

KC HARVEY

ENVIRONMENTAL CONSULTING, ENGINEERING AND RECLAMATION FIELD SERVICES

October 1, 2018

North Dakota Public Service Commission
Patrick Fahn
600 E. Boulevard, Dept. 408
Bismarck, ND 58505-0480

RE: First Annual Tree and Shrub Planting Survival Monitoring Report for the Dakota Access Pipeline

Dear Mr. Fahn,

In accordance with the North Dakota Public Service Commission (NDPSC) Tree and Shrub Mitigation Specifications, KC Harvey Environmental, LLC (KC Harvey) is submitting documentation of the reclamation planting survival monitoring for the first year after reclamation for the Dakota Access Pipeline (DAPL).

During pipeline construction, 34,371 trees and shrubs were removed from the DAPL right-of-way (ROW). DAPL was required to mitigate these trees and shrubs at a 2:1 ratio, which would be 68,742 mitigation plantings. Further, the PSC set a goal of at least 75% survival of these mitigation plantings by 2020.

KC Harvey planted 88,309 trees and shrubs in 2017 and an additional 52,808 trees and shrubs in 2018 to compensate for the large number of losses due to the severe 2017 drought. KC Harvey conducted the first (of three) annual fall survival monitoring in September 2018. This monitoring of the mitigation plantings, as well as natural regeneration growth along the pipeline ROW, showed 57,359 surviving mitigation plants. This number is approximately 83% of the required 2:1 mitigation count and exceeds the 75% survival requirement by 9,239 plants. These monitoring results are documented in the attached report.

Please contact us if you require any additional information.

Sincerely,



David P. Cameron
Principal Engineer
KC Harvey Environmental, LLC

402 PU-14-842 Filed: 10/1/2018 Pages: 25
**First Annual Tree and Shrub Planting Survival
Monitoring Report**

KC Harvey Environmental, LLC

David Cameron, Principal Engineer

**FIRST ANNUAL MONITORING REPORT OF
TREE AND SHRUB SURVIVAL
FOR THE DAKOTA ACCESS PIPELINE**

Prepared for:
Dakota Access, LLC

Submitted by:
KC Harvey Environmental, LLC
376 Gallatin Park Drive
Bozeman, MT 59715

October 1, 2018

Introduction

This document is the first of three annual monitoring reports of tree and shrub mitigation on the Dakota Access Pipeline (DAPL). Dakota Access, LLC replanted trees and shrubs removed during construction following methods outlined in the State of North Dakota Public Service Commission (NDPSC) approved Tree and Shrub Reclamation Plan submitted April 2017. The approximately 1,134 mile pipeline transports crude oil from Stanley, North Dakota, to Patoka, Illinois. The North Dakota portion of the DAPL Project is approximately 359 miles in length, and traverses seven counties: Mountrail, Williams, McKenzie, Dunn, Mercer, Morton, and Emmons. The construction right-of-way (ROW) is 75 to 100 feet wide, inclusive of 50 feet of permanent right-of-way (PROW). Where superficially disturbed, the PROW will be maintained in an herbaceous state for the lifetime of the pipeline.

Tree and Shrub Mitigation Plantings

The 2017 inventory of planted tree and shrub species was documented in a letter to the NDPSC dated September 25, 2017 titled Tree and Shrub Baseline Planting Report for Dakota Access Pipeline. In accordance to the NDPSC Tree and Shrub Mitigation Specifications, trees and shrubs removed within the ROW during construction were replaced at a 2:1 ratio, with an additional ~10% as a contingency to account for potential loss while still achieving the required successful reestablishment of trees and shrubs. In total, 88,309 trees and shrubs were planted in spring of 2017 (see Attachment 1 for photos). Two-year-old saplings were purchased from Lincoln Oaks Nursery and the Towner State Nursery in North Dakota. Replacement plantings were the same species as those removed, or in some cases substituted with a similar species as recommended by the North Dakota Forest Service (see Attachment 2 for planting locations). Some shrub species, including willow and snowberry, will naturally regenerate on the reclaimed ROW, increasing the mitigation total. DAPL worked with landowners along the pipeline ROW to determine desired locations and species for planting. Trees and shrubs were planted outside the ROW as requested by landowners; most plantings were placed within windrows and shelter belts. The goal is $\geq 75\%$ survival after three years.

2018 Supplemental Planting Program

Some tree species had a high mortality rate after the severe 2017 drought; these effects were mitigated by additional planting of 51,717 trees and shrubs in the spring of 2018. Several of the 2017 planting locations also had high mortality rates due to browsing by ground squirrels and prairie dogs. Supplemental planting was not conducted in these locations since it is anticipated that that continued high mortality rates would occur in these locations. Table 2 documents the number of supplemental plants, the planting location ID, coordinates, and date planted at each location. Locations with poor soils and high prairie dog grazing had poor survival in 2017 and were not re-planted in 2018. DAPL laid down weed barrier fabric, sprayed deer and rodent deterrent, built fences, installed irrigation systems, and watered all mitigation plants approximately once per week to facilitate plant survival. Juneberry and snowberry planted in 2018 had high mortality due to the nursery stock. To compensate for losses, the nursery will provide additional plants in the spring of 2019.

Tree and Shrub Mitigation Survival Monitoring

A total of 42,648 trees and shrubs were documented in the planned construction disturbance on the ROW in the Tree and Shrub Reclamation Plan. This quota did not take into account selective use of horizontal drilling techniques to bore beneath the surface, leaving some vegetative communities undisturbed. Monitoring data from September 2018 documented 8,277 originally inventoried trees and shrubs that were not removed during construction, which were included in the total previously thought to be removed and included in the mitigation plan. With this new data, an adjusted total of 34,371 trees and shrubs were actually removed during pipeline construction (Table 1). The adjusted 2:1 replacement count is 68,742 with a $\geq 75\%$ survival goal of 48,120 plants by 2020.

Survival of planted trees and shrubs was monitored in September of 2018 by counting the number of live stems per species at each planting location. Natural regeneration was surveyed by counting the number of live individuals per species, at 115 points on 16 parcels out of 1,269 original inventory points on 248 parcels; this represents a 57% sample of original inventoried trees and shrubs. Table 1 summarizes the number of surviving and regenerating mitigation plants. A total of 52,137 planted trees and shrubs were alive as of September 2018. Regeneration data documented an additional 5,222 plants, for a total of 57,359 surviving mitigation plantings (Table 1). Table 3 provides the 2018 survival counts by species.

This total of 57,359 is approximately 67% of the initial replacement planting number; and 83% of the adjusted 2:1 replacement count requirement, after adjusting for trees and shrubs not removed by selective horizontal drilling. This overall total of 57,359 surviving mitigation plants is 83% of the adjusted 2:1 replacement count; and exceeds the 75% survival goal of 48,120 by 9,239 plants or 8%.

It is expected that regeneration will continue over the next two years, increasing the overall total. Additional surveys will be completed in 2019 and 2020 to verify natural regeneration.

Tables

Table 1. Summary of tree and shrub mitigation plantings on the Dakota Access Pipeline.

Number Inventoried ¹	2017 Replacement Total	Not Removed	Adjusted Number Inventoried	Adjusted Replacement Total (2:1)	2017 Planted	2018 Planted	Natural Regeneration	2018 Alive Count
42,648	85,296	8,277	34,371	68,742	88,309	51,717	5,222	52,137

Total Live: 57,359

Table 2. 2018 Supplemental planting summary.

Planting ID	Latitude	Longitude	Planting Date	Planted Total
1	48.2944225	-102.6772728	5/29/2018	448
2*	48.26318255	-103.6852232	5/30/2018	0
3	48.26934199	-103.6451437	5/31/2018	227
4	47.946493	-103.8784034	6/1/2018	84
5	47.93778005	-103.8659877	6/2/2018	13
6	47.79610126	-103.0900395	6/3/2018	26
7	48.20821813	-103.777444	6/4/2018	19
8	47.8202104	-103.4379949	6/5/2018	71
9	48.09789918	-103.7661086	6/6/2018	184
11	48.0611245	-103.8801631	6/7/2018	5
12	47.59885504	-102.8873306	6/8/2018	437
14	48.23655484	-103.7741558	6/9/2018	64
15	47.7831623	-103.230411	6/10/2018	74
16	48.27003173	-102.8182327	6/11/2018	31
17	48.05173821	-103.9020885	6/12/2018	31
18	47.31540883	-102.2190145	6/13/2018	473
19	48.281282	-103.1752138	6/14/2018	31
20	47.36295611	-102.3467518	6/15/2018	15
21	47.83772676	-103.5042635	6/16/2018	12
23	48.27699294	-102.7997969	6/17/2018	5
24	47.76885897	-102.8975538	6/18/2018	265
25	47.80711057	-102.4137086	6/19/2018	112
26	47.38127912	-102.3550201	6/20/2018	17
27	47.98178136	-103.9137015	6/21/2018	2
28	48.05016715	-103.906393	6/22/2018	49
30	47.79782455	-102.9858637	6/23/2018	10
31	47.85753549	-103.6411977	6/24/2018	125
32	47.85753549	-103.6411977	6/25/2018	494
33	47.79416055	-103.033126	6/26/2018	263
34	47.84919911	-103.5944819	6/27/2018	77
35	48.29086825	-102.7697439	6/28/2018	215
36	47.29005681	-102.1453142	6/29/2018	675

Dakota Access Pipeline
Tree and Shrub Annual Survival Monitoring Report

Planting ID	Latitude	Longitude	Planting Date	Planted Total
37	47.71449435	-102.8181793	6/30/2018	180
38	47.805483	-102.9507085	7/1/2018	19
39	47.41507067	-102.5110609	7/2/2018	2
40	47.47107623	-102.7488777	7/3/2018	468
41	47.30948443	-102.2162496	7/4/2018	257
42	47.52799269	-102.8482141	7/5/2018	835
43	47.29535303	-102.1711187	7/6/2018	3330
45	47.84583094	-103.5530773	7/7/2018	56
46	47.89975802	-103.7774363	7/8/2018	28
47	47.48025326	-102.767663	7/9/2018	1194
48*	47.87948473	-103.6674264	7/10/2018	0
49	47.95191608	-103.9016831	7/11/2018	224
50	47.78369477	-103.7407614	7/12/2018	1951
51	47.78391509	-103.1940674	7/13/2018	10
52*	48.068269	-103.864297	7/14/2018	0
53	48.2528498	-103.7155914	7/15/2018	77
54	48.05517608	-103.8798562	7/16/2018	13
57	47.74713883	-102.9191297	7/17/2018	34
58	47.86657741	-103.2935447	7/18/2018	12144
59	48.276298	-103.0427308	7/19/2018	25
60*	46.43134631	-100.6179408	7/20/2018	0
61*	46.43127856	-100.6197885	7/21/2018	0
62	46.43807581	-100.6063375	7/22/2018	268
64*	46.43482693	-100.6008226	7/23/2018	0
65	47.45681296	-102.7238184	7/24/2018	1341
66	47.42139336	-102.6473879	7/25/2018	542
67*	47.68071916	-102.8390711	7/26/2018	0
68	47.67386653	-102.8303944	7/27/2018	1272
70	47.6523626	-102.835559	7/28/2018	905
71	47.65075826	-102.8475529	7/29/2018	463
72	47.64651515	-102.8542116	7/30/2018	1511
73	47.64401956	-102.8579891	7/31/2018	641
74	47.64561382	-102.8615288	8/1/2018	8
80	48.25989892	-103.6563062	8/2/2018	331
81	48.27352719	-103.6429695	8/3/2018	159
82*	46.43391765	-100.5986978	8/4/2018	0
83	46.43380509	-100.597731	8/5/2018	1879
85	47.49070535	-102.8283484	8/6/2018	74
86*	46.43285562	-100.597493	8/7/2018	0
90	48.26539116	-103.649313	8/8/2018	225
100	48.08760002	-103.799191	8/9/2018	4042

Dakota Access Pipeline
Tree and Shrub Annual Survival Monitoring Report

Planting ID	Latitude	Longitude	Planting Date	Planted Total
120	48.27608774	-102.8704177	8/10/2018	1
121	48.03266756	-103.9072184	8/11/2018	114
122	47.90458638	-103.9072184	8/12/2018	99
123	47.36933221	-102.224902	8/13/2018	12
124	48.15131885	-103.8268557	8/14/2018	62
125	47.77191972	-103.2685001	8/15/2018	357
126*	48.280043	-102.4619578	8/16/2018	0
127	48.29452818	-102.6881189	8/17/2018	3
128	47.41609976	-102.5132653	8/18/2018	151
129	48.08272436	-103.8424926	8/19/2018	156
130	47.40006427	-102.4714	8/20/2018	239
131	48.2740145	-103.4080883	8/21/2018	20
132*	48.27672058	-103.3795752	8/22/2018	0
133	48.09299482	-103.784237	8/23/2018	295
134	48.00359358	-104.0216405	8/24/2018	126
135	48.01229501	-104.0427177	8/25/2018	35
136	47.93474386	-102.3245438	8/26/2018	363
138	48.29016478	-102.7595395	8/27/2018	2519
139	47.68667863	-102.8403287	8/28/2018	209
140	47.77524	-103.7414895	8/29/2018	1724
141	48.36732839	-102.394326	8/30/2018	50
147	48.50883743	-102.8668273	8/31/2018	220
155	47.80198608	-102.8968122	9/1/2018	1034
156	46.57126522	-101.6213419	9/2/2018	3765
158	46.94715358	-100.9809401	9/3/2018	293
500	46.6694838	-101.1565081	9/4/2018	79
501	46.813873	-101.5145184	9/5/2018	55
502	46.629248	-100.995937	9/6/2018	51
503	46.64588964	-101.0241863	9/7/2018	73
504	46.679626	-101.247198	9/8/2018	46
505	46.668322	-101.2640485	9/9/2018	74
506	46.65015971	-101.1720353	9/10/2018	378
507	46.560004	-100.885228	9/11/2018	52

Total Planted: 51,717

*Site was abandoned due to high mortality from wildlife, access issues, or at the landowner's request.

Table 3. Tree and shrub species present on the Dakota Access Pipeline.

Species	Number Inventoried ¹	Not Removed	Actual Replacement Total (2:1)	Natural Regeneration	2018 Alive Count
American Bittersweet	8	0	16	0	0
American Elm	304	3	602	1	0
American Hazelnut	1268	0	2536	41	428
American Plum	72	0	144	19	11273
Amur honeysuckle	200	146	108	0	0
Amur maple	8	0	16	0	417
Arnold hawthorn	0	0	0	0	0
Bay willow	1	0	2	0	0
Beaked hazel	118	108	20	0	0
Black currant	1033	1023	20	0	64
Black Hills spruce	19	0	38	0	974
Boxelder	114	14	200	0	34
Bur oak	619	0	1238	106	433
Canadian gooseberry	1785	146	3278	20	0
Caragana	0	0	0	0	393
Clove currant	793	0	1586	0	0
Colorado blue spruce	1	0	2	0	549
Common buckthorn	1188	0	2376	0	0
Common chokecherry	602	40	1124	468	3791
Common juniper	67	2	130	0	0
Common lilac	18	0	36	0	4002
Downy hawthorn	0	0	0	0	306
Eastern cottonwood	231	69	324	0	0
Eastern red cedar	15	0	30	0	113
Fourwing saltbush	84	0	168	8	0
Fragrant sumac	99	5	188	14	60
Golden currant	912	149	1526	15	5045
Greasewood	226	0	452	2	0
Green ash	3618	156	6924	160	7211
Hackberry	0	0	0	0	24
Hawthorn	2154	3	4302	0	0
Horizontal juniper	126	3	246	1	0
Indigo bush	16	16	0	0	0
Japanese elm	1	0	2	0	0
Juneberry	0	0	0	34	350
Leadplant	22	0	44	0	0
Long-leaved sage	49	0	98	0	0
Meyer spruce	0	0	0	0	200
Missouri River willow	198	0	396	0	0

Dakota Access Pipeline
Tree and Shrub Annual Survival Monitoring Report

Species	Number Inventoried ¹	Not Removed	Actual Replacement Total (2:1)	Natural Regeneration	2018 Alive Count
Multiflora rose	7	3	8	0	0
Nannyberry viburnum	980	0	1960	0	291
Native cottonwood	0	0	0	88	245
Paper birch	17	0	34	0	0
Peachleaf willow	30	27	6	33	0
Pekin lilac	0	0	0	0	497
Pin cherry	625	0	1250	0	0
Poison ivy	3	0	6	0	0
Ponderosa pine	59	10	98	0	1396
Prairie rose	212	11	402	199	0
Quaking aspen	312	31	562	60	0
Rabbitbrush	552	0	1104	678	0
Red raspberry	788	0	1576	66	0
Redosier dogwood	1935	1085	1700	8	130
Rocky Mountain juniper	238	1	474	0	3735
Russian olive	254	68	372	1	0
Sand cherry	314	0	628	0	914
Sand sagebrush	21	0	42	0	0
Sandbar willow	5532	4851	1362	912	316
Scotch pine	0	0	0	0	2515
Serviceberry	106	8	196	0	0
Sharpleaf willow	0	0	0	0	0
Siberian elm	1604	150	2908	0	198
Silver buffaloberry	1187	75	2224	52	641
Skunkbush sumac	28	0	56	11	3694
Woods rose	125	19	212	114	31
Shrubby cinquefoil	1633	0	3266	0	0
Siberian peashrub	193	20	346	0	0
Silver sage	7664	9	15310	1148	0
Silverberry	573	1	1144	647	0
Snowberry	728	21	1414	258	0
Tatarian honeysuckle	856	0	1712	35	1867
Water birch	6	0	12	0	0
White willow	3	0	6	0	0
Winterfat	94	4	180	23	0
TOTAL	42,648	8,277	68,742	5,222	52,137

Attachments

1. Tree and Shrub Mitigation on the DAPL: Photos
2. 2017 and 2018 Planting Locations Map

References

1. Dakota Access, LLC. 2017. Tree and Shrub Reclamation Plan for the Dakota Access Pipeline. Bozeman, MT. Prepared by KC Harvey Environmental, LLC, Bozeman, MT.

Attachment 1

Tree and Shrub Mitigation on the DAPL: Photos.

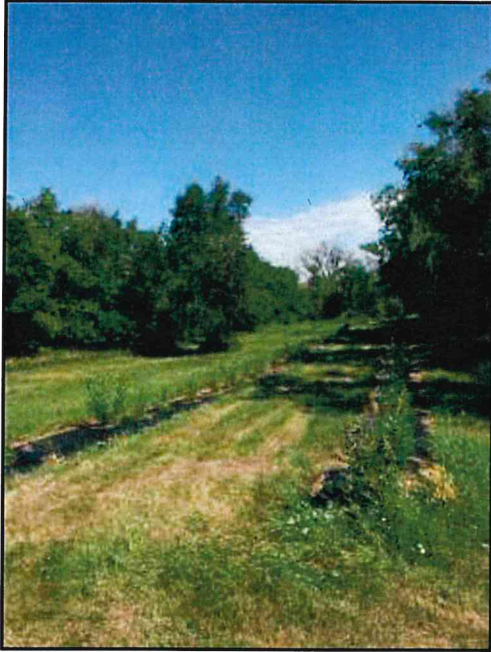


Figure 1. Planted shelter belts.



Figure 2. Green ash sapling.

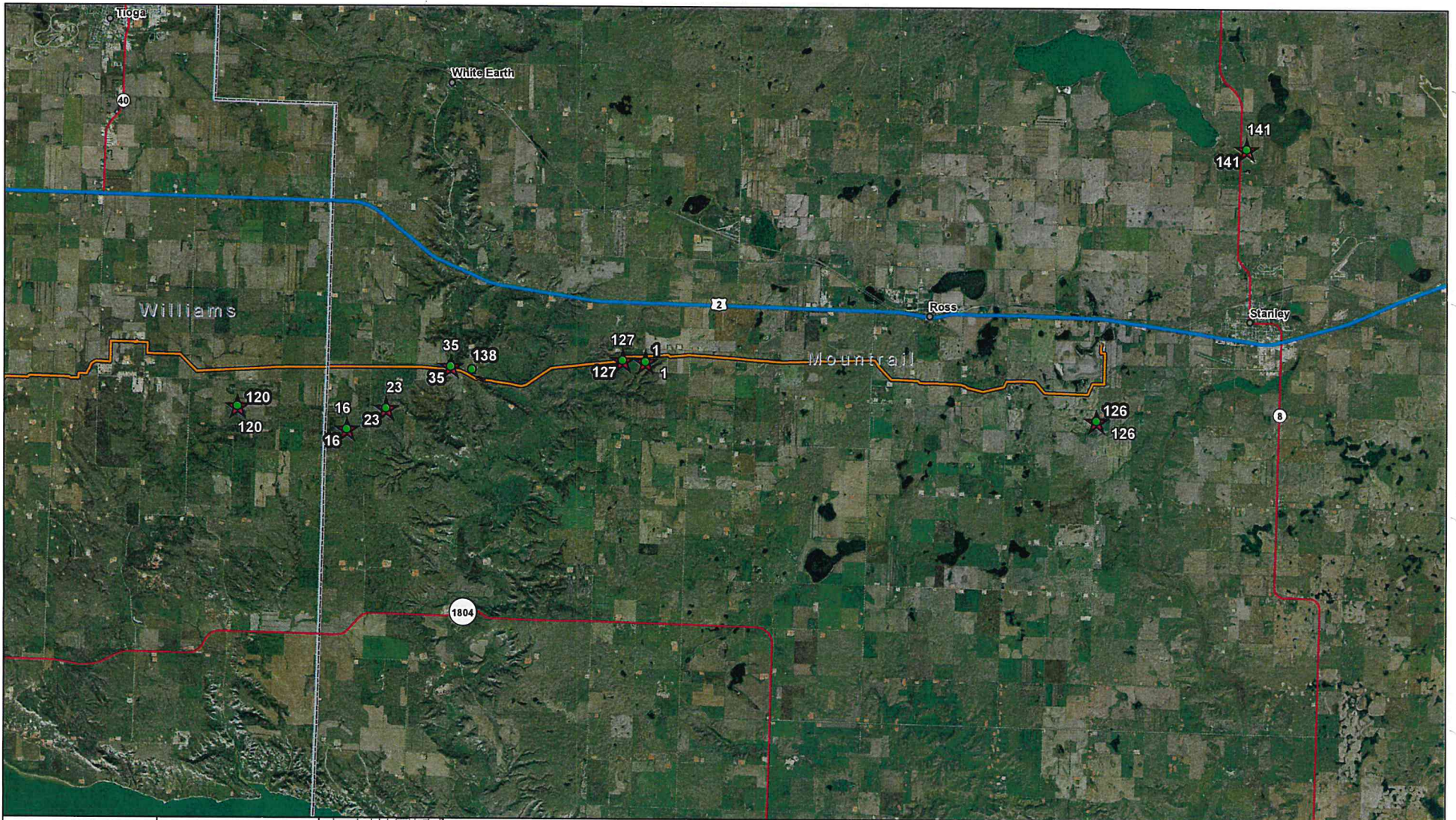


Figure 3. Coniferous wind row.



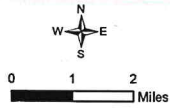
Figure 4. Planted shelter belts.

Attachment 2
2017 and 2018 Planting Locations Map



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Aerial Imagery: NAIP 2017

- 2018 Planting Locations
- ★ 2017 Planting Locations

- Pipeline
- US Highway
- State Highway

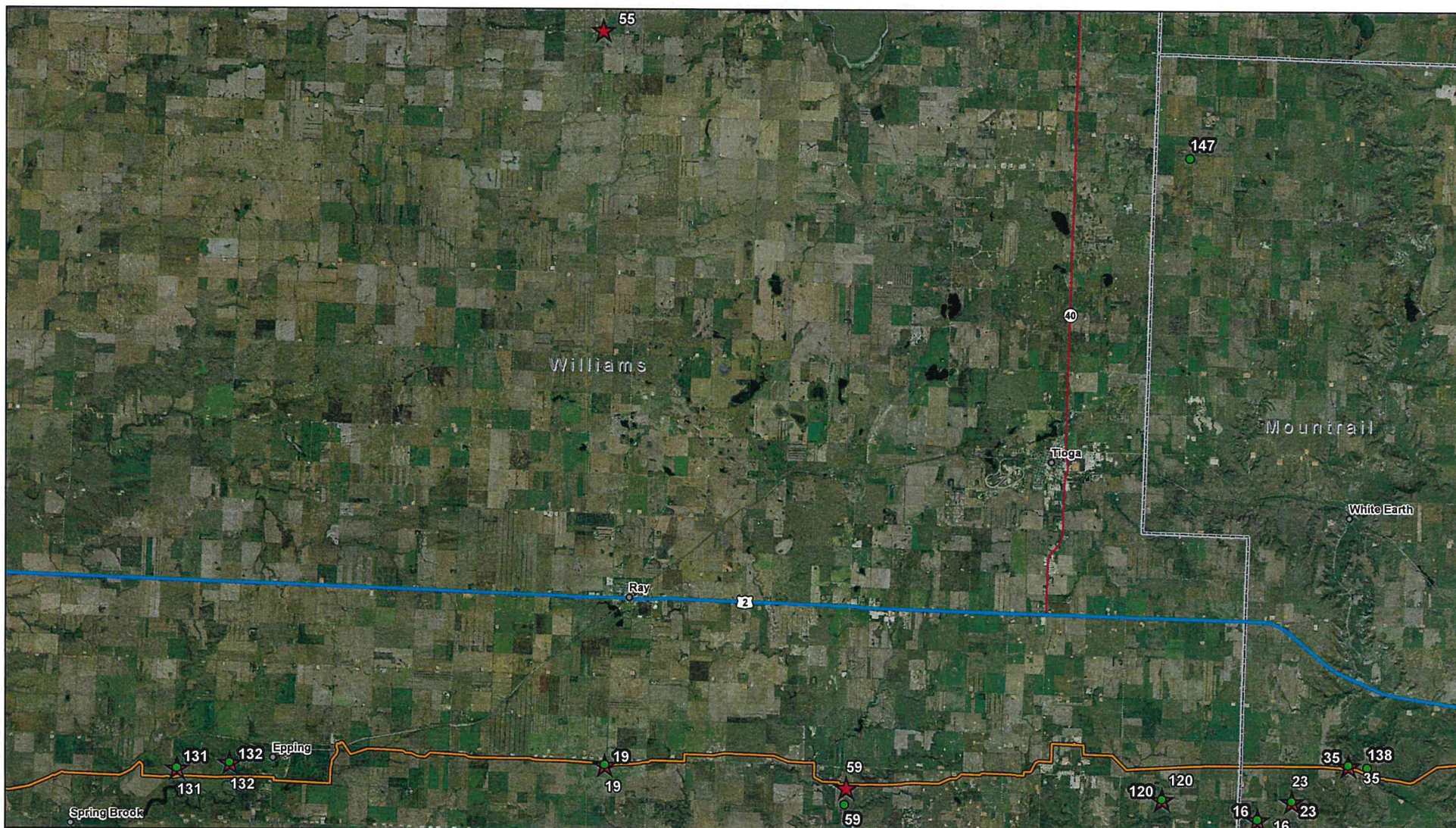
Energy Transfer Partners, L.P.

Dakota Access Pipeline
 Tree and Shrub Planting Locations

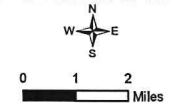
Map: 1

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Date: 9/24/2018



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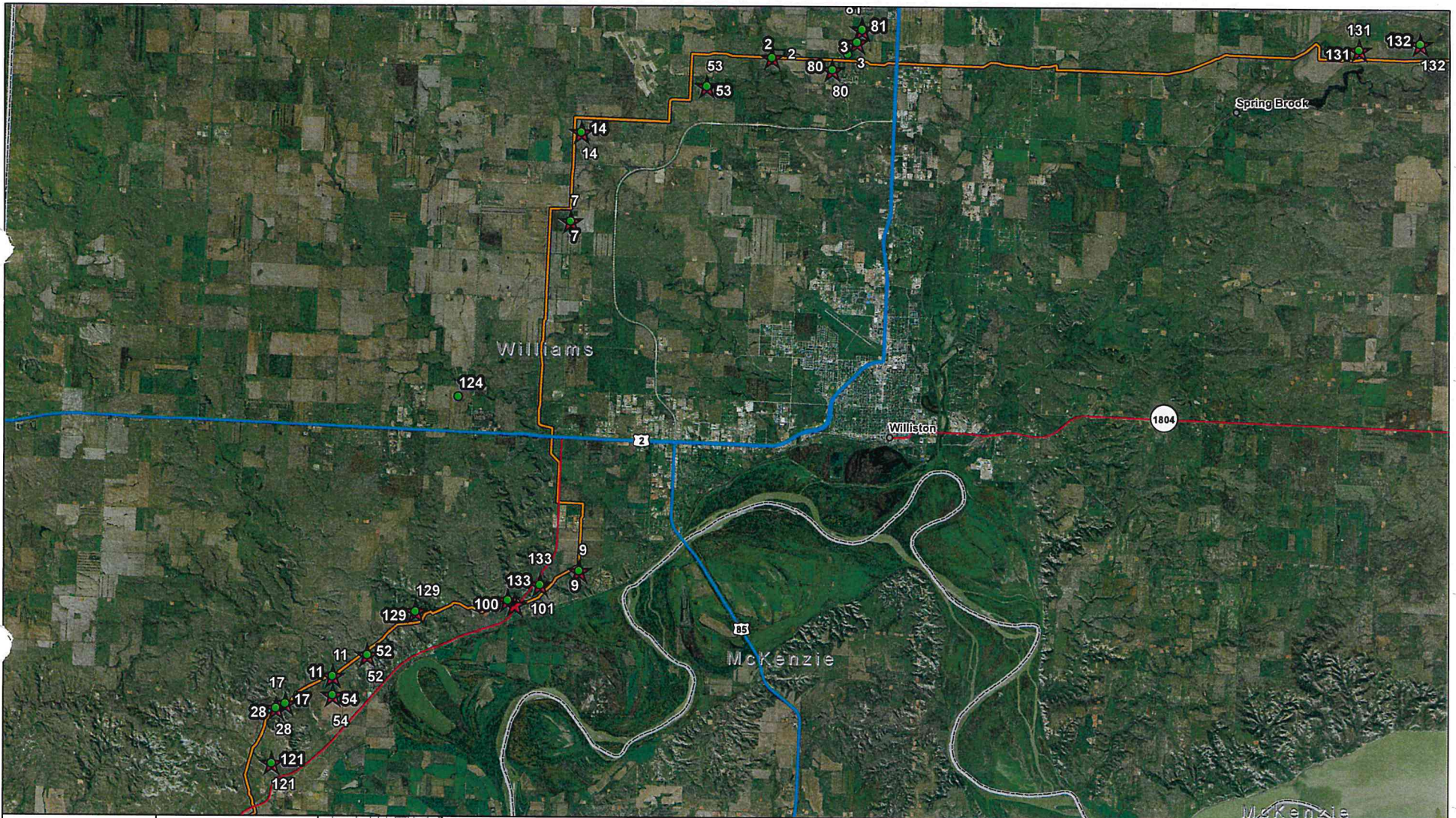


Aerial Imagery: NAIP 2017

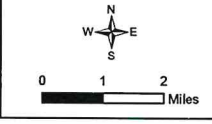
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- US Highway
- State Highway

Map: 2

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 1:145,000 Date: 9/24/2018



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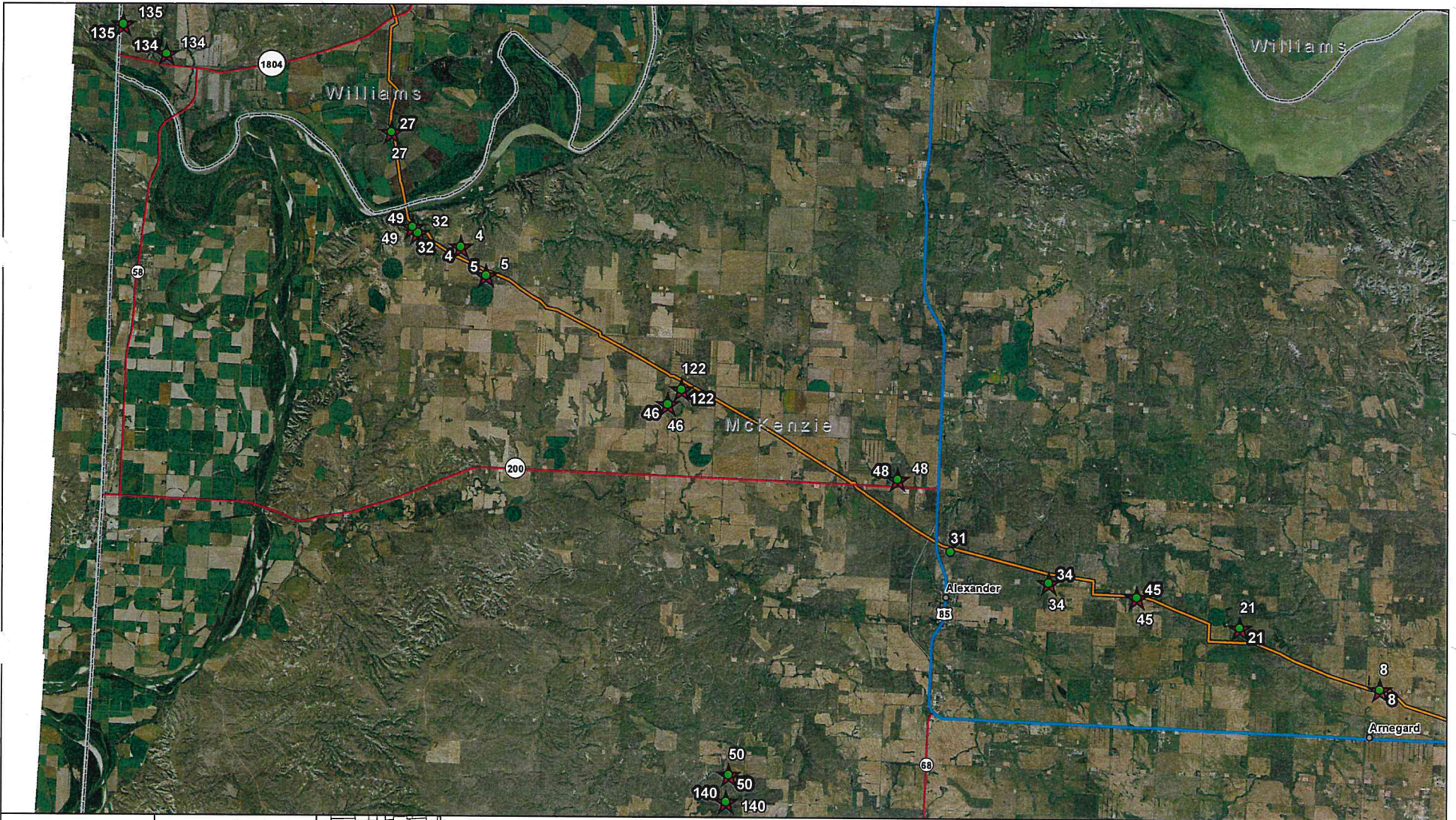


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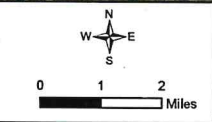
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- US Highway
- State Highway

Map: 3

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Dakota Access Pipeline Tree and Shrub Planting Locations	
1:125,000	Date: 9/24/2018



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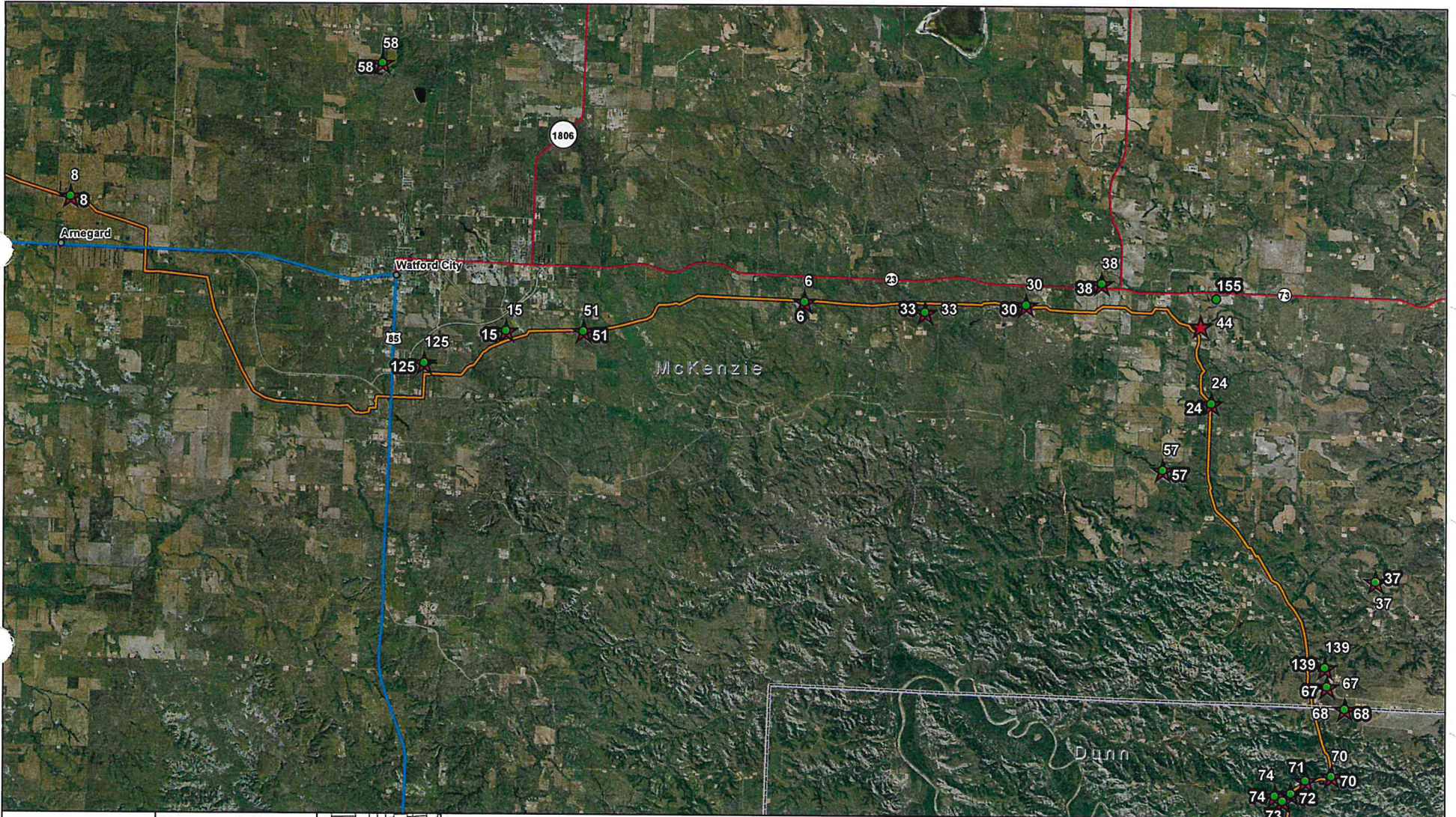


Aerial Imagery: NAIP 2017

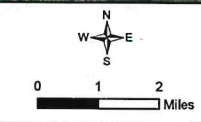
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- US Highway
- State Highway

Map: 4

Energy Transfer Partners, L.P.	
Dakota Access Pipeline Tree and Shrub Planting Locations	
1:125,000	Date: 9/24/2018



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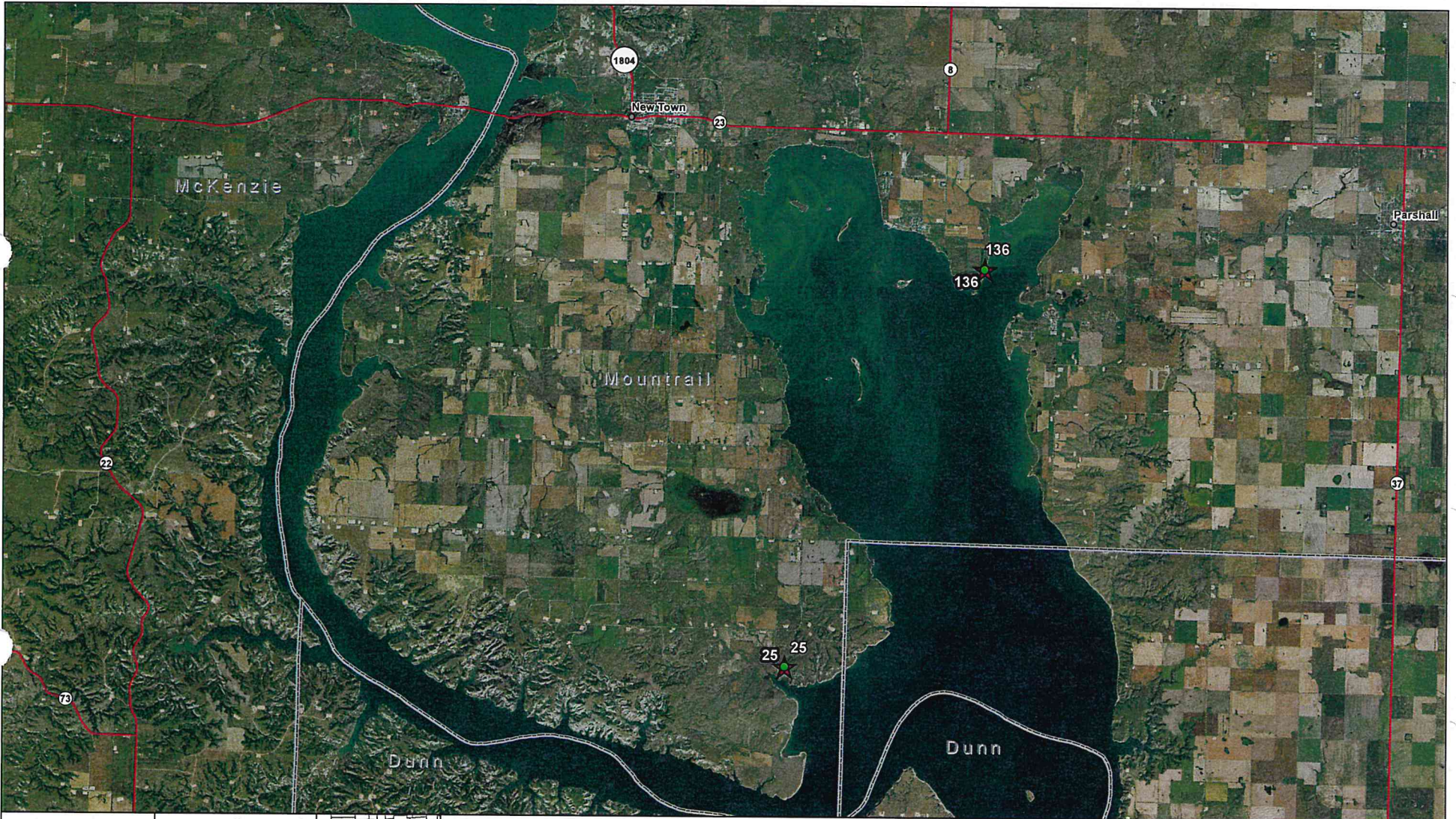


Aerial Imagery: NAIP 2017

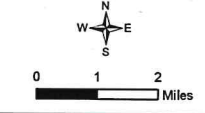
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- US Highway
- State Highway

Map: 5

Energy Transfer Partners, L.P.	
Dakota Access Pipeline Tree and Shrub Planting Locations	
1:125,000	Date: 9/24/2018



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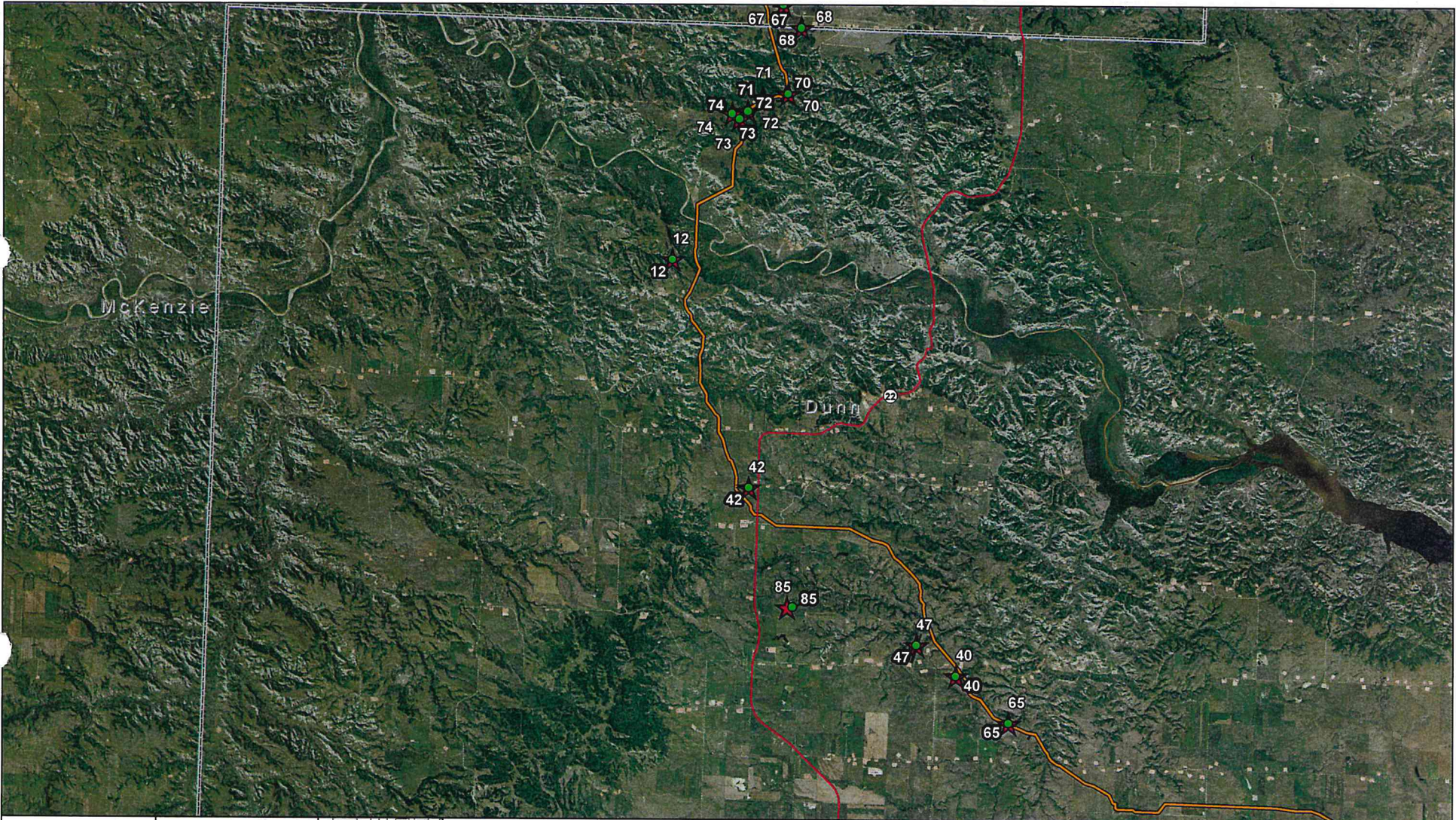


Aerial Imagery: NAIP 2017

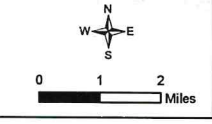
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- State Highway

Map: 6

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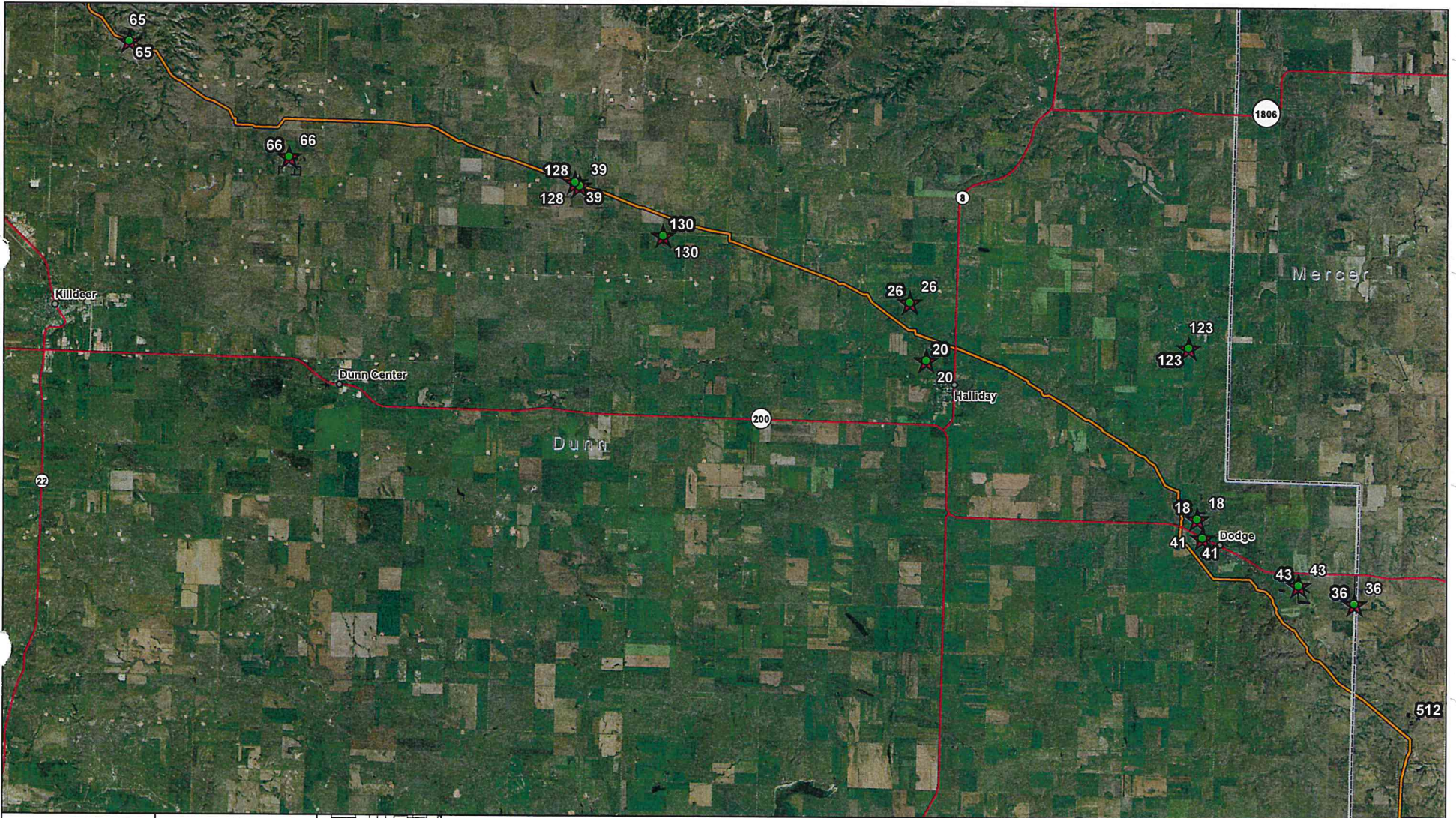


Aerial Imagery: NAIP 2017

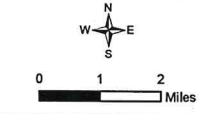
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- State Highway

Map: 7

Energy Transfer Partners, L.P.	
Dakota Access Pipeline Tree and Shrub Planting Locations	
1:125,000	Date: 9/24/2018



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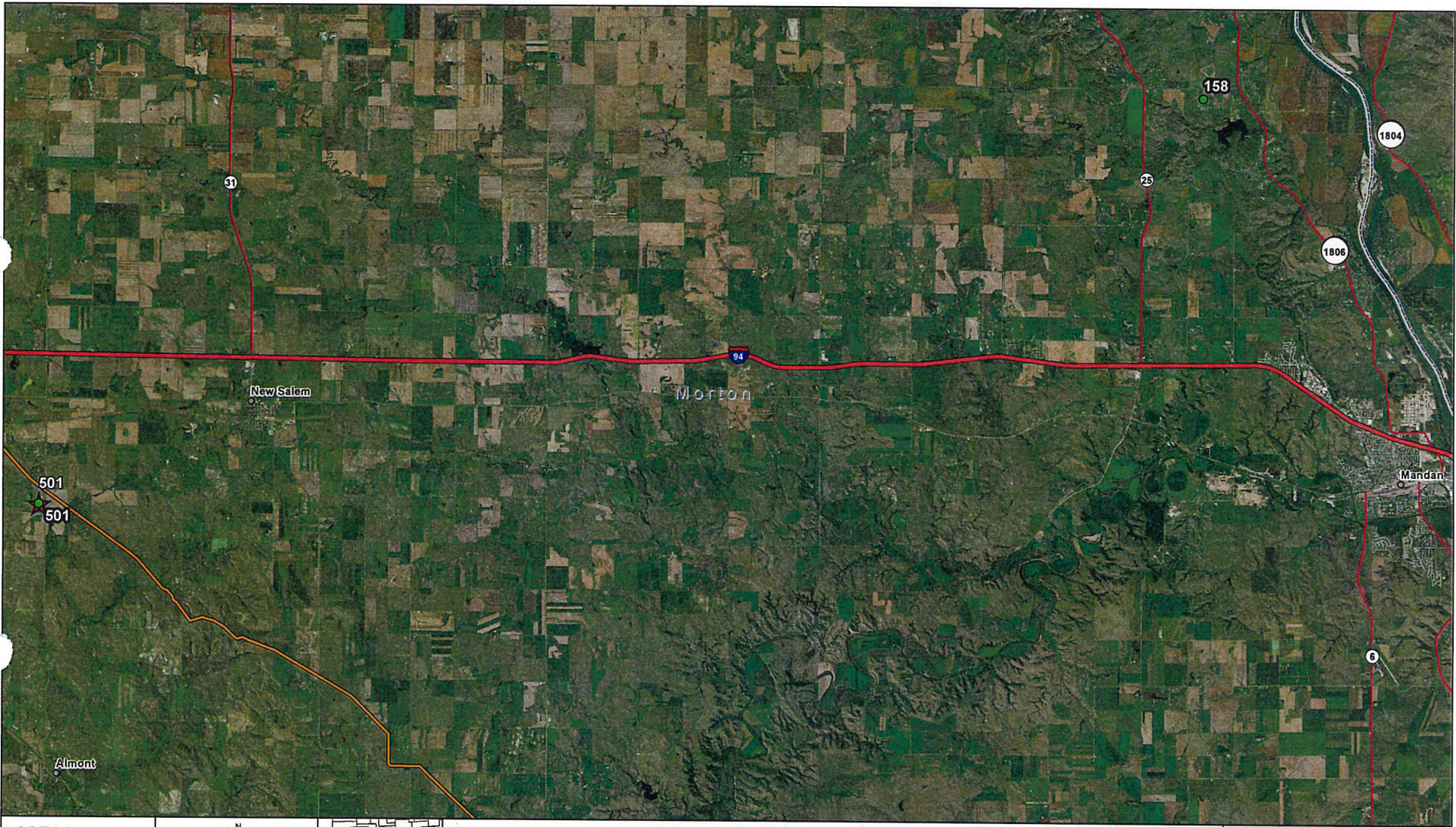


Aerial Imagery: NAIP 2017

- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- State Highway

Map: 8

Energy Transfer Partners, L.P.
 Dakota Access Pipeline
 Tree and Shrub Planting Locations
 1:125,000 Date: 9/24/2018



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Aerial Imagery: NAIP 2017

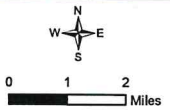
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- Interstate
- State Highway

Map: 9

Energy Transfer Partners, L.P.	
Dakota Access Pipeline Tree and Shrub Planting Locations	
1:125,000	Date: 9/24/2018



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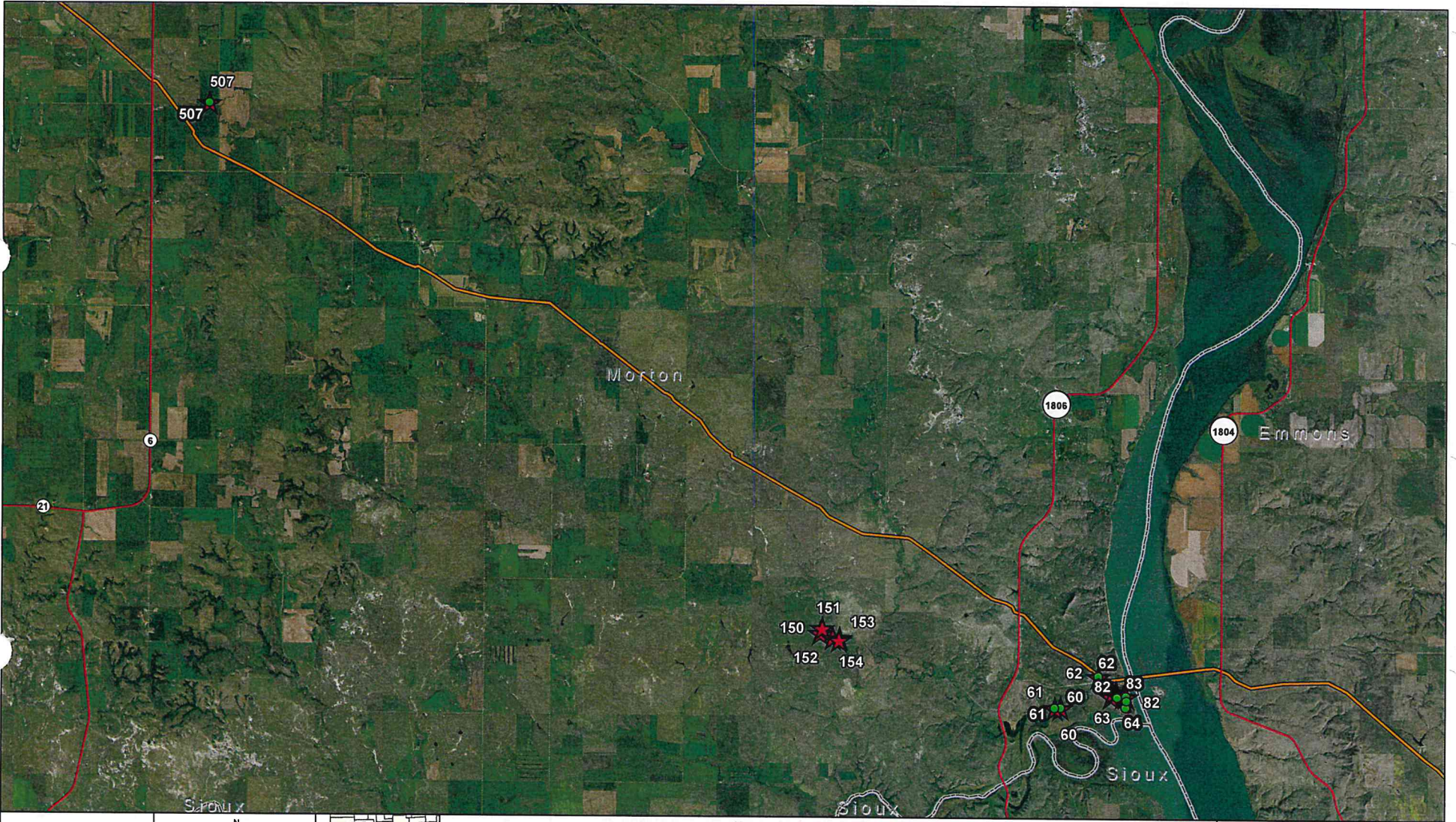


Aerial Imagery: NAIP 2017

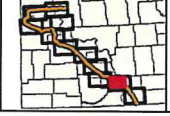
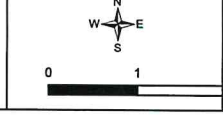
- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline

Map: 10

Energy Transfer Partners, L.P.
Dakota Access Pipeline Tree and Shrub Planting Locations
1:130,000
Date: 9/24/2018



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Aerial Imagery: NAIP 2017

- 2018 Planting Locations
- ★ 2017 Planting Locations
- Pipeline
- State Highway

Map: 11

Energy Transfer Partners, L.P.	
Dakota Access Pipeline Tree and Shrub Planting Locations	
1:85,000	Date: 9/24/2018