

Using GIS for Vegetation Management

Mark Bresnahan

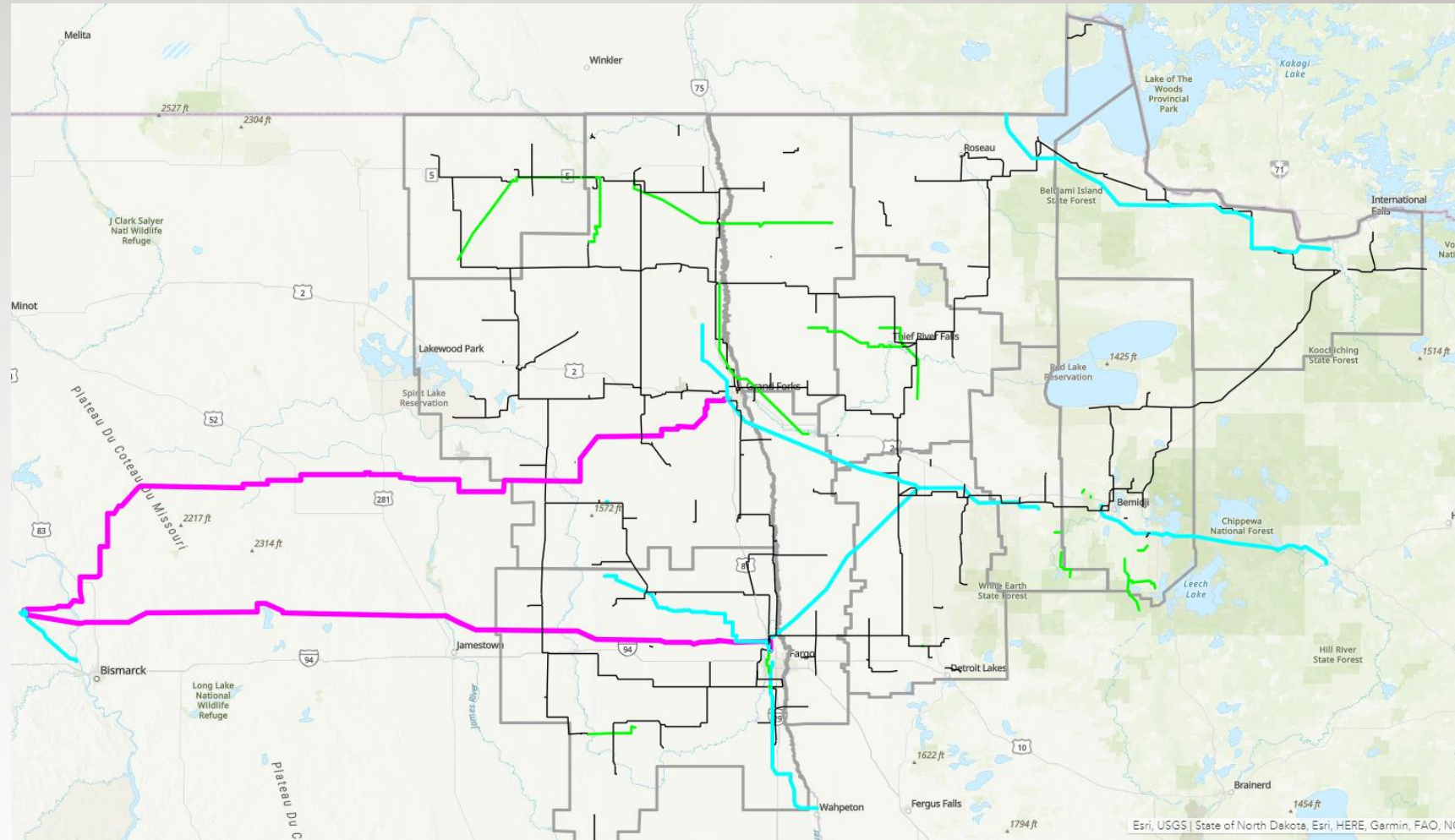
GIS Analyst



A Touchstone Energy® Cooperative 

System Overview

- 11 member-owner distribution cooperatives
- 3,420 line miles
 - ~2,460 miles of 69/115
 - ~960 miles of 230/345
- 252 substations

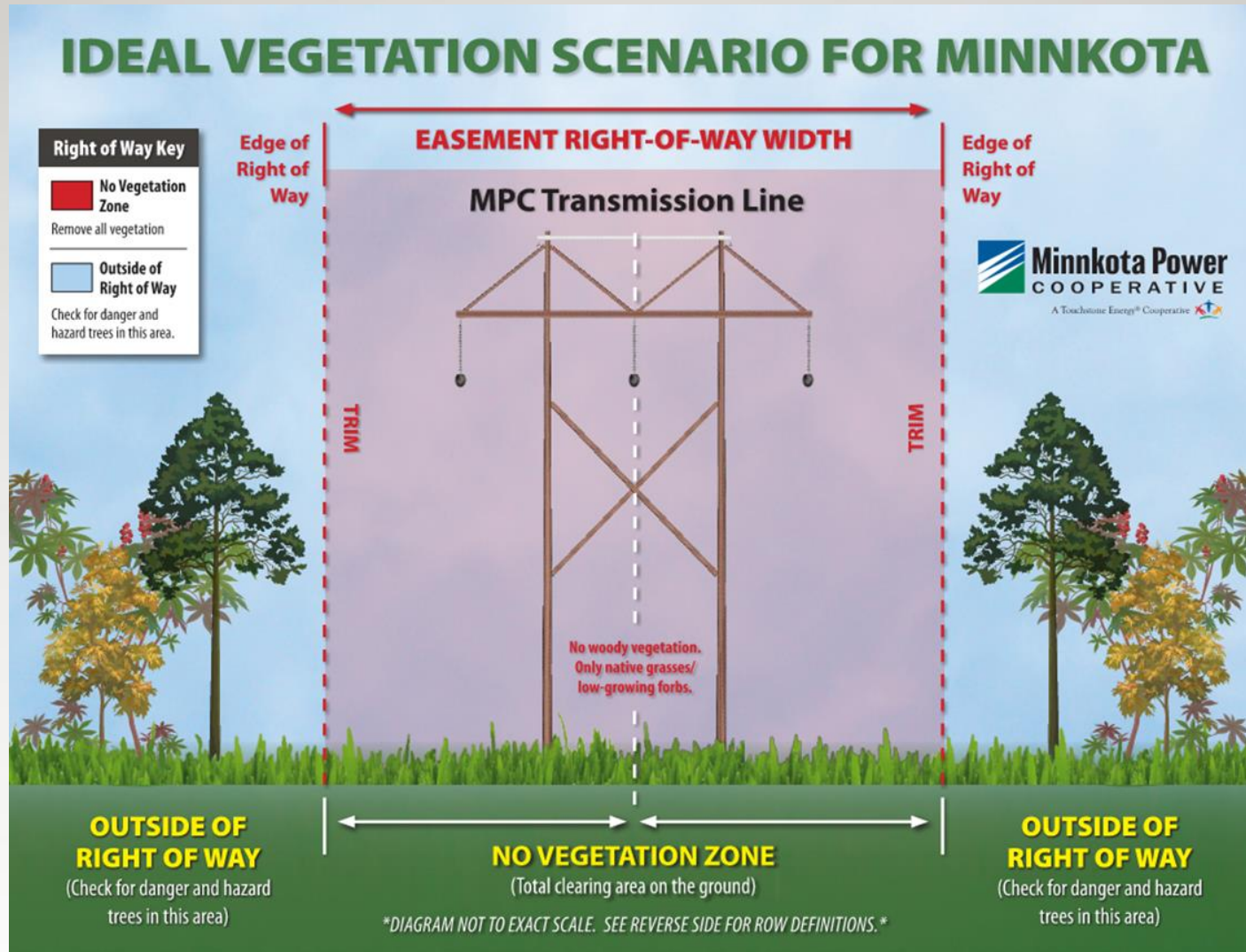


Incorporating GIS – Why?

- Paper Forms
- Site Tracking
- Real Time Data
- Spatial Analysis



MPC's VM Process



MPC's VM Schedule

2023 - 2024 MPC VEGETATION SIGNIFICANT DATES

MILESTONE	DATE	COMMENTS
Area Line Worker Spring Vegetation Meeting	4/5/2023	Vegetation field guide and 2023 Work Plan Verifications are released. All associated training is delivered
Vegetation Contractor Discussion	4/1/2023	Distribute vegetation work plan for 2023
Area Line Worker Summer/ Fall Vegetation Meeting	8/9/2023	Discuss any vegetation concerns, begin 2024 vegetation inspections and ROW patrols in GIS
Ground Patrols Begin for Area Line Workers	8/16/2023	ALW's begin ground patrols with Arborist of all 230 or 345 kV lines in their area, as well as any 69 or 115 lines due for inspection
Helicopter Patrols Begin for Area Line Workers	5/9/2023/ 9/12/2023	ALW's begin helicopter patrols of any applicable lines in their area
2024 Vegetation Inspections Due	11/17/2023	2024 Vegetation Inspections are due
2023 Vegetation Verifications Due	4/1/2024	2023 Vegetation Verifications are due

Figure 5: Projected Vegetation Management Dates

Paper Forms – Work Identification

Right Of Way Tree Trimming Work Plan

Page 1

Name: .MPC.QA.RW Tree Trimming Sheet: Work Plan

Run Date: 30-MAR-21 03.11.46 PM

Type: AI= Added Inspection, I= Inspection of Work Needed, W= Work Performed by Outpost

Contractor: _____

Work Plan Year: '2021',

From Pole		To Pole		H o t S p t		W e t L n d s		R e v r C r s		Contact Information	Rec No	T y p e	Work Year	A e r i a l	D n g T r e	G r o u n d	M o w	S p r a y	S t r i p T r	R e m o v e	By	Date	Comments	
0475	0476	N	N	N	N						4678	I	2021		X	X	X				X	Hebl, Kelly L	05-NOV-2020	
											Work Performed													
											4678													
0496	0500	N	N	N	N						4677	I	2021			X	X				X	Hebl, Kelly L	05-NOV-2020	
											Work Performed													
											4677													
0506	0509	N	Y	Y							4752	I	2021		X	X					X	Hebl, Kelly L	25-MAR-2021	12" TAMARACK SCATTERED IN RW
											Work Performed													
											4752													

Paper Forms – Verification

Right Of Way Tree Trimming Verification

Page 1 of 1

Name: MPC.QA.Rv. Tree Trimming Sheet: Verification

Run Date: 31-MAR-21 03.23.42 PM

Work Plan Year: '2021'

Type: AI= Added Inspection, AV= Added Verification, I= Inspection of Work Needed, IV= Verification of Work Performed, W= Work Performed by Outpost

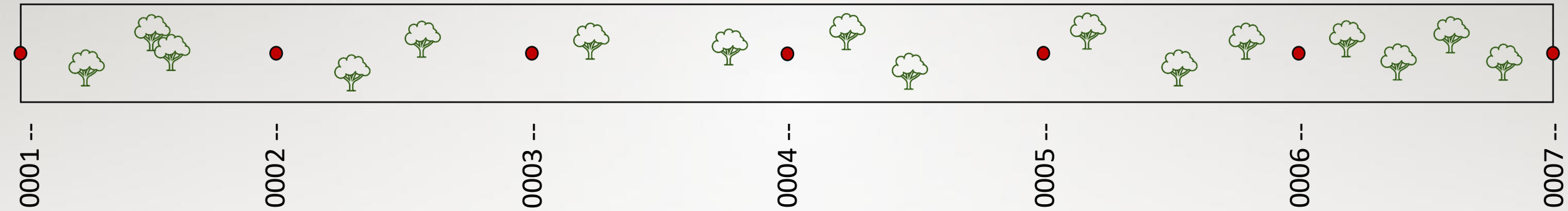
Reason Modification: 1= Change in growth rate, 2= Rescheduling work between growing seasons, 3= Contractor availability, 4= Unanticipated high priority work, 5= Weather conditions/Accessibility, 6= Permitting delays, 7= Landowner, 8= Other

Columns - C1: 100% Complete (Y=yes or N=no) C2: If Not 100% Complete: Outside MVCD - Move to Next Yr. (Y=yes or N=no) C3: If Not 100% Complete: Reason Modification Code (above)

Outpost: International Falls		Status: A	Line: 019C	Voltage: 230 kV	Name: LUND TAP TO LITTLEFORK 230 SUB MPL LINE																					
From Pole	To Pole	M	H	W	R	Contact Information	Rec No	T y e	Work Year	A	D	G	M	S	S	T	R	O	By	Date	C	C	C	Comments	G r a d e	Contractor
		s	t	t	t					e	n	r	o	p	t	r	e	/			1	2	3			
		F	S	L	C						i	T	a	p	m	o	F									
		r	p	n	r						a	r	n	y	T	v	r									
		q	t	d	s						l	e	d	r	e	q										
0475	0476	1	N	N	N		4678	I	2021	X	X	X					X	Hebl, Kelly L	05-NOV-2020							
475	476	N	N	N			4678	IV	2021	X	X	X					X	K-H	3-7-22	Y					LS Tree ✓	
0496	0500	1	N	N	N		4677	I	2021	X	X						X	Hebl, Kelly L	05-NOV-2020							
496	500	M	M	M			4677	IV	2021									K-H	3-7-22	N	Y	1	Move to 2022		LS Tree ✓	
0506	0509	1	N	Y	Y		4752	I	2021	X	X						X	Hebl, Kelly L	25-MAR-2021				12' TAMARACK SCATTERED IN RW			
506	509	N	Y	Y			4752	IV	2021	X	X						X	K-H	3-7-22	Y					LS Tree ✓	

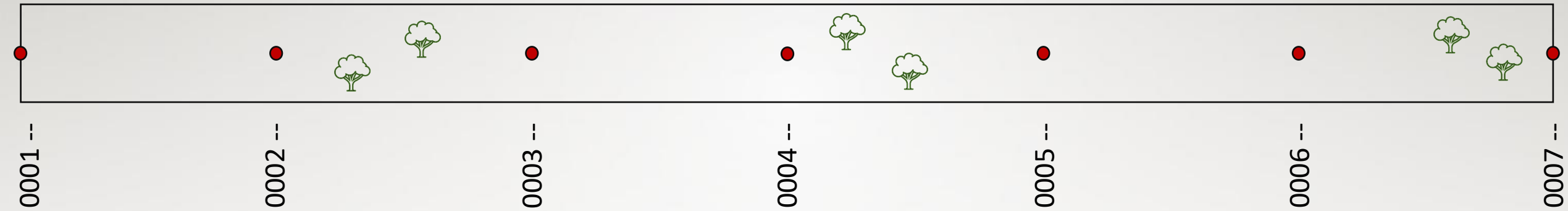
Original Site Method

2019 WORK PLAN
LINE: 001A
REC#: 1275
FROM 0001 - 0007



Original Site Method

2020 WORK PLAN
LINE: 001A
REC#: 1275
FROM 0001 - 0007

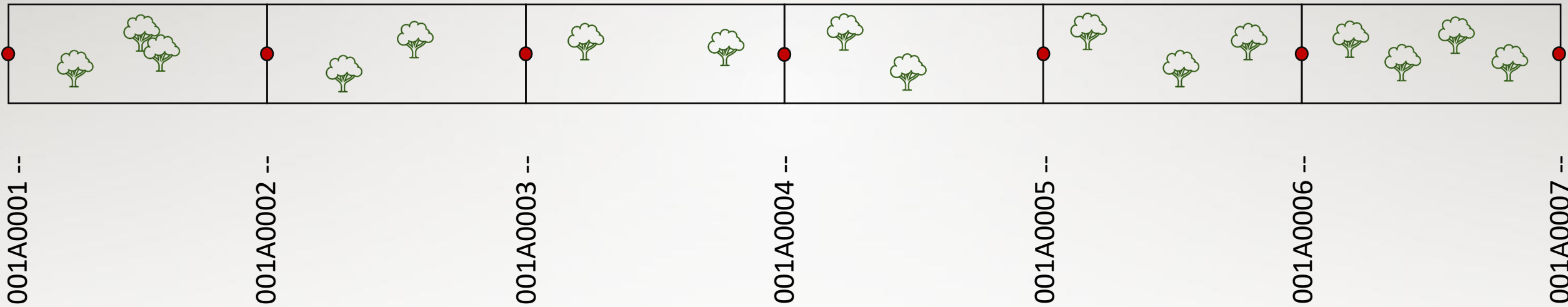


New Site Method

2019 WORK PLAN

LINE: 001A

REC#: 001A0001, 001A0002, 001A0003, 001A0004, 001A0005, 001A0006, 001A0007

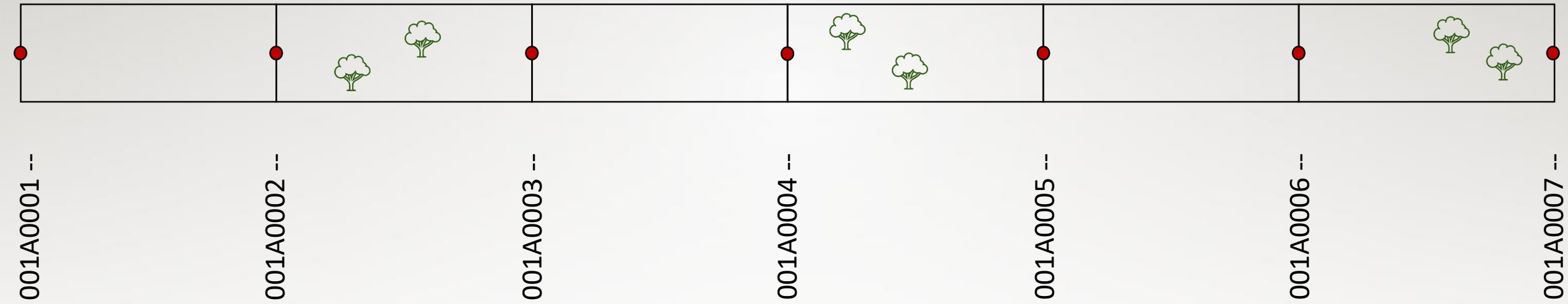


New Site Method

2020 WORK PLAN

LINE: 001A

REC#: 001A0002, 001A0004, 001A0006



Converting to Collector/Field Maps

Right Of Way Tree Trimming Work Plan

Page 1

Name: .MPC.QA.RW Tree Trimming Sheet: Work Plan

Run Date: 30-MAR-21 03.11.46 PM

Type: AI= Added Inspection, I= Inspection of Work Needed, W= Work Performed by Outpost

Contractor: _____

Work Plan Year: '2021',

From Pole		To Pole		H o t S p t		W e t L n d s		R e v r C r s		Contact Information	Rec No	T y p e	Work Year	A e r i a l	D n g T r e	G r o u n d	M o w	S p r a y	S t r i p T r	R e m o v e	By	Date	Comments	
0475		0476		N N		N N					4678	I	2021		X	X	X				X	Hebl, Kelly L	05-NOV-2020	
Work Performed											:													
4678																								
0496		0500		N N		N N					4677	I	2021			X	X				X	Hebl, Kelly L	05-NOV-2020	
Work Performed											:													
4677																								
0506		0509		N Y		Y Y					4752	I	2021			X	X				X	Hebl, Kelly L	25-MAR-2021	12" TAMARACK SCATTERED IN R/W
Work Performed											:													
4752																								

Converting to Collector/Field Maps

Right Of Way Tree Trimming Work Plan

Page 1

Name: MPC.QA.RW Tree Trimming Sheet: Work Plan

Run Date: 30-MAR-21 03:11:46 PM

Type: AI= Added Inspection, I= Inspection of Work Needed, W= Work Performed by Outpost

Contractor: _____

Work Plan Year: '2021',

Outpost: International Falls		Status: A	Line: 019C	Voltage: 230 kV	Name: LUND TAP TO LITTLEFORK 230 SUB MPL LINE														
From Pole	To Pole	H	W	R	Contact Information	Rec No	Type	Work Year	A	D	G	M	S	S	T	R	By	Date	Comments
ot	ot	t	e	e					e	r	r	o	p	t	r	e			
S	S	L	L	L					r	o	o	r	a	m	i				
p	p	C	C	C					n	n	n	y	p	t	m				
t	t	n	n	n					d	d	d	l	l	r	o				
		s	s	s					s	s	s				v				
0475	0476	N	N	N		4678	I	2021	X	X	X				X	Hebl, Kelly L	05-NOV-2020		
						4678													
						4678													
						4678													
0496	0500	N	N	N		4677	I	2021		X	X				X	Hebl, Kelly L	05-NOV-2020		
						4677													
						4677													
						4677													
0506	0509	N	Y	Y		4752	I	2021		X	X				X	Hebl, Kelly L	25-MAR-2021	12" TAMARACK SCATTERED IN RW	
						4752													
						4752													
						4752													

PRE-POPULATED
VALUES

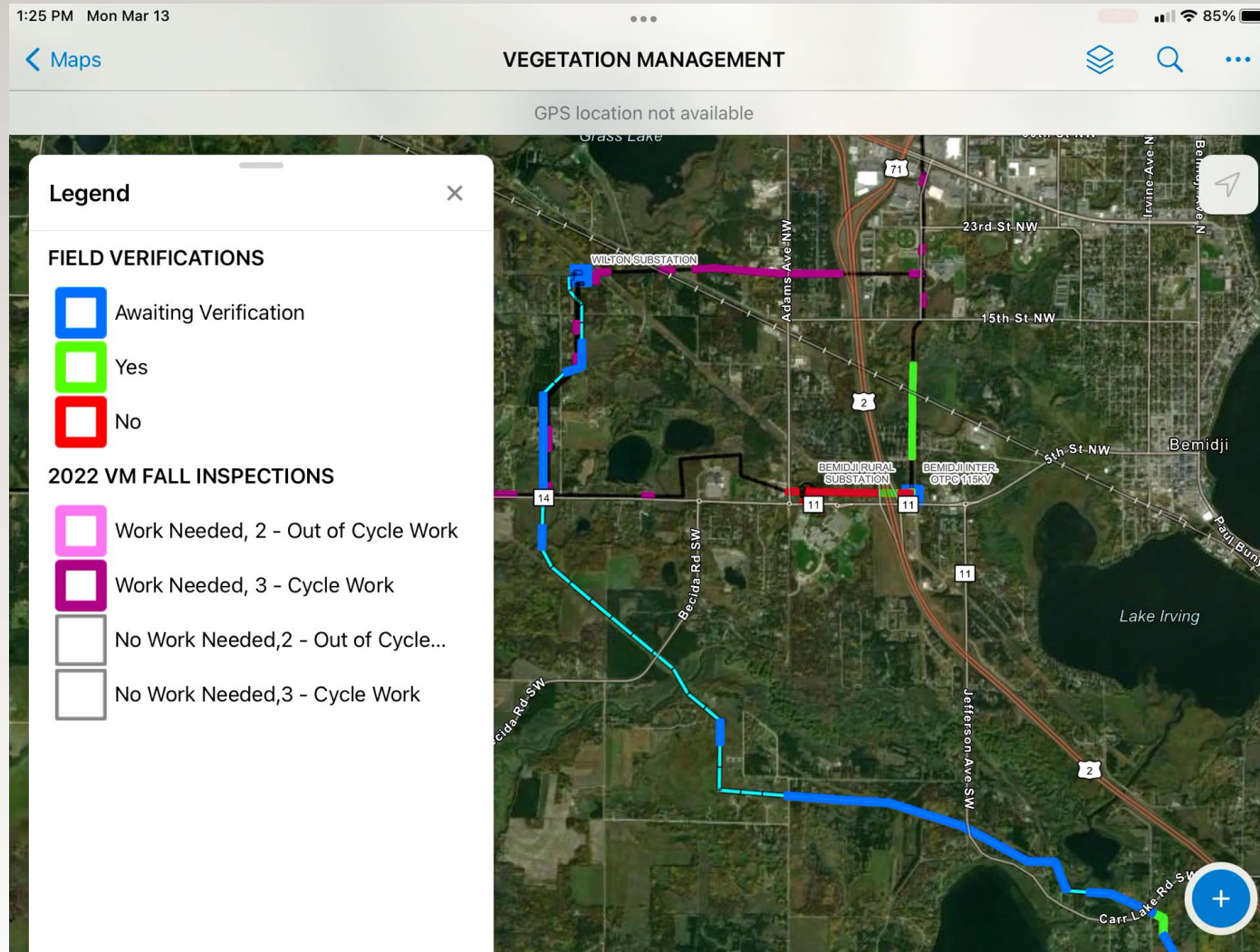
DROP DOWNS

FREE FIELDS

EDITOR TRACKING

OMITTED

Field Maps Demo



Still a Need for Paper

Page 1
Run Date: 4/13/2022 9:18 AM

International Falls Outpost – 2022 VM Work Plan

Wright Tree Service

Type: AI= Added Inspection, I= Inspection of Work Needed



Name: MORANVILLE SUB TO LUND TAP					Line: 019B		Voltage: 230 kV			Cycle Years: 0, 2026, 0	
Record #	Ins. Type	Aerial	Dng Tre	Ground	Mow	Spray	Stmp Tr	Trim	Remove	Contact Info	
019B0172	I			X		X					
Comments:											
By: khebl@MPCI			Date: 10/22/2021 7:12:39 PM								

Name: MORANVILLE SUB TO LUND TAP					Line: 019B		Voltage: 230 kV			Cycle Years: 0, 2026, 0	
Record #	Ins. Type	Aerial	Dng Tre	Ground	Mow	Spray	Stmp Tr	Trim	Remove	Contact Info	
019B0173	I			X		X					
Comments:											
By: khebl@MPCI			Date: 10/22/2021 7:12:16 PM								

Name: MORANVILLE SUB TO LUND TAP					Line: 019B		Voltage: 230 kV			Cycle Years: 0, 2026, 0	
Record #	Ins. Type	Aerial	Dng Tre	Ground	Mow	Spray	Stmp Tr	Trim	Remove	Contact Info	
019B0174	I			X		X					
Comments:											
By: khebl@MPCI			Date: 10/22/2021 7:11:57 PM								

Still a Need for Paper

Page 1
Run Date: 9/8/2022 1:26 PM

Int'l Falls Outpost – 2022 VM Work Plan VERIFICATIONS

Wright Tree Service

Type: AI= Added Inspection, I= Inspection of Work Needed

Contractor Grade: 1 = Not Complete, 2 = Complete, Not to MPC Standards, 3 = Completed to MPC Standards



NAME: STR 279 TO LUND 230KV SUB (WEST LINE)							LINE: 030A	VOLTAGE: 230 kv			CONTRACTOR GRADE: 3
RECORD #	INS. TYPE	AERIAL	DNG TRE	GROUND	MOW	SPRAY	STMP TR	TRIM	REMOVE	CONTACT INFO	
030A0002	I			X		X					
COMMENTS:										BY: khebl@MPCI	DATE: 10/19/2021
CONTRACTOR	COMPLETE?	REASON NOT COMPLETE			DATE	100%COMPLETE	REASON NOT COMPLETE			VERIFIED BY	VERIFY DATE
Wright Tree Service	Yes				8/2/2022	Yes				khebl@MPCI	08/18/2022

NAME: STR 279 TO LUND 230KV SUB (WEST LINE)							LINE: 030A	VOLTAGE: 230 kv			CONTRACTOR GRADE: 3
RECORD #	INS. TYPE	AERIAL	DNG TRE	GROUND	MOW	SPRAY	STMP TR	TRIM	REMOVE	CONTACT INFO	
030A0004	I			X		X					
COMMENTS:										BY: khebl@MPCI	DATE: 10/19/2021
CONTRACTOR	COMPLETE?	REASON NOT COMPLETE			DATE	100%COMPLETE	REASON NOT COMPLETE			VERIFIED BY	VERIFY DATE
Wright Tree Service	Yes				8/2/2022	Yes				khebl@MPCI	08/18/2022

NAME: STR 279 TO LUND 230KV SUB (WEST LINE)							LINE: 030A	VOLTAGE: 230 kv			CONTRACTOR GRADE: 3
RECORD #	INS. TYPE	AERIAL	DNG TRE	GROUND	MOW	SPRAY	STMP TR	TRIM	REMOVE	CONTACT INFO	
030A0004	I			X		X					
COMMENTS:										BY: khebl@MPCI	DATE: 10/19/2021
CONTRACTOR	COMPLETE?	REASON NOT COMPLETE			DATE	100%COMPLETE	REASON NOT COMPLETE			VERIFIED BY	VERIFY DATE
Wright Tree Service	Yes				8/2/2022	Yes				khebl@MPCI	08/18/2022

LO/ROW Exhibits

2022 MPC VM Work Plan

Line #: **537B / Bemidji Outpost**

Record #: **537B0103**

Inspected: 8/25/2021 2:40:39 PM (I)



Hot Spot	N	Wetland	N	River Crossing	N
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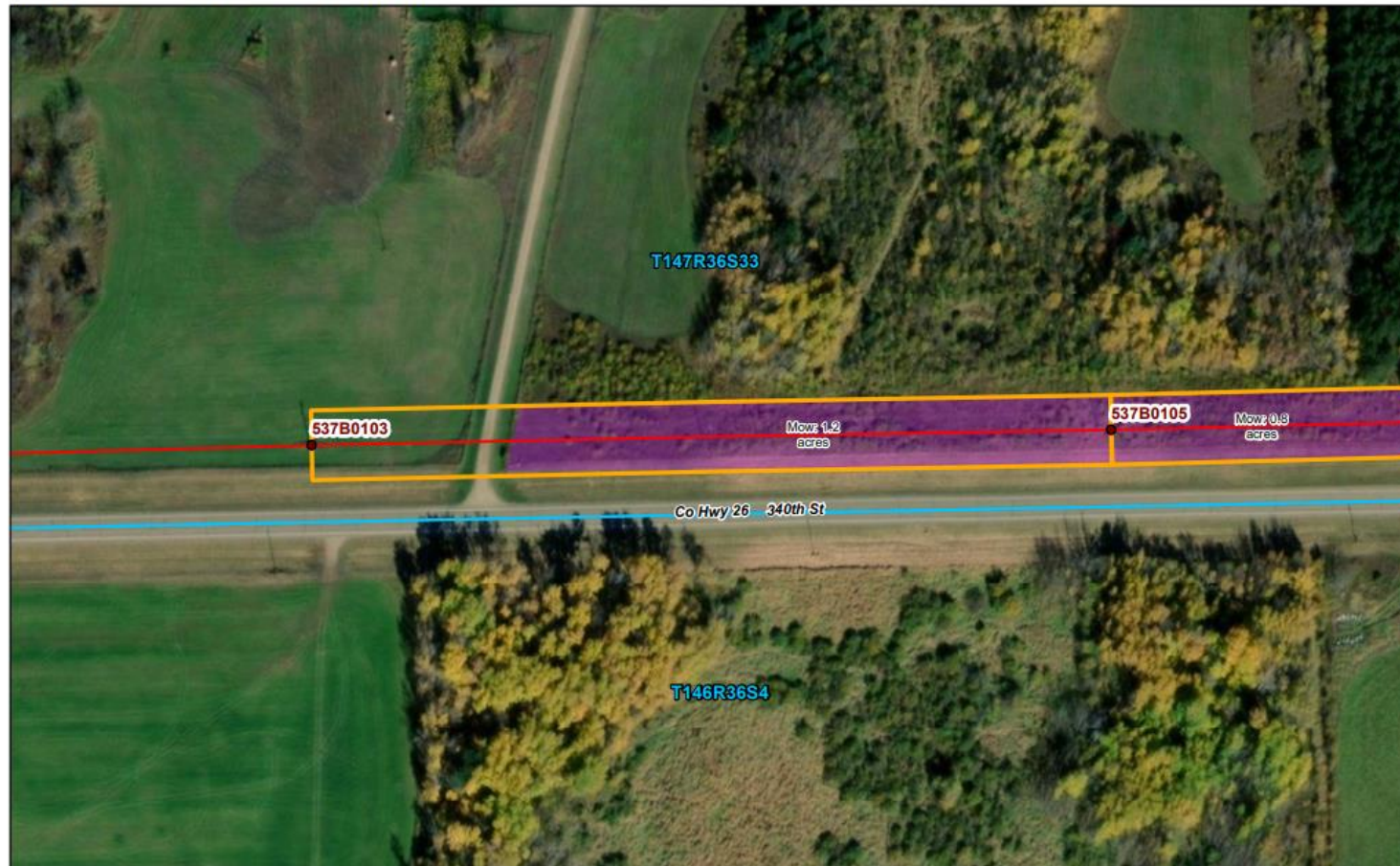
Inspected by: aproulx@MPCI

Comments: Mow

Priority: 3 - Cycle Work

Contact: N/A

Area: 1.7 acres



Aerial	<input type="checkbox"/>	Danger Tree	<input type="checkbox"/>	Ground	<input type="checkbox"/>	Mow	<input checked="" type="checkbox"/>	Spray	<input type="checkbox"/>	Stump Treatment	<input type="checkbox"/>	Trim	<input type="checkbox"/>	Remove	<input type="checkbox"/>
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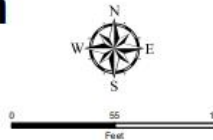
LO/ROW Exhibits

2022 MPC VM Work Plan

Line #: **537B / Bemidji Outpost**

Record #: **537B0105**

Inspected: 8/25/2021 2:40:54 PM (I)



Hot Spot	N	Wetland	N	River Crossing	N
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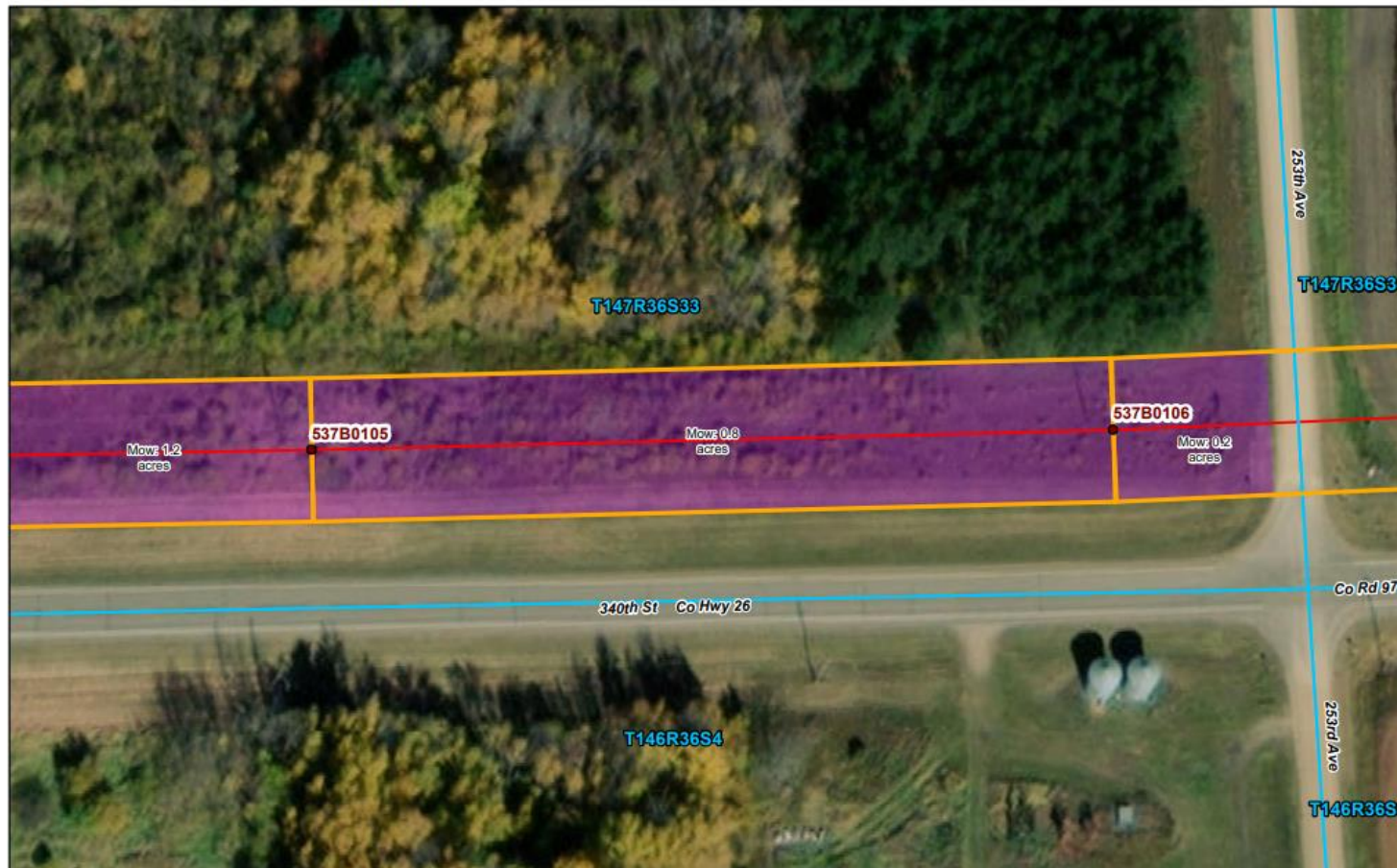
Inspected by: aproulx@MPCI

Comments: Mow

Priority: 3 - Cycle Work

Contact: N/A

Area: 0.8 acres



Aerial	<input type="checkbox"/>	Danger Tree	<input type="checkbox"/>	Ground	<input type="checkbox"/>	Mow	<input checked="" type="checkbox"/>	Spray	<input type="checkbox"/>	Stump Treatment	<input type="checkbox"/>	Trim	<input type="checkbox"/>	Remove	<input type="checkbox"/>
--------	--------------------------	-------------	--------------------------	--------	--------------------------	-----	-------------------------------------	-------	--------------------------	-----------------	--------------------------	------	--------------------------	--------	--------------------------

Minnkota Power COOPERATIVE **3,289**
A Touchstone Energy® Cooperative total sites

323A0011: 0.9 acres (AI)

Hotspot: | River Crossing: N | Wetland: N

Contact Information

Aerial	
Danger Tree	
Ground	
Mow	X
Spray	
Stump Treatment	
Trim	
Remove	
Priority	

Comments

Date: 3/2/2023
Inspected by: PRDDBO

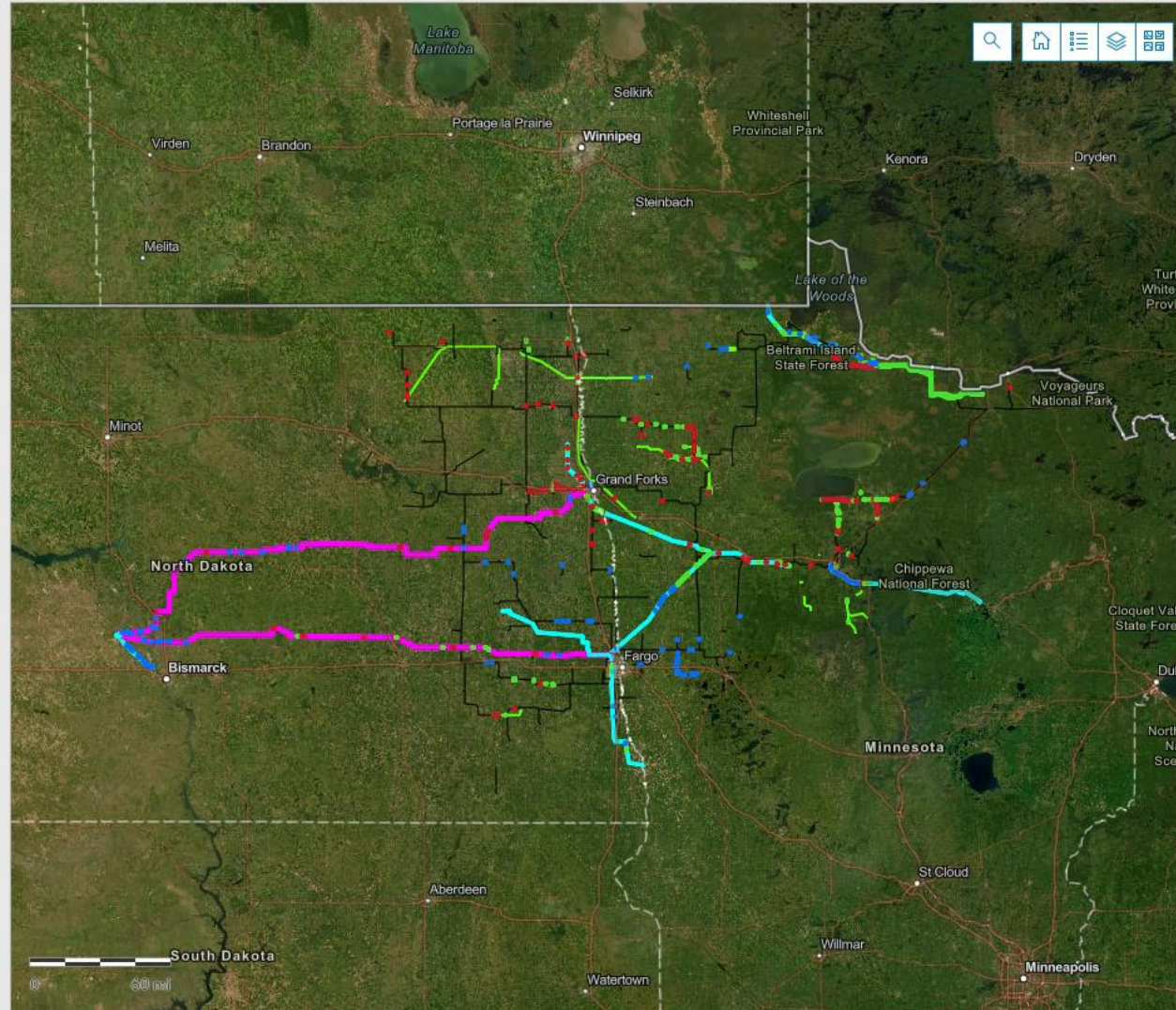
033A0276: 0.9 acres (AI)

Hotspot: N | River Crossing: N | Wetland: N

Contact Information

Aerial	
Danger Tree	
Ground	
Mow	
Spray	X
Stump Treatment	

2022 WORK PLAN | 2022 AI's | VERIFICATIONS



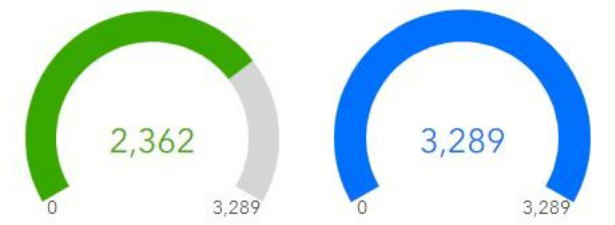
Earthstar Geographics | State of North Dakota, Esri, HERE, Garmin, FAO, NOAA, USGS, EPA, NPS

Powered by Esri

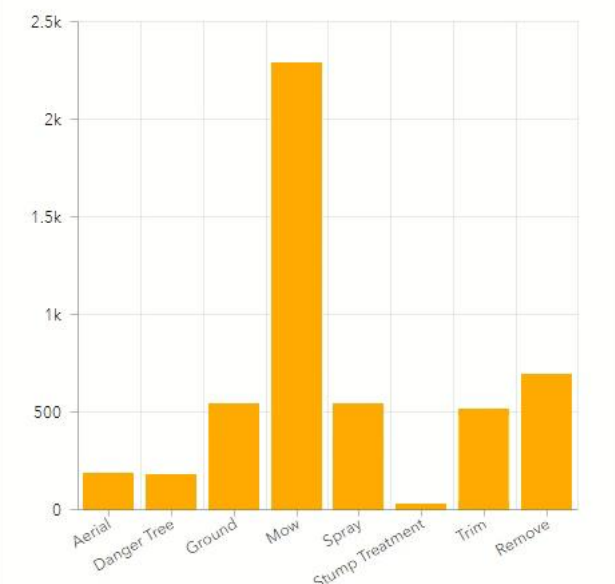
MAP | LINE INFORMATION | 2022 FALL INSPECTIONS (2023 WORK PLAN)

REMAINING SITES: 1,998

Verified by Minnkota Contractor Completed



Verification Progress Contractor Progress



Work Description

Incorporating GIS – Why?

■ Paper Forms

- Eliminated for data collection

■ Site Tracking

- Identify work by spans
- Map Exhibits

■ Real Time Data

- Field Maps
- Operations Dashboard



Questions?

Mark Bresnahan

Minnkota Power Cooperative, Inc

5301 32nd Ave. S.

Grand Forks, ND 58201

Office: (701) 795-4388

Email: mbresnahan@minnkota.com



Minnkota Power
COOPERATIVE

A Touchstone Energy[®] Cooperative 