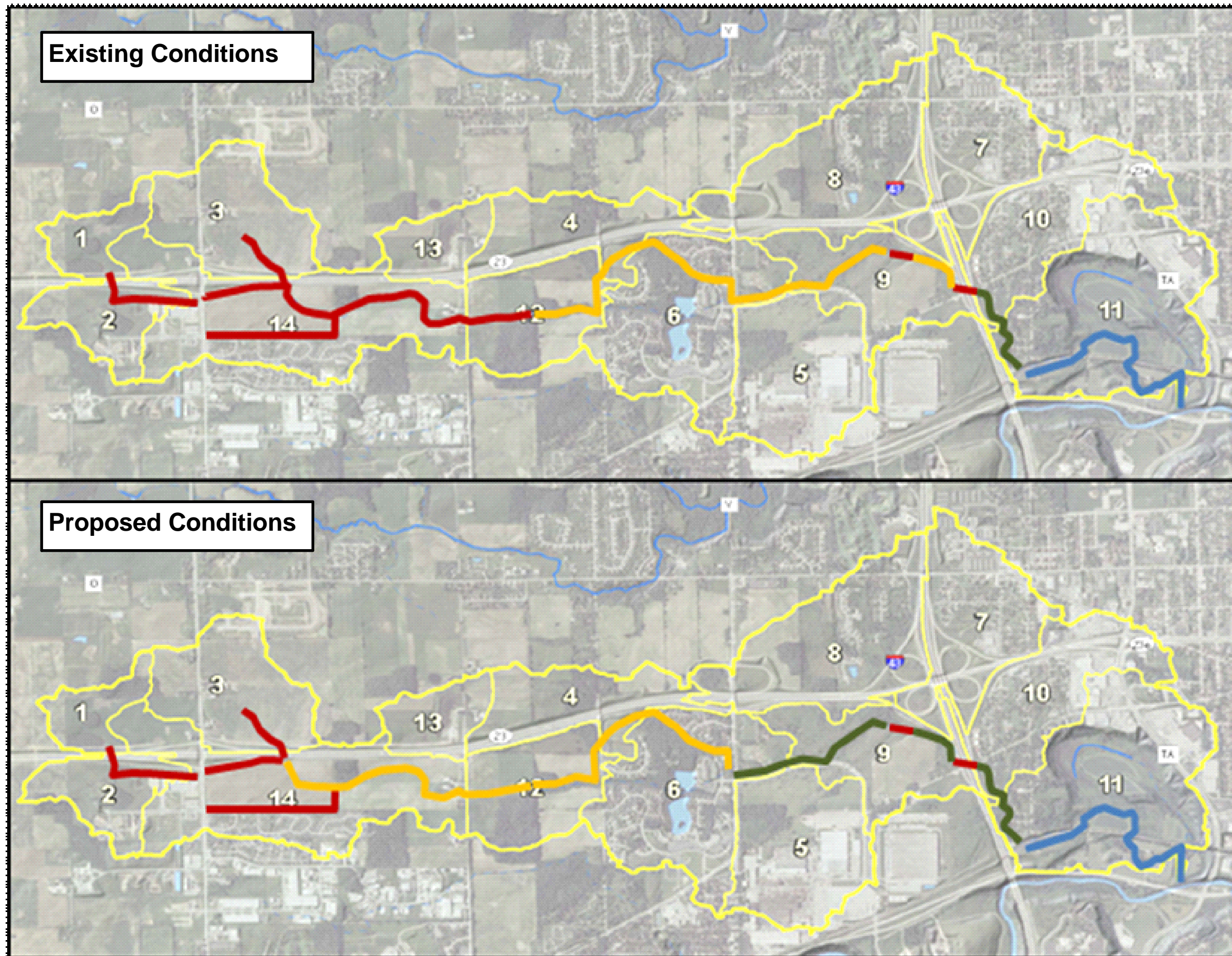
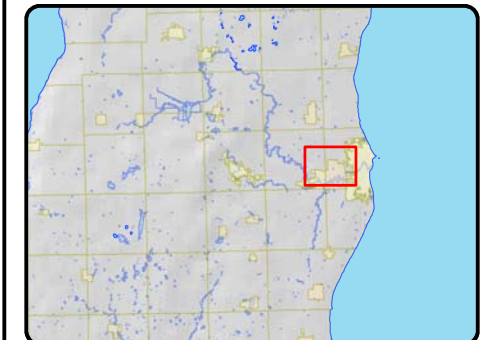


Figure 10. Willow Creek Watershed Stream Condition Map



Location
Sheboygan County, WI

Project Information
Project Number: 0010-0099-01
Modified: May 23, 2011



Legend

- Willow Cr. Watershed 20101216
- Revised Subwatersheds 20101216
- Stream Condition**
- Excellent
- Fair
- Good
- Poor

Data Sources Include: WDNR, WisDOT, UWSP, USGS, Stantec.
Orthophotography: 208 NAIP.



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ATTACHMENT B

Willow Creek Watershed Land Cover Acreages (BLRPC data)

Unit Description	Acres
Subwatershed 1 - State Highways	0.18
Subwatershed 1 - Woodlands	18.13
Subwatershed 1 - Croplands/Pastures	38.22
Subwatershed 1 - Other Natural Areas, including Open Space	1.75
Subwatershed 10 - Churches/Temples/Synagogues	5.45
Subwatershed 10 - Clinics	0.97
Subwatershed 10 - Designated Historic/Cultural/Archaeological Sites	0.71
Subwatershed 10 - Federal Highways	2.99
Subwatershed 10 - Hospitals	0.43
Subwatershed 10 - Lawns/Yards	0.78
Subwatershed 10 - Local Streets and Roads	20.46
Subwatershed 10 - Off-Street Parking	23.33
Subwatershed 10 - Parks/Parkways/Forest-Related Picnic Areas	9.06
Subwatershed 10 - Water Supply Storage Tanks/Reservoirs	0.70
Subwatershed 10 - Woodlands	8.71
Subwatershed 10 - Fallow Fields	15.74
Subwatershed 10 - Manufacturing	1.09
Subwatershed 10 - Motor Vehicle Related	1.02
Subwatershed 10 - Other Natural Areas, including Open Space	19.10
Subwatershed 10 - Retail Sales	7.17
Subwatershed 10 - Retail Services	0.85
Subwatershed 10 - Shopping Centers	5.53
Subwatershed 10 - Single Family Residential	58.85
Subwatershed 10 - Two Family	1.31
Subwatershed 11 - Churches/Temples/Synagogues	7.54
Subwatershed 11 - County Highways	0.73
Subwatershed 11 - Designated Historic/Cultural/Archaeological Sites	0.38
Subwatershed 11 - Federal Highways	0.29
Subwatershed 11 - Hospitals	0.09

Subwatershed 11 - Lawns/Yards	8.03
Subwatershed 11 - Local Streets and Roads	11.22
Subwatershed 11 - Museums	0.32
Subwatershed 11 - Natural Gas Substations	0.66
Subwatershed 11 - Off-Street Parking	20.42
Subwatershed 11 - Parks/Parkways/Forest-Related Picnic Areas	3.40
Subwatershed 11 - Police/Fire Stations/Offices	0.64
Subwatershed 11 - Reservoirs and Ponds	0.31
Subwatershed 11 - Water Supply Storage Tanks/Reservoirs	0.00
Subwatershed 11 - Woodlands	168.95
Subwatershed 11 - Croplands/Pastures	20.85
Subwatershed 11 - Fallow Fields	6.02
Subwatershed 11 - Farm Buildings/Accessories	0.26
Subwatershed 11 - Other Natural Areas, including Open Space	32.95
Subwatershed 11 - Rail Related	5.96
Subwatershed 11 - Retail Sales	9.05
Subwatershed 11 - Retail Services	0.76
Subwatershed 11 - Shopping Centers	13.41
Subwatershed 11 - Single Family Residential	15.42
Subwatershed 11 - Two Family	0.27
Subwatershed 11 - Vacant Agriculture/Silviculture	0.28
Subwatershed 11 - Vacant Residence	1.39
Subwatershed 12 - Local Streets and Roads	0.76
Subwatershed 12 - Rivers and Streams	0.40
Subwatershed 12 - Trails	0.25
Subwatershed 12 - Woodlands	38.32
Subwatershed 12 - Croplands/Pastures	94.96
Subwatershed 12 - Fallow Fields	0.81
Subwatershed 12 - Other Natural Areas, including Open Space	2.72
Subwatershed 12 - Single Family Residential	1.34
Subwatershed 13 - Local Streets and Roads	0.84
Subwatershed 13 - Reservoirs and Ponds	1.65
Subwatershed 13 - State Highways	1.83
Subwatershed 13 - Trails	0.28
Subwatershed 13 - Woodlands	0.29

Subwatershed 13 - Croplands/Pastures	36.88
Subwatershed 13 - Farm Buildings/Accessories	2.88
Subwatershed 13 - Multi-Family	0.61
Subwatershed 13 - Other Natural Areas, including Open Space	23.17
Subwatershed 13 - Single Family Residential	0.48
Subwatershed 14 - Administrative Buildings	0.37
Subwatershed 14 - Local Streets and Roads	6.55
Subwatershed 14 - Parks/Parkways/Forest-Related Picnic Areas	2.31
Subwatershed 14 - State Highways	8.52
Subwatershed 14 - Trails	2.38
Subwatershed 14 - Woodlands	9.45
Subwatershed 14 - Croplands/Pastures	187.95
Subwatershed 14 - Farm Buildings/Accessories	5.98
Subwatershed 14 - Manufacturing	1.18
Subwatershed 14 - Mobile Homes	32.35
Subwatershed 14 - Other Natural Areas, including Open Space	45.34
Subwatershed 14 - Retail Sales	1.33
Subwatershed 14 - Single Family Residential	7.61
Subwatershed 14 - Two Family	2.30
Subwatershed 2 - State Highways	1.86
Subwatershed 2 - Trails	1.30
Subwatershed 2 - Woodlands	18.20
Subwatershed 2 - Croplands/Pastures	59.67
Subwatershed 2 - Other Natural Areas, including Open Space	12.95
Subwatershed 3 - State Highways	3.07
Subwatershed 3 - Woodlands	2.18
Subwatershed 3 - Croplands/Pastures	144.09
Subwatershed 3 - Farm Buildings/Accessories	6.98
Subwatershed 3 - Other Natural Areas, including Open Space	7.78
Subwatershed 3 - Single Family Residential	3.29
Subwatershed 4 - County Highways	0.08
Subwatershed 4 - Local Streets and Roads	0.63
Subwatershed 4 - State Highways	5.86
Subwatershed 4 - Trails	2.41
Subwatershed 4 - Woodlands	16.49

Subwatershed 4 - Croplands/Pastures	55.46
Subwatershed 4 - Fallow Fields	1.33
Subwatershed 4 - Farm Buildings/Accessories	0.02
Subwatershed 4 - Multi-Family	0.27
Subwatershed 4 - Other Natural Areas, including Open Space	52.62
Subwatershed 4 - Single Family Residential	2.58
Subwatershed 4 - Two Family	0.18
Subwatershed 5 - County Highways	1.27
Subwatershed 5 - Local Streets and Roads	5.02
Subwatershed 5 - Woodlands	8.73
Subwatershed 5 - Manufacturing	101.89
Subwatershed 5 - Other Natural Areas, including Open Space	73.82
Subwatershed 5 - Rail Related	3.70
Subwatershed 5 - Retail Sales	2.42
Subwatershed 5 - Single Family Residential	0.11
Subwatershed 6 - Athletic Fields	2.22
Subwatershed 6 - Cemeteries	6.31
Subwatershed 6 - County Highways	4.40
Subwatershed 6 - Lakes	11.63
Subwatershed 6 - Local Streets and Roads	16.12
Subwatershed 6 - Off-Street Parking	0.97
Subwatershed 6 - Playfields/Ball Diamonds/Volleyball Courts	5.68
Subwatershed 6 - State Highways	0.02
Subwatershed 6 - Trails	0.04
Subwatershed 6 - Woodlands	35.28
Subwatershed 6 - Croplands/Pastures	5.85
Subwatershed 6 - Fallow Fields	4.30
Subwatershed 6 - Land Under Development	23.19
Subwatershed 6 - Land Under Residential Development	0.29
Subwatershed 6 - Multi-Family	5.85
Subwatershed 6 - Other Natural Areas, including Open Space	42.60
Subwatershed 6 - Retail Sales	18.39
Subwatershed 6 - Retail Services	3.03
Subwatershed 6 - Shopping Centers	13.54
Subwatershed 6 - Single Family Residential	48.25

Subwatershed 6 - Two Family	5.32
Subwatershed 7 - County Highways	1.19
Subwatershed 7 - Fairgrounds	1.05
Subwatershed 7 - Federal Highways	7.19
Subwatershed 7 - Hospitals	0.29
Subwatershed 7 - Local Streets and Roads	10.32
Subwatershed 7 - Municipal Garages	0.02
Subwatershed 7 - Police/Fire Stations/Offices	0.35
Subwatershed 7 - State Highways	0.76
Subwatershed 7 - Water Supply Storage Tanks/Reservoirs	0.45
Subwatershed 7 - Fallow Fields	42.57
Subwatershed 7 - Land Under Development	19.15
Subwatershed 7 - Land Under Residential Development	0.27
Subwatershed 7 - Multi-Family	5.01
Subwatershed 7 - Other Natural Areas, including Open Space	56.10
Subwatershed 7 - Retail Sales	5.51
Subwatershed 7 - Single Family Residential	35.92
Subwatershed 7 - Two Family	0.81
Subwatershed 8 - County Highways	1.64
Subwatershed 8 - Federal Highways	5.16
Subwatershed 8 - Golf Courses	3.65
Subwatershed 8 - Local Streets and Roads	3.94
Subwatershed 8 - Reservoirs and Ponds	0.87
Subwatershed 8 - State Highways	7.42
Subwatershed 8 - Trails	1.23
Subwatershed 8 - Woodlands	27.90
Subwatershed 8 - Croplands/Pastures	21.67
Subwatershed 8 - Land Under Residential Development	5.01
Subwatershed 8 - Multi-Family	1.03
Subwatershed 8 - Other Natural Areas, including Open Space	129.79
Subwatershed 8 - Retail Sales	1.50
Subwatershed 8 - Single Family Residential	22.35
Subwatershed 8 - Two Family	19.06
Subwatershed 9 - Cemeteries	0.21
Subwatershed 9 - Federal Highways	4.85

Subwatershed 9 - Local Streets and Roads	3.47
Subwatershed 9 - Trails	1.18
Subwatershed 9 - Woodlands	60.43
Subwatershed 9 - Croplands/Pastures	31.64
Subwatershed 9 - Manufacturing	1.90
Subwatershed 9 - Other Natural Areas, including Open Space	53.74
Subwatershed 9 - Single Family Residential	2.72
Total	2543.08

**Soil Description Summary
Willow Creek Watershed
Sheboygan County, Wisconsin**

Hydrologic Group A

Boyer (BmB, Bmc2)

The Boyer series consists of well drained soils underlain by stratified sand and gravel. The surface layer (0-4") consists of loamy sand with very friable weak fine granular structure. The subsoil (4"-22") consists of loamy sand and heavy sandy loam with friable to very friable weak thin platy, weak medium subangular blocky and moderate medium subangular blocky structures. The substratum (22"-60") consists of an moderately rapid permeability upper layer to (26") of sandy loam with friable weak medium subangular blocky structures above a very rapid permeable lower layer (60") of stratified sand and fine gravel (35% gravel by volume).

Hydrologic Group A/D

Palms (Pa)

The Palms series consists of very poorly drained soils with a 36" organic material layer underlain by loamy mineral layers. Permeability is moderately rapid in the organic layer and moderate in the underlying loamy layers. The surface layer (0-8") consists of a sapric material with friable moderate fine granular structure. The subsurface layer (8"- 36") consists of a sapric material with friable moderate weak medium to medium subangular blocky structures. The substratum (36"- 60") consists of friable silt loam.

Alluvial Land, Wet (An)

The Alluvial Land, Wet series consists of layered loamy, sandy, and gravelly soil material. Some layers contain organic material and are poorly or very poorly drained. This soil varies widely in permeability and is subject to frequent flooding.

Hydrologic Group B

Bellevue Variant (Bf)

The Bellevue Variant series consists of well drained and moderately drained soils formed in loamy and sandy alluvial material. This soil has moderately rapid permeability and is subject to frequent flooding.

The surface layer (0-8") consists of fine sandy loam with friable weak medium granular structure. The subsoil (8"-30") consists of fine sandy loam with very friable weak medium subangular blocky structures. The substratum (30"-60") consists of loamy fine sand very friable thin strata of very fine sand and single grained loose sand.

Casco (CeB, CrE)

The Casco series consists of very steep well drained soils with a moderate permeability to a depth of 17 inches and very rapid below. The surface layer (0-8") consists of loam with friable weak medium subangular blocky structures. The subsurface layer (8"- 36") consists of clay loam with firm moderate subangular blocky structures and sandy clay loam with firm moderate medium subangular blocky structures. The substratum layer (17"- 60") consists of stratified gravel and loose single grained sand, 60% gravel by volume.

Fox Series (FsB)

The Fox series consists of well drained soils that are underlain by gravelly and sandy outwash that have a moderate permeability to a depth of 27 inches and very rapid below. The surface layer (0-9") consists of silty loam with friable moderate fine granular structures. The subsurface layer (9"- 22") consists of silt loam with moderate thin platy structure, light silty clay loam with a strong medium subangular blocky structures, and clay loam with firm strong medium subangular blocky structures. The substratum layer (22"- 60") consists of heavy clay loam with strong

medium subangular blocky structures above firm stratified gravel and loose single grained sand, 55% gravel by volume.

Kibbie Series (KuA)

The Kibbie series consists of somewhat poorly drained soils that are underlain by stratified silt and very fine sand. These soils are on old glacial lake plains with a moderate permeability. The surface layer (0-8") consists of silt loam with friable weak fine subangular blocky structures. The subsurface layer (8"- 18") consists of clay loam with firm moderate fine subangular structure. The substratum layer (18"- 60") consists of silt loam with friable moderate medium subangular blocky structures above very firm stratified silt and very fine sand.

Matherton Series (MkA)

The Matherton series consists of somewhat poorly drained soils formed in silty and loamy deposits that are underlain by sand and gravel. Permeability is moderate in the subsoil and rapid in the substratum. The surface layer (0-8") consists of silt loam with friable moderate medium granular structures. The subsurface layer (8"- 11") consists of silt loam with friable moderate medium platy structures. The subsoil layer (11"- 29") consists of silt loam with friable moderate fine subangular structures, silty clay loam with firm moderate fine subangular blocky structures, and clay loam with firm moderate fine subangular blocky structures. The substratum layer (29"- 60") consists of stratified sand and gravel with loose single grained gravel.

Sisson Series (SrA, SrB, SrC2)

The Sisson series consists of well drained soils that are underlain by stratified silt and very fine sand. Permeability is moderate. The surface layer (0-8") consists of very fine sandy loam with friable moderate fine subangular blocky structures. The subsurface layer (8"- 10") consists of very fine sandy loam with friable weak fine subangular blocky structures. The subsoil layer (10"- 27") consists of light clay and clay loam with firm moderate medium subangular blocky structures, fine sandy loam with friable weak fine subangular blocky structures. The substratum layer (27"- 60") consists of friable stratified silt and very fine sand.

Wasepi Series (Wa)

The Wasepi series consists of somewhat poorly drained soils formed in sandy and loamy deposits underlain by sandy glacial outwash. Permeability is moderately rapid in the subsoil and rapid in the substratum. The surface layer (0-8") consists of sandy loam with friable weak medium subangular blocky structure parting to friable moderate medium granular structures. The subsoil layer (8"- 29") consists of loamy sand with very friable weak medium subangular blocky structures, sand clay loam with firm moderate medium subangular blocky structures, sandy loam with friable weak medium subangular blocky structure. The substratum layer (29"- 60") consists of loose single grained sand and fine sand.

Waymor Series (WbA, WbB, WbC2)

The Waymor series consists of well drained soils formed in a thin silty and loamy layer over calcareous loamy glacial till. Permeability is moderate. The surface layer (0-9") consists of silty loam with friable moderate medium subangular blocky structure parting to friable moderate fine granular structures. The subsoil layer (9"- 31") consists of silty clay loam with firm strong medium subangular blocky structures parting to strong fine granular structures, clay loam with firm moderate medium subangular blocky structures. The substratum layer (31"- 60") consists of friable loam with 5% gravel by volume.

Zurich Series (ZuA, ZuB)

The Zurich series consists of well drained and moderately drained soils formed in silty sediments and stratified silt and very fine sand. Permeability is moderate. The surface layer (0-9") consists of silty loam with friable weak medium subangular blocky structure parting to friable moderate medium granular structures. The subsoil layer (9"- 24") consists of heavy silt loam with friable moderate medium subangular blocky structures, silty clay loam with strong fine subangular blocky structures, stratified silt and very fine sand with friable weak medium subangular blocky

structures. The substratum layer (24"- 60") consists of very friable stratified silt and very fine sand.

Hydrologic Group C:

Hebron Series (HeA, HeB)

The Hebron series consists of well drained and moderately well drained soils formed in a thin layer of loamy material over stratified silty and clayey lacustrine deposits. These soils are on old glacial lake plains and depressions with a moderate permeability to a depth of 23 inches and moderately slow below. The surface layer (0-8") consists of loam with friable moderate fine subangular structures. The subsurface layer (8"- 28") consists of loam with friable moderate medium subangular blocky structures, sandy clay loam with firm moderate fine subangular blocky structures, sandy loam with friable moderate fine subangular blocky structures, and silty clay loam with firm moderate medium prismatic structure parting to moderate fine angular blocky structures. The substratum layer (28"- 60") consists of stratified silt, silty clay, and silty clay loam, with firm weak thick platy structures.

Hebron Variant Series (HfA, HfB)

The Hebron series consists of well drained and moderately well drained soils formed in sandy and loamy sediments over stratified silty and clayey lacustrine deposits. These soils are on old glacial lake plains with a moderate rapid permeability to a depth of 33 inches and moderately slow below. The surface layer (0-8") consists of sandy loam with friable weak medium granular structures. The subsurface layer (8"- 33") consists of loamy sand with very friable weak medium subangular blocky structures, sandy clay loam with firm moderate medium subangular blocky structures, and loamy sand with very friable weak medium subangular blocky structures. The substratum layer (33"- 60") consists of stratified silty loam, and silty clay loam, with firm moderate fine angular structures.

Kewaunee Series (KnB, KpB2, KpC2, KpD2)

The Kewaunee series consists of well drained and moderately well drained soils formed in silty clay loam glacial till with permeability moderately slow. The surface layer (0-8") consists of silt loam with friable moderate fine subangular blocky structure. The subsurface layer (8"-25") consists of silty clay to silty clay loam with firm fine angular blocky structures. The substratum layer (25"- 60") consists of firm silty clay loam.

Manawa Series (MbA)

The Manawa series consists of somewhat poorly drained soils formed in silty clay loam glacial till with permeability slow. The surface layer (0-8") consists of silt loam with friable moderate medium granular structure. The subsurface layer (8"-26") consists of clay with firm weak medium prismatic structures parting to strong fine angular blocky structures above heavy silty clay loam with firm weak medium prismatic structure parting to strong fine angular blocky structures. The substratum layer (26"- 60") consists of firm silty clay loam.

Mosel Series (MsA)

The Mosel series consists of somewhat poorly drained soils formed in loamy lacustrine deposits on glacial till with permeability moderate to a depth of 26 inches and moderately slow below. The surface layer (0-9") consists of loam with friable weak medium granular structure. The subsurface layer (8"-29") consists of clay loam with firm moderate medium subangular blocky structures, gravelly sandy loam with friable weak medium subangular blocky structures, and heavy silt clay loam with firm moderate medium subangular blocky structures parting to moderate fine angular blocky structures. The substratum layer (29"- 60") consists of firm silty clay loam.

Hydrologic Group D:

Poygan (Py)

The Poygan series consists of poorly drained soils formed in silty clay lacustrine deposits or glacial till with a high organic-matter content and slow permeability. The surface layer (0-11")

consists of silty clay with friable weak medium and fine granular structure. The subsurface layer (11"-24") consists of silty clay to heavy silty clay with firm moderate medium subangular blocky structures, some parting to moderate fine angular blocky and weak coarse prismatic parting to strong medium angular blocky structures. The substratum (24"-60") consists of silty clay with firm weak coarse prismatic parting to moderate medium angular blocky structures.

Navan (Na)

The Navan series consists of poorly drained soils that are underlain by silty and clayey deposits. Permeability is moderate to a depth of 25 inches and moderately slow below. The surface layer (0-11") consists of loam with friable moderate medium granular structure and moderate fine subangular blocky structure. The subsurface layer (11"-36") consists of heavy loam with friable moderate medium subangular blocky structures, sandy clay loam with friable moderate medium subangular blocky structures, clay loam with firm moderate fine prismatic structure parting to moderate fine subangular blocky structure, and heavy silty clay loam with firm moderate medium subangular blocky structures.

No Hydrologic Group:

Cut and Fill Land, Sandy and Gravelly (Cx)

This soil identification consists of sandy and gravelly soil fill material. Percentages of sand and gravel ranges from 100% sand to 100% gravel. The permeability is rapid or very rapid.

Cut and Fill Land, Loamy (Cy)

This soil identification consists of silt loam, clay loam, sandy loam, or sandy clay loam soil fill material. The permeability is moderate or moderately rapid.

Gravel Pit (Gp)

This soil identification consists of areas where sand, gravel, or sand and gravel have been removed. Soil material is droughty and some sand and gravel may remain.

Marsh (Mf)

This soil identification consists of very poorly drained mixed mineral and organic material that is covered with water most of the year.

Rough Broken Land (Ry)

This soil identification consists of well drained silty clay loam or clay loam glacial till, commonly on lake beds, riverbanks, and escarpments.

ATTACHMENT C

Appendix C



Photo 1 – C3 outlet



Photo 2 – C3 inlet



Photo 3 – C2 outlet



Photo 4 – C2 inlet



Photo 5 – C1 outlet



Photo 6 – C1A inlet

Appendix C



Photo 7 – C1A outlet



Photo 8 – C4 outlet



Photo 9 – C4 inlet



Photo 10 – C5 inlet



Photo 11 – C5 outlet



Photo 12 – C6 outlet

Appendix C



Photo 13 – C6 inlet



Photo 14 – C7 inlet



Photo 15 – C7 outlet



Photo 16 – C8 outlet



Photo 17 –C8 inlet



Photo 19 – C9 outlet

Appendix C



Photo 20 – C10 outlet



Photo 21 – C11 outlet



Photo 22 – C11 inlet



Photo 23 – C12 outlet



Photo 24 – C12A inlet



Photo 25 – C12A outlet

Stream Walk Worksheet

Willow

Stream Name

Shelbyga VT
County State

Tom Nedland

Your Name

Willow Creek, C-4
Monitoring Location (legal description – Township/Range/Section, longitude/latitude if known)

11-16-10
Date

11:07
Time

Weather in the past 24 hours:

- ☐ Storm (heavy rain)
☐ Rain (steady rain)
☒ Showers (intermittent rain)
☐ Overcast
☐ Clear/Sunny

Weather Now:

- ☐ Storm (heavy rain)
☐ Rain (steady rain)
☐ Showers (intermittent rain)
☐ Overcast
☒ Clear/Sunny

Attach photo or sketch your site:

Note features that affect stream habitat, such as riffles, runs, pools, ditches, wetlands, dams, riprap, outfalls, tributaries, landscape features, logging, paths and roads. Include an arrow showing which way the stream is flowing, and another arrow showing 'north.'

1. Water Appearance

- ☐ Clear ☐ Dark Brown
☒ Turbid ☐ Oily Sheen
☐ Milky ☐ Reddish
☐ Foamy ☐ Green
☐ Other _____

Notes _____

2. Water Odor

- ☐ None ☐ Fishy
☐ Sewage ☐ Rotten Eggs
☐ Chlorine ☐ Petroleum
☒ Other _____

Notes smells of manure

3. Temperature

Air _____ °F °C
Water _____ °F °C
(circle temp. scale used)

(continued on back)

4. Submersed Aquatic Plants

Are there submersed aquatic plants?

Yes _____ No ☒

Where? _____

Identify or describe them: _____

5. Riparian Vegetation

Looking upstream, describe the streamside cover.

a) Note vegetation on streambank only and check boxes if present (left column is for left-hand side of stream; right column is for right-hand side).

left		right
<input type="checkbox"/> Evergreen trees		<input type="checkbox"/>
<input type="checkbox"/> Hardwood trees		<input type="checkbox"/>
<input type="checkbox"/> Bushes, shrubs		<input type="checkbox"/>
<input checked="" type="checkbox"/> Tall grasses, ferns, etc.		<input checked="" type="checkbox"/>
<input type="checkbox"/> Lawn		<input type="checkbox"/>
<input type="checkbox"/> Boulders/rocks		<input type="checkbox"/>
<input type="checkbox"/> Gravel/sand		<input type="checkbox"/>
<input type="checkbox"/> Bare soil		<input type="checkbox"/>
<input type="checkbox"/> Pavement/structures		<input type="checkbox"/>

b) Note vegetation from the top of streambank back 66 feet.

left		right
<input type="checkbox"/> Evergreen trees		<input type="checkbox"/>
<input type="checkbox"/> Hardwood trees		<input type="checkbox"/>
<input type="checkbox"/> Bushes, shrubs		<input type="checkbox"/>
<input type="checkbox"/> Tall grasses, ferns, etc.		<input type="checkbox"/>
<input type="checkbox"/> Lawn		<input type="checkbox"/>
<input type="checkbox"/> Boulders/rocks		<input type="checkbox"/>
<input type="checkbox"/> Gravel/sand		<input type="checkbox"/>
<input type="checkbox"/> Bare soil		<input type="checkbox"/>
<input type="checkbox"/> Pavement/structures		<input type="checkbox"/>
<input checked="" type="checkbox"/> Agricultural fields		<input checked="" type="checkbox"/>
<input type="checkbox"/> Pasture		<input type="checkbox"/>

6. Canopy Cover

Pick the category that best describes how much vegetation shades the stream at your site.

☒ 0% ☐ 25% ☐ 75% ☐ 100%

Notes on vegetation: _____

7. Bottom Substrate

Record the materials that make up the stream bottom.

Bottom types:

- ☐ Bedrock
- ☐ Boulder (> 10 inches)
- ☐ Cobble (2.5 inches - 10 inches)
- ☐ Gravel (0.1 inches - 2.5 inches)
- ☐ Sand (< 0.1 inches)
- ☒ Silt
- ☐ Other (include organics)

Notes on substrate: _____

8. Stream Discharge Estimate

Stream width: 3 feet
(a)

Depth measurements:

2" ft.
____ ft.
____ ft.
____ ft.
____ ft.

total / 5 = _____ avg. depth
(b)

Velocity: Time (per 10 ft)

____ sec.
____ sec. 11.5/sec.
____ sec.
____ total

divide total by number of trials

____ / 3 = _____ secs. (avg.)

Velocity = foot/second

10 ft. / _____ sec. (avg. time)

= 0.5 ft/sec.
(c)

Discharge: (width x depth x velocity)

3 feet x 17 feet x 0.5 ft/sec. =
(a) (b) (c)
= 25 ft³/sec.

9. Watershed Features

(within about 1/4 mile of the site - upstream)

Adjacent land used can impact the stream. Check "1" if present, "2" if clearly having an impact on the stream:

1 2 Residential

- ☐ single-family housing (dense)
- ☒ single-family housing (> 1 acre lots)
- ☐ multifamily housing
- ☒ lawns
- ☐ commercial/institutional

1 2 Roads, etc.

- ☒ paved roads, parking lots, bridges
- ☒ unpaved roads

1 2 Construction underway on:

- ☐ housing development
- ☐ commercial development
- ☐ road or bridge building/repair

1 2 Agricultural

- ☐ grazing land (pastures)
- ☐ feeding lots, animal holding areas
- ☒ cropland (type?)
- ☐ inactive agricultural land

1 2 Recreation

- ☐ golfing
- ☐ camping
- ☐ swimming/fishing/canoeing
- ☐ hunting land/natural

1 2 Other

- ☐ mining
- ☐ logging
- ☐ industry
- ☐ sanitary landfill
- ☐ sewage treatment plant
- ☐ dams

10. Channel Alteration

Has the stream been channelized?

Yes ☒ No _____

WAV materials revised
Summer, ©2005.

Willow

Stream Walk Worksheet

Stream Name

Sheboygan

WI

County

State

Your Name

Tom Nedland

Monitoring Location (legal description – Township/Range/Section, longitude/latitude if known)

11-16-10

Date

Time

Attach photo or sketch your site:

Note features that affect stream habitat, such as riffles, runs, pools, ditches, wetlands, dams, riprap, outfalls, tributaries, landscape features, logging, paths and roads. Include an arrow showing which way the stream is flowing, and another arrow showing 'north.'

Weather in the past 24 hours:

- ☐ Storm (heavy rain)
- ☐ Rain (steady rain)
- ☒ Showers (intermittent rain)
- ☐ Overcast
- ☐ Clear/Sunny

Weather Now:

- ☐ Storm (heavy rain)
- ☐ Rain (steady rain)
- ☐ Showers (intermittent rain)
- ☐ Overcast
- ☒ Clear/Sunny

1. Water Appearance

- ☒ Clear
- ☐ Turbid
- ☐ Milky
- ☐ Foamy
- ☐ Other
- ☐ Dark Brown
- ☐ Oily Sheen
- ☐ Reddish
- ☐ Green

Notes _____

2. Water Odor

- ☒ None
- ☐ Sewage
- ☐ Chlorine
- ☐ Other
- ☐ Fishy
- ☐ Rotten Eggs
- ☐ Petroleum

Notes _____

3. Temperature

Air _____ °F °C
 Water _____ °F °C
 (circle temp. scale used)

(continued on back)

4. Submersed Aquatic Plants

Are there submersed aquatic plants?

Yes _____ No ☒

Where? _____

Identify or describe them: _____

5. Riparian Vegetation

Looking upstream, describe the streamside cover.

a) Note vegetation on streambank only and check boxes if present (left column is for left-hand side of stream; right column is for right-hand side).

left		right
<input type="checkbox"/> Evergreen trees		<input type="checkbox"/>
<input checked="" type="checkbox"/> Hardwood trees		<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/> Bushes, shrubs		<input checked="" type="checkbox"/>
<input type="checkbox"/> Tall grasses, ferns, etc.		<input type="checkbox"/>
<input type="checkbox"/> Lawn		<input type="checkbox"/>
<input type="checkbox"/> Boulders/rocks		<input type="checkbox"/>
<input type="checkbox"/> Gravel/sand		<input type="checkbox"/>
<input type="checkbox"/> Bare soil		<input type="checkbox"/>
<input type="checkbox"/> Pavement/structures		<input type="checkbox"/>

b) Note vegetation from the top of streambank back 66 feet.

left		right
<input type="checkbox"/> Evergreen trees		<input type="checkbox"/>
<input checked="" type="checkbox"/> Hardwood trees		<input type="checkbox"/>
<input checked="" type="checkbox"/> Bushes, shrubs		<input type="checkbox"/>
<input type="checkbox"/> Tall grasses, ferns, etc.		<input type="checkbox"/>
<input type="checkbox"/> Lawn		<input type="checkbox"/>
<input type="checkbox"/> Boulders/rocks		<input type="checkbox"/>
<input type="checkbox"/> Gravel/sand		<input type="checkbox"/>
<input type="checkbox"/> Bare soil		<input type="checkbox"/>
<input type="checkbox"/> Pavement/structures		<input checked="" type="checkbox"/>
<input type="checkbox"/> Agricultural fields		<input type="checkbox"/>
<input type="checkbox"/> Pasture		<input type="checkbox"/>

6. Canopy Cover

Pick the category that best describes how much vegetation shades the stream at your site.

☐ 0% ☐ 25% ☒ 75% ☐ 100%

Notes on vegetation: _____

7. Bottom Substrate

Record the materials that make up the stream bottom.

Bottom types:

- ☐ Bedrock
- ☐ Boulder (> 10 inches)
- ☒ Cobble (2.5 inches - 10 inches) 50
- ☐ Gravel (0.1 inches - 2.5 inches)
- ☒ Sand (< 0.1 inches) 50
- ☐ Silt
- ☐ Other (include organics)

Notes on substrate: _____

8. Stream Discharge Estimate

Stream width: 8 feet
(a)

Depth measurements:

<u>1</u>	ft.	<u>7.5</u>
<u>1</u>	ft.	
<u>1</u>	ft.	
<u>1</u>	ft.	
<u>1</u>	ft.	

37 total / 5 = 7.4 avg. depth
(b)

Velocity: Time (per 10 ft)

<u>11</u>	sec.
<u>14</u>	sec.
<u>12</u>	sec.

37 total

divide total by number of trials

37 / 3 = 12.3 secs. (avg.)

Velocity = foot/second

10 ft. / 12.3 sec. (avg. time)

= 0.81 ft/sec.
(c)

Discharge: (width x depth x velocity)

8 feet x 7.5 feet x 0.81 ft/sec. =
(a) (b) (c)
= 4.86 ft³/sec.

9. Watershed Features

(within about 1/4 mile of the site - upstream)

Adjacent land used can impact the stream. Check "1" if present, "2" if clearly having an impact on the stream:

1 2 Residential

- ☐ single-family housing (dense)
- ☐ single-family housing (> 1 acre lots)
- ☐ multifamily housing
- ☐ lawns
- ☐ commercial/institutional

1 2 Roads, etc.

- ☒ paved roads, parking lots, bridges
- ☐ unpaved roads

1 2 Construction underway on:

- ☐ housing development
- ☐ commercial development
- ☐ road or bridge building/repair

1 2 Agricultural

- ☐ grazing land (pastures)
- ☐ feeding lots, animal holding areas
- ☒ cropland (type?)
- ☐ inactive agricultural land

1 2 Recreation

- ☐ golfing
- ☐ camping
- ☐ swimming/fishing/canoeing
- ☐ hunting land/natural

1 2 Other

- ☐ mining
- ☐ logging
- ☐ industry
- ☐ sanitary landfill
- ☐ sewage treatment plant
- ☐ dams

10. Channel Alteration

Has the stream been channelized?

Yes _____ No ☒

WAV materials revised
Summer, ©2005.

Stream Walk Worksheet

Willow

Stream Name

Sheboygan, WI

County

State

Tom Nedland

Your Name

Willow Creek, C12A

Monitoring Location (legal description – Township/Range/Section, longitude/latitude if known)

11-16-10

Date

Time

Attach photo or sketch your site:

Note features that affect stream habitat, such as riffles, runs, pools, ditches, wetlands, dams, riprap, outfalls, tributaries, landscape features, logging, paths and roads. Include an arrow showing which way the stream is flowing, and another arrow showing 'north.'

Weather in the past 24 hours:

- ☐ Storm (heavy rain)
☐ Rain (steady rain)
☒ Showers (intermittent rain)
☐ Overcast
☐ Clear/Sunny

Weather Now:

- ☐ Storm (heavy rain)
☐ Rain (steady rain)
☐ Showers (intermittent rain)
☐ Overcast
☒ Clear/Sunny

1. Water Appearance

- ☒ Clear
☐ Turbid
☐ Milky
☐ Foamy
☐ Other _____
☐ Dark Brown
☐ Oily Sheen
☐ Reddish
☐ Green

Notes _____

2. Water Odor

- ☒ None
☐ Sewage
☐ Chlorine
☐ Other _____
☐ Fishy
☐ Rotten Eggs
☐ Petroleum

Notes _____

3. Temperature

Air _____ °F °C
 Water _____ °F °C
 (circle temp. scale used)

(continued on back)

4. Submersed Aquatic Plants

Are there submersed aquatic plants?

Yes _____ No ☒

Where? _____

Identify or describe them: _____

5. Riparian Vegetation

Looking upstream, describe the streamside cover.

a) Note vegetation on streambank only and check boxes if present (left column is for left-hand side of stream; right column is for right-hand side).

left		right
<input type="checkbox"/>	Evergreen trees	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Hardwood trees	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Bushes, shrubs	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Tall grasses, ferns, etc.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Lawn	<input type="checkbox"/>
<input type="checkbox"/>	Boulders/rocks	<input type="checkbox"/>
<input type="checkbox"/>	Gravel/sand	<input type="checkbox"/>
<input type="checkbox"/>	Bare soil	<input type="checkbox"/>
<input type="checkbox"/>	Pavement/structures	<input type="checkbox"/>

b) Note vegetation from the top of streambank back 66 feet.

left		right
<input type="checkbox"/>	Evergreen trees	<input type="checkbox"/>
<input checked="" type="checkbox"/>	Hardwood trees	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Bushes, shrubs	<input checked="" type="checkbox"/>
<input checked="" type="checkbox"/>	Tall grasses, ferns, etc.	<input checked="" type="checkbox"/>
<input type="checkbox"/>	Lawn	<input type="checkbox"/>
<input type="checkbox"/>	Boulders/rocks	<input type="checkbox"/>
<input type="checkbox"/>	Gravel/sand	<input type="checkbox"/>
<input type="checkbox"/>	Bare soil	<input type="checkbox"/>
<input type="checkbox"/>	Pavement/structures	<input type="checkbox"/>
<input type="checkbox"/>	Agricultural fields	<input type="checkbox"/>
<input type="checkbox"/>	Pasture	<input type="checkbox"/>

6. Canopy Cover

Pick the category that best describes how much vegetation shades the stream at your site.

☐ 0% ☒ 25% ☐ 75% ☐ 100%

Notes on vegetation: _____

7. Bottom Substrate

Record the materials that make up the stream bottom.

Bottom types:

☐ Bedrock
☐ Boulder (> 10 inches)
 10 ☒ Cobble (2.5 inches - 10 inches)
☐ Gravel (0.1 inches - 2.5 inches)
☐ Sand (< 0.1 inches)
 90 ☒ Silt
☐ Other (include organics)

Notes on substrate: _____

8. Stream Discharge Estimate

Stream width: 7 feet
(a)

Depth measurements:

 ft.
 ft.
 ft.
 ft.
 ft.
 total / 5 = 5 avg. depth
 (b)

Velocity: Time (per 10 ft)

 sec.
 sec.
 sec.

 total

divide total by number of trials

 / 3 = secs. (avg.)

Velocity = foot/second

10 ft. / sec. (avg. time)

= 1 ft/sec.
(c)

Discharge: (width x depth x velocity)

7 feet x 5 feet x 1 ft/sec. =
(a) (b) (c)

= 3.5 ft³/sec.

9. Watershed Features

(within about 1/4 mile of the site - upstream)

Adjacent land used can impact the stream. Check "1" if present, "2" if clearly having an impact on the stream:

1 2 Residential

☐ single-family housing (dense)
☐ single-family housing (> 1 acre lots)
☐ multifamily housing
☐ lawns
☐ commercial/institutional

1 2 Roads, etc.

☐ paved roads, parking lots, bridges
☐ unpaved roads

1 2 Construction underway on:

☐ housing development
☐ commercial development
☐ road or bridge building/repair

1 2 Agricultural

☐ grazing land (pastures)
☐ feeding lots, animal holding areas
☒ cropland (type?)
☐ inactive agricultural land

1 2 Recreation

☐ golfing
☐ camping
☐ swimming/fishing/canoeing
☐ hunting land/natural

1 2 Other

☐ mining
☐ logging
☐ industry
☐ sanitary landfill
☐ sewage treatment plant
☐ dams

10. Channel Alteration

Has the stream been channelized?

Yes _____ No ☒

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 Summer, ©2005.

Stream Crossing Data Sheet

Site ID: C-1

General Information

Name of Observer(s): TSNDate: 11-16Road Name/Number: Hwy 23 Stream Name: Willow Creek

GPS Waypoint: _____

GPS

Lat/Long: _____

Additional Location

Comments: Hwy 23

Road Information

Road Type:

Federal

State

County

Town

Tribal

Private

Other: _____

Road Surface:

Paved

Gravel

Sand

Native Surface

Other: _____

Fill Depth (ft): > 10'Road Width (ft): > 50'Structure Length (ft):¹ > 50'

Crossing Information

Structure Type:

Culvert(s) no.: _____

Bridge

Ford

Dam

Other: _____

Structure ID: _____

Structure Shape

Round

Square/Rectangle

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition:

New

Good

Fair

Poor

Plugged: _____ %

Inlet

Outlet

In Pipe

Crushed: _____ %

Inlet

Outlet

In Pipe

Rusted Through?

Yes

No

Condition Comments: _____

Structure Height (ft):¹ 4Structure Water Depth (ft):^{1,3} I: O: 34Perch Height (ft):^{1,2} /Structure Width (ft):¹ 4Structure Water Velocity (ft/sec):¹ < .5Height of Head (ft):^{1,2} /¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.² Fill out, if present.³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow:

None

< ½ Bankfull

< Bankfull

= Bankfull

> Bankfull

Bankfull Width (ft): 7.5Stream Depth (ft): 2.5Stream Velocity (ft/sec): < .5Scour Pool Length & Width (ft):² 10 x 18Upstream Pond Length & Width (ft):² 10 x 15 NA

Fish Passage Information

Is the structure perched?	Yes	No	Is there ponding upstream?	Yes	No
Is there a scour pool at the outlet?	Yes	No	Is the structure fully backwatered?	Yes	No
Is there substrate through the structure's entire length?	Yes	No	Is there a change in head from the upstream side to downstream side?	Yes	No
Does the structure substrate match the stream substrate?	Yes	No	Is the structure narrower than the bankfull stream width?	Yes	No
Is water in the structure moving faster than in the stream?	Yes	No	Is there debris blocking the inlet?	Yes	No
Is water in the structure shallower than in the stream?	Yes	No	Is there evidence of overtopping or wash-outs?	Yes	No

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Inlet
 ☐ Outlet
- ☐ Road Approach – Left
 ☐ Road Approach – Right
 ☐
- ☐ Upstream Conditions
 ☐ Downstream Conditions
 ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- No channel on other side of Hwy 23. This culvert appears to be a drain tile ? storm discharge

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: _____ / Stream water depth: _____ = Depth Ratio: _____

Yes	No
Yes	No
Yes	No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: _____ Stream bankfull width: _____ = Constriction Ratio: _____

Yes	No
Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☐ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: G-1A

General Information

Name of Observer(s): TSN Date: 11-16-10

Road Name/Number: Bike Trail

Stream Name: _____

GPS Waypoint: _____ GPS Lat/Long: _____

Additional Location _____

Comments: Bike Trail 2 ponds between Hwy 3 bike trail

Road Information

Road Type: Federal State County _____ Town _____ Tribal _____ Private _____ Other: _____

Road Surface: Paved Gravel _____ Sand _____ Native Surface _____ Other: _____

Fill Depth (ft): 5 Road Width (ft): 9 Structure Length (ft):¹ 35 (thru pipe)

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge _____ Ford _____ Dam _____ Other: _____ Structure ID: _____

Structure Shape

Round

Square/Rectangle

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet _____ Outlet _____ In Pipe _____

Crushed _____ % Inlet _____ Outlet _____ In Pipe _____

Rusted Through? Yes _____ No _____

Condition Comments: _____

Structure Height (ft):¹ 2.5 Structure Water Depth (ft):^{1,3} I: 37 O: 39 Perch Height (ft):^{1,2} unknown

Structure Width (ft):¹ 2.5 Structure Water Velocity (ft/sec):¹ <.5 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 7.5 Stream Depth (ft): .5 Stream Velocity (ft/sec): <.5

Scour Pool Length & Width (ft):² 10x15 Upstream Pond Length & Width (ft):² 10x15

Fish Passage Information

Is the structure perched? <u>Is submerged</u>	Yes <u>No</u>	Is there ponding upstream?	Yes <u>No</u>
Is there a scour pool at the outlet?	<u>Yes</u> No	Is the structure fully backwatered?	<u>Yes</u> No
Is there substrate through the structure's entire length? <u>-could not tell, submerged</u>	Yes No	Is there a change in head from the upstream side to downstream side?	Yes <u>No</u>
Does the structure substrate match the stream substrate? <u>see above</u>	Yes No	Is the structure narrower than the bankfull stream width?	<u>Yes</u> No
Is water in the structure moving faster than in the stream?	Yes <u>No</u>	Is there debris blocking the inlet?	Yes <u>No</u>
Is water in the structure shallower than in the stream?	Yes <u>No</u>	Is there evidence of overtopping or wash-outs?	Yes <u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID

☐ Inlet

☐ Outlet

☐ Road Approach – Left

☐ Road Approach – Right

☐

☐ Upstream Conditions

☐ Downstream Conditions

☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

-culverts submerged. ~~Outlet~~ 9" under H₂O
Inlet 7" under H₂O
-This is the end of the channel. Does not continue on other side of Hwy 23

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 3.16 / Stream water depth: 0.5 = Depth Ratio: 6.32

Yes	No
Yes	No
Yes	No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 2.5 / Stream bankfull width: 7.5 = Constriction Ratio: 0.33

Yes	No
Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: C-2

General Information

Name of Observer(s): TSN Date: 11-16

Road Name/Number: NA

Stream Name: Willow Creek

GPS Waypoint: See map GPS Lat/Long: _____

Additional Location: _____

Comments: Field Crossing

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): 3.75 Road Width (ft): 17 Structure Length (ft):¹ 23

Crossing Information

Structure Type: Culvert(s) no.: _____ Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round - Outlet

Square/Rectangle - Inlet

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

* Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Outlet

Structure Height (ft):¹ 2.875 Structure Water Depth (ft):^{1,3} 1.50 Perch Height (ft):^{1,2} _____

Structure Width (ft):¹ 2.875 Structure Water Velocity (ft/sec):¹ <.5 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 12 Stream Depth (ft): .25 Stream Velocity (ft/sec): <.5

Scour Pool Length & Width (ft):² _____ Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	Yes	<u>No</u>	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	Yes	<u>No</u>	Is the structure fully backwatered?	<u>Yes</u>	<u>No</u>
Is there substrate through the structure's entire length?	<u>Yes</u>	No	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	<u>Yes</u>	No	Is the structure narrower than the bankfull stream width?	<u>Yes</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	Yes	<u>No</u>
Is water in the structure shallower than in the stream?	Yes	<u>No</u>	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Inlet
 ☐ Outlet
- ☐ Road Approach – Left
 ☐ Road Approach – Right
 ☐
- ☐ Upstream Conditions
 ☐ Downstream Conditions
 ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

-Channel upslope of culvert almost entirely silted in

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow. ?
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 0.75 / Stream water depth: 0.25 = Depth Ratio: 3

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 2.75 / Stream bankfull width: 12 = Constriction Ratio: 0.22

Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☐ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☒ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: C-3

General Information

Name of Observer(s): T. Medland Date: 11-16-10

Road Name/Number: LA

Stream Name: Willow Creek

GPS Waypoint: see map GPS Lat/Long: _____

Additional Location: Field Crossing

Comments: _____

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): 5 Road Width (ft): 20 Structure Length (ft):¹ 23.5'

Crossing Information

Structure Type: Culvert(s) no.: 2 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round

Square/Rectangle

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed: _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Structure Height (ft):¹ 4' (3.4') Structure Water Depth (ft):^{1,3} I: Dry O: _____ Perch Height (ft):^{1,2} 0

Structure Width (ft):¹ 58 (4.8) Structure Water Velocity (ft/sec):¹ _____ Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 8 Stream Depth (ft): Dry Stream Velocity (ft/sec): Dry

Scour Pool Length & Width (ft):² _____ Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	Yes	<u>No</u>	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	Yes	<u>No</u>	Is the structure fully backwatered?	Yes	<u>No</u>
Is there substrate through the structure's entire length?	Yes	<u>No</u>	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	Yes	<u>No</u>	Is the structure narrower than the bankfull stream width?	Yes	<u>No</u>
Is water in the structure moving faster than in the stream?	<u>Yes</u>	No	Is there debris blocking the inlet?	Yes	<u>No</u>
Is water in the structure shallower than in the stream?	<u>Yes</u>	No	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2	36	24	23.5
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- | | | |
|---|--|---------------------------------|
| <input type="checkbox"/> Site ID | <input type="checkbox"/> Inlet | <input type="checkbox"/> Outlet |
| <input type="checkbox"/> Road Approach – Left | <input type="checkbox"/> Road Approach – Right | <input type="checkbox"/> |
| <input type="checkbox"/> Upstream Conditions | <input type="checkbox"/> Downstream Conditions | <input type="checkbox"/> |

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- Crossing topped 1 time in last 20 years.
- Based on conversation w/ land owner

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: _____ / Stream water depth: _____ = Depth Ratio: 3.3 Dry

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes Dry	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 4.8 / Stream bankfull width: 8 = Constriction Ratio: 0.6

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☐ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☒ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No
Yes	No Dry
Yes	No Dry
<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No

Additional Comments _____

Stream Crossing Data Sheet

Site ID: E-4

General Information

Name of Observer(s): TSN

Date: 11-16

Road Name/Number: Range Line Road

Stream Name: _____

GPS Waypoint: See map

GPS

Lat/Long: _____

Additional Location _____

Comments: _____

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): 7 Road Width (ft): 20 Structure Length (ft):¹ 45

Crossing Information

Structure Type: Culvert(s) no.: _____ Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round

Square/Rectangle

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition:

New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments:

Structure Height (ft):¹ 6.7 Structure Water Depth (ft):^{1,3} I: .5 O: .5 Perch Height (ft):^{1,2} _____

Structure Width (ft):¹ 6 Structure Water Velocity (ft/sec):¹ <.5 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 12.5 Stream Depth (ft): .25 Stream Velocity (ft/sec): <.5

Scour Pool Length & Width (ft):² 7 x 15 Upstream Pond Length & Width (ft):² NA

Fish Passage Information

Is the structure perched?	Yes <input type="radio"/> No <input checked="" type="radio"/>	Is there ponding upstream?	Yes <input type="radio"/> No <input checked="" type="radio"/>
Is there a scour pool at the outlet?	Yes <input checked="" type="radio"/> No <input type="radio"/>	Is the structure fully backwatered?	Yes <input checked="" type="radio"/> No <input type="radio"/>
Is there substrate through the structure's entire length?	Yes <input checked="" type="radio"/> No <input type="radio"/>	Is there a change in head from the upstream side to downstream side?	Yes <input type="radio"/> No <input checked="" type="radio"/>
Does the structure substrate match the stream substrate?	Yes <input type="radio"/> No <input checked="" type="radio"/>	Is the structure narrower than the bankfull stream width?	Yes <input checked="" type="radio"/> No <input type="radio"/>
Is water in the structure moving faster than in the stream?	Yes <input type="radio"/> No <input checked="" type="radio"/>	Is there debris blocking the inlet?	Yes <input checked="" type="radio"/> No <input type="radio"/>
Is water in the structure shallower than in the stream?	Yes <input type="radio"/> No <input checked="" type="radio"/>	Is there evidence of overtopping or wash-outs?	Yes <input type="radio"/> No <input checked="" type="radio"/>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Inlet
 ☐ Outlet
- ☐ Road Approach – Left
 ☐ Road Approach – Right
 ☐
- ☐ Upstream Conditions
 ☐ Downstream Conditions
 ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

Box culvert Not a fish barrier.

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 0.5 / Stream water depth: 0.25 = Depth Ratio: 2

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 6 / Stream bankfull width: 12.5 = Constriction Ratio: 0.48

<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: 05

General Information

Name of Observer(s): TSN Date: 11-16-10Road Name/Number: Woodland

Stream Name: _____

GPS Waypoint: See map GPS Lat/Long: _____

Additional Location _____

Comments: _____

Road Information

Road Type: Federal State County Town Tribal Private Other: _____Road Surface: Paved Gravel Sand Native Surface Other: _____Fill Depth (ft): _____ Road Width (ft): 25 Structure Length (ft):¹ 32

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round

Square/Rectangle

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Structure Height (ft):¹ 6.3 Structure Water Depth (ft):^{1,3} I: 1.3 O: 2 Perch Height (ft):^{1,2} 2Structure Width (ft):¹ 6.3 Structure Water Velocity (ft/sec):¹ 4.5 Height of Head (ft):^{1,2} 1¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.² Fill out, if present.³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > BankfullBankfull Width (ft): 12 Stream Depth (ft): 1 Stream Velocity (ft/sec): 4.5Scour Pool Length & Width (ft):² 15 x 12 Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	Yes	<u>No</u>	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	<u>Yes</u>	No	Is the structure fully backwatered?	<u>Yes</u>	No
Is there substrate through the structure's entire length?	<u>Yes</u>	No	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	<u>Yes</u>	No	Is the structure narrower than the bankfull stream width?	<u>Yes</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	Yes	<u>No</u>
Is water in the structure shallower than in the stream?	Yes	<u>No</u>	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
- ☐ Road Approach – Left
- ☐ Upstream Conditions
- ☐ Inlet
- ☐ Road Approach – Right
- ☐ Downstream Conditions
- ☐ Outlet
- ☐
- ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- wide, "U" shaped channel. - Appears to have been ditched historically

- Does not appear to be a fish passage issue

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 1.65 / Stream water depth: 0.1 = Depth Ratio: 16.5

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 6.3 / Stream bankfull width: 12 = Constriction Ratio: 0.52

<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: C-6

General Information

Name of Observer(s): TSN Date: 11-16-10

Road Name/Number: Woodland North

Stream Name: _____

GPS Waypoint: See map GPS Lat/Long: _____

Additional Location _____

Comments: _____

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): _____ Road Width (ft): 25 Structure Length (ft):¹ 85

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round
Square/Rectangle
Open Bottom Square/Rectangle
Pipe Arch
Open Bottom Arch
Ellipse

Structure Material

Metal
Concrete
Plastic
Wood

Structure Interior

Smooth
Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Structure Height (ft):¹ 36 Structure Water Depth (ft):^{1,3} I: 1 O: 1 Perch Height (ft):^{1,2} 3

Structure Width (ft):¹ 36 Structure Water Velocity (ft/sec):¹ 1 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 3 Stream Depth (ft): 25 Stream Velocity (ft/sec): 5

Scour Pool Length & Width (ft):² 12 x 12 Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	<u>Yes</u>	No	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	<u>Yes</u>	No	Is the structure fully backwatered?	<u>Yes</u>	No
Is there substrate through the structure's entire length?	Yes	<u>No</u>	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	Yes	<u>No</u>	Is the structure narrower than the bankfull stream width?	<u>Yes</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	<u>Yes</u>	No
Is water in the structure shallower than in the stream?	<u>Yes</u>	No	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Road Approach – Left
 ☐ Upstream Conditions
- ☐ Inlet
 ☐ Road Approach – Right
 ☐ Downstream Conditions
- ☐ Outlet
 ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- ^{single} fish observed in scour hole
 - Outlet is a blockage to fish passage
 - Inlet is " "

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No

Structure water depth: 1 / 25 = Depth Ratio: 0.04

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

<input type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

<input type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input type="radio"/> No

Structure width: _____ / Stream bankfull width: _____ = Constriction Ratio: _____

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No

Additional Comments

Stream Crossing Data Sheet

Site ID: C-7

General Information

Name of Observer(s): TGN Date: 11-16-10

Road Name/Number: Twin Oaks

Stream Name: _____

GPS Waypoint: See Map GPS Lat/Long: _____

Additional Location _____

Comments: _____

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): 4.6 Road Width (ft): 35 Structure Length (ft):¹ 60

Crossing Information

Structure Type: Culvert(s) no.: 2 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round
Square/Rectangle
Open Bottom Square/Rectangle
Pipe Arch
Open Bottom Arch
Ellipse

Structure Material

Metal
Concrete
Plastic
Wood
Structure Interior
Smooth
Corrugated

Structure Condition

General Condition: New Good Fair Poor
Plugged: _____ % Inlet Outlet In Pipe
Crushed _____ % Inlet Outlet In Pipe
Rusted Through? Yes No
Condition Comments: _____

Structure Height (ft):¹ 4 Structure Water Depth (ft):^{1,3} I: 1.25 O: 1.0 Perch Height (ft):^{1,2} _____

Structure Width (ft):¹ 6.25 Structure Water Velocity (ft/sec):¹ < 0.5 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 25 Stream Depth (ft): 0.5 Stream Velocity (ft/sec): < 0.5

Scour Pool Length & Width (ft):² _____ Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	Yes	<u>No</u>	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	Yes	<u>No</u>	Is the structure fully backwatered?	<u>Yes</u>	No
Is there substrate through the structure's entire length? <u>Large rock</u>	<u>Yes</u>	No	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	<u>Yes</u>	No	Is the structure narrower than the bankfull stream width?	<u>Yes</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	<u>Yes</u>	No
Is water in the structure shallower than in the stream?	Yes	<u>No</u>	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2	4	6.25	60
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Road Approach – Left
 ☐ Upstream Conditions
- ☐ Inlet
 ☐ Road Approach – Right
 ☐ Downstream Conditions
- ☐ Outlet
 ☐
☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- Culvert 2 does not receive inflows except during High flow events
- Several fish observed at outlet, 3 swimming upstream into culvert - Not trout

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Structure water depth: 1.1 / Stream water depth: 0.5 = Depth Ratio: 2.2

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No

Structure width: 6.25 / Stream bankfull width: 25 = Constriction Ratio: 0.25

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: C-8

General Information

Name of Observer(s): Tom Wedlar Date: 11-16-10

Road Name/Number: Highland Drive

Stream Name: Willow Creek

GPS Waypoint: See map GPS Lat/Long: _____

Additional Location Comments: Fish observed swimming through box culvert; both up & downstream

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): _____ Road Width (ft): _____ Structure Length (ft):¹ _____

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round
Square/Rectangle
Open Bottom Square/Rectangle
Pipe Arch
Open Bottom Arch
Ellipse

Structure Material

Metal
Concrete
Plastic
Wood

Structure Interior

Smooth
Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed: _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Structure Height (ft):¹ _____ Structure Water Depth (ft):^{1,3} I: No O: Formal Perch Height (ft):^{1,2} 0

Structure Width (ft):¹ 20 Structure Water Velocity (ft/sec):¹ Notes Recorded Height of Head (ft):^{1,2} 0

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None 1/2 Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): No Stream Depth (ft): Notes Stream Velocity (ft/sec): _____

Scour Pool Length & Width (ft):² Recorded Upstream Pond Length & Width (ft):² 0

Fish Passage Information

Is the structure perched?	Yes	<u>No</u>	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	Yes	<u>No</u>	Is the structure fully backwatered?	<u>Yes</u>	No
Is there substrate through the structure's entire length?	<u>Yes</u>	No	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	<u>Yes</u>	No	Is the structure narrower than the bankfull stream width?	<u>Yes</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	Yes	<u>No</u>
Is water in the structure shallower than in the stream?	Yes	No	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Inlet
 ☐ Outlet
- ☐ Road Approach – Left
 ☐ Road Approach – Right
 ☐
- ☐ Upstream Conditions
 ☐ Downstream Conditions
 ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

Fish observed swimming through culvert - both up & downstream

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: _____ / Stream water depth: _____ = Depth Ratio: _____

Yes	No
Yes	No
Yes	No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: _____ / Stream bankfull width: _____ = Constriction Ratio: _____

Yes	No
Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☐ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: C-9

General Information

Name of Observer(s): Nedland & Guntow Date: 11-16-10
 Road Name/Number: Kohler property
 Stream Name: Willow Creek
 GPS Waypoint: See map. GPS Lat/Long: _____
 Additional Location _____
 Comments: _____

Road Information

Road Type: Federal State County Town Tribal (Private) Other: _____
 Road Surface: Paved Gravel Sand (Native Surface) Other: _____
 Fill Depth (ft): ? Road Width (ft): NA Structure Length (ft):¹ 200

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge Ford Dam Other: _____ Structure ID: _____
 Structure Shape: Round (Square/Rectangle) Open Bottom Square/Rectangle Pipe Arch Open Bottom Arch Ellipse
 Structure Material: Metal (Concrete) Plastic Wood
 Structure Interior: (Smooth) Corrugated
 Structure Condition: General Condition: New Good Fair Poor
 Plugged: _____ % Inlet Outlet In Pipe
 Crushed: _____ % Inlet Outlet In Pipe
 Rusted Through? Yes No
 Condition Comments: _____

Structure Height (ft):¹ _____ Structure Water Depth (ft):^{1,3} I: .17 O: .67 Perch Height (ft):^{1,2} _____
 Structure Width (ft):¹ 20 Structure Water Velocity (ft/sec):¹ .3 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < 1/2 Bankfull (< Bankfull) = Bankfull > Bankfull
 Bankfull Width (ft): 10 Stream Depth (ft): .75 Stream Velocity (ft/sec): .2
 Scour Pool Length & Width (ft):² _____ Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	Yes	<u>(No)</u>	Is there ponding upstream?	Yes	<u>(No)</u>
Is there a scour pool at the outlet?	Yes	<u>(No)</u>	Is the structure fully backwatered?	<u>(Yes)</u>	No
Is there substrate through the structure's entire length?	Yes	<u>(No)</u>	Is there a change in head from the upstream side to downstream side?	Yes	<u>(No)</u>
Does the structure substrate match the stream substrate? <u>Where Present</u>	<u>(Yes)</u>	No	Is the structure narrower than the bankfull stream width?	<u>(Yes)</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>(No)</u>	Is there debris blocking the inlet?	Yes	<u>(No)</u>
Is water in the structure shallower than in the stream?	<u>(Yes)</u>	No	Is there evidence of overtopping or wash-outs?	Yes	<u>(No)</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
- ☐ Road Approach – Left
- ☐ Upstream Conditions
- ☐ Inlet
- ☐ Road Approach – Right
- ☐ Downstream Conditions
- ☐ Outlet
- ☐
- ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- Very little flow on inlet end of culvert.

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 0.42 / Stream water depth: 0.75 = Depth Ratio: 0.56

Yes	No
Yes	No
Yes	No

Passability = 0.5

~~Some species and/or life stages cannot pass at most flows.~~

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet. for 100 feet
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 20 / Stream bankfull width: 10 = Constriction Ratio: 2

Yes	No
Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet. < 0.2 feet for 100 ft
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: _____

General Information

Name of Observer(s): Tom Nedland Date: 11-16-10

Road Name/Number: Hwy 43 Culvert 910

Stream Name: Willow

GPS Waypoint: See Map GPS Lat/Long: _____

Additional Location _____

Comments: _____

Road Information

Road Type: ☒ Federal ☐ State ☐ County ☐ Town ☐ Tribal ☐ Private ☐ Other: _____

Road Surface: ☒ Paved ☐ Gravel ☐ Sand ☐ Native Surface ☐ Other: _____

Fill Depth (ft): _____ Road Width (ft): _____ Structure Length (ft): 1330

Crossing Information

Structure Type: Culvert(s) no.: 1 ☐ Bridge ☐ Ford ☐ Dam ☐ Other: _____ Structure ID: _____

Structure Shape

☒ Round
☒ Square/Rectangle
☐ Open Bottom Square/Rectangle
☐ Pipe Arch
☐ Open Bottom Arch
☐ Ellipse

Structure Material

☐ Metal
☒ Concrete
☐ Plastic
☐ Wood
Structure Interior
☒ Smooth
☐ Corrugated

Structure Condition

General Condition: ☐ New ☐ Good ☐ Fair ☐ Poor
Plugged: _____ % ☐ Inlet ☐ Outlet ☐ In Pipe
Crushed: _____ % ☐ Inlet ☐ Outlet ☐ In Pipe
Rusted Through? ☐ Yes ☐ No
Condition Comments: _____

Structure Height (ft): ¹ — Structure Water Depth (ft): ^{1,3} 1.17 ^{Perch Height (ft): ^{1,2} —}

Structure Width (ft): ¹ 20 Structure Water Velocity (ft/sec): ¹ 0.3 Height of Head (ft): ^{1,2} —

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: ☐ None ☐ < 1/2 Bankfull ☒ < Bankfull ☐ = Bankfull ☐ > Bankfull

Bankfull Width (ft): 8 Stream Depth (ft): 0.25 Stream Velocity (ft/sec): 1.2

Scour Pool Length & Width (ft): ² — Upstream Pond Length & Width (ft): ² —

Fish Passage Information

Is the structure perched?	Yes	<input checked="" type="radio"/> No	Is there ponding upstream?	Yes	<input checked="" type="radio"/> No
Is there a scour pool at the outlet?	Yes	<input checked="" type="radio"/> No	Is the structure fully backwatered?	<input checked="" type="radio"/> Yes	<input type="radio"/> No
Is there substrate through the structure's entire length?	Yes	<input checked="" type="radio"/> No	Is there a change in head from the upstream side to downstream side?	Yes	<input type="radio"/> No
Does the structure substrate match the stream substrate? <u>Where present</u>	<input checked="" type="radio"/> Yes	<input type="radio"/> No	Is the structure narrower than the bankfull stream width?	Yes	<input type="radio"/> No
Is water in the structure moving faster than in the stream?	Yes	<input checked="" type="radio"/> No	Is there debris blocking the inlet?	Yes	<input checked="" type="radio"/> No
Is water in the structure shallower than in the stream?	<input checked="" type="radio"/> Yes	<input type="radio"/> No	Is there evidence of overtopping or wash-outs?	Yes	<input checked="" type="radio"/> No

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Road Approach – Left
 ☐ Upstream Conditions
- ☐ Inlet
 ☐ Road Approach – Right
 ☐ Downstream Conditions
- ☐ Outlet
 ☐
☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- Box culvert has two passages. N'y passage only flows during High Flows. Not connected to stream during site visit.

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 0.15 (weighted avg) / Stream water depth: 0.75 = Depth Ratio: 0.2

Yes No
Yes No
Yes No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet. (weighted average = 0.15)
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes No
Yes No
Yes No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 20 / Stream bankfull width: 8 = Constriction Ratio: 2.5

Yes No
Yes No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

Yes No
Yes No
Yes No
Yes No
Yes No
Yes No
Yes No

Additional Comments

Stream Crossing Data Sheet

Site ID: _____

General Information

Name of Observer(s): Neelband Date: 11-16-10

Road Name/Number: Greendale Road C11

Stream Name: Willow

GPS Waypoint: See Map GPS Lat/Long: _____

Additional Location Comments: Abandoned Road

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): _____ Road Width (ft): _____ Structure Length (ft):¹ 60

Crossing Information

Structure Type: Culvert(s) no.: 2 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round
Square/Rectangle
Open Bottom Square/Rectangle
Pipe Arch
Open Bottom Arch
Ellipse

Structure Material

Metal
Concrete
Plastic
Wood
Structure Interior
Smooth
Corrugated

Structure Condition

General Condition: New Good Fair Poor
Plugged: _____ % Inlet Outlet In Pipe
Crushed: _____ % Inlet Outlet In Pipe
Rusted Through? Yes No
Condition Comments: _____

Structure Height (ft):¹ 6 Structure Water Depth (ft):^{1,3} I: .42 O: .83 Perch Height (ft):^{1,2} _____

Structure Width (ft):¹ 6 Structure Water Velocity (ft/sec):¹ < .5 Height of Head (ft):^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < ½ Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 15 Stream Depth (ft): 1.25 Stream Velocity (ft/sec): < .5

Scour Pool Length & Width (ft):² 20 x 20 Upstream Pond Length & Width (ft):² _____

Fish Passage Information

Is the structure perched?	Yes	<u>No</u>	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	<u>Yes</u>	No	Is the structure fully backwatered?	<u>Yes</u>	No
Is there substrate through the structure's entire length? <u>Sparsely sand & gravel</u>	Yes	<u>No</u>	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	Yes	<u>No</u>	Is the structure narrower than the bankfull stream width?	Yes	<u>No</u>
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	<u>Yes</u>	No
Is water in the structure shallower than in the stream?	<u>Yes</u>	No	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2	6	6	60
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Road Approach – Left
 ☐ Upstream Conditions
- ☐ Inlet
 ☐ Road Approach – Right
 ☐ Downstream Conditions
- ☐ Outlet
 ☐
☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

Debris dam at inlet.
- Large fish observed at outlet.

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: 0.62 / Stream water depth: 1.25 = Depth Ratio: 0.5

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	<input checked="" type="radio"/> No
Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 12 / Stream bankfull width: 15 = Constriction Ratio: 0.8

<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	No
Yes	<input checked="" type="radio"/> No

Additional Comments

Stream Crossing Data Sheet

Site ID: _____

General Information

Name of Observer(s): Neelam Date: _____

Road Name/Number: C12 (Field Road)

Stream Name: Willow

GPS Waypoint: See Map GPS Lat/Long: _____

Additional Location Comments: Water main blocks outlet

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: _____

Fill Depth (ft): _____ Road Width (ft): _____ Structure Length (ft): ¹ 50

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round

Square/Rectangle

Open Bottom Square/Rectangle

Pipe Arch

Open Bottom Arch

Ellipse

Structure Material

Metal

Concrete

Plastic

Wood

Structure Interior

Smooth

Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed: _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Structure Height (ft): ¹ 4 Structure Water Depth (ft): ^{1,3} 1.17 O: 0.67 Perch Height (ft): ^{1,2} _____

Structure Width (ft): ¹ 4 Structure Water Velocity (ft/sec): ¹ <.5 Height of Head (ft): ^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None 25 1/2 Bankfull downstream < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): _____ Stream Depth (ft): _____ Stream Velocity (ft/sec): _____

Scour Pool Length & Width (ft): ² _____ Upstream Pond Length & Width (ft): ² _____

Fish Passage Information

Is the structure perched?	Yes	No	Is there ponding upstream?	Yes	No
Is there a scour pool at the outlet?	Yes	No	Is the structure fully backwatered?	Yes	No
Is there substrate through the structure's entire length?	Yes	No	Is there a change in head from the upstream side to downstream side?	Yes	No
Does the structure substrate match the stream substrate?	Yes	No	Is the structure narrower than the bankfull stream width?	Yes	No
Is water in the structure moving faster than in the stream?	Yes	No	Is there debris blocking the inlet?	Yes	No
Is water in the structure shallower than in the stream?	Yes	No	Is there evidence of overtopping or wash-outs?	Yes	No

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam	
	Length	Width	Depth		Yes	No		
Road Approach – Left					Yes	No		
Road Approach – Right					Yes	No		
Road over Crossing					Yes	No		
Upstream Ditch – Left					Yes	No		
Upstream Ditch – Right					Yes	No		
Downstream Ditch – Left					Yes	No		
Downstream Ditch – Right					Yes	No		
Upstream Embankment – Left					Yes	No		
Upstream Embankment – Right					Yes	No		
Downstream Embankment – Left					Yes	No		
Downstream Embankment – Right					Yes	No		
Total Erosion at Crossing:								
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?							Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
 ☐ Inlet
 ☐ Outlet
- ☐ Road Approach – Left
 ☐ Road Approach – Right
 ☐
- ☐ Upstream Conditions
 ☐ Downstream Conditions
 ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

- Watermain acts as potential fish barrier
 - No notes on stream as it flows into another culvert 25 ft. downstream.

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: _____ / Stream water depth: _____ = Depth Ratio: _____

Yes	No
Yes	No
Yes	No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet.
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: _____ / Stream bankfull width: _____ = Constriction Ratio: _____

Yes	No
Yes	No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet.
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☐ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No
Yes	No

Additional Comments

Stream Crossing Data Sheet

Site ID: _____

General Information

Name of Observer(s): Nedland Date: _____

Road Name/Number: RR Tracks C12A

Stream Name: Willow

GPS Waypoint: See Map GPS Lat/Long: _____

Additional Location _____

Comments: _____

Road Information

Road Type: Federal State County Town Tribal Private Other: _____

Road Surface: Paved Gravel Sand Native Surface Other: Rail Road

Fill Depth (ft): _____ Road Width (ft): _____ Structure Length (ft): ¹ 60

Crossing Information

Structure Type: Culvert(s) no.: 1 Bridge Ford Dam Other: _____ Structure ID: _____

Structure Shape

Round
Square/Rectangle
Open Bottom Square/Rectangle
Pipe Arch
Open Bottom Arch
Ellipse

Structure Material

Metal
Concrete
Plastic
Wood

Structure Interior

Smooth
Corrugated

Structure Condition

General Condition: New Good Fair Poor

Plugged: _____ % Inlet Outlet In Pipe

Crushed _____ % Inlet Outlet In Pipe

Rusted Through? Yes No

Condition Comments: _____

Structure Height (ft): ¹ 4 Structure Water Depth (ft): ^{1,3} I: .5 O: .08 Perch Height (ft): ^{1,2} .33

Structure Width (ft): ¹ 4 Structure Water Velocity (ft/sec): ¹ 1 Height of Head (ft): ^{1,2} _____

¹ Fill out for primary culvert (culvert #1). If multiple culverts are used, see reverse.

² Fill out, if present.

³ For a culvert, record the water depth at the inlet (I) and outlet (O) to determine if the culvert is fully backwatered. Record just 1 depth for other structures.

Stream Information

Stream Flow: None < ½ Bankfull < Bankfull = Bankfull > Bankfull

Bankfull Width (ft): 7 Stream Depth (ft): .5 Stream Velocity (ft/sec): 1

Scour Pool Length & Width (ft): ² 25 x 10 Upstream Pond Length & Width (ft): ² _____

Fish Passage Information

Is the structure perched?	<u>Yes</u>	No	Is there ponding upstream?	Yes	<u>No</u>
Is there a scour pool at the outlet?	<u>Yes</u>	No	Is the structure fully backwatered?	<u>Yes</u>	No
Is there substrate through the structure's entire length?	<u>Yes</u>	No	Is there a change in head from the upstream side to downstream side?	Yes	<u>No</u>
Does the structure substrate match the stream substrate?	<u>Yes</u>	No	Is the structure narrower than the bankfull stream width?	<u>Yes</u>	No
Is water in the structure moving faster than in the stream?	Yes	<u>No</u>	Is there debris blocking the inlet?	<u>Yes</u>	No
Is water in the structure shallower than in the stream?	<u>Yes</u>	No	Is there evidence of overtopping or wash-outs?	Yes	<u>No</u>

Erosion Information

Fill out all that apply. Use blank rows for additional locations. Additional locations may include prominent erosion along stream banks within 50 feet of crossing. Left and right are facing downstream. Note any comments below.

Location of Erosion	Erosion Dimensions (ft)			Total Erosion (Cubic feet)	Erosion Reaching Stream		Material Eroded Sand, Silt, Clay, Gravel, Loam, Sandy Loam or Gravelly Loam
	Length	Width	Depth				
Road Approach – Left					Yes	No	
Road Approach – Right					Yes	No	
Road over Crossing					Yes	No	
Upstream Ditch – Left					Yes	No	
Upstream Ditch – Right					Yes	No	
Downstream Ditch – Left					Yes	No	
Downstream Ditch – Right					Yes	No	
Upstream Embankment – Left					Yes	No	
Upstream Embankment – Right					Yes	No	
Downstream Embankment – Left					Yes	No	
Downstream Embankment – Right					Yes	No	
Total Erosion at Crossing:							
If there is erosion occurring, can corrective actions, such as road drainage measures, be installed to address the problem?						Yes	No

Multiple Culverts

Number multiple cells from left to right facing downstream. Include a diagram below indicating which culvert is culvert #1.

Culvert #	Width (ft)	Height (ft)	Length (ft)
2			
3			

Culvert #	Width (ft)	Height (ft)	Length (ft)
4			
5			

Photos

- ☐ Site ID
- ☐ Inlet
- ☐ Outlet
- ☐ Road Approach – Left
- ☐ Road Approach – Right
- ☐
- ☐ Upstream Conditions
- ☐ Downstream Conditions
- ☐

Additional Site Comments

Culvert diagram, erosion, channel condition, evidence of wash-out, beaver, local testimony of frequency of overtopping...

Large fish observed downstream of culvert

Fish Passage Determination Summary

Site ID: _____

Follow these guidelines to determine "passability" for a range of fish species. Thresholds may need to be modified if the objective is to evaluate passage for a particular species. Answer all questions.

Passability = 0

Most species and life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.

1. The outlet of the structure is perched.
2. The structure water velocity is greater than 3 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is less than 0.1 (depth ratio).

Structure water depth: .29 / Stream water depth: .5 = Depth Ratio: .58

<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No

Passability = 0.5

Some species and/or life stages cannot pass at most flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.5.

1. The water depth in the structure is less than 0.2 feet. *yes. At outlet.*
2. The structure water velocity is 2-3 feet/second during baseflow.
3. The structure is longer than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No

Passability = 0.9

Barrier at high flows.

If any of the following questions can be answered "yes", then the crossing barrier score = 0.9.

1. There is a scour pool below the structure.
2. The ratio of the structure width to stream bankfull width is less than 0.5. (constriction ratio).

Structure width: 4 / Stream bankfull width: 7 = Constriction Ratio: .57

<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No

Passability = 1

Not a barrier.

If all of the following questions can be answered "yes", then the crossing barrier score = 1.

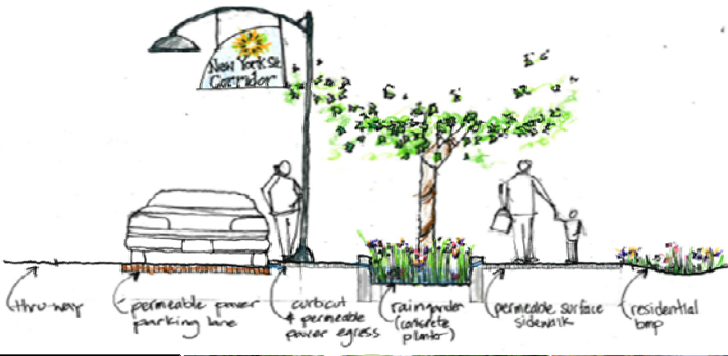
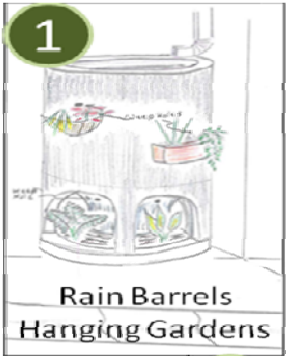
1. The outlet of the structure is not perched.
2. The structure water velocity is less than 2 feet/second during baseflow.
3. The ratio of the structure water depth to stream water depth is greater than 0.1 (depth ratio).
4. The water depth in the structure is greater than 0.2 feet. *1 inch at Inlet*
5. There is not a scour pool below the structure.
6. The ratio of the structure width to stream bankfull width is greater than 0.5 (constriction ratio).
7. ☒ The structure is longer than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and has natural substrate through its entire length, or
☐ The structure is shorter than 30 feet and does not have natural substrate through its entire length.

<input checked="" type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input type="radio"/> Yes	<input checked="" type="radio"/> No
<input checked="" type="radio"/> Yes	<input type="radio"/> No
<input type="radio"/> Yes	<input type="radio"/> No

Additional Comments

ATTACHMENT D

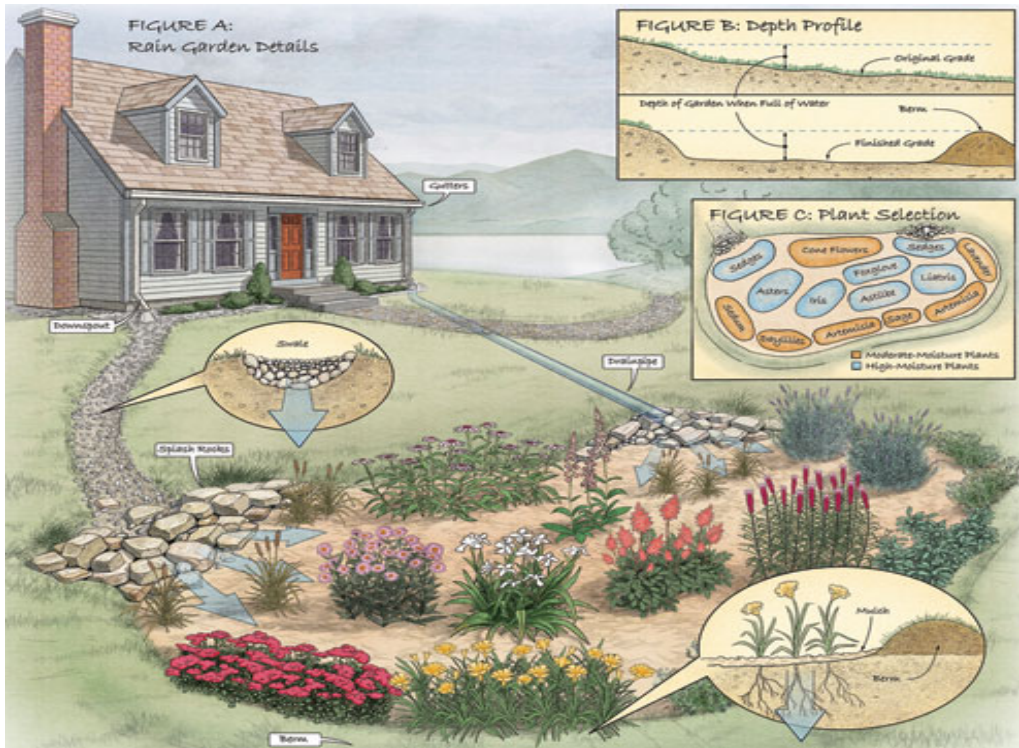
Green/Sustainable Infiltration Practices for New Development and Basin Retrofits



Example of Basin Storage Approach



Rain Garden Design Example



Conceptual Stormwater Infiltration Design

