APPENDIX 'I'

Wetland Delineation Report

Standard Wetland Delineation Report: Grand Harbour, Grand Manan, NB

PID 15185465

June 16, 2018

For

Silk Stevens Design and Consulting Engineers

By

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Introduction:

A Standard Wetland Delineation was conducted by Theo Popma, a recognized Delineator at Overdale Environmental Inc. The property (PID 15185465) is located on Grand Manan Island near Grand Harbour, NB (Figure 1, Appendix A). The western boundary of the PID is adjacent to the parking lot for the local Arena. Wetland is shown to exist on the site according to the map layer at SNB GeoNB (Figure 2). The delineation was conducted in accordance with the NB Wetland Conservation Policy and the Clean Environment Act.

It is recommended that this report be provided by the client to the New Brunswick Dept. of Environment for review.

Legislation

These identified wetlands are subject to the *Watercourse and Wetland Alteration Regulation* (REG # 90-80), of the New Brunswick *Clean Water Act.* Any proposed alteration within these areas or within the 30 meter regulated upland buffer requires permitting through the Department of Environment, Watercourse and Wetlands Alteration Program. These areas may also be subject to *Environmental Impact Assessment* (REG 87-83) of the New Brunswick *Clean Environment Act* and other *Acts* and Regulations. It is the responsibility of the proponent to ensure that all regulatory requirements are met prior to development within these areas.

Site Description (See Photos in Appendix D)

The site consists of a dried-down wetland with an open transition zone dominated by shrubs and a variety of grasses. Previous beaver activity in the area likely affected drainage of this wetland which used to be much larger. Ditching and development at the nearby arena also may account for this. The wetland itself has been reduced to a Shrub Swamp with some Marsh characteristics occupying the lowest poorly drained regions. Some open water is present as well as channeling. Microtopographical relief defined much of the wetland boundary.

Wetlands shown as two separate polygons are joined by a hydrological connection less than 5m wide which is usually not shown in wetland delineations.

Methodology

Surveys were conducted according to the guidelines established by NBENV based on the US Army Corps of Engineer Wetland Delineation Manual (1987), Field Indicators of Hydric Soils in the United States and Lichvar, 2005. The Flora of NB (Hinds, 2000) was consulted for plant identification.

Datapoints were analyzed for soil, hydrology and vegetation characteristics at several different locations (Figure 3). Color of soil strata are described in terms of texture, ‘value’ and ‘chroma’ according to a Munsell Soil Color Chart. The wetland delineation line was then completed by walking with a handheld Garmin GPSmap 64st GPS unit.

Datapoint locations and boundary-flag positions are listed in Appendix B. Coordinates are in UTM NAD83.

Wetland habitat was identified by establishing the presence of dominating hydric vegetation, of hydric soils and of hydrological markers such as surface water, soil saturation and channeling. The wetland edge was identified with Data Points (DPs) (wetland and upland) which straddled the boundary. Data sheets are included in Appendix C.

Results

The boundaries of wetland on the PID are shown in the schematic in Figure 3. Photos of each datapoint location are shown in Appendix D.

DPs 1, 3, 4: Upland

Upland sites were dominated by either mature mixed forest or by open dried-down meadows. Meadows were dominated by remnants of hydrophytic plants which occupied the historic wetland, but soils were dry, un-depleted and lacked hydrological indicators such as saturation.

DP 2: Wetland

This region is slightly upslope from the main stream channel which feeds wetland on this PID. DP2 borders on the adjacent PID where open meadow habitat still contains wetland indicators such as water-saturated soils.

DP5: Wetland

This sample point represents the area nearest to the arena and is defined by the presence of Hydrogen Sulfide gas in the sediments and presence of high water table. Channels are nearby as well as open water pools. Some microtopographical relief is present along this edge of the wetland boundary.

Conclusion

This wetland delineation survey on PID 15185465 identified Shrub Swamp Wetland as occupying approximately 0.65ha in two distinct but connected lobes. A small (less than 0.1ha) marshy wetland area was also identified in a nearby clearing by the arena parking lot.

Interpretation of aerial photos indicates that the total size of this wetland (both on and off this PID) as approximately 1 Hectare in total. The majority of this wetland happens to be located within the boundaries of the PID.

It should be noted that this is considered an Atypical Area where human impacts affect analysis of wetland indicators, and that it is a Problem Area where natural events such as beaver activity also affect indicators (hydrology and soils, in this case).

Closing

I trust this information meets your current needs. Please feel free to contact me via telephone at (506) 227-7605 or by email at tpopma@nb.sympatico.ca if further clarification or explanation is required.

Sincerely,

Theo Popma BSc, MSc.

President, Overdale Environmental Inc.

Sources:

The Canadian Wetland Classification System, 2nd ed. 1997. National Wetlands Working Group. Wetlands Research Center, University of Waterloo, ONT.

Environmental Laboratory. (1987). "Corps of Engineers Wetlands Delineation Manual," Technical Report Y-87-1, U.S. Army Engineer Waterways Experiment Station, Vicksburg, Miss.

Field Indicators of Hydric Soils in the United States. 2006.

Hinds, H. 2000. The Flora of New Brunswick.

Lichvar, R., 2005. Wetland Identification, Delineation and Classification. Humbolt Field Research Institute, Steuben, ME, USA.

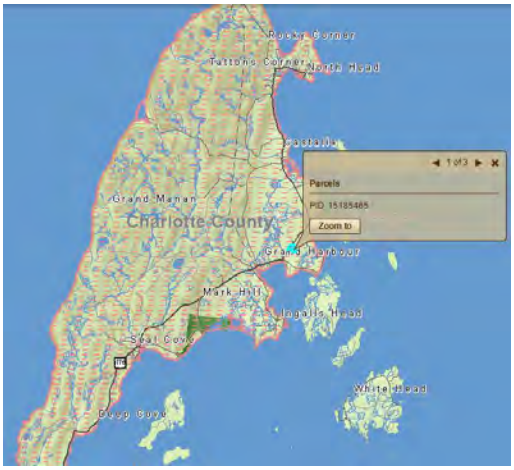
U.S. Army Corps of Engineers. 200X. *Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Northcentral and Northeast Region*, ed. J. S. Wakeley, R. W. Lichvar, and C. V. Noble. ERDC/EL TR-0X-XX. Vicksburg, MS: U.S. Army Engineer Research and Development Center.

US Army Corps of Engineer Wetland Delineation Manual. 1987.

US Department of Fish and Wildlife. 1988. National List of Plant Species that occur in Wetlands.

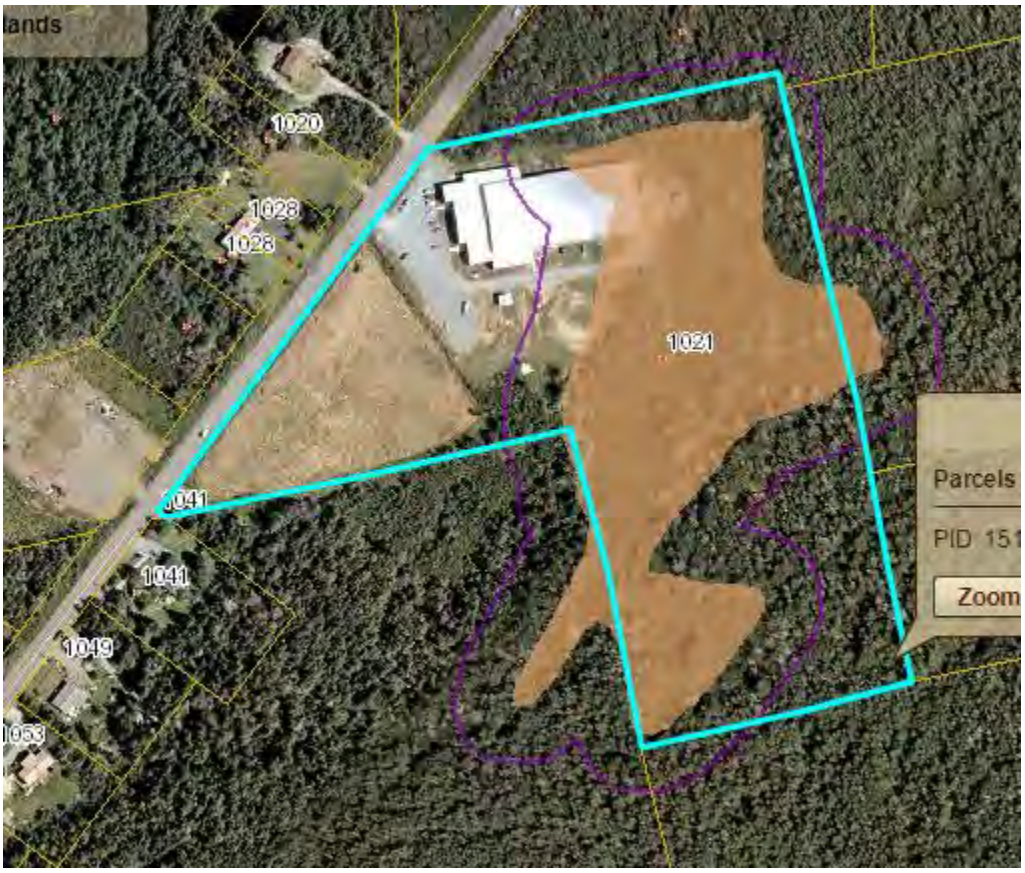
Appendix A: Figures

Figure 1. Survey Area



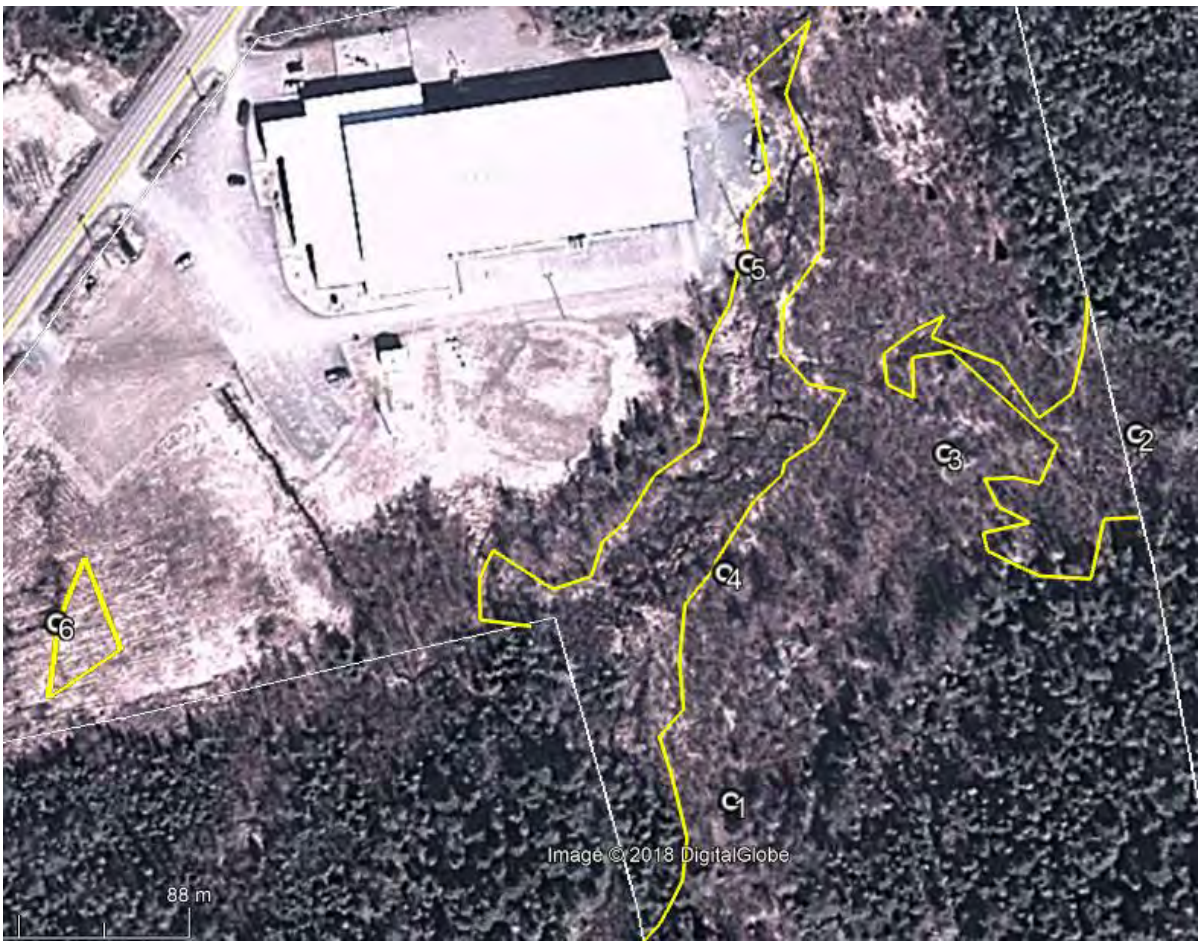
Silk Stevens Design and Consulting Engineers	Figure 1	Project Location	Overdale Environmental Inc.

Figure 2. Wetland on PID 15185465 according to GeoNB.



Silk Stevens Design and Consulting Engineers	Figure 2	NB Wetlands Map	Overdale Environmental Inc.

Figure 3. Wetland Delineation Schematic



Silk Stevens Design and Consulting Engineers	Figure 3	WL polygon and Datapoints	Overdale Environmental Inc.

Appendix B: Datapoint and flag positions

Flags

ID	Lat	Long	ID	Lat	Long
43	44.691324	-66.752146	87	44.69278	-66.7512
44	44.691381	-66.752074	88	44.69275	-66.7512
45	44.691419	-66.752044	89	44.6927	-66.7514
46	44.691482	-66.751999	90	44.69259	-66.7515
47	44.691581	-66.751984	91	44.69263	-66.7516
48	44.691728	-66.752035	92	44.6927	-66.7517
49	44.691815	-66.752074	93	44.69281	-66.7517
50	44.691879	-66.751995	94	44.69293	-66.7515
51	44.691988	-66.752009	95	44.69306	-66.7516
52	44.69212	-66.751991	96	44.69313	-66.7516
53	44.692204	-66.751895	97	44.69309	-66.7517
54	44.692219	-66.751891	98	44.69301	-66.7518
55	44.692356	-66.75177	99	44.69291	-66.7518
56	44.692419	-66.751677	100	44.69289	-66.7518
57	44.692447	-66.751669	101	44.69281	-66.7518
58	44.692497	-66.751566	102	44.69275	-66.7519
59	44.692611	-66.751474	103	44.69267	-66.7519
60	44.692627	-66.751339	104	44.69257	-66.7519
61	44.692596	-66.751253	105	44.69249	-66.7519
62	44.692689	-66.751257	106	44.69242	-66.7521
63	44.692702	-66.751133	107	44.69231	-66.7522
64	44.692526	-66.750859	108	44.69227	-66.7523
65	44.692488	-66.750794	109	44.69219	-66.7523
66	44.692399	-66.75085	110	44.69216	-66.7524
67	44.692413	-66.750933	111	44.69225	-66.7526
68	44.692409	-66.751027	112	44.69218	-66.7527
69	44.692346	-66.750982	113	44.69209	-66.7527
70	44.69231	-66.750883	114	44.69208	-66.7526
71	44.692286	-66.751032	115	44.69207	-66.7525
72	44.692244	-66.751017	116	44.69203	-66.7524
73	44.692188	-66.750854	117	44.69194	-66.7524
74	44.692182	-66.75069	123	44.69208	-66.754
75	44.692318	-66.750647	124	44.69223	-66.7539
76	44.692322	-66.750539	125	44.69202	-66.7538
77	44.692899	-66.750704	126	44.69191	-66.7541
78	44.692899	-66.750703	127	44.69321	-66.7516
81	44.692673	-66.750978	128	44.69329	-66.7517
82	44.692549	-66.750853	129	44.69346	-66.7516
83	44.692605	-66.750748	130	44.69333	-66.7518
84	44.692703	-66.750713	131	44.69338	-66.7517
85	44.692774	-66.750701			
86	44.692735	-66.751197			

Datapoints

ID	Latitude	Longitude
1	44.691671	-66.751837
2	44.692516	-66.750538
3	44.692472	-66.751148
4	44.692197	-66.751857
5	44.692909	-66.751782
6	44.692082	-66.754018

Appendix C: Wetland Datasheets

Project Site:	Grand Manan; Grand Harbour	Date:	16-Jun-18	Sample Point: 1	Job #:
Client/owner:	Silk Stevens Limited	Field Investigator(s):	Theo Popma		
County:	Charlotte	Coordinates:	44.691671°; -66.751837°		
PID 15185465		Do normal environmental conditions exist on-site?		Yes [ ]	No [x]

If no, explain: Frequent frost in mid month of June

Atypical Situation? Yes [x] No [ ] Explain: Human-induced and natural fluctuations in drainage, water levels

Is this a potential **Problem Area?** Yes [x] No [ ] Explain: Drained-down areas used to be wetland still have flora but not H. soils

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule)	Yes [x]	No [ ]
Wetland Hydrology	Yes [ ]	No [x]
Hydric Soils	Yes [ ]	No [x]

Wetland Type:

Rational for Determination:

Wetland Determination

[ ] **YES** [x] **NO**

Vegetation

	Tree Stratum: (Plot size: 9m2)		%Cover		Dominant Species	Indicator Status
1						#N/A
2						
3						
4						
5						
6						
			0	=	**Total Cover**	
	Shrub Stratum: (Plot size: 5m2)					
1	*alnus incana*		5			*facw*
2	*larix laricina*		5			*fac*
3	*spiraea alba*		25		x	*fac*
4						
5						
			35	=	**Total Cover**	
	Herb Stratum: (Plot Size: 1m2)					
1	*agrostis capillaris*		20		x	*fac*
2	*solidago rugosa*		20		x	*fac*
3	*moehringia lateriflora*		5			*fac*
4	*luzula multiflora*		5			*facu*
5	*Anthoxanthum odoratum*		10			*facu*
			60	=	**Total Cover**	

Comments

Dominance Test Worksheet:

# of Dominant Species that are OBL,FACW,FAC:	3
Total # of Dominant Species across all strata:	3
% of Dominant Species that are OBL,FACW,FAC:	100

Prevalence Index Worksheet:

	Total %Cover of:	Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
ULP Species		x 5 =	0
Column Totals:	0		0

Prevalence Index = B/A = ##

Hydrophytic Vegetation Indicators:

- [x] Rapid Test for Hydrolic Vegetation
- [x] Dominance Test is >50%
- [ ] Prevalence Index is≤3.0[1]
- [ ] Morphological Adaptations[1](explain)
- [ ] Problematic Hydrophytic Vegetation[1](explain)

[1]Indicators of hydric soil and weland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes x No

Hydrology

Primary Hydrological Indicators:(minimum of one is required;check all that apply)

___ Surface Water (A1)	___ Water Stained Leaves (B9)
___ High Water Table (A2)	___ Aquatic Fauna (B13)
___ Saturation (A3)	___ Marl Deposits (B15)
___ Watermarks	___ Hydrogen Sulfide Odor (C1)
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)
___ Algal Mat of Crust (B4)	___ Recent Iron reduction in tilled Soils (C6)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)
___ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators:(minimum of two required)

___ Surface Soil Cracks (B6)	___ Stunted or Stressed Plants (D1)
___ Drainage Patterns (B10)	___ Geomorphic Position (D2)
___ Moss Trim Lines (B16)	___ Shallow Aquitard (D3)
___ Dry-Season Water Table (C2)	___ Microtopographic Relief (D4)
___ Crayfish Burrows (C8)	___ FAC-Neutral Test (D5)
___ Saturation Visible on Aerial Imagery (C9)	

Field Observations:

Surface Water Present?	Yes___	No	x	Depth	___		
Water Table Present?	Yes___	No	x	Depth	___	**Wetland Hydrology Present?**	**Yes** ___ **No** ___
Saturation Present?	Yes___	No	x	Depth	___		

Comments:

Soil Profile

Profile Description:(Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type:C=Concentration,D=Depletion,RM=Reduced Matrix,CS=Covered or Coated Sand Grains.2Location:PL=Pore Lining,M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)	___ Sandy Redox (S5)
___ Histic Epipedon (A2)	___ Stripped Matrix (S6)
___ Black Histic (A3)	___ Dark Surfaces (S7)
___ Hydrogen Sulfide (A4)	___ Polyvalue Below Surface (S8)
___ Stratified Layers (A5)	___ Thin Dark Surface (S9)
___ Depleted Below Dark Surface (A11)	___ Loamy Gleyed Matrix (F2)
___ Thick Dark Surface (A12)	___ Depleted Matrix (F3)
___ Sandy Mucky Mineral (S1)	___ Redox Dark Surface (F6)
___ 5cm Mucky Peat or Peat (S3)	___ Depleted Dark Surface (F7)
___ Sandy Gleyed Matrix (S4)	___ Redox Depressions (F8)

Restrictive Layer Type (if observed | Depth: | **Hydric Soil Present?** | **Yes** ___ **No** x

Comments:

no depletion, no hydrogen sulfide

Project Site:	Grand Manan; Grand Harbour	Date:	16-Jun-18	Sample Point:	2	Job #:
Client/owner:	Silk Stevens Limited	Field Investigator(s):	Theo Popma			
County:	Charlotte	Coordinates:	44.692516°; -66.750538°			
PID	15185465	Do normal environmental conditions exist on-site?	Yes [ ]	No [x]		

If no, explain: Frequent frost in mid month of June

Atypical Situation? Yes [x] No [ ] Explain: Human-induced and natural fluctuations in drainage, water levels

Is this a potential **Problem Area?** Yes [x] No [ ] Explain: Drained-down areas used to be wetland still have flora but not H. soils

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule)	Yes [x]	No [ ]
Wetland Hydrology	Yes [x]	No [ ]
Hydric Soils	Yes [x]	No [ ]

Wetland Determination

[x] **YES** [ ] **NO**

Wetland Type: Shrub Swamp

Rational for Determination: shrub dominated near forest edge

Vegetation

	Tree Stratum: (Plot size: 9m2)	%Cover	Dominant Species	Indicator Status
1		5	x	#N/A
2				
3				
4				
5				
6				
		5 =	**Total Cover**	

	Shrub Stratum: (Plot size: 5m2)	%Cover	Dominant Species	Indicator Status
1	*alnus incana*	20	x	*facw*
2	*ledum groenlandicum*	10	x	*facw+*
3	*spiraea alba*	10	x	*fac*
4				
5				
		40 =	**Total Cover**	

	Herb Stratum: (Plot Size: 1m2)	%Cover	Dominant Species	Indicator Status
1	*dryopteris cristata*	10		*facw*
2	*dryopteris carthusiana*	10		*fac*
3	*carex brunnescens*	15		*fac*
4	*carex echinata*	50	x	*obl*
5				
		85 =	**Total Cover**	

Comments

Dominance Test Worksheet:

# of Dominant Species that are OBL,FACW,FAC:	4
Total # of Dominant Species across all strata:	4
% of Dominant Species that are OBL,FACW,FAC:	100

Prevalence Index Worksheet:

	Total %Cover of:	Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
ULP Species		x 5 =	0
Column Totals:	0		0

Prevalence Index = B/A = ##

Hydrophytic Vegetation Indicators:

- [x] Rapid Test for Hydrolic Vegetation
- [x] Dominance Test is >50%
- [ ] Prevalence Index is≤3.0[1]
- [ ] Morphological Adaptations[1](explain)
- [ ] Problematic Hydrophytic Vegetation[1](explain)

[1]Indicators of hydric soil and weland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes x No

Hydrology

Primary Hydrological Indicators:(minimum of one is required;check all that apply)

x	Surface Water (A1)		Water Stained Leaves (B9)
x	High Water Table (A2)		Aquatic Fauna (B13)
x	Saturation (A3)		Marl Deposits (B15)
	Watermarks		Hydrogen Sulfide Odor (C1)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living Roots (C3)
	Drift Deposits (B3)		Presence of Reduced Iron (C4)
	Algal Mat of Crust (B4)		Recent Iron reduction in tilled Soils (C6)
	Iron Deposits (B5)		Thin Muck Surface (C7)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)
	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators:(minimum of two required)

	Surface Soil Cracks (B6)		Stunted or Stressed Plants (D1)
	Drainage Patterns (B10)		Geomorphic Position (D2)
	Moss Trim Lines (B16)		Shallow Aquitard (D3)
	Dry-Season Water Table (C2)		Microtopographic Relief (D4)
	Crayfish Burrows (C8)		FAC-Neutral Test (D5)
	Saturation Visible on Aerial Imagery (C9)		

Field Observations:

Surface Water Present?	Yes		No	x	Depth					
Water Table Present?	Yes	x	No		Depth	20cm	**Wetland Hydrology Present?**	**Yes**	x	**No**
Saturation Present?	Yes	x	No		Depth	0cm				

Comments:

Soil Profile

Profile Description:(Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features				
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
15cm							organic	
15 to 25cm	10YR 4/1						fines	
25 to ref	10YR 3/2						sandy clay	

[1]Type:C=Concentration,D=Depletion,RM=Reduced Matrix,CS=Covered or Coated Sand Grains.2Location:PL=Pore Lining,M=Matrix

Hydric Soil Indicators:

	Histosol (A1)		Sandy Redox (S5)
	Histic Epipedon (A2)		Stripped Matrix (S6)
	Black Histic (A3)		Dark Surfaces (S7)
	Hydrogen Sulfide (A4)		Polyvalue Below Surface (S8)
	Stratified Layers (A5)		Thin Dark Surface (S9)
	Depleted Below Dark Surface (A11)		Loamy Gleyed Matrix (F2)
	Thick Dark Surface (A12)	x	Depleted Matrix (F3)
	Sandy Mucky Mineral (S1)		Redox Dark Surface (F6)
	5cm Mucky Peat or Peat (S3)		Depleted Dark Surface (F7)
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)

Restrictive Layer Type (if observed | Depth: | **Hydric Soil Present?** | **Yes** | x | **No**

Comments:

Project Site:	Grand Manan; Grand Harbour	Date:	16-Jun-18	Sample Point: 3	Job #:
Client/owner:	Silk Stevens Limited	Field Investigator(s):	Theo Popma		
County:	Charlotte	Coordinates:	44.692472°; -66.751148°		
PID 15185465		Do normal environmental conditions exist on-site?		Yes [ ]	No [x]

If no, explain: Frequent frost in mid month of June

Atypical Situation? Yes [x] No [ ] Explain: Human-induced and natural fluctuations in drainage, water levels

Is this a potential **Problem Area?** Yes [x] No [ ] Explain: Drained-down areas used to be wetland still have flora but not H. soils

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule)	Yes [x]	No [ ]
Wetland Hydrology	Yes [ ]	No [x]
Hydric Soils	Yes [ ]	No [x]

Wetland Type:

Rational for Determination:

Wetland Determination

[ ] **YES** [x] **NO**

Vegetation

	Tree Stratum: (Plot size: 9m2)		%Cover		Dominant Species	Indicator Status
1						#N/A
2						
3						
4						
5						
6						
			0	=	**Total Cover**	
	Shrub Stratum: (Plot size: 5m2)					
1		*alnus incana*	20		x	*facw*
2		*spiraea alba*	30		x	*fac*
3						
4						
5						
			50	=	**Total Cover**	
	Herb Stratum: (Plot Size: 1m2)					
1		*solidago rugosa*	40		x	*fac*
2						
3						
4						
5						
			40	=	**Total Cover**	

Comments

Dominance Test Worksheet:

# of Dominant Species that are OBL,FACW,FAC:	3
Total # of Dominant Species across all strata:	3
% of Dominant Species that are OBL,FACW,FAC:	100

Prevalence Index Worksheet:

	Total %Cover of:	Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
ULP Species		x 5 =	0
Column Totals:	0		0

Prevalence Index = B/A = ##

Hydrophytic Vegetation Indicators:

- [x] Rapid Test for Hydrolic Vegetation
- [x] Dominance Test is >50%
- [ ] Prevalence Index is≤3.0[1]
- [ ] Morphological Adaptations[1](explain)
- [ ] Problematic Hydrophytic Vegetation[1](explain)

[1]Indicators of hydric soil and weland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes x No

Hydrology

Primary Hydrological Indicators:(minimum of one is required;check all that apply)

___ Surface Water (A1)	___ Water Stained Leaves (B9)
___ High Water Table (A2)	___ Aquatic Fauna (B13)
___ Saturation (A3)	___ Marl Deposits (B15)
___ Watermarks	___ Hydrogen Sulfide Odor (C1)
___ Sediment Deposits (B2)	___ Oxidized Rhizospheres on Living Roots (C3)
___ Drift Deposits (B3)	___ Presence of Reduced Iron (C4)
___ Algal Mat of Crust (B4)	___ Recent Iron reduction in tilled Soils (C6)
___ Iron Deposits (B5)	___ Thin Muck Surface (C7)
___ Inundation Visible on Aerial Imagery (B7)	___ Other (Explain in Remarks)
___ Sparsely Vegetated Concave Surface (B8)	

Secondary Indicators:(minimum of two required)

___ Surface Soil Cracks (B6)	___ Stunted or Stressed Plants (D1)
___ Drainage Patterns (B10)	___ Geomorphic Position (D2)
___ Moss Trim Lines (B16)	___ Shallow Aquitard (D3)
___ Dry-Season Water Table (C2)	___ Microtopographic Relief (D4)
___ Crayfish Burrows (C8)	___ FAC-Neutral Test (D5)
___ Saturation Visible on Aerial Imagery (C9)	

Field Observations:

Surface Water Present? Yes ___ No x Depth ___

Water Table Present? Yes ___ No x Depth ___ **Wetland Hydrology Present?** **Yes** ___ **No** x

Saturation Present? Yes ___ No x Depth ___

Comments:

Soil Profile

Profile Description:(Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type:C=Concentration,D=Depletion,RM=Reduced Matrix,CS=Covered or Coated Sand Grains.2Location:PL=Pore Lining,M=Matrix

Hydric Soil Indicators:

___ Histosol (A1)	___ Sandy Redox (S5)
___ Histic Epipedon (A2)	___ Stripped Matrix (S6)
___ Black Histic (A3)	___ Dark Surfaces (S7)
___ Hydrogen Sulfide (A4)	___ Polyvalue Below Surface (S8)
___ Stratified Layers (A5)	___ Thin Dark Surface (S9)
___ Depleted Below Dark Surface (A11)	___ Loamy Gleyed Matrix (F2)
___ Thick Dark Surface (A12)	___ Depleted Matrix (F3)
___ Sandy Mucky Mineral (S1)	___ Redox Dark Surface (F6)
___ 5cm Mucky Peat or Peat (S3)	___ Depleted Dark Surface (F7)
___ Sandy Gleyed Matrix (S4)	___ Redox Depressions (F8)

Restrictive Layer Type (if observed Depth: **Hydric Soil Present?** **Yes** ___ **No** ___

Comments:

no depletion no hydrogen sulfide

Project Site:	Grand Manan; Grand Harbour	Date:	16-Jun-18	Sample Point: 4	Job #:
Client/owner:	Silk Stevens Limited	Field Investigator(s):	Theo Popma		
County:	Charlotte	Coordinates:	44.692197°; -66.751857°		
PID 15185465		Do normal environmental conditions exist on-site?	Yes [ ]	No [x]	

If no, explain: Frequent frost in mid month of June

Atypical Situation? Yes [x] No [ ] Explain: Human-induced and natural fluctuations in drainage, water levels

Is this a potential **Problem Area?** Yes [x] No [ ] Explain: Drained-down areas used to be wetland still have flora but not H. soils

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule)	Yes [ ]	No [ ]
Wetland Hydrology	Yes [ ]	No [x]
Hydric Soils	Yes [ ]	No [x]

Wetland Type:

Rational for Determination:

Wetland Determination

[ ] **YES** [x] **NO**

Vegetation

	Tree Stratum: (Plot size: 9m2)	%Cover	Dominant Species	Indicator Status
1	*Picea glauca*	50	x	*fac*
2				
3				
4				
5				
6				
		50 =	**Total Cover**	

	Shrub Stratum: (Plot size: 5m2)			
1	*alnus incana*	15	x	*facw*
2	*Larix laricina*	15	x	*fac*
3	*Picea glauca*	15	x	*fac*
4				
5				
		45 =	**Total Cover**	

	Herb Stratum: (Plot Size: 1m2)			
1	*solidago rugosa*	5		*fac*
2	*calamagrostis canadensis*	5		*facw*
3	*carex debilis*	10	x	*fac*
4	*pteridium aquilinum*	10	x	*facu*
5	*luzula multiflora*	15	x	*facu*
		45 =	**Total Cover**	

Comments

Dominance Test Worksheet:

# of Dominant Species that are OBL,FACW,FAC:	5
Total # of Dominant Species across all strata:	7
% of Dominant Species that are OBL,FACW,FAC:	71.4

Prevalence Index Worksheet:

	Total %Cover of:	Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
ULP Species		x 5 =	0
Column Totals:	0		0

Prevalence Index = B/A = ##

Hydrophytic Vegetation Indicators:

- [x] Rapid Test for Hydrolic Vegetation
- [x] Dominance Test is >50%
- [ ] Prevalence Index is≤3.0[1]
- [ ] Morphological Adaptations[1](explain)
- [ ] Problematic Hydrophytic Vegetation[1](explain)

[1]Indicators of hydric soil and weland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes x No

Hydrology

Primary Hydrological Indicators:(minimum of one is required;check all that apply)

___	Surface Water (A1)	___	Water Stained Leaves (B9)
___	High Water Table (A2)	___	Aquatic Fauna (B13)
___	Saturation (A3)	___	Marl Deposits (B15)
___	Watermarks	___	Hydrogen Sulfide Odor (C1)
___	Sediment Deposits (B2)	___	Oxidized Rhizospheres on Living Roots (C3)
___	Drift Deposits (B3)	___	Presence of Reduced Iron (C4)
___	Algal Mat of Crust (B4)	___	Recent Iron reduction in tilled Soils (C6)
___	Iron Deposits (B5)	___	Thin Muck Surface (C7)
___	Inundation Visible on Aerial Imagery (B7)	___	Other (Explain in Remarks)
___	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators:(minimum of two required)

___	Surface Soil Cracks (B6)	___	Stunted or Stressed Plants (D1)
___	Drainage Patterns (B10)	___	Geomorphic Position (D2)
___	Moss Trim Lines (B16)	___	Shallow Aquitard (D3)
___	Dry-Season Water Table (C2)	___	Microtopographic Relief (D4)
___	Crayfish Burrows (C8)	___	FAC-Neutral Test (D5)
___	Saturation Visible on Aerial Imagery (C9)		

Field Observations:

Surface Water Present?	Yes ___	No x	Depth ___						
Water Table Present?	Yes ___	No x	Depth ___	**Wetland Hydrology Present?**		**Yes** ___	**No** x		
Saturation Present?	Yes ___	No x	Depth ___						

Comments:

0

Soil Profile

Profile Description:(Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features				
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 to 25cm	10YR 4/5						sandy clay	

[1]Type:C=Concentration,D=Depletion,RM=Reduced Matrix,CS=Covered or Coated Sand Grains.2Location:PL=Pore Lining,M=Matrix

Hydric Soil Indicators:

___	Histosol (A1)	___	Sandy Redox (S5)
___	Histic Epipedon (A2)	___	Stripped Matrix (S6)
___	Black Histic (A3)	___	Dark Surfaces (S7)
___	Hydrogen Sulfide (A4)	___	Polyvalue Below Surface (S8)
___	Stratified Layers (A5)	___	Thin Dark Surface (S9)
___	Depleted Below Dark Surface (A11)	___	Loamy Gleyed Matrix (F2)
___	Thick Dark Surface (A12)	___	Depleted Matrix (F3)
___	Sandy Mucky Mineral (S1)	___	Redox Dark Surface (F6)
___	5cm Mucky Peat or Peat (S3)	___	Depleted Dark Surface (F7)
___	Sandy Gleyed Matrix (S4)	___	Redox Depressions (F8)

Restrictive Layer Type (if observed | Depth: | **Hydric Soil Present?** | **Yes** ___ | **No** x

Comments:

No depletion no hydrogen sulfide

Project Site:	Grand Manan; Grand Harbour	Date:	16-Jun-18	Sample Point: 5	Job #:
Client/owner:	Silk Stevens Limited	Field Investigator(s):	Theo Popma		
County:	Charlotte	Coordinates:	44.692909°; -66.751782°		
PID 15185465		Do normal environmental conditions exist on-site?		Yes [ ]	No [x]

If no, explain: Frequent frost in mid month of June

Atypical Situation? Yes [x] No [ ] Explain: Human-induced and natural fluctuations in drainage, water levels

Is this a potential **Problem Area?** Yes [x] No [ ] Explain: Drained-down areas used to be wetland still have flora but not H. soils

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule)	Yes [x]	No [ ]
Wetland Hydrology	Yes [x]	No [ ]
Hydric Soils	Yes [x]	No [ ]

Wetland Type:

Rational for Determination:

Wetland Determination

[x] **YES** [ ] **NO**

Vegetation

Tree Stratum: (Plot size: 9m2)		%Cover		Dominant Species	Indicator Status
1					#N/A
2					
3					
4					
5					
6					
		0	=	**Total Cover**	
Shrub Stratum: (Plot size: 5m2)					
1	*alnus incana*	15		x	*facw*
2					
3					
4					
5					
		15	=	**Total Cover**	
Herb Stratum: (Plot Size: 1m2)					
1	*Calamagrostis canadensis*	75		x	*facw*
2	*juncus filiformis*	10			*obl*
3					
4					
5					
		85	=	**Total Cover**	

Comments

Dominance Test Worksheet:

# of Dominant Species that are OBL,FACW,FAC:	2
Total # of Dominant Species across all strata:	2
% of Dominant Species that are OBL,FACW,FAC:	100

Prevalence Index Worksheet:

	Total %Cover of:	Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
ULP Species		x 5 =	0
Column Totals:	0		0

Prevalence Index = B/A = ##

Hydrophytic Vegetation Indicators:

- [x] Rapid Test for Hydrolic Vegetation
- [x] Dominance Test is >50%
- [ ] Prevalence Index is≤3.0[1]
- [ ] Morphological Adaptations[1](explain)
- [ ] Problematic Hydrophytic Vegetation[1](explain)

[1]Indicators of hydric soil and weland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? **Yes** x **No**

Hydrology

Primary Hydrological Indicators:(minimum of one is required;check all that apply)

x	Surface Water (A1)		Water Stained Leaves (B9)
x	High Water Table (A2)		Aquatic Fauna (B13)
x	Saturation (A3)		Marl Deposits (B15)
	Watermarks		Hydrogen Sulfide Odor (C1)
	Sediment Deposits (B2)		Oxidized Rhizospheres on Living Roots (C3)
	Drift Deposits (B3)		Presence of Reduced Iron (C4)
	Algal Mat of Crust (B4)		Recent Iron reduction in tilled Soils (C6)
	Iron Deposits (B5)		Thin Muck Surface (C7)
	Inundation Visible on Aerial Imagery (B7)		Other (Explain in Remarks)
	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators:(minimum of two required)

	Surface Soil Cracks (B6)		Stunted or Stressed Plants (D1)
	Drainage Patterns (B10)		Geomorphic Position (D2)
	Moss Trim Lines (B16)		Shallow Aquitard (D3)
	Dry-Season Water Table (C2)		Microtopographic Relief (D4)
	Crayfish Burrows (C8)		FAC-Neutral Test (D5)
	Saturation Visible on Aerial Imagery (C9)		

Field Observations:

Surface Water Present?	Yes	x	No		Depth	15cm				
Water Table Present?	Yes	x	No		Depth	10cm	**Wetland Hydrology Present?**	**Yes**	x	**No**
Saturation Present?	Yes	x	No		Depth	0cm				

Comments:

Soil Profile

Profile Description:(Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features					
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks

[1]Type:C=Concentration,D=Depletion,RM=Reduced Matrix,CS=Covered or Coated Sand Grains.2Location:PL=Pore Lining,M=Matrix

Hydric Soil Indicators:

	Histosol (A1)		Sandy Redox (S5)
	Histic Epipedon (A2)		Stripped Matrix (S6)
	Black Histic (A3)		Dark Surfaces (S7)
x	Hydrogen Sulfide (A4)		Polyvalue Below Surface (S8)
	Stratified Layers (A5)		Thin Dark Surface (S9)
	Depleted Below Dark Surface (A11)		Loamy Gleyed Matrix (F2)
	Thick Dark Surface (A12)		Depleted Matrix (F3)
	Sandy Mucky Mineral (S1)		Redox Dark Surface (F6)
	5cm Mucky Peat or Peat (S3)		Depleted Dark Surface (F7)
	Sandy Gleyed Matrix (S4)		Redox Depressions (F8)

Restrictive Layer Type (if observed | Depth: | **Hydric Soil Present?** | **Yes** | x | **No**

Comments:

Project Site:	Grand Manan; Grand Harbour	Date:	16-Jun-18	Sample Point: 6	Job #:
Client/owner:	Silk Stevens Limited	Field Investigator(s):	Theo Popma		
County:	Charlotte	Coordinates:			
PID 15185465		Do normal environmental conditions exist on-site?		Yes [ ]	No [x]

If no, explain: Frequent frost in mid month of June

Atypical Situation? Yes [x] No [ ] Explain: Human-induced and natural fluctuations in drainage, water levels

Is this a potential **Problem Area?** Yes [x] No [ ] Explain: Drained-down areas used to be wetland still have flora but not H. soils

Wetland Determination

(Check One Only For Each Criteria)

Dominant Hydrophytic Vegetation (50/20 rule)	Yes [x]	No [ ]
Wetland Hydrology	Yes [x]	No [ ]
Hydric Soils	Yes [x]	No [ ]

Wetland Type: Marsh

Rational for Determination:

Wetland Determination

[x] **YES** [ ] **NO**

Vegetation

	Tree Stratum: (Plot size: 9m2)		%Cover		Dominant Species	Indicator Status
1						#N/A
2						
3						
4						
5						
6						
			0	=	**Total Cover**	
	Shrub Stratum: (Plot size: 5m2)					
1		*Spiraea alba*	5		x	*fac*
2						
3						
4						
5						
			5	=	**Total Cover**	
	Herb Stratum: (Plot Size: 1m2)					
1		*Scirpus microcarpus*				*obl*
2		*Houstonia caerulea*	51		x	*fac-*
3		*Carex canescens*	15			*obl*
4		*Juncus effusus*	20		x	*facw*
5		*Iris versicolor*	10			*facw+*
			96	=	**Total Cover**	

Comments

Dominance Test Worksheet:

# of Dominant Species that are OBL,FACW,FAC:	3
Total # of Dominant Species across all strata:	3
% of Dominant Species that are OBL,FACW,FAC:	100

Prevalence Index Worksheet:

	Total %Cover of:	Multiply by:	
OBL Species		x 1 =	0
FACW Species		x 2 =	0
FAC Species		x 3 =	0
FACU Species		x 4 =	0
ULP Species		x 5 =	0
Column Totals:	0		0

Prevalence Index = B/A = ##

Hydrophytic Vegetation Indicators:

- [x] Rapid Test for Hydrolic Vegetation
- [x] Dominance Test is >50%
- [ ] Prevalence Index is≤3.0[1]
- [ ] Morphological Adaptations[1](explain)
- [ ] Problematic Hydrophytic Vegetation[1](explain)

[1]Indicators of hydric soil and weland hydrology must be present, unless disturbed or problematic

Hydrophytic Vegetation Present? Yes x No

Hydrology

Primary Hydrological Indicators:(minimum of one is required;check all that apply)

___	Surface Water (A1)	___	Water Stained Leaves (B9)
___	High Water Table (A2)	___	Aquatic Fauna (B13)
x	Saturation (A3)	___	Marl Deposits (B15)
___	Watermarks	___	Hydrogen Sulfide Odor (C1)
___	Sediment Deposits (B2)	___	Oxidized Rhizospheres on Living Roots (C3)
___	Drift Deposits (B3)	___	Presence of Reduced Iron (C4)
___	Algal Mat of Crust (B4)	___	Recent Iron reduction in tilled Soils (C6)
___	Iron Deposits (B5)	___	Thin Muck Surface (C7)
___	Inundation Visible on Aerial Imagery (B7)	___	Other (Explain in Remarks)
___	Sparsely Vegetated Concave Surface (B8)		

Secondary Indicators:(minimum of two required)

___	Surface Soil Cracks (B6)	___	Stunted or Stressed Plants (D1)
___	Drainage Patterns (B10)	___	Geomorphic Position (D2)
___	Moss Trim Lines (B16)	___	Shallow Aquitard (D3)
___	Dry-Season Water Table (C2)	___	Microtopographic Relief (D4)
___	Crayfish Burrows (C8)	___	FAC-Neutral Test (D5)
___	Saturation Visible on Aerial Imagery (C9)		

Field Observations:

Surface Water Present?	Yes ___	No	x	Depth	___				
Water Table Present?	Yes ___	No	x	Depth	___	**Wetland Hydrology Present?**	**Yes**	x	**No** ___
Saturation Present?	Yes x	No	___	Depth	0cm				

Comments:

Soil Profile

Profile Description:(Describe to the depth needed to document the indicator or confirm the absence of indicators)

Depth(cm)	Matrix		Redox Features				
	Color(moist)	%	Color(moist)	%	Type[1]	Loc[2]	Texture	Remarks
0 to 5cm							Organic	
5 to 20	10YR 3/2	65	10YR 4/5	35				

[1]Type:C=Concentration,D=Depletion,RM=Reduced Matrix,CS=Covered or Coated Sand Grains.2Location:PL=Pore Lining,M=Matrix

Hydric Soil Indicators:

___	Histosol (A1)	___	Sandy Redox (S5)
___	Histic Epipedon (A2)	___	Stripped Matrix (S6)
___	Black Histic (A3)	___	Dark Surfaces (S7)
___	Hydrogen Sulfide (A4)	___	Polyvalue Below Surface (S8)
___	Stratified Layers (A5)	___	Thin Dark Surface (S9)
___	Depleted Below Dark Surface (A11)	___	Loamy Gleyed Matrix (F2)
___	Thick Dark Surface (A12)	x	Depleted Matrix (F3)
___	Sandy Mucky Mineral (S1)	___	Redox Dark Surface (F6)
___	5cm Mucky Peat or Peat (S3)	___	Depleted Dark Surface (F7)
___	Sandy Gleyed Matrix (S4)	___	Redox Depressions (F8)

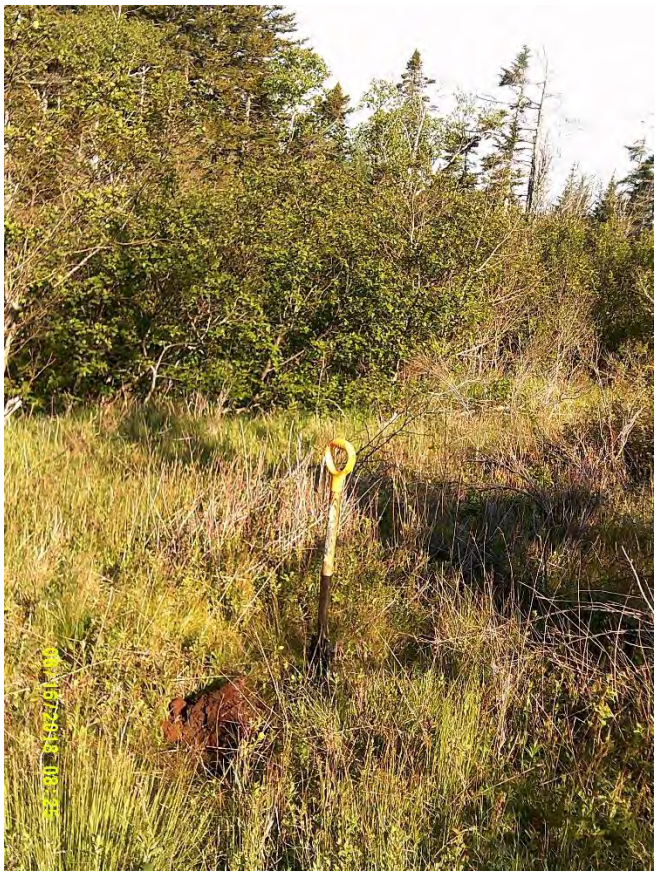
Restrictive Layer Type (if observed | Depth: | **Hydric Soil Present?** | **Yes** | x | **No** ___

Comments:

Poorly drained disturbed field

Appendix D: Photos

Silk Stevens Design and Consulting Engineers	Open water in Shrub Swamp Wetland	Grand Manan	Overdale Environmental Inc.



Silk Stevens Design and Consulting Engineers	Datapoint 1	Grand Manan	Overdale Environmental Inc.

Silk Stevens Design and Consulting Engineers	Datapoint 2	Grand Manan	Overdale Environmental Inc.

Silk Stevens Design and Consulting Engineers	Datapoint 3	Grand Manan	Overdale Environmental Inc.

Silk Stevens Design and Consulting Engineers	Datapoint 4	Grand Manan	Overdale Environmental Inc.

Silk Stevens Design and Consulting Engineers	Datapoint 5	Grand Manan	Overdale Environmental Inc.

Silk Stevens Design and Consulting Engineers	Datapoint 6	Grand Manan	Overdale Environmental Inc.