

APPENDIX A
Summary Table

Survey Date (s)	Site	Native Plant Community Code	Description	Calcareous Fen Point Summary
6/29/2016 and 8/15/2016	BR01	OPp93	Calc Fen - Prairie Extremely Rich Fen	80
7/1/2016	BR02	WMp73	Prairie Wet Meadow/Carr	0
7/1/2016	BR02	MRp93	Prairie Bulrush-Arrowhead Marsh	0
6/30/2016	BR03	WMp73	Prairie Wet Meadow/Carr	0
6/30/2016	BR04	WMs83	Southern Seepage Meadow/Carr	0
6/30/2016	BR05	None	Degraded Wet Meadow/Cattail Marsh	0
6/30/2016	BR06	None	Drainage swale dominated by reed canary grass	0
N/A	BR07	N/A	Not Evaluated	0
6/30/2016	BR08	WM	Wet Meadow Community - no type assigned	0
6/30/2016	BR09	None	Upland	0
6/30/2016	BR10	None	Upland	0
6/30/2016	BR11	None	Drainage Swale	0
6/30/2016	BR12	WMs83	Southern Seepage Meadow/Carr	25
6/30/2016	BR13	WMs83	Southern Seepage Meadow/Carr	25
6/30/2016 and 8/15/2016	BR14	WM or OP	Wet Meadow or Calc Fen	50
7/1/2016	BR15	None	Upland	0
7/1/2016	BR16	None	Upland	0
7/1/2016	BR17	WMp73	Prairie Wet Meadow/Carr	0
7/1/2016	BR18	WMp73	Prairie Wet Meadow/Carr	0
7/1/2016	BR19	WMs83	Southern Seepage Meadow/Carr	25
7/1/2016	BR20	WMs83	Southern Seepage Meadow/Carr	25
7/1/2016	BR21	WMp73	Prairie Wet Meadow/Carr	0
7/1/2016	BR22	OPp93	Calc Fen - Prairie Extremely Rich Fen	190
7/1/2016	BR23	OPp93	Calc Fen - Prairie Extremely Rich Fen	55
8/16/2016	BR24	None	Upland	0
8/16/2016	BR25	OPp93	Calc Fen - Prairie Extremely Rich Fen	75
8/16/2016	BR26	None	Upland	0
8/16/2016	BR27	WM	Degraded Wet Meadow	0
8/16/2016	BR28	None	Upland/Degraded Wetland	0
8/16/2016	BR29	None	Upland	0
8/16/2016	BR30	None	Upland	0
8/16/2016	BR31	None	Upland	0
8/16/2016	BR32	OPp93	Calc Fen - Prairie Extremely Rich Fen	110
8/16/2016	BR33	WM	Wet Meadow Complex	0

APPENDIX B
Summary of Scoring Results

APPENDIX C

Site Photos



BR01



BR02 – WMp73



BR02 – MRn93



BR03



BR04



BR05



BR06



BR08



BR09



BR10



BR11



BR12



BR13



BR14



BR15



BR16



BR17



BR18



BR19



BR20



BR21



BR22



BR23



BR24



BR25



BR26



BR27



BR28



BR29



BR30



BR31



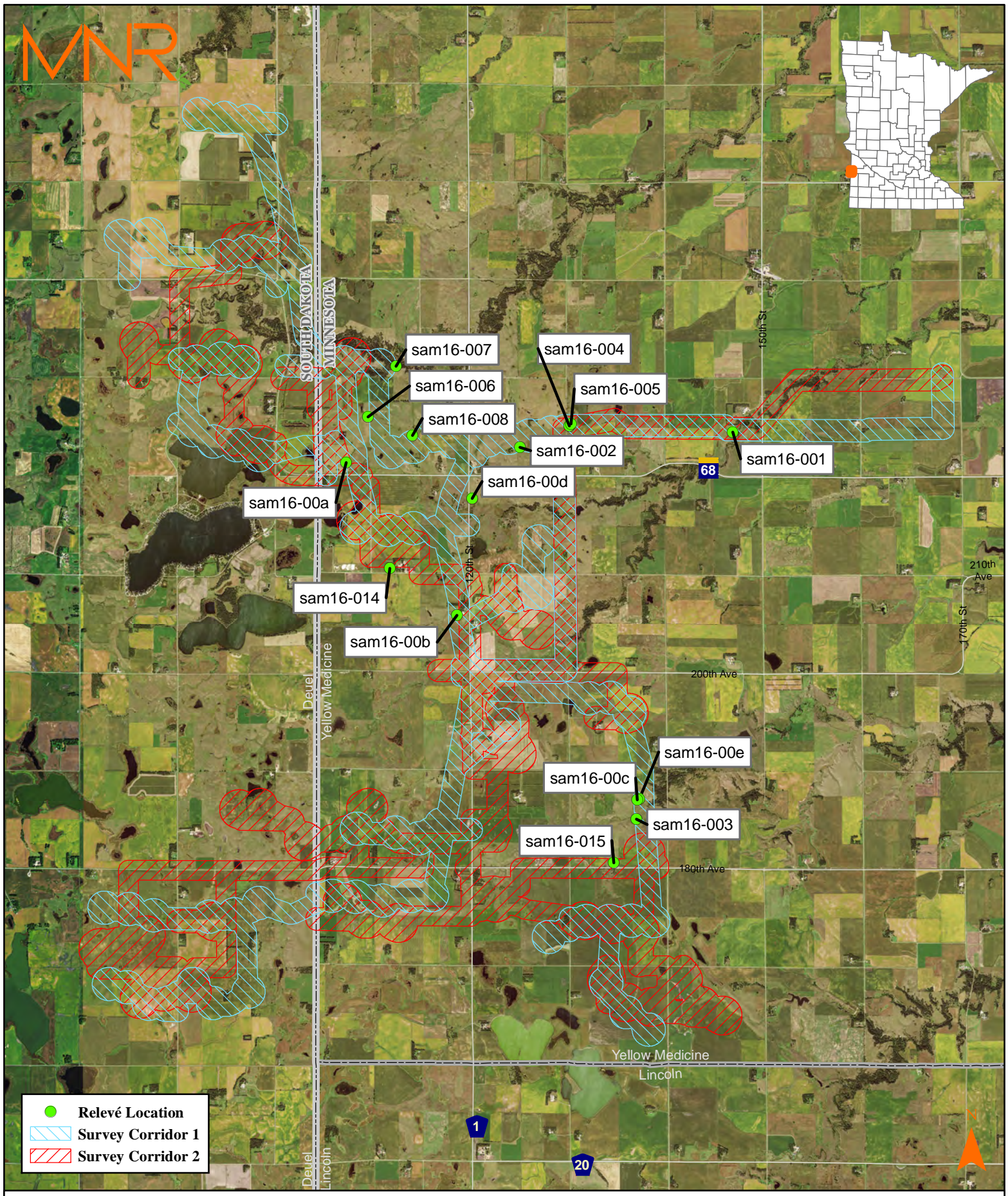
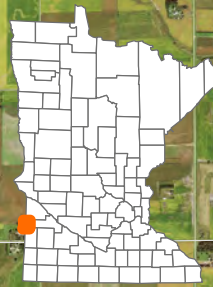
BR32



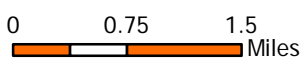
BR33

APPENDIX D
Relevé Forms

Survey Date (s)	Site	Native Plant Community Code	Description	Relevé ID	MN DNR Fen ID	Within Project Footprint (8/12/2016)
6/29/2016 and 8/15/2016	BR01	OPp93	Calc Fen - Prairie Extremely Rich Fen	sam16-001	ID	Yes
7/1/2016	BR02	WMp73	Prairie Wet Meadow/Carr	sam16-004		Yes
7/1/2016	BR02	MRp93	Prairie Bulrush-Arrowhead Marsh	sam16-005		Yes
6/30/2016	BR03	WMp73	Prairie Wet Meadow/Carr	sam16-002		No
6/30/2016	BR04	WMs83	Southern Seepage Meadow/Carr	sam16-008		No
6/30/2016	BR05	None	Degraded Wet Meadow/Cattail Marsh	sam16-00a		Yes
6/30/2016	BR06	None	Drainage swale dominated by reed canary grass			Yes
N/A	BR07	N/A	Not Evaluated			No
6/30/2016	BR08	WM	Wet Meadow Community - no type assigned	sam16-00b		No
6/30/2016	BR09	None	Upland			Yes
6/30/2016	BR10	None	Upland			No
6/30/2016	BR11	None	Drainage Swale			No
6/30/2016	BR12	WMs83	Southern Seepage Meadow/Carr	sam16-00e		No
6/30/2016	BR13	WMs83	Southern Seepage Meadow/Carr	sam16-00c		No
6/30/2016 and 8/15/2016	BR14	WM or OP	Wet Meadow or Calc Fen	sam16-003		No
7/1/2016	BR15	None	Upland			No
7/1/2016	BR16	None	Upland			No
7/1/2016	BR17	WMp73	Prairie Wet Meadow/Carr	sam16-006		No
7/1/2016	BR18	WMp73	Prairie Wet Meadow/Carr			No
7/1/2016	BR19	WMs83	Southern Seepage Meadow/Carr	sam16-007		No
7/1/2016	BR20	WMs83	Southern Seepage Meadow/Carr	sam16-00d		No
7/1/2016	BR21	WMp73	Prairie Wet Meadow/Carr			Yes
7/1/2016	BR22	OPp93	Calc Fen - Prairie Extremely Rich Fen		Fortier 6	No
7/1/2016	BR23	OPp93	Calc Fen - Prairie Extremely Rich Fen			No
8/16/2016	BR24	None	Upland			Yes
8/16/2016	BR25	OPp93	Calc Fen - Prairie Extremely Rich Fen	sam16-015		Yes
8/16/2016	BR26	None	Upland			Yes
8/16/2016	BR27	WM	Degraded Wet Meadow			No
8/16/2016	BR28	None	Upland/Degraded Wetland			Yes
8/16/2016	BR29	None	Upland			Yes
8/16/2016	BR30	None	Upland			Yes
8/16/2016	BR31	None	Upland			Yes
8/16/2016	BR32	OPp93	Calc Fen - Prairie Extremely Rich Fen	sam16-014	Fortier 5	No
8/16/2016	BR33	WM	Wet Meadow Complex			No



- Relevé Location
- ▨ Survey Corridor 1
- ▨ Survey Corridor 2



Bitter Root Wind Project
Calcareous Fen Evaluation
Yellow Medicine County, MN

Relevé Locations





Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
 Surveyor(s): S. Milburn
 Surveyor's Relève #: SAW14-001 Surveyor's Place Name: BR 81
 Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNE
 Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
 Revisit: (Y)es (N)o _____ Original DNR Relève #: _____
 Date: 23 Month: JUN Year: 2016 (e.g. 09 JUL 2004)
 MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
 NPC Code (Name): OP p 93 (_____)
 NPC Ranking in Relève: _____
 Stand Typical of NPC: (Y)es (N)o (U)ncertain
 If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
 Relève Typical of Stand: (Y)es (N)o
 If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
 Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 708653 E } (record in NAD83, Zone 16)
4955729 N }
 UTM Accuracy: _____ meters
 Location Source: (G)PS (A)ir photo (T)opo map (L)idar (O)ther _____
 County: VELVET MEDICINE Township: _____ N Range: _____ Section: _____ QRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
 Elevation: _____ ft. Slope: 45 (°) or _____ (%) Aspect: S (e.g., N, NE, etc.; LV for level)
 Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
 Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
 Humus Thickness: _____ cm
 Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
 Earthworms Present: (Y)es (N)o
 Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
 Depth to Semi-Permeable Layer: _____ cm
 Depth to Gray Colors or Redox Features: _____ cm
 Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
 (S)omewhat poorly (P)oorly (V)ery poorly drained
 Height of Moss Hummocks: _____ cm
 Sphagnum Cover: _____ %
 Depth of Standing Water: (>) _____ cm
 pH of Surface Water: _____ ± _____
 Average Depth to Bedrock: _____ cm
 Exposed Rock: _____ %
 Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther
 Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>) _____ cm		_____	_____
2:	_____ cm (>) _____ cm	_____	_____	_____	
3:	_____ cm (>) _____ cm	_____	_____	_____	
4:	_____ cm (>) _____ cm	_____	_____	_____	
5:	_____ cm (>) _____ cm	_____	_____	_____	
6:	_____ cm (>) _____ cm	_____	_____	_____	
7:	_____ cm (>) _____ cm	_____	_____	_____	
8:	_____ cm (>) _____ cm	_____	_____	_____	

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
 If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, 7 = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Side slope feature with obvious discharge. Dominated by graminoid cover (S. paludosus / S. acutus / S. pungens). Exposed pools and dark substrate in parts. Flowering early. Small waterways runs through feature and associated with chuffs. T. palustris associated with the waterway. S. acutus growing in clusters.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes: 4827/4832

Prism Factor: _____
 Relève-Wide DBH Statistics
 Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): SAML-002
Surveyor's Relève #: SAML-002 Surveyor's Place Name: BR02
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 29 Month: JUN Year: 2016 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): WMS83 _____
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 705162 E (record in NAD83, Zone 15) Permanent Marker: (N)o (Y)es
4955370 N Marker Type / Placement: _____
UTM Accuracy: _____ meters UTM 14
Location Source: (G)PS (A)ir photo (T)opo map (L)idar (O)ther _____
County: YELLOW MEDICINE Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>)	_____ cm	_____	_____
2:	_____ cm (>)	_____ cm	_____	_____	_____
3:	_____ cm (>)	_____ cm	_____	_____	_____
4:	_____ cm (>)	_____ cm	_____	_____	_____
5:	_____ cm (>)	_____ cm	_____	_____	_____
6:	_____ cm (>)	_____ cm	_____	_____	_____
7:	_____ cm (>)	_____ cm	_____	_____	_____
8:	_____ cm (>)	_____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILCL = silty clay loam, SC = sandy clay, SICL = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 < 15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Wet meadow system dominated by grasses with no shrub cover and limited herbaceous diversity. Primarily dominated by Carex pellita; history of cattle grazing.

Basal Area & Tree Diameters

Species	L/D	BA-1	BA-2	Ave.	DBH List: (C)omplete (P)artial
					DBH (cm)

Notes:

4830

Relève-Wide DBH Statistics

Prism Factor: _____
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): S.M. Ljund
Surveyor's Relève #: Small 6-003 Surveyor's Place Name: BR14
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MUR
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 30 Month: Aug Year: 2016 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): _____ (SEE NOTES WM or OP)
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 707274 E (record in NAD83, Zone 16)
4949312 N
UTM Accuracy: 1 meters
Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: YELLOW MEDICINE Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____
Permanent Marker: (N)o (Y)es
Marker Type / Placement: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
Elevation: _____ ft. Slope: _____ (°) or 30 (%) Aspect: NW (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M) or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther
Rock Type: _____
General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm (>)	_____ cm	_____	_____	_____
2:	_____ cm (>)	_____ cm	_____	_____	_____
3:	_____ cm (>)	_____ cm	_____	_____	_____
4:	_____ cm (>)	_____ cm	_____	_____	_____
5:	_____ cm (>)	_____ cm	_____	_____	_____
6:	_____ cm (>)	_____ cm	_____	_____	_____
7:	_____ cm (>)	_____ cm	_____	_____	_____
8:	_____ cm (>)	_____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILC = silty clay loam, SC = sandy clay, SILC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Remarks: Seepage wetland in a hilltop; dominated by graminoids, particularly S. pungens and Carex hystericina. Other prominent graminoids include Calamagrostis stricta and Scirpus pallidus. Quality of features degrades further down slope but Amorphum is common below at the base. Discharge is obvious with exposed pebbles. Organic substrate appears but reduced near base (mineral).

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes: Meets point criterion for wetlands but more representative of a seepage wet meadow.
4876-4881

Prism Factor: _____
Relève-Wide DBH Statistics
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVE # _____

Surveyor(s): S.M. Iburn Surveyor's Relève #: SM16-003 Date: June 30, 2016
 County: Yellow Medicine Surveyor's Place Name: B214

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
		<u>D1-3r</u>				<u>H1-3r</u>				<u>C1-3c</u>	
2		<u>CORNUS STOLONIFERA</u>		1		<u>S. CANADENSIS</u>		3		<u>S. PUNCTATUS</u>	
		<u>AMORPHA FRUTICOSA</u>		+		<u>T. DRACUNCULIFORMIS</u>		2		<u>S. PALLIDUS</u>	
				+		<u>A. INKERSATA</u>		+		<u>CALAMAGROSTIS STRICTA</u>	
		<u>C1-2a</u>		1		<u>S. CALICATA</u>		1		<u>J. HODGSONI</u>	
1		<u>P. VITACEA</u>		1		<u>E. M. LULCULUM</u>		1		<u>E. EPYMIOPADON</u>	
				1		<u>V. VITICOLA</u>		1		<u>P. ARUNDINACEA</u>	
				1		<u>L. ASPER</u>		1		<u>C. BIVATA</u>	
				1		<u>S. LANCEOLATUM</u>		1		<u>J. DUDLEYI</u>	
				1		<u>Z. LAUREA</u>		1		<u>C. PELLITA</u>	
				1		<u>I. CAPENSIS</u>		+		<u>C. GRANULATIS</u>	
				1		<u>V. HASTATA</u>				<u>G. GRANDIS</u>	OP
				1		<u>S. ARVENSIS</u>		1		<u>S. PECTINATA</u>	
				1		<u>E. LEUCOPHYLLUM</u>		3		<u>CAREX STRICTA</u>	
				1		<u>T. LYMAVENSIS</u>		3		<u>C. HISTERICINA</u>	
				+		<u>A. ARTEMISIIFOLIA</u>		+		<u>C. VULPINIOWEN</u>	
				+		<u>L. AMERICANUS</u>					
				1		<u>EUPHROASIA ESCULENTUS</u>					
				+		<u>T. REPENS</u>					
				+		<u>E. PROFOLIATUM</u>					
				+		<u>POTENTILLA ANSERINA</u>					
				1		<u>LOBELIA KALMII</u>					
				+		<u>HELENIUM AUTUMNALE</u>					
				1		<u>AGALIS tenuifolia</u>					

Life Form
 B = broadleaf evergreen
 D = broadleaf deciduous
 E = needleleaf evergreen
 G = graminoids
 H = forbs
 L = lichens
 M = mosses & liverworts
 C = climbers
 K = stem succulents
 F = floating-leaved
 S = submerged
 X = epiphytes

Height
 8 >35m
 7 = 20-35m
 6 = 10-20m
 5 = 5-10m
 4 = 2-5m
 3 = 0.5-2m
 2 = 0.1-0.5m
 1 = 0-0.1m

Cover
 Group Species
 c 5 75-100%
 i 4 50-75%
 p 3 25-50%
 r 2 5-25%
 b 1-5%
 a <1%
Abundance
 1 <5% cover, many individuals
 + <5% cover, few (2-20) individuals
 r <5% cover, single

Sociability
 5 = extensive mat
 4 = small colonies, broken mat
 3 = large group, many plants
 2 = small dense clumps
 1 = growing singly

Reliability Code
 0 = variety certain
 1 = cf. var./subsp.
 2 = species certain
 3 = species complex
 4 = cf. species
 5 = genus certain
 6 = cf. genus
 7 = unknown

Selected Remark Codes
 DD = dead
 DY = dying
 GE = germinating
 SD = seedling
 SP = sprout (coppice)
 FR = fruiting
 OP = outside plot (<2m)
 ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): S.M. LEWIS
Surveyor's Relève #: 39M116-004 Surveyor's Place Name: BP#2
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MAWR
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 30 Month: JUN Year: 2016 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU)wooded upland (OU)open upland (WW)wooded wetland (OW)open wetland
NPC Code (Name): Wm p 73
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 78 5964 E (record in NAD83, Zone 14) Permanent Marker: (N)o (Y)es
4955748 N Marker Type / Placement: _____
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: WALTON Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
Elevation: _____ ft. Slope: _____ (°) or 0 (%) Aspect: LV (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Coarse Fragments		
	Top	Bottom	Texture ^A	Type ^B	Volume ^C
	_____ cm	(>) _____ cm			
1:	0	(>) _____			
2:	_____	(>) _____			
3:	_____	(>) _____			
4:	_____	(>) _____			
5:	_____	(>) _____			
6:	_____	(>) _____			
7:	_____	(>) _____			
8:	_____	(>) _____			

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILC = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat
Remarks: Grassland dominated wet meadow with no shrub cover.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes: _____

Prism Factor: _____
Releve-Wide DBH Statistics
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. Milburn Surveyor's Releve #: 2016-004 Date: 6/30/16
 County: Yellow Medicine Surveyor's Place Name: RR2

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
		<u>D1-2b</u>				<u>H1-3r</u>				<u>G1-3c</u>	
+		<u>C. STOLONIFERA</u>		2		<u>Z. AQUILA</u>		1		<u>J. BAUCUS</u>	
				1		<u>A. CANADENSIS</u>		4		<u>C. PELLITA</u>	
				+		<u>R. CRISPUS</u>		2		<u>C. CLAMMIDOSA STRICTA</u>	
				1		<u>T. CANADENSIS</u>		2		<u>S. PALLIDUS</u>	
				1		<u>P. AUREA</u>		3		<u>A. GIGANTEA</u>	
				1		<u>A. CANADENSIS</u>		1		<u>P. PRATENSIS</u>	
				2		<u>G. LEPIDATA</u>		1		<u>D. HIRTUM</u>	
				1		<u>C. MACULATA</u>		!		<u>C. PRÆGRACILIS</u>	
				1		<u>S. LANCEOLATUM</u>		1		<u>G. STRIATA</u>	
				1		<u>S. CANADENSIS</u>		1		<u>E. EPYTHRODONTA</u>	
				1		<u>T. DASYCARPUM</u>		1		<u>H. JURATUM</u>	
						<u>Z. APICATA</u>	<u>OP</u>	1		<u>J. DUNALEYI</u>	
								+		<u>C. VULPINOIDEA</u>	
								1		<u>E. COMPRESSA</u>	
										<u>S. PECTINATA</u>	<u>OP</u>

Life Form B = broadleaf evergreen D = broadleaf deciduous E = needleleaf evergreen G = graminoids H = forbs L = lichens M = mosses & liverworts C = climbers K = stem succulents F = floating-leaved S = submerged X = epiphytes	Height 8 >35m 7 = 20-35m 6 = 10-20m 5 = 5-10m 4 = 2-5m 3 = 0.5-2m 2 = 0.1-0.5m 1 = 0-0.1m	Cover Group Species c 5 75-100% i 4 50-75% p 3 25-50% r 2 5-25% b 1-5% a <1% Abundance 1 <5% cover, many individuals + <5% cover, few (2-20) individuals r <5% cover, single	Sociability 5 = extensive mat 4 = small colonies, broken mat 3 = large group, many plants 2 = small dense clumps 1 = growing singly	Reliability Code 0 = variety certain 1 = cf. var./subsp. 2 = species certain 3 = species complex 4 = cf. species 5 = genus certain 6 = cf. genus 7 = unknown	Selected Remark Codes DD = dead DY = dying GE = germinating SD = seedling SP = sprout (coppice) FR = fruiting OP = outside plot (<2m) ## = specimen collection #
---	--	---	---	---	---

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. M. [unclear]

Surveyor's Relève #: SAMU-005 Surveyor's Place Name: BR02 part 2

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR

Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relève #: _____

Date: 30 Month: JUN Year: 2016 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): MBP93 (_____)

NPC Ranking in Relève: _____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relève Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary, (E)cotonal

LOCATION INFORMATION

UTM: 705991 E (record in NAD83, Zone 15)
4955781 N

Permanent Marker: (N)o (Y)es
Marker Type / Placement: _____

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: YELLOW MEDICINE Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther _____

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Seasonally inundated system in a depressed basin and adjacent to a WMP 73 community. Dominated by grass sedge with bulrushes (sedges) distributed in waters. No surface peat at the time of survey.

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>)		_____ cm	_____
2:	_____ cm (>)	_____ cm	_____	_____	
3:	_____ cm (>)	_____ cm	_____	_____	
4:	_____ cm (>)	_____ cm	_____	_____	
5:	_____ cm (>)	_____ cm	_____	_____	
6:	_____ cm (>)	_____ cm	_____	_____	
7:	_____ cm (>)	_____ cm	_____	_____	
8:	_____ cm (>)	_____ cm	_____	_____	

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILCL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave. DBH (cm)	

Notes: 4888
Underdocumented community type

Releve-Wide DBH Statistics
Prism Factor: _____
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): Scott M. Muehlen

Surveyor's Relève #: SAW16-506 Surveyor's Place Name: BR17

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR

Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relève #: _____

Date: 01 Month: JUL Year: 2014 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): WMP73 (_____)

NPC Ranking in Relève: _____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relève Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 702040 E (record in NAD83, Zone 15)
4955787 N

Permanent Marker: (N)o (Y)es

Marker Type / Placement: _____

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. Slope: _____ (°) or 0 (%) Aspect: LV (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Wet Meadow community in an active pasture; no shrub cover and limited forb cover.

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	_____ cm	(>) _____ cm			
1:	0	(>)	_____	_____	_____
2:	_____	(>)	_____	_____	_____
3:	_____	(>)	_____	_____	_____
4:	_____	(>)	_____	_____	_____
5:	_____	(>)	_____	_____	_____
6:	_____	(>)	_____	_____	_____
7:	_____	(>)	_____	_____	_____
8:	_____	(>)	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes: 4900

Prism Factor: _____
Releve-Wide DBH Statistics
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): S. M. [unclear] Surveyor's Relevé #: SAM16-006 Date: 7/1/2014
 County: Yellow Medicine Surveyor's Place Name: BR17

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
						H1-3b				G1-3c	
				1.		S. BULICATUM		3.		S. PECTINATA	
				2.		M. ADLUNSI		2.		C. PELLITA	
								1.		C. PRACARBICUS	
								4.		C. STRICTA	
								2.		A. GIGANTEA	
								1.		S. PALLIDUS	
								1.		C. MARGRITAE	
								1.		C. GRANULIS	
								+		E. REVENSIS	

Life Form

- B = broadleaf evergreen
- D = broadleaf deciduous
- E = needleleaf evergreen
- G = graminoids
- H = forbs
- L = lichens
- M = mosses & liverworts
- C = climbers
- K = stem succulents
- F = floating-leaved
- S = submerged
- X = epiphytes

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1-0.5m
- 1 = 0-0.1m

Cover

- | | |
|--------------|----------------|
| <i>Group</i> | <i>Species</i> |
| c | 5 75-100% |
| i | 4 50-75% |
| p | 3 25-50% |
| r | 2 5-25% |
| b | 1-5% |
| a | <1% |

Abundance

- 1 <5% cover, many individuals
- + <5% cover, few (2-20) individuals
- r <5% cover, single

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

- 0 = variety certain
- 1 = cf. var./subsp.
- 2 = species certain
- 3 = species complex
- 4 = cf. species
- 5 = genus certain
- 6 = cf. genus
- 7 = unknown

Selected Remark Codes

- DD = dead
- DY = dying
- GE = germinating
- SD = seedling
- SP = sprout (coppice)
- FR = fruiting
- OP = outside plot (<2m)
- ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): S.A.M. Nelson
Surveyor's Relève #: SAM16-607 Surveyor's Place Name: BE10
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)the MNL
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 01 Month: JUL Year: 2014 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU)wooded upland (OU)open upland (WW)wooded wetland (OW)open wetland
NPC Code (Name): WM 83 _____
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 10 3081 E (record in NAD83, Zone 16)
4950637 N _____
UTM Accuracy: _____ meters
Location Source: (GPS) (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: Yellowknife Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____
Permanent Marker: (N)o (Y)es
Marker Type / Placement: _____

PLOT INFORMATION

Plot Size: 16 m x 16 m = 100 m²
Elevation: _____ ft. Slope: _____ (°) or 45 (%) Aspect: 11 (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)ratirie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther
Rock Type: _____
General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm	(>) _____ cm			
2:	_____ cm	(>) _____ cm			
3:	_____ cm	(>) _____ cm			
4:	_____ cm	(>) _____ cm			
5:	_____ cm	(>) _____ cm			
6:	_____ cm	(>) _____ cm			
7:	_____ cm	(>) _____ cm			
8:	_____ cm	(>) _____ cm			

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Remarks: Seepage feature on a side slope with significant erosion;

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave. DBH (cm)	

Notes: _____

Prism Factor: _____
Relève-Wide DBH Statistics
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. Milburn Surveyor's Releve #: SM16-09 Date: 7/1/2016
 County: Yellow Medicine Surveyor's Place Name: BRIA

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
		D1-3r				H1-3c				G1-3r	
1		F. PENNSYLVANICA		4		E. ARVENSI		2		S. PALLIDUS	
+		O. VIRGINIANA		1		S. GIGANTEA		1		E. BRITHYRACODA	
				+		P. MAJOR		4		C. INSEBRICINA	
				+		Z. AUREA		1		J. DUREGII	
				5	1	T. PIMA		1		J. NODOSUS	
				+		E. PORPHYRUM		1		A. GIGANTEA	
				1		G. ROZALE					
				+		M. ALBA					
				+		M. ARVENSI					
				1		L. CAPENSIS					
				+		V. NEBRASKENSIS					
				+		L. AMERICANA					
				+		H. RUTINIFOLIA					
				+		S. ARVENSI					
				+		C. ARIZONENSIS					
				1		P. AULICA					

Life Form

- B = broadleaf evergreen
- D = broadleaf deciduous
- E = needleleaf evergreen
- G = graminoids
- H = forbs
- L = lichens
- M = mosses & liverworts
- C = climbers
- K = stem succulents
- F = floating-leaved
- S = submerged
- X = epiphytes

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1-0.5m
- 1 = 0-0.1m

Cover

- | | |
|-------|-----------|
| Group | Species |
| c | 5 75-100% |
| i | 4 50-75% |
| p | 3 25-50% |
| r | 2 5-25% |
| b | 1-5% |
| a | <1% |

Abundance

- 1 <5% cover, many individuals
- + <5% cover, few (2-20) individuals
- r <5% cover, single

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

- 0 = variety certain
- 1 = cf. var./subsp.
- 2 = species certain
- 3 = species complex
- 4 = cf. species
- 5 = genus certain
- 6 = cf. genus
- 7 = unknown

Selected Remark Codes

- DD = dead
- DY = dying
- GE = germinating
- SD = seedling
- SP = sprout (coppice)
- FR = fruiting
- OP = outside plot (<2m)
- ## = specimen collection #

Note: Indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. Muzard

Surveyor's Relève #: SNM16-008 Surveyor's Place Name: Berka

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR

Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relève #: _____

Date: 30 Month: Jun Year: 2016 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU)wooded upland (OU)open upland (WW)wooded wetland (OW)open wetland

NPC Code (Name): WMS 83 (_____)

NPC Ranking in Relève: _____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relève Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 703389 E } (record in NAD83, Zone 16)
4955511 N } 14

Permanent Marker: (N)o (Y)es
Marker Type / Placement: _____

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QVRT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: A wet meadow community dominated by graminoids, primarily Carex stricta. Area surrounding feature is hayed. Feature is depression and includes an open water component with non-native cattails. Tussocks present. Soils with high organic content at surface with mucky mineral below.

Soil Layers	Depth of Layer		Coarse Fragments		
	Top	Bottom	Texture ^A	Type ^B	Volume ^C
	_____ cm	(>) _____ cm			
1:	0	(>) _____	_____	_____	_____
2:	_____	(>) _____	_____	_____	_____
3:	_____	(>) _____	_____	_____	_____
4:	_____	(>) _____	_____	_____	_____
5:	_____	(>) _____	_____	_____	_____
6:	_____	(>) _____	_____	_____	_____
7:	_____	(>) _____	_____	_____	_____
8:	_____	(>) _____	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 < 15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes: 4843-4844

Relève-Wide DBH Statistics
Prism Factor: _____
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVE # _____

Surveyor(s): <u>S. Milburn</u>	Surveyor's Relève #: <u>84M16088</u> Date: <u>6/30/2016</u>
County: <u>Yellow Medicine</u>	Surveyor's Place Name: <u>BRDA</u>

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
		D1-2a				H1-3r				G1-3c	
	p	<i>A. NEGUNDO</i>		1.		<i>M. ARVENSE</i>		5.		<i>C. PELLITA</i>	
				+		<i>A. INCANUM</i>		2.		<i>CALAMAGROSTIS STRICTA</i>	
				1.		<i>V. MACSTRA</i>		1.		<i>H. SUBATUM</i>	
				1.		<i>S. CAMBODIENSIS</i>		2.		<i>S. PALLIDUS</i>	
				1.		<i>L. ASPER</i>		1.		<i>S. PECTINATA</i>	
				1.		<i>P. HYPODIPYED</i>		1.		<i>CARUM SINDICA</i>	
				1.		<i>V. NEPAPALLA</i>					
				1.		<i>M. BINGENS</i>					
						<i>T. CAMBODIENSIS</i>	OP				
						<i>A. SYRIACA</i>	OP				
				1.		<i>B. LEPTOPHYLLUM</i>					
						<i>C. ARVENSIS</i>					
						<i>P. PENNSYLVANICA</i>	OP				
						<i>T. DASYCARPUM</i>	OP				
						<i>S. LUCIDATUM</i>					

<p>Life Form</p> <p>B = broadleaf evergreen</p> <p>D = broadleaf deciduous</p> <p>E = needleleaf evergreen</p> <p>G = graminoids</p> <p>H = forbs</p> <p>L = lichens</p> <p>M = mosses & liverworts</p> <p>C = climbers</p> <p>K = stem succulents</p> <p>F = floating-leaved</p> <p>S = submerged</p> <p>X = epiphytes</p>	<p>Height</p> <p>8 >35m</p> <p>7 = 20-35m</p> <p>6 = 10-20m</p> <p>5 = 5-10m</p> <p>4 = 2-5m</p> <p>3 = 0.5-2m</p> <p>2 = 0.1-0.5m</p> <p>1 = 0-0.1m</p>	<p>Cover</p> <table border="0" style="font-size: small;"> <tr> <td><i>Group</i></td> <td><i>Species</i></td> </tr> <tr> <td>c</td> <td>5 75-100%</td> </tr> <tr> <td>i</td> <td>4 50-75%</td> </tr> <tr> <td>p</td> <td>3 25-50%</td> </tr> <tr> <td>r</td> <td>2 5-25%</td> </tr> <tr> <td>b</td> <td>1-5%</td> </tr> <tr> <td>a</td> <td><1%</td> </tr> </table> <p>Abundance</p> <p>1 <5% cover, many individuals</p> <p>+ <5% cover, few (2-20) individuals</p> <p>r <5% cover, single</p>	<i>Group</i>	<i>Species</i>	c	5 75-100%	i	4 50-75%	p	3 25-50%	r	2 5-25%	b	1-5%	a	<1%	<p>Sociability</p> <p>5 = extensive mat</p> <p>4 = small colonies, broken mat</p> <p>3 = large group, many plants</p> <p>2 = small dense clumps</p> <p>1 = growing singly</p>	<p>Reliability Code</p> <p>0 = variety certain</p> <p>1 = cf. var./subsp.</p> <p>2 = species certain</p> <p>3 = species complex</p> <p>4 = cf. species</p> <p>5 = genus certain</p> <p>6 = cf. genus</p> <p>7 = unknown</p>	<p>Selected Remark Codes</p> <p>DD = dead</p> <p>DY = dying</p> <p>GE = germinating</p> <p>SD = seedling</p> <p>SP = sprout (coppice)</p> <p>FR = fruiting</p> <p>OP = outside plot (<2m)</p> <p>## = specimen collection #</p>
<i>Group</i>	<i>Species</i>																		
c	5 75-100%																		
i	4 50-75%																		
p	3 25-50%																		
r	2 5-25%																		
b	1-5%																		
a	<1%																		

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. Milburn

Surveyor's Relève #: SAM16-014 Surveyor's Place Name: B232

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR

Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther _____

Revisit: (Y)es (N)o Original DNR Relève #: _____

Date: 11 Month: AUG Year: 2016 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): OP p 93 (_____)

NPC Ranking in Relève: _____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relève Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 703083E (record in NAD83, Zone 14)
4953310N

Permanent Marker: (N)o (Y)es

Marker Type / Placement: _____

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Mounded calcareous fen feature; obvious discharge and peat soils. Much of the feature is dominated by non-native cattails.

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>) _____ cm		_____	_____
2:	_____ cm (>) _____ cm	_____	_____	_____	
3:	_____ cm (>) _____ cm	_____	_____	_____	
4:	_____ cm (>) _____ cm	_____	_____	_____	
5:	_____ cm (>) _____ cm	_____	_____	_____	
6:	_____ cm (>) _____ cm	_____	_____	_____	
7:	_____ cm (>) _____ cm	_____	_____	_____	
8:	_____ cm (>) _____ cm	_____	_____	_____	

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILCL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave. DBH (cm)	

Relève-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes: 5089

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. Milburn Surveyor's Relève #: SAM16014 Date: Aug 16, 2016
 County: Yellow Medicine Surveyor's Place Name: BR32

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
		D1-2a				H1-3P				G1-3	
+		C. STOLONIFERA		1.		H. GIGANTAEUS		4.		S. PUNGEN	
				+		G. PROCEPERA		1.		S. ACUTUS	
				1.		P. GLAUCH		2.		M. RICHARDSONII	
				M.		L. LOESELLI		1.		M. GLOMERATA	
				1.		L. KALMII		+		E. TRICHYCALUS	
				1.		V. HYPOBRYLLA		1.		C. AQUATICUS	
				+		S. PIDCELLI		+		P. ARUNDINACEA	
				1.		S. BOLSAZE		A 1.		C. PELLITA	
				+		B. LEPTOPHYLLUM					
				1.		B. MACULATUM					
				1.		H. GROSSESEPPATUS					
				1.		L. ASPER					
				1.		A. CHAMAEBIDUM					
				M.		A. INCARNATUM					
				2.		TYPHA ANGYUTICOLM					

Life Form

- B = broadleaf evergreen
- D = broadleaf deciduous
- E = needleleaf evergreen
- G = graminoids
- H = forbs
- L = lichens
- M = mosses & liverworts
- C = climbers
- K = stem succulents
- F = floating-leaved
- S = submerged
- X = epiphytes

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1-0.5m
- 1 = 0-0.1m

Cover

- | | |
|--------------|----------------|
| <i>Group</i> | <i>Species</i> |
| c | 5 75-100% |
| i | 4 50-75% |
| p | 3 25-50% |
| r | 2 5-25% |
| b | 1-5% |
| a | <1% |

Abundance

- 1 <5% cover, many individuals
- + <5% cover, few (2-20) individuals
- r <5% cover, single

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

- 0 = variety certain
- 1 = cf. var./subsp.
- 2 = species certain
- 3 = species complex
- 4 = cf. species
- 5 = genus certain
- 6 = cf. genus
- 7 = unknown

Selected Remark Codes

- DD = dead
- DY = dying
- GE = germinating
- SD = seedling
- SP = sprout (coppice)
- FR = fruiting
- OP = outside plot (<2m)
- ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVE # _____

SITE DATA SHEET

GENERAL INFORMATION

DNR RELEVE # _____
 Surveyor(s): S. M. M... ..
 Surveyor's Releve #: SM16-015 Surveyor's Place Name: BR25
 Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M(O)ther: M.N.Z.
 Purpose of Releve: (C)lassification (R)are species habitat (M)onitoring (O)ther _____
 Revisit: (Y)es (N)o _____ Original DNR Releve #: _____
 Date: 14 Month: AUG Year: 2016 (e.g. 09 JUL 2004)
 MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
 NPC Code (Name): OP09B _____
 NPC Ranking in Releve: _____
 Stand Typical of NPC: (Y)es (N)o (U)ncertain
 If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
 Releve Typical of Stand: (Y)es (N)o _____
 If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther: Impacted by Cattle
 Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 706921E } (record in NAD83, Zone 15) } 1A Permanent Marker: (N)o (Y)es
4948581N }
 Marker Type / Placement: _____
 UTM Accuracy: _____ meters
 Location Source: (G)PS (A)ir photo (T)opo map (L)idar (O)ther _____
 County: YELLOW MEDICINE Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
 Elevation: _____ ft. Slope: _____ (°) or 15 (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)
 Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
 Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
 Humus Thickness: _____ cm
 Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
 Earthworms Present: (Y)es (N)o
 Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
 Depth to Semi-Permeable Layer: _____ cm
 Depth to Gray Colors or Redox Features: _____ cm
 Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
 (S)omewhat poorly (P)oorly (V)ery poorly drained
 Height of Moss Hummocks: _____ cm
 Sphagnum Cover: _____ %
 Depth of Standing Water: (>) _____ cm
 pH of Surface Water: _____ ± _____
 Average Depth to Bedrock: _____ cm
 Exposed Rock: _____ %
 Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____
 Rock Type: _____
 General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
1:	0 cm (>)	_____ cm	_____	_____	_____
2:	_____ cm (>)	_____ cm	_____	_____	_____
3:	_____ cm (>)	_____ cm	_____	_____	_____
4:	_____ cm (>)	_____ cm	_____	_____	_____
5:	_____ cm (>)	_____ cm	_____	_____	_____
6:	_____ cm (>)	_____ cm	_____	_____	_____
7:	_____ cm (>)	_____ cm	_____	_____	_____
8:	_____ cm (>)	_____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
 If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, 7 = unknown

Remarks: Site slope features; impacted by cattle grazing; dominated by grasses with very few forbs and limited herb cover in general. Obvious discharge with exposed muck.

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave. DBH (cm)	

Releve-Wide DBH Statistics
 Prism Factor: _____
 Min: _____ Max: _____ Median: _____

Notes: 5712

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. MILBUEN

Surveyor's Relève #: SAMHE-40A Surveyor's Place Name: BR05

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR

Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther Documentation

Revisit: (Y)es (N)o Original DNR Relève #: _____

Date: 30 Month: JUN Year: 2016 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): _____ (NONE → Degraded feature)

NPC Ranking in Relève: _____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relève Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 102309 E (record in NAD83, Zone 18)
4955027 N

Permanent Marker: (N)o (Y)es

Marker Type / Placement: _____

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QURT: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: LV (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ilicous quartzite (O)ther _____

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Shallow wet meadow/morph depression dominated by cattails with P. arundinacea, C. lacustris, and B. flummitis. Mineral rich; no indication of fire conditions

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>)	_____ cm	_____	_____
2:	_____ cm (>)	_____ cm	_____	_____	_____
3:	_____ cm (>)	_____ cm	_____	_____	_____
4:	_____ cm (>)	_____ cm	_____	_____	_____
5:	_____ cm (>)	_____ cm	_____	_____	_____
6:	_____ cm (>)	_____ cm	_____	_____	_____
7:	_____ cm (>)	_____ cm	_____	_____	_____
8:	_____ cm (>)	_____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes:

48 #6

Relève-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

VEGETATION DATA SHEET

DNR RELEVÉ # _____

Surveyor(s): S. Milburn Surveyor's Relevé #: 50M16-08A Date: 6/30/2016
 County: Yellow Medicine Surveyor's Place Name: BRBS

ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS	ID	C.S	SPECIES NAME	REMARKS
						H1-3c				G1-3p	
		4. <i>T. x glauca</i>				1. <i>C. LACUSSTRIS</i>				1. <i>B. FLUVIATILIS</i>	
		+ <i>S. LANCEOLATUM</i>				3. <i>P. APRUNIFLORUM</i>					
		+ <i>A. INCARNATA</i>									
		1. <i>P. PENNSYLVANICA</i>									
		+ <i>V. HASTATA</i>									
		<i>T. CANADENSE</i>	OP								
		<i>S. BURNINGHAMII</i>	OP								
		<i>L. ASPER</i>	OP								
		<i>H. GRASSCUTUS</i>	OP								
		<i>U. DIACA</i>	OP								

Life Form

- B = broadleaf evergreen
- D = broadleaf deciduous
- E = needleleaf evergreen
- G = graminoids
- H = forbs
- L = lichens
- M = mosses & liverworts
- C = climbers
- K = stem succulents
- F = floating-leaved
- S = submerged
- X = epiphytes

Height

- 8 >35m
- 7 = 20-35m
- 6 = 10-20m
- 5 = 5-10m
- 4 = 2-5m
- 3 = 0.5-2m
- 2 = 0.1- 0.5m
- 1 = 0-0.1m

Cover

- | | |
|-------|-----------|
| Group | Species |
| c | 5 75-100% |
| i | 4 50-75% |
| p | 3 25-50% |
| r | 2 5-25% |
| b | 1-5% |
| a | <1% |

Abundance

- 1 <5% cover, many individuals
- + <5% cover, few (2-20) individuals
- r <5% cover, single

Sociability

- 5 = extensive mat
- 4 = small colonies, broken mat
- 3 = large group, many plants
- 2 = small dense clumps
- 1 = growing singly

Reliability Code

- 0 = variety certain
- 1 = cf. var./subsp.
- 2 = species certain
- 3 = species complex
- 4 = cf. species
- 5 = genus certain
- 6 = cf. genus
- 7 = unknown

Selected Remark Codes

- DD = dead
- DY = dying
- GE = germinating
- SD = seedling
- SP = sprout (coppice)
- FR = fruiting
- OP = outside plot (<2m)
- ## = specimen collection #

Note: indicate tree canopy by recording "Ca" to right of canopy layer life form/height code (ex: "D6-9p, Ca")



Initial Scan	_____
Entered	_____
QC'd	_____
Edited	_____
Final Scan	_____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____

Surveyor(s): S. MILLER

Surveyor's Relève #: SA116-008 Surveyor's Place Name: BRB

Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MND

Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther Documentation

Revisit: (Y)es (N)o Original DNR Relève #: _____

Date: 30 Month: JUL Year: 2016 (e.g. 09 JUL 2004)

MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland

NPC Code (Name): WM (Wet Meadow)

NPC Ranking in Relève: _____

Stand Typical of NPC: (Y)es (N)o (U)ncertain

If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____

Relève Typical of Stand: (Y)es (N)o

If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____

Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 784216 E (record in NAD83, Zone 18A)
4952572 N

Permanent Marker: (N)o (Y)es

Marker Type / Placement: _____

UTM Accuracy: _____ meters

Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____

County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QURT: _____ of QURT: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²

Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: LV (e.g., N, NE, etc.; LV for level)

Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm

Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____

Humus Thickness: _____ cm

Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull

Earthworms Present: (Y)es (N)o

Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)

Depth to Semi-Permeable Layer: _____ cm

Depth to Gray Colors or Redox Features: _____ cm

Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well

(S)omewhat poorly (P)oorly (V)ery poorly drained

Height of Moss Hummocks: _____ cm

Sphagnum Cover: _____ %

Depth of Standing Water: (>) _____ cm

pH of Surface Water: _____ ± _____

Average Depth to Bedrock: _____ cm

Exposed Rock: _____ %

Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____

Rock Type: _____

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Wet meadow community associated with a meandering creek system. Component of interest is depression and not tied to a water body. Features include major flow lines. Features in physically reworked by a natural O berm.

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>)	_____ cm	_____	_____
2:	_____ cm (>)	_____ cm	_____	_____	_____
3:	_____ cm (>)	_____ cm	_____	_____	_____
4:	_____ cm (>)	_____ cm	_____	_____	_____
5:	_____ cm (>)	_____ cm	_____	_____	_____
6:	_____ cm (>)	_____ cm	_____	_____	_____
7:	_____ cm (>)	_____ cm	_____	_____	_____
8:	_____ cm (>)	_____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILCL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck

If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge

^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders

^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Basal Area & Tree Diameters				DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)

Notes: 4852-4854
No discharge or seepage observed.
gravel and compacted soils (minim)

Prism Factor: _____

Relève-Wide DBH Statistics

Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): S. Milbrund
Surveyor's Relève #: SM110-80C Surveyor's Place Name: BE13
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNR
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther Documentation
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 30 Month: JUN Year: 2016 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): WM 8.3 (_____)
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 707275 E } (record in NAD83, Zone 15) 14 Permanent Marker: (N)o (Y)es
4949627 N Marker Type / Placement: _____
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QART: _____ of QRT: _____

PLOT INFORMATION

Plot Size: 20 m x 50 m = 1000 m²
Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well
(S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)oux quartzite (O)ther
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>) _____ cm		_____	_____
2:	_____ cm (>) _____ cm	_____	_____	_____	
3:	_____ cm (>) _____ cm	_____	_____	_____	
4:	_____ cm (>) _____ cm	_____	_____	_____	
5:	_____ cm (>) _____ cm	_____	_____	_____	
6:	_____ cm (>) _____ cm	_____	_____	_____	
7:	_____ cm (>) _____ cm	_____	_____	_____	
8:	_____ cm (>) _____ cm	_____	_____	_____	

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Remarks: Drainage swale positioned between two steep hillslopes and future drains surface water towards meandering waterway. Corynephorus is abundant in patches but less than 50% covered by grass.

Basal Area & Tree Diameters			DBH List: (C)omplete (P)artial		
Species	L/D	BA-1	BA-2	Ave. DBH (cm)	

Relève-Wide DBH Statistics

Prism Factor: _____ Min: _____ Max: _____ Median: _____

Notes: Mucky mineral soils

4862-4865

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): S. Milgrom
Surveyor's Relève #: SAM16-01 Surveyor's Place Name: BR20
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther: MNHS
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther: DOCUMENTATION
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 01 Month: JUL Year: 2016 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): WMS83
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 704402 E } (record in NAD83, Zone 14)
4954505 N }
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: Yellow Pine Township: _____ N Range: _____ Section: _____ QART: _____ of QRT: _____
Permanent Marker: (N)o (Y)es
Marker Type / Placement: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)iliceous quartzite (O)ther _____
Rock Type: _____

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>) _____ cm		_____ cm	_____
2:	_____ cm (>) _____ cm	_____ cm	_____	_____	
3:	_____ cm (>) _____ cm	_____ cm	_____	_____	
4:	_____ cm (>) _____ cm	_____ cm	_____	_____	
5:	_____ cm (>) _____ cm	_____ cm	_____	_____	
6:	_____ cm (>) _____ cm	_____ cm	_____	_____	
7:	_____ cm (>) _____ cm	_____ cm	_____	_____	
8:	_____ cm (>) _____ cm	_____ cm	_____	_____	

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SILCL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat
Remarks: Sloped wetland features, feeding into a basin of cattails; emergent

Basal Area & Tree Diameters					DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)	

Notes: _____

Prism Factor: _____
Relève-Wide DBH Statistics
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o



Initial Scan _____
Entered _____
QC'd _____
Edited _____
Final Scan _____

DNR RELEVE # _____

GENERAL INFORMATION

SITE DATA SHEET

DNR RELEVE # _____
Surveyor(s): SM, JUP, J
Surveyor's Relève #: SM116-002 Surveyor's Place Name: 2112
Institution: (M)BS (E)CS (N)HP (U)SFS (U) of M (O)ther MNP
Purpose of Relève: (C)lassification (R)are species habitat (M)onitoring (O)ther Documentation
Revisit: (Y)es (N)o Original DNR Relève #: _____
Date: 15 Month: Aug Year: 2016 (e.g. 09 JUL 2004)
MBS Site #: _____ Ownership: _____

VEGETATION INFORMATION

Vegetation Group: (WU) wooded upland (OU) open upland (WW) wooded wetland (OW) open wetland
NPC Code (Name): WU 83
NPC Ranking in Relève: _____
Stand Typical of NPC: (Y)es (N)o (U)ncertain
If No, identify appropriate modifier: (N)atural disturbance (H)uman disturbance (Y)oung stand (<40 yrs) (O)ther _____
Relève Typical of Stand: (Y)es (N)o
If No, identify appropriate modifier: (H)igher Quality (L)ower Quality (C)anopy Gap (O)ther _____
Plot Location in NPC: (F)ar from community boundary (M)oderately far from boundary (C)lose to boundary (E)cotonal

LOCATION INFORMATION

UTM: 707312E (record in NAD83, Zone 15)
4949644N
UTM Accuracy: _____ meters
Location Source: (G)PS (A)ir photo (T)opo map (L)IDAR (O)ther _____
County: Yellow Medicine Township: _____ N Range: _____ Section: _____ QART: _____ of QRT: _____
Permanent Marker: (N)o (Y)es
Marker Type / Placement: _____

PLOT INFORMATION

Plot Size: 10 m x 10 m = 100 m²
Elevation: _____ ft. Slope: _____ (°) or _____ (%) Aspect: _____ (e.g., N, NE, etc.; LV for level)
Topographic Context: (C)rest (U)pper (M)iddle (L)ower (T)oe (F)lat (D)epression (?)uncertain

SOIL INFORMATION

Litter Thickness: _____ cm
Litter Type: (L)eaves (N)eedles (G)rass (O)ther _____
Humus Thickness: _____ cm
Humus Type: (M)or (M)oder (P)rairie mull (W)ormed mull
Earthworms Present: (Y)es (N)o
Earthworm Rapid Assessment Rank (low → heavy): (1) (2) (3) (4) (5)
Depth to Semi-Permeable Layer: _____ cm
Depth to Gray Colors or Redox Features: _____ cm
Drainage Class: (E)xcessively/Somewhat excessively (W)ell (M)oderately well (S)omewhat poorly (P)oorly (V)ery poorly drained
Height of Moss Hummocks: _____ cm
Sphagnum Cover: _____ %
Depth of Standing Water: (>) _____ cm
pH of Surface Water: _____ ± _____
Average Depth to Bedrock: _____ cm
Exposed Rock: _____ %
Rock Group: (F)elsic (M)afic (C)alcareous (S)andstone (S)ioux quartzite (O)ther
Rock Type: _____
General Soil Texture: (C)lay (L)oam (S)and (S)ilt (R)ock (M)uck (P)eat

Soil Layers	Depth of Layer		Texture ^A	Coarse Fragments	
	Top	Bottom		Type ^B	Volume ^C
	1:	0 cm (>)	_____ cm	_____	_____
2:	_____ cm (>)	_____ cm	_____	_____	_____
3:	_____ cm (>)	_____ cm	_____	_____	_____
4:	_____ cm (>)	_____ cm	_____	_____	_____
5:	_____ cm (>)	_____ cm	_____	_____	_____
6:	_____ cm (>)	_____ cm	_____	_____	_____
7:	_____ cm (>)	_____ cm	_____	_____	_____
8:	_____ cm (>)	_____ cm	_____	_____	_____

^A S = sand, LS = loamy sand, SL = sandy loam, L = loam, SIL = silt loam, SCL = sandy clay loam, CL = clay loam, SICL = silty clay loam, SC = sandy clay, SIC = silty clay, C = clay, RO = rock, PE = peat, MP = mucky peat, MU = muck
If origin of peat or mucky peat is known, add suffix to two-letter code: -m = moss, -s = sedge
^B Gr = gravel, Co = cobbles, St = stones, Bo = boulders
^C 0 = <15%, 1 = 15-35%, 2 = 35-60%, 3 = 60-90%, 4 = >90%, ? = unknown

Remarks: Side sloped seepage with limited discharge; Amorphum fruticosa abundant further downslope and the remainder is graminoid dominated

Basal Area & Tree Diameters					DBH List: (C)omplete (P)artial	
Species	L/D	BA-1	BA-2	Ave.	DBH (cm)	

Notes: _____

Prism Factor: _____
Relève-Wide DBH Statistics
Min: _____ Max: _____ Median: _____

Photos Taken: (Y)es (N)o

Anne-Marie Griger

From: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Sent: Friday, December 02, 2016 10:45 AM
To: Joe Sedarski
Cc: Steinhauer, Suzanne (COMM); Davis, Richard (COMM); Sean Flannery; Anne-Marie Griger; Peter Rood; John Seaberg; Todd Mattson; Warzecha, Cynthia (DNR)
Subject: RE: Bitter Root Wind Project - Calcareous Fen Matters

Thanks Joe,

MNDNR staff is in the process of reviewing the report and we will provide a response in the near future. We appreciate the work that went into the report and your efforts to identify and avoid calcareous fens.

Thanks,

Kevin

From: Joe Sedarski [mailto:jsedarski@merjent.com]
Sent: Wednesday, November 30, 2016 8:17 AM
To: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Cc: Steinhauer, Suzanne (COMM) <suzanne.steinhauer@state.mn.us>; Davis, Richard (COMM) <Richard.Davis@state.mn.us>; Sean Flannery <Sean.Flannery@res-group.com>; Anne-Marie Griger <Anne-Marie.Griger@res-group.com>; Peter Rood <Peter.Rood@res-americas.com>; John Seaberg <jseaberg@merjent.com>; Todd Mattson <tmattson@west-inc.com>
Subject: RE: Bitter Root Wind Project - Calcareous Fen Matters

... and here is the second with the last 37 pages of said report.

Thanks,

Joe

merjent

Joe Sedarski

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800 Washington Avenue N.	612.924.3981 direct
Suite 315	612.214.6658 cell
Minneapolis, MN 55401	612.746.3679 fax

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jsedarski@merjent.com

From: Joe Sedarski
Sent: Wednesday, November 30, 2016 8:13 AM
To: 'Mixon, Kevin (DNR)' <kevin.mixon@state.mn.us>
Cc: 'Steinhauer, Suzanne (COMM)' <suzanne.steinhauer@state.mn.us>; 'Davis, Richard (COMM)'

<Richard.Davis@state.mn.us>; 'Sean Flannery' <Sean.Flannery@res-group.com>; 'Anne-Marie Griger' <Anne-Marie.Griger@res-group.com>; 'Peter Rood' <Peter.Rood@res-americas.com>; John Seaberg <jseaberg@merjent.com>; 'Todd Mattson' <tmattson@west-inc.com>

Subject: RE: Bitter Root Wind Project - Calcareous Fen Matters

Good morning Kevin and all – apologies for multiple emails on this matter. We tried emailing the referenced report yesterday (about 23 MB), but it did not get through to you, Suzanne and Richard (limit appears to be around 25 MB and notice said the message was 30 MB).

Attached is the first 20 pages and I'll send the second 20 pages right after this email.

Please let us know if you have any questions or problems with the attached document.

Best,
Joe

merjent

Joe Sedarski

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From: Joe Sedarski
Sent: Tuesday, November 29, 2016 3:45 PM
To: 'Mixon, Kevin (DNR)' <kevin.mixon@state.mn.us>
Cc: 'Steinhauer, Suzanne (COMM)' <suzanne.steinhauer@state.mn.us>; 'Davis, Richard (COMM)' <Richard.Davis@state.mn.us>; 'Sean Flannery' <Sean.Flannery@res-group.com>; 'Anne-Marie Griger' <Anne-Marie.Griger@res-group.com>; Peter Rood <Peter.Rood@res-americas.com>; John Seaberg <jseaberg@merjent.com>; 'Todd Mattson' <tmattson@west-inc.com>
Subject: RE: Bitter Root Wind Project - Calcareous Fen Matters

Dear Kevin,

This e-mail is follow-up to the August 11, 2016 e-mail that I sent you regarding the early season phase of the calcareous fen field survey for the Bitter Root Wind Project (Project). Subsequent to the early season survey work, we have completed the late season survey as required by MN DNR. The attached Calcareous Fen Survey Report includes the results of both the early and late season surveys. The late season field survey was conducted for sites that were determined to be potential calcareous fens in the early season field survey, as well as new potential calcareous fen sites that were not previously surveyed based upon the results of the early season field survey and updated site layout revisions of the Project. Please let us know if you have any questions or comments on the attached Calcareous Fen Survey Report.

Also, please note that we also conducted wetland/waterbody surveys for the project this fall, and are currently summarizing the results in a report that we anticipate submitting to you for review in the near future. We would like to

schedule a meeting with the MN DNR shortly thereafter to review both the calcareous fen and wetland/waterbody data.

If you have any questions or comments, please contact me. We appreciate your assistance and involvement with the Project.

Best,
Joe

merjent

Joe Sedarski

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From: Joe Sedarski
Sent: Thursday, August 11, 2016 11:41 AM
To: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Cc: Steinhauer, Suzanne (COMM) <suzanne.steinhauer@state.mn.us>; Davis, Richard (COMM) <Richard.Davis@state.mn.us>; Sean Flannery <Sean.Flannery@res-group.com>; Anne-Marie Griger <Anne-Marie.Griger@res-group.com>; Jeff Jackson <Jeff.Jackson@res-group.com>; John Seaberg <jseaberg@merjent.com>; Todd Mattson <tmattson@west-inc.com>
Subject: Bitter Root Wind Project - Calcareous Fen Matters

Dear Kevin,

Please find attached the preliminary Calcareous Fen (CF) Survey Report for the Bitter Root Wind Project (Project) for your review. Note this work was conducted on a preliminary site layout and that follow up CF desktop and field review is being conducted on a revised site layout.

We are planning to conduct the 2nd round/late season CF plant surveys this coming week on Aug. 15-16, 2016, and are completing the desktop work on the revised Project layout at this time. For the late season field review, we are not planning to revisit sites evaluated during the early season field review that were determined not to be potential CFs. We do plan to revisit sites that were determined to be potential CFs in the early season field review, as well as field review any new potential CF sites based upon the revised site layout of the Project that were not evaluated in the early season effort. We request MN DNR review and concurrence with this approach, to be applied to the late season field work to be done Aug. 15-16 and other subsequent fen evaluation that may be necessary.

Upon completion of the 2nd season field review, a report will be prepared (similar to the attached report) and submitted to the MN DNR. Wetland/Waterbody surveys are being scheduled for this month. Once that work is completed, we would like to schedule a meeting with the MN DNR in early September to review CF and wetland/waterbody data and provide updates to the MN DNR on those matters. We would appreciate it if you could let us know some dates/times you are available for a meeting in early September.

If you have any questions or comments, please contact me or respond to all on this email. We appreciate your assistance and involvement with the Project.

Best,
Joe



Joe Sedarski

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From: Joe Sedarski
To: [Mixon, Kevin \(DNR\)](#)
Cc: "[Anne-Marie Griger](#)"; [Sean Flannery](#); [Michelle Matthews](#); [Jim Arndt](#)
Bcc: [Brie Anderson](#); [Dean Sather](#); [Kevin Mueller](#); [Scott A. Milburn](#)
Subject: RES Bitter Root Wind Project - Calcareous Fen Follow Up
Date: Thursday, August 17, 2017 2:51:00 PM
Attachments: [image002.jpg](#)

Good afternoon Kevin,

On behalf of RES Americas, we are following up with you on the calcareous fen review for the Bitter Root Wind Project following the meeting on July 26th, 2017.

First of all, thanks for your email on July 31, 2017, indicating that the MnDNR has further reviewed the existing calcareous fen across 210th Avenue from the proposed Project access road, and that the MnDNR agrees that the access road in this location should not impact the fen, and avoidance of potential impacts to the fen has been achieved.

Also, please see attached kmz regarding culvert locations to address question during the July 26th meeting – RES America confirms there are two culverts on 201th Avenue in this area.

Secondly, as discussed during the July 26, 2017, meeting, RES/Merjent conducted a desktop review of potential calcareous fens in areas associated with the current Project site layout which were not reviewed in 2016. Jim Arndt with Merjent conducted a desktop review the same protocols used in 2016. We request your review of the attached information and summary of the desktop data and response to our recommendations for conducting late season calcareous fen field review by the end of August.

A brief summary of the desktop review follows:

- 50 wetland areas were examined within the 500 foot buffer areas of the current 2017 Project site layout construction corridors.
- No areas were double counted with the exception of “Site 13 FenCheck++ 0817” which, though portions of which are outside of the 2016 footprint, was checked by MNR during the 2016 field survey (referred to as BR32 in 2016 report). Because this was reviewed in 2016, no further review of Site 13 is recommended.
- Merjent looked at everything except for obvious farmed wetland. All wetland areas were examined for offsite fen indicator features, including topographic anomalies (based on 2’ contour interval LiDAR Data) indicative of the presence of sloping peatland, peat domes, and groundwater spring heads and spring runs, national wetlands inventory (NWI) data, and air photo interpretation of a number of photo years from 1991 to 2015 to assess land use and surface water hydrology. If an area had any indicators of potential calcareous fen regardless of how subtle the expression, it was included as an area requiring field assessment.
- A total of 10 areas were identified as new areas within the 2017 footprint requiring a field survey; however, only two sites (15 FenCheck 0817 and 50 FenCheck 0817) are anticipated to have significant potential for calcareous fen. These ten areas include Sites 7, 10, 12, 15 (three

locations), 17, 18, 22, and 50, as indicated in the attached kmz and shapefiles.

- The remainder do not have any offsite evidence of calcareous fen, e.g. sloping peatland, peat domes or topographic anomalies, spring head spring run discharge, etc.

Based upon this information, we recommend that ten identified locations be field reviewed for calcareous fens. Field survey protocols for this effort will be the same as we used in 2016. After the field survey is completed, we will prepare a report with the findings and provide to the MnDNR. This information will also be used, as necessary, for possible changes to the site layout.

Because the late season survey window for calcareous fens is closing at the end of August, we appreciate your review and response to this email so that we can get this done if you are in agreement with this recommendation.

Best Regards,
Joe



Joe Sedarski

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--	--

From: [Mixon, Kevin \(DNR\)](#)
To: [Joe Sedarski](#)
Cc: [Anne-Marie Griger](#); [Sean Flannery](#); [Michelle Matthews](#); [Jim Arndt](#); [Benage, Megan \(DNR\)](#); [Scott A. Milburn](#); [Warzecha, Cynthia \(DNR\)](#)
Subject: RE: RES Bitter Root Wind Project - Calcareous Fen Follow Up
Date: Wednesday, September 6, 2017 2:17:17 PM
Attachments: [image002.jpg](#)

Joe:

Thanks for the update and coordination on this issue. We have no comments or concerns at this time and we look forward to receiving the combined report.

Kevin

From: Joe Sedarski [mailto:jsedarski@merjent.com]
Sent: Wednesday, August 30, 2017 10:44 AM
To: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Cc: Anne-Marie Griger <Anne-Marie.Griger@res-group.com>; Sean Flannery <Sean.Flannery@res-group.com>; Michelle Matthews <Michelle.Matthews@res-group.com>; Jim Arndt <jarndt@merjent.com>; Benage, Megan (DNR) <megan.benage@state.mn.us>; Scott A. Milburn <scott.milburn@mnrinc.us>
Subject: RE: RES Bitter Root Wind Project - Calcareous Fen Follow Up

Good morning Kevin, and all:

Quick update – on this past Monday (Aug 28, 2017) Scott with MNR conducted field review of the potential sites flagged by Jim Arndt in current site layout areas that are new/updated for the Bitter Root Wind Project. None of the sites had indication of calcareous fens.

Note that we did not field review 7 FenCheck (it is located in South Dakota and Project is no longer in SD), nor 15 FenCheck sites located at USFWS lands (Project will not impact these lands), or 17 FenCheck site (landowner has not signed up for the Project and Project will not impact this parcel).

We are preparing a report that will compile applicable 2016 and 2017 desktop and field review information relative to the current site layout which will correspond to the site layout to be included in the Site Permit Application.

Please let us know if any questions or comments regarding this update.

We appreciate your assistance with these matters.

Best Regards,
Joe

merjent

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From: Mixon, Kevin (DNR) [<mailto:kevin.mixon@state.mn.us>]
Sent: Tuesday, August 22, 2017 8:52 AM
To: Joe Sedarski <jsedarski@merjent.com>
Cc: Anne-Marie Griger <Anne-Marie.Griger@res-group.com>; Sean Flannery <Sean.Flannery@res-group.com>; Michelle Matthews <Michelle.Matthews@res-group.com>; Jim Arndt <jarndt@merjent.com>; Benage, Megan (DNR) <megan.benage@state.mn.us>
Subject: RE: RES Bitter Root Wind Project - Calcareous Fen Follow Up

Joe:

The MNDNR is in agreement with your methods and desktop review for calcareous fens in the areas that were not reviewed in 2016. Please proceed to review the 10 potential calcareous fens in the field. We appreciate the high level of coordination that has occurred on this issue.

Thanks,

Kevin

From: Joe Sedarski [<mailto:jsedarski@merjent.com>]
Sent: Thursday, August 17, 2017 2:52 PM
To: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Cc: Anne-Marie Griger <Anne-Marie.Griger@res-group.com>; Sean Flannery <Sean.Flannery@res-group.com>; Michelle Matthews <Michelle.Matthews@res-group.com>; Jim Arndt <jarndt@merjent.com>
Subject: RES Bitter Root Wind Project - Calcareous Fen Follow Up

Good afternoon Kevin,

On behalf of RES Americas, we are following up with you on the calcareous fen review for the Bitter Root Wind Project following the meeting on July 26th, 2017.

First of all, thanks for your email on July 31, 2017, indicating that the MndNR has further reviewed the existing calcareous fen across 210th Avenue from the proposed Project access road, and that the MndNR agrees that the access road in this location should not impact the fen, and avoidance of potential impacts to the fen has been achieved.

Also, please see attached kmz regarding culvert locations to address question during the July 26th meeting – RES America confirms there are two culverts on 201th Avenue in this area.

Secondly, as discussed during the July 26, 2017, meeting, RES/Merjent conducted a desktop review of potential calcareous fens in areas associated with the current Project site layout which were not reviewed in 2016. Jim Arndt with Merjent conducted a desktop review the same protocols used in 2016. We request your review of the attached information and summary of the desktop data and response to our recommendations for conducting late season calcareous fen field review by the end of August.

A brief summary of the desktop review follows:

- 50 wetland areas were examined within the 500 foot buffer areas of the current 2017 Project site layout construction corridors.
- No areas were double counted with the exception of “Site 13 FenCheck++ 0817” which, though portions of which are outside of the 2016 footprint, was checked by MNR during the 2016 field survey (referred to as BR32 in 2016 report). Because this was reviewed in 2016, no further review of Site 13 is recommended.
- Merjent looked at everything except for obvious farmed wetland. All wetland areas were examined for offsite fen indicator features, including topographic anomalies (based on 2’ contour interval LiDAR Data) indicative of the presence of sloping peatland, peat domes, and groundwater spring heads and spring runs, national wetlands inventory (NWI) data, and air photo interpretation of a number of photo years from 1991 to 2015 to assess land use and surface water hydrology. If an area had any indicators of potential calcareous fen regardless of how subtle the expression, it was included as an area requiring field assessment.
- A total of 10 areas were identified as new areas within the 2017 footprint requiring a field survey; however, only two sites (15 FenCheck 0817 and 50 FenCheck 0817) are anticipated to have significant potential for calcareous fen. These ten areas include Sites 7, 10, 12, 15 (three locations), 17, 18, 22, and 50, as indicated in the attached kmz and shapefiles.
- The remainder do not have any offsite evidence of calcareous fen, e.g. sloping peatland, peat domes or topographic anomalies, spring head spring run discharge, etc.

Based upon this information, we recommend that ten identified locations be field reviewed for calcareous fens. Field survey protocols for this effort will be the same as we used in 2016. After the field survey is completed, we will prepare a report with the findings and provide to the MnDNR. This information will also be used, as necessary, for possible changes to the site layout.

Because the late season survey window for calcareous fens is closing at the end of August, we appreciate your review and response to this email so that we can get this done if you are in agreement with this recommendation.

Best Regards,

Joe



Joe Sedarski

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From: [Mixon, Kevin \(DNR\)](#)
To: [Joe Sedarski](#)
Cc: [Anne-Marie Griger](#); [Michelle Matthews](#); [Sean Flannery](#); [Scott A. Milburn](#); [Jim Arndt](#); [Warzecha, Cynthia \(DNR\)](#)
Subject: RE: Bitter Root Wind Project - Follow up Calcareous Fen Question and Review
Date: Friday, September 29, 2017 9:18:12 AM
Attachments: [image001.gif](#)

Joe:

The MNDNR agrees that locating a collection line on the south side of 180th Avenue would not be considered an impact to the fen located approximately 218 feet north of 180th Avenue.

Thanks

From: Joe Sedarski [mailto:jsedarski@merjent.com]
Sent: Thursday, September 28, 2017 1:14 PM
To: Mixon, Kevin (DNR) <kevin.mixon@state.mn.us>
Cc: Anne-Marie Griger <Anne-Marie.Griger@res-group.com>; Michelle Matthews <Michelle.Matthews@res-group.com>; Sean Flannery <Sean.Flannery@res-group.com>; Scott A. Milburn <scott.milburn@mnrinc.us>; Jim Arndt <jarndt@merjent.com>
Subject: Bitter Root Wind Project - Follow up Calcareous Fen Question and Review

Good afternoon Kevin,

While putting together the compiled calcareous fen report for the Bitter Root Wind Project, we identified a second fen (BR25) located within the 500 foot buffered survey corridor (see attached jpg). As shown in the figure, a proposed collection line would be installed within about 218 feet of fen BR25, which is located on the north side of 180th Avenue. Please note the proposed collection line would be trenched in along the south side of 180th Avenue.

Similar to your earlier previous review of MN DNR fen Fortier 5 (BR32), which is located about 120 from the construction corridor for a proposed access road that would be installed south of 210th Avenue (see attached jpg), could you also review BR25 and let us know if concerns or if potential impacts to this fen has been achieved as well?

Once we have this determination, we'll finalize the fen report and submit to you.

Please contact us with any questions or comments regarding this matter and thanks in advance for your review.

Best,
Joe



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From: Joe Sedarski
To: ["Mixon, Kevin \(DNR\)"; Warzecha, Cynthia \(DNR\)](#)
Cc: ["Sean Flannery"; "Anne-Marie Griger"; "Michelle Matthews"; Jim Arndt; "Scott Milburn"](#)
Subject: Bitter Root Wind Project - Combined Calcareous Fen Survey Report
Date: Thursday, October 5, 2017 1:25:00 PM
Attachments: [image001.gif](#)

Good morning Kevin and Cynthia,

Please find attached the above referenced report concerning the Bitter Root Wind Project. We will include this in the Site Permit Application (SPA) for the Project as well, but we'd like to review that with you in terms of showing fen locations.

If you have any questions or comments, please contact me or any of the parties cc'd on this email.

We appreciate your continued assistance with this Project!

Best,
Joe



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October 4, 2017

Mr. Sean Flannery
Permitting Director
Renewable Energy Systems Americas, Inc.
330 2nd Avenue South, Suite 820
Minneapolis, MN 55401

**Re: Combined Calcareous Fen Survey Report
Bitter Root Wind Project**

Dear Mr. Flannery:

Midwest Natural Resources, Inc. (MNR) and Merjent Inc. (Merjent) are pleased to provide the following 2016 – 2017 Field Seasons combined Calcareous Fen Survey Report (Report) for the proposed Bitter Root Wind Project (Project). Flying Cow Wind, LLC (Flying Cow Wind), a subsidiary of Renewable Energy Systems Americas Inc., is the Project proposer. The boundary of the Project and 2016-2017 Survey Corridors are indicated in the attached Figure 1.

Project Regulatory Summary and Coordination Updates

The calcareous fen survey work was conducted to address Minnesota Department of Natural Resources (MN DNR) initial comments on the Project provided in the MN DNR Preliminary Review letter dated May 3, 2016, and subsequent MN DNR review and coordination with Flying Cow Wind on calcareous fen matters. The MN DNR required that early and late season field surveys be conducted for the Project to assess the potential impacts to calcareous fens in 2016 and associated follow-up fen surveys in August 2017¹. This Report provides a summary of all desktop and field survey results completed in 2016 and 2017 as of this date for the Project.

On August 11, 2016, Merjent submitted to the MN DNR the Preliminary Calcareous Fen Survey Report (Preliminary Report, dated July 18, 2016), which provided the results of a desktop assessment of potential calcareous fen sites and results of the early season field survey conducted for the then current site layout of the Project. On November 28, 2016, Merjent submitted the Calcareous Fens Early and Late Season Survey Report to the MN DNR, which provide the results of desktop assessment and early and late season field survey work conducted for the updated site layout of the Project. Flying Cow Wind used the results of the 2016 calcareous fen work to further revise the site layout of the proposed Project to avoid and/or minimize potential impacts to fens and associated sensitive environmental features within the Project construction corridors.

On July 26, 2017, representatives of the Minnesota Department of Commerce (DOC), MN DNR, and Flying Cow Wind met to discuss, among other things, the status of the Project and review updated environmental field survey and related information, including site layout updates and calcareous fens. During the meeting, Flying Cow Wind informed the MN DNR that, except for one location, all Project turbines, access roads,

¹ The suite of calcareous fen indicator plant species that are observed during spring survey are different from those that can be identified during fall survey.

collections lines, and other Project facilities were outside of the 500-foot buffer² from identified calcareous fens (Figure 2).

One planned Project access road (which consists of an existing field access road) to a turbine site near 210th Avenue is located within the 500-foot buffer near MN DNR fen Fortier 5/BR32 (Figures 2 and 5). The access road is proposed because it follows an existing field access road and is the most direct route to the turbine site which minimizes impacts to land use and other environmental features in this area. On July 31, 2017, the MN DNR informed Flying Cow Wind via email that it reviewed the planned access road relative to the fen, and determined that the planned access road should not impact this fen and avoidance of potential impacts to the fen has been achieved (see Agency Correspondence in the Attachments).

Upon subsequent design and review, Flying Cow Wind has determined that a proposed collection line disturbance corridor would be within approximately 218 feet of another fen, BR25 (Table 1; Figure 2). This fen is located on the north side of 180th Avenue, whereas the proposed collection line would be trenched along the south side of 180th Avenue. On September 29, 2017, MN DNR informed Flying Cow Wind via email that it reviewed the planned collection line relative to the fen, and determined that locating the planned collection line on the south side of 180th Avenue would not be considered an impact to this fen (see Agency Correspondence in the Attachments).

On August 17, 2017, Flying Cow Wind provided follow-up information regarding the completed desktop work and planned methodology for conducting field survey work for the August 2017 calcareous fen review (see Agency Correspondence in the Attachments). On August 22, 2017, MN DNR approved the proposed field methodology and desktop review for fen field review. Based upon this approval, MNR conducted field review of the additional potential calcareous fen sites for the current Project site layout in late August 2017.

This Report includes a compilation of the early season work and results of the late season desktop and field survey efforts completed in August 2016 and the desktop/field survey efforts completed in 2017 on the updated Project site layout. This information is being used to appropriately site Project facilities and to avoid potential Project impacts to calcareous fens and other natural resources.

Background

Flying Cow Wind is proposing the Project located in southwestern Minnesota in Yellow Medicine County and Deuel County, South Dakota, approximately 1.5 miles west of the City of Canby and 5 miles to the northwest of the City of Porter (Figure 1). The Project is a wind conversion facility with a planned capacity up to 152 megawatts, with 37 planned turbines and 3 alternate turbines planned in Minnesota.

The Project also includes an approximately 10-mile long 345 kilovolt overhead transmission line, which will be entirely located in South Dakota. The Project Substation will be located near the Minnesota/South Dakota border in Deuel County, South Dakota, and will continue southwest in Deuel County until the point of interconnection located at Otter Tail Power's planned Astoria Substation in southeastern Deuel County. The transmission line and Project substation will be permitted separately by the South Dakota Public Utilities Commission and Deuel County. The layout for the Project may continue to be updated slightly as additional constraint information and agency feedback is incorporated in to the Project development.

The 2016 calcareous early season fen survey was based on a preliminary turbine layout that included up to 42 turbine locations, including alternate sites. The 2016 late season fen survey was based upon a revised preliminary turbine layout that had 46 turbine locations, including alternate sites. The 2017 late season fen

² By agreement between the MN DNR and Flying Cow Wind, calcareous fens with a closest approach beyond 500 feet from the boundary of the Project footprint are automatically considered avoided.

survey was based upon a subsequent revised turbine layout that has 40 turbine locations (37 proposed and 3 alternate sites). Figure 3 illustrates the 2016 early season and late season and 2017 late season Project layouts and buffer areas used for fen Survey Corridors 1 and 2, as well as the August 2017 Survey Corridor 3. With each desktop and field review data, the design of the Project layout has been refined, particularly to avoid known and suspected environmental impacts and minimize to the extent practicable unavoidable impacts, and will continue to be slightly revised to further meet these objectives, if possible.

In addition to the turbines, facilities necessary for construction and operation of the Project in Minnesota that are included in the Project footprint (and the calcareous fen assessment based on the footprint) include access roads, electrical collection lines, fiber optic communication cabling, an operations and maintenance facility, and temporary crane paths and laydown/staging areas. Construction in Minnesota is expected to begin in first quarter 2019.

According to the MN DNR, there are seven previously documented calcareous fen features in the Project Area (see Agency Correspondence [MN DNR Preliminary Review letter dated May 3, 2016], and Figure 3). As a result, Flying Cow Wind retained MNR and Merjent to investigate other potential calcareous fen locations.

Calcareous fens are wetland plant communities regulated by both the MN DNR and the Minnesota Pollution Control Agency. These features are groundwater-fed discharge systems rich in calcium carbonate (CaCO_3) and/or magnesium carbonates (Bergland 1995; Leete et al. 2005, Arndt et al. 2015). Calcareous fens remain saturated year-round due to continuous groundwater discharge maintaining anaerobic conditions at and near the soil surface, resulting in the accumulation of organic matter (peat) in the wetland soil.

Calcareous fens typically classify into Prairie Extremely Rich Fen communities (OPp93) in the Minnesota Native Plant Community Classification system (MN DNR 2005), and host a number of unusual plants that are adapted to the calcareous fen environment. A number of these plants are state-listed species and are further protected under Minnesota's endangered species law.

Methods

Desktop Review and Selection of Potential Calcareous Fen Sites

The objective of the field surveys was to identify potential calcareous fens in or near the Project Area in Minnesota. Merjent staff, in collaboration with MNR, targeted survey locations of possible calcareous fen sites based on desktop review conducted just prior to field surveys in 2016 and 2017.

Desktop review involved the examination of the following geospatial resources obtained for the study area and interpreted in a Geographic Information System (Google Earth Professional):

1. Recent high-resolution aerial imagery, dated 9/1/2015;
2. A 2-foot topographic contour map created from high resolution light detection and ranging data available for the State of Minnesota³;
3. National Wetlands Inventory (NWI) polygons and associated attribute data;
4. Supplemental information from the Minnesota Geospatial Commons included MN DNR native plant community polygons and attribute data⁴ for areas inventoried for potential biological significance by the MN County Biological Survey⁵ and the calcareous fen source feature points datasets; and

³ <http://arcgis.dnr.state.mn.us/maps/mntopo/>

⁴ <http://www.dnr.state.mn.us/eco/mcbs/maps.html>

⁵ <http://www.dnr.state.mn.us/eco/mcbs/maps.html>

5. A polygon created by buffering planned infrastructure associated with the Project by 500 feet to represent the area to be investigated, the “Survey Corridor” (see Figures 3 to 5).

On unrelated projects, Dr. James Arndt of Merjent previously reviewed several listed calcareous fens in the field in Yellow Medicine County near the proposed Project. That work was conducted to support an informational document prepared for the Environmental Protection Agency (Arndt 1995, 1999), and to characterize a state-listed calcareous fen potentially affected by a proposed road realignment in nearby Lincoln County (Arndt and DeJooode 2009). Calcareous fens in southwest Minnesota are associated with unique landscape positions and present unique landform features that can be used as a scoping tool to identify locations that may have calcareous fens (Arndt, J.L. 1995, 1999; Almendinger and Leete, 1998a, 1998b; Arndt and DeJooode, 2005). These features include:

1. The presence of wetlands and wetland signatures on sloping ground in areas that are inconsistent with typical depression-type palustrine wetlands, and are not characteristic of the topography associated with riparian wetlands adjacent to area streams. The accretion of peat in these areas presents a signature of a doubly convex, sloping apron of saturated ground in sideslope and toeslope positions typically located above the floodplain of incised drainageways within the surrounding till plain. These areas typically represent sidehill seeps of calcareous water from exposures of confined aquifers on the valley walls of incised drainageways; and
2. Breaks in the confining aquitard⁶ that allow confined aquifers to discharge as spring-heads in nearly level till areas, resulting in an accumulation of peat forming a classic “dome” feature. Such features are typically 10 to 12 feet or more in height, and readily appear on contour maps as approximate circular concentric contours indicative of a mounding effect.

All data were incorporated into Google Earth Pro GIS. Within the Survey Corridor, all NWI wetland areas and all NWI-designated upland areas that presented anomalous topographic signatures of peat accretion were identified as sites requiring subsequent field identification for potential calcareous fen. These desktop reviews preceded both early and late field surveys to account for ongoing alterations in the Project footprint.

Field Survey Methods

Using the desktop review data, Merjent engaged MNR personnel to field review each of the potential calcareous fen areas identified in the desktop review. In the event that MNR determined any of the potential calcareous fens did not meet the criteria to be a calcareous fen, Merjent’s wetland personnel would then delineate it as a wetland.

MNR made a determination of potential fen status in the field and documented with basic site notes and representative photographs. The approach included collecting detailed plot data at those locations having possible calcareous fen conditions observed in the field. Sites having wetlands with no observed calcareous fen features were documented either by collecting thorough species lists or with relevés.

Relevés are used as tools to document and classify native plant communities. This sampling involves the collection of species richness and abundance within a standardized plot. This method also incorporates the documentation of plant life form (e.g., forbs, graminoids, broadleaf evergreens etc.), and height class. Sampling by means of relevés was reserved for those sites dominated by intact native plant communities. Field-determined native plant community classifications are based on Minnesota's Native Plant Community Classification (Version 2.0). Possible calcareous fen locations were further evaluated by means of the vegetation technical criterion as described in the “Test of the Technical Criteria for Identifying and Delineating Calcareous Fens in Minnesota” document (Leete et al. 2005).

⁶ Aquitard: a relatively low permeability layer that impedes groundwater flow.

Results

2016 Early Season Desktop Screening Analysis and Field Surveys

Early season site evaluations were conducted June 29 - July 1, 2016 within Survey Corridor 1 based on the most current Project footprint at the time (Survey Corridor 1, Figures 3 and 5). Initial site selection based on the above information resulted in the selection of 23 potential areas to survey early in the growing season.

MNR evaluated all but one of the 23 predetermined sites, with one additional site added based on the field reconnaissance (Figures 3 and 5). The site that was not evaluated (BR07) is located on federal land. Because MNR did not have access permission for that parcel and Flying Cow Wind redesigned the Project to avoid this area, no survey was completed. No Project infrastructure will be placed on federal land. Appendix A summarizes the field survey results, and Appendix B presents the scoring results used in the classification of calcareous fens. Representative photos are provided in Appendix C, and relevé data are provided in Appendix D.

Preliminary surveys resulted in the location of three areas exhibiting calcareous fen characteristics, one of which (BR22-Fortier 6) had been previously documented by MN DNR. This particular feature, along with the associated fen (BR23), were both outside of Survey Corridor 1, while the third fen location (BR01) was located within it. Site BR14 was also identified as a possible fen location so it was surveyed again during the late season survey. All other remaining survey areas were classified as either wet meadow communities (Prairie Wet Meadow/Carr and Southern Seepage Meadow/Carr), marsh (Prairie Bulrush-Arrowhead Marsh), upland, or drainage swale.

2016 Late Season Desktop Screening Analysis and Field Surveys

The late season surveys were conducted August 15 - 16, 2016 using the same protocols described for the early season survey. However, Survey Corridor 1 was revised based on the early season survey results and other Project constraints to avoid impacts to known sensitive resources, resulting in a Survey Corridor 2 that was used during the late season survey (see Figures 3 and 5).

Application of the desktop screening procedures identified 10 additional areas to be surveyed within Survey Corridor 2 for the late season survey. Sites discounted as potential fens during the early season survey were not included in the late season survey. Two potential calcareous fens were subjected to both early and late season plant surveys. In total, 33 areas were assessed during the two surveys for diagnostic calciphile plants (Figure 5)⁷.

The 2016 late season survey identified two potential calcareous fens within Survey Corridor 2, in addition to fen BR01, which was resurveyed. Features identified as potential fens in the early and late season surveys are summarized in Table 1 below. Feature BR14 was also revisited during the August field review. This site would fall into the classification of a seepage wet meadow community, but meets the vegetative criterion of a calcareous fen strictly related to the point value of the feature. However, it is located outside of Survey Corridor 2. All other remaining survey areas were classified as either wet meadow communities (Prairie Wet Meadow/Carr and Southern Seepage Meadow/Carr), marsh (Prairie Bulrush-Arrowhead Marsh), upland, or drainage swale that lacked calciphiles or did not have sufficient calciphiles to be considered calcareous fen by plant criteria. In summary, the 2016 early and late season surveys identified three fen features within Survey Corridor 2—BR01, BR25, and BR32 (Figure 5).

⁷ Several potential fen areas are outside of the Project Survey Corridor 2 as a result of interim adjustments to Survey Corridor, which was based on previous Project configurations designed by Flying Cow Wind to avoid impacts to potentially environmentally sensitive resources, including potential fen areas.

2017 Late Season Desktop Screening Analysis and Field Surveys

From late 2016 to early August 2017, Flying Cow Wind refined the Project site layout to meet a number of objectives, including avoiding calcareous fens and other environmentally sensitive resources (see Figures 3 and 4). Merjent conducted desktop screening for the 2017 late season assessment on Survey Corridor 3, the current Project site layout, after receiving MN DNR approval of proposed protocols on August 22, 2017.

Merjent's desktop review included all area within Survey Corridor 3. A brief summary of the 2017 desktop review follows:

- 50 wetland areas were examined within the 500-foot buffer areas of the current 2017 Project site layout construction corridors (Survey Corridor 3), including areas that overlapped with the 2016 Project site layout buffered areas (Survey Corridors 1 and 2);
- No areas assessed during 2016 were included in the 2017 target locations, with the exception of "Site 13 FenCheck++ 0817" which, though portions of which are outside of the 2016 footprint, was checked by MNR during the 2016 field survey (referred to as BR32 in 2016 report). Because this was reviewed in 2016, no further review of Site 13 was recommended;
- Merjent looked at all vegetated areas with wetland signatures except for obvious farmed wetlands. All remaining wetland areas were examined for offsite fen indicator features that are discussed in the Methods section above. To ensure all potential fen areas were considered, if an area had any indicators of potential calcareous fen regardless of how subtle the expression, it was included as an area requiring field assessment;
- A total of 10 areas were identified as new areas within the 2017 Survey Corridor 3 requiring a field survey; however, only two sites (15 FenCheck 0817 and 50 FenCheck 0817) were anticipated to have significant potential for calcareous fen. These ten areas include Sites 7, 10, 12, 15 (three locations), 17, 18, 22, and 50, were provided to the MN DNR along with a summary of the desktop review on August 17, 2017 (see Agency Correspondence in the Attachments);
- Of these 10 areas, six of the sites were either surveyed in 2016, were located in South Dakota (none of the Project turbines will be located in South Dakota), were located on federal lands (no Project facilities will be located on federal lands), were located on non-participating land (no Project facilities will be located on non-participating land), or were where Project collection lines were rerouted to avoid potential fen locations. For this reason, the only remaining four sites were surveyed by MNR (BR34, BR35, BR36, and BR37) in August 2017; and
- The remainder wetland areas do not have any offsite evidence of calcareous fen (e.g. sloping peatland, peat domes or topographic anomalies, spring head spring run discharge, etc.).

Based upon this information, Merjent recommended that four identified locations be field reviewed for calcareous fens (see Figure 4). Field survey protocols for this effort were similar to those used in 2016. On August 28, 2017, Scott Milburn of MNR conducted the field review of the four sites.

The first site, BR34, is a small watercourse through a grazed pasture with no signs of seepage and no calciphiles were observed. The second site, BR35, is a large degraded marsh complex with a wet meadow fringe. This site is surrounded by row crop agriculture and subject to agricultural runoff. This particular area lacked obvious signs of discharge and no calciphiles were observed. The third site, BR36, is a small depressional drainage way that is primarily dominated by non-native graminoid species. This particular feature lacked both discharge hydrology and calciphiles. The final of the four sites, BR 37, is a degraded wet meadow associated with a waterway that is also dominated by non-native graminoids. As with the other sites, this feature lacked discharge and the presence of calciphiles.

A summary of the survey date (s), calcareous fen point summary, site locations, and general characterization of the previously documented calcareous fen features and the four additional sites are provided in Table 1.

Additionally, the overall Project summary table (Appendix A) has been updated along with the calcareous fen scoring points summary table (Appendix B), and site photos (Appendix C). Relevés were not collected during the 2017 survey efforts since none of the four sites were deemed intact native plant communities.

Table 1
Potential Calcareous Fens Identified in 2016-2017 Field Surveys

Site	Survey Date	Calcareous Fen Point Summary	Location			Comments
			Within Survey Corridor 1 (June/July 2016)	Within Survey Corridor 2 (August 2016)	Within Survey Corridor 3 (August 2017)	
BR01	6/29/2016 and 8/15/2016	80	Yes	Yes	No	Calcareous Fen—Prairie Extremely Rich Fen
BR14	6/30/2016 and 8/15/2016	50	Yes	No	No	Wet Meadow or Calcareous Fen
BR22	7/1/2016	190	No	No	No	Calcareous Fen—Prairie Extremely Rich Fen
BR23	7/1/2016	55	No	No	No	Calcareous Fen—Prairie Extremely Rich Fen
BR25	8/16/2016	75	No	Yes	Yes	Calcareous Fen—Prairie Extremely Rich Fen
BR32	8/16/2016	110	No	Yes	Yes	Calcareous Fen—Prairie Extremely Rich Fen
BR34	8/28/2017	0	No	No	Yes	Drainage Swale
BR35	8/28/2017	0	No	No	Yes	Degraded Marsh
BR36	8/28/2017	0	No	No	Yes	Drainage Swale/Degraded Wetland
BR37	8/28/2017	0	No	No	Yes	Degraded Wet Meadow

All five documented calcareous fen features (2016 survey efforts) are outside of the of the current construction corridor. However, as discussed above, the MN DNR calcareous fen Fortier 5 at site BR32 and fen BR25 are both within the 500-foot buffer area, approximately 120 feet and 218 feet, respectively, away from the proposed construction corridor (Figure 5). MN DNR reviewed the proposed access road relative to fen Fortier 5/BR32 and the proposed collection line relative to fen BR25 and determined that the planned access road and collection line should not impact these fens and avoidance of potential impacts to the fen has been achieved (see Agency Correspondence in the Attachments).

Calcareous fen surveys as described in this Report will be conducted on any new areas subsequently identified as potentially part of future updated Project footprints, as they are developed. The information provided in this Report has been used to refine the Project footprint.

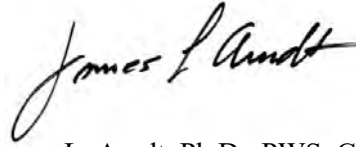
Flying Cow Wind anticipates that all impacts to identified calcareous fens can be avoided, and will request MN DNR concurrence for any previously unsurveyed areas if there are future changes to the Project layout.

Please feel free to contact either of us if you have any questions regarding the findings of the calcareous fen studies for the Project. Scott can be reached at 612.310.6260 or scott.milburn@mnrinc.us, and Jim can be reached at 612.924.3987 or jarndt@merjent.com.

Respectfully submitted,



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Attachments Agency Correspondence
Figure 1 Project Location and Survey Corridor Overview
Figure 2 Closeup of Calcareous Fens Within Survey Corridors
Figure 3 Project Survey Corridors and MN DNR Calcareous Fen Locations
Figure 4 Calcareous Fen Evaluation Locations August 2017
Figure 5 Potential Calcareous Fen Areas Within or Near Survey Corridor 3
Appendix A Summary Table
Appendix B Summary of Scoring Results
Appendix C Site Photos
Appendix D Relevé Forms

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