



TARGA BADLANDS LLC NEW TOWN TO STANLEY PIPELINE: TREE AND SHRUB SURVIVAL REPORT 2017

MOUNTRAIL COUNTY, NORTH DAKOTA

NDPSC Case Number: PU-14-625

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September 27, 2017

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1.0 INTRODUCTION

The New Town to Stanley Pipeline Project (the Project), filed under North Dakota Public Service Commission (NDPSC) Case Number PU-14-625, was completed in 2014 in Mountrail County, North Dakota, within portions of Township 152N, Range 92W; Township 153N, Range 91W; Township 154N, Range 91W; Township 155N, Range 91W; and Township 156N, Range 91W. The Project is operated by Targa Badlands LLC (Targa) and includes two terminals with storage tanks and a 31.7 mile underground pipeline for the transport and storage of crude oil. Golder understands that the Project is under the jurisdiction of the North Dakota Public Service Commission NDPSC.

Construction of the Project required the removal and replacement of trees and shrubs within the Project right-of-way. Targa has requested Golder Associates Inc. (Golder) to assist with tree and shrub survivorship monitoring associated with the Project. This annual tree and shrub survival report documents the survival of the trees and shrubs for this Project over the 2017.

1.1 Background

It is understood that 75 trees and shrubs were removed during the course of the Project, and Targa mitigated this removal by planting 163 replacement trees and shrubs (replacement ratio of 2.2:1). The NDPSC requires tree and shrub replacement at a 2:1 ratio, and a 75% survivorship at the end of a three-year monitoring period. Using this information, Golder understands that 113 of Targa's replacement trees and shrubs will be required to have survived by October 1, 2018 for the Project to meet NDPSC requirements.

It is understood that eight of the 11 landowners in the Project area requested replacement of trees on their property. The remaining three landowners waived replacement of trees and shrubs on their property and instead donated the trees and shrubs. The trees and shrubs were donated to: Stanley City Cemetery/Dog Park grounds, an urban housing project in the city of New Town, and the Van Hook Wildlife Management Area property southeast of New Town. General planting locations are shown in Figure 1.

Initial data collection was conducted in 2015 by Lowham Walsh LLC (Lowham Walsh) and documented in a report titled "*Targa Badlands New Town and Stanley Pipeline: Tree and Shrub Planting Report 2015.*" This report included landowner identification, global positioning system (GPS) coordinates for replacement trees and shrubs, replacement species identification, and replacement tree and shrub height data.

At Targa's request, Lowham Walsh also conducted an assessment of replacement tree and shrub survivorship in September of 2016. Records obtained from Lowham Walsh indicate that during the 2016 assessment, 144 of the 163 replacement plants were identified as alive.



Golder relied on Lowham Walsh's records and data to locate and assess individual plants while conducting the 2017 survivorship survey described herein.



2.0 2017 TREE AND SHRUB MONITORING

This section summarizes Golder's efforts to assess survivorship of mitigation trees and shrubs in September of 2017.

2.1 Preparatory Activities

Prior to the start of survey efforts, land access permission was obtained from each landowner where plantings occurred. A Site-specific Golder Health and Safety Environment Plan (HaSEP) was prepared for tree and shrub survey field activities.

2.2 2017 Survivorship Survey

On September 20, 2017 Golder conducted survivorship surveys at each of the planting locations. Although Lowham Walsh records indicate survival of only 144 replacement plants, Golder staff attempted to locate each of the 163 trees and shrubs planted to make an independent survivorship determination. Golder utilized sub-meter GNSS instruments, electronic tablets, and digital cameras (>10 megapixel) to locate individual trees and shrubs and record field data. Golder recorded whether or not each tree and shrub was deemed to be alive or dead. If the tree or shrub was determined to be dead, a probable cause of death was determined (i.e. stepped on by cattle, damaged by snow removal operations, natural causes, etc.).

Trees or shrubs that had any portion of living plant material were considered alive. Of the 163 trees and shrubs planted, 123 trees and shrubs were observed as alive as of September 20, 2017. Two trees were classified as dead at the time of Golder's survey. Golder staff were unable to locate 38 plants, which were classified as "unknown status". As they cannot be confirmed alive, plants of unknown status are considered to be dead for the purposes of this assessment. The 123 alive trees and shrubs of the initial 163 planted calculates to an overall 82% survival rate. Since the 163 trees and shrubs planted exceeds the 150 plant requirement, the survival rate in relation to NDPSC standards is recorded as 82%. A summary of replacement tree and shrub planting and survivorship is provided in Table 1. Representative photographs from Golder's September 2017 assessment are provided in Attachment 1.

Golder staff were unable to locate 38 plants. These 38 plants consisted of 34 silver buffaloberry (*Shepherdia argentea*), one green ash (*Fraxinus pennsylvanica*) and three Canada red chokecherry (*Prunus virginiana*). Mortality of the 34 silver buffaloberry shrubs assessed for this survey is assumed to be due to grazing and trampling by cattle and other ungulate wildlife. Due to the presence of cattle and wildlife tracks, grazing evidence, and droppings in the direct vicinity of the planting locations, it has been assumed that grazing and trampling has contributed to the mortality of the 31 silver buffaloberry plantings. Golder was unable to locate one green ash tree and two Canada red chokecherry trees at the Nathan Lahtinen property. Three green ash plantings were located at the property, each planting had white corrugated tree guard covering the base of the planting. No evidence of tree removal was noted for either the green ash or Canada red chokecherry trees. Golder was unable to locate one Canada red chokecherry tree at the Ardell and Mavis



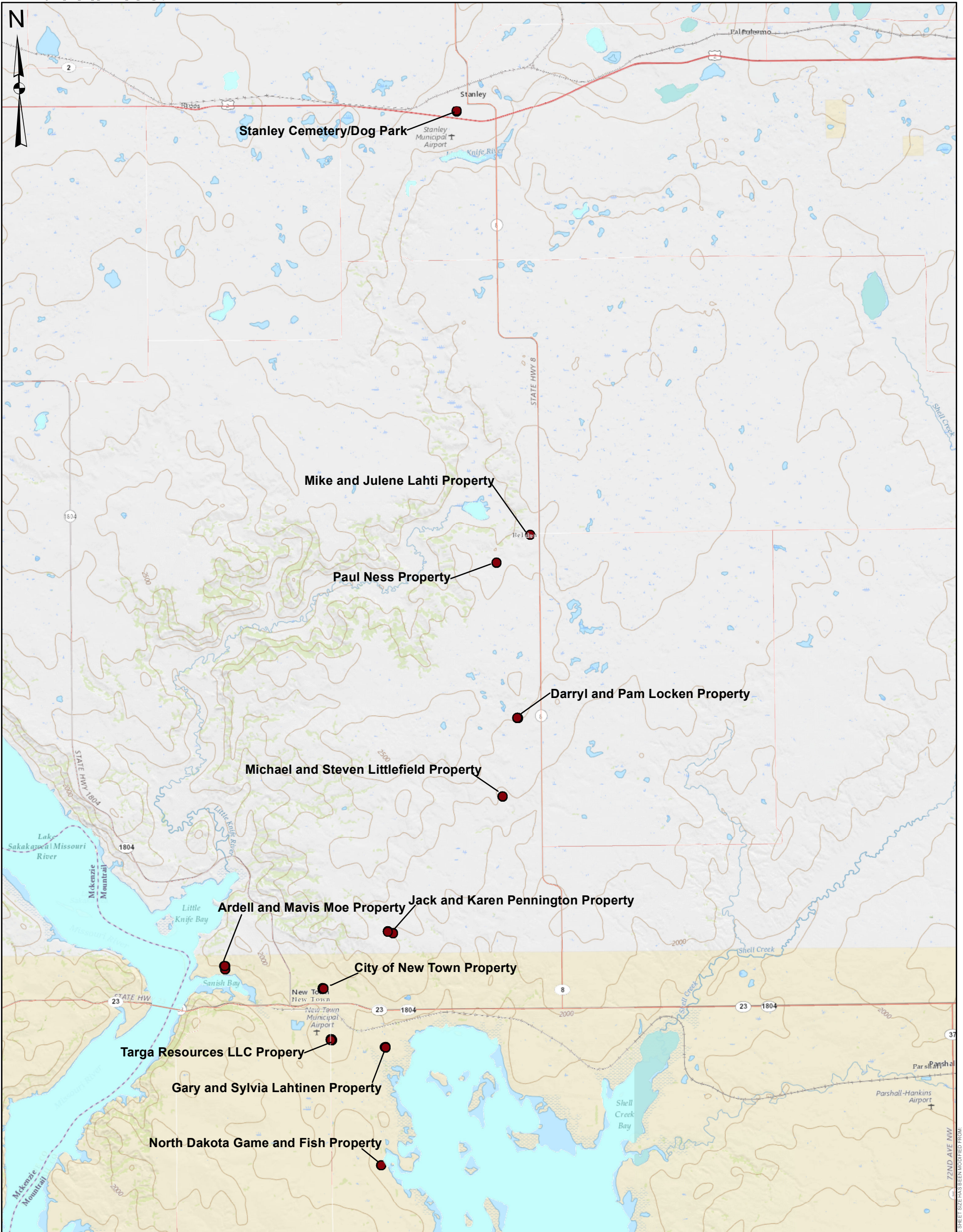
Moe property. At the Moe property 36 of the 37 chokecherry plantings were located and alive. No evidence of tree planting or removal was noted at the location of the missing Canada red chokecherry tree.

Two green ash (*Fraxinus pennsylvanica*) plantings were recorded as dead during Golder's survey efforts. Mortality of one green ash at the New Town location is attributed to damage during snow removal efforts as the stem was broken at the base. Mortality of one green ash tree at the Lahtinen residence is assumed to be due to natural causes, as no indicators of mechanical damage or grazing were observed.

3.0 SUMMARY AND CONCLUSIONS

Each replacement tree and shrub planting location related to the Project was visited by Golder staff on September 20, 2017 to assess mitigation plant survivorship. Trees or shrubs that had any amount of foliage or living plant material at the time of Golder's assessment were recorded as alive. A total of 123 replacement trees and shrubs were identified as alive at the time of Golder's survey. When compared to NDPSC's requirement of 150 replacement trees and shrubs for the Project, this represents a survival rate of 82%. Based on these results, Targa's tree and shrub survivorship is in alignment with NDPSC expectations and no additional plantings are necessary at this time. A final survivorship study will be completed prior to October 1, 2018.

FIGURE 1



LEGEND

- Replacement Tree and Shrub Planting Location

NOTES

1. REPLACEMENT PLANTING LOCATIONS SHOWN BASED ON DATA OBTAINED FROM LOWHAM WALSH LLC.
2. TREE AND SHRUB SURVIVORSHIP INFORMATION PROVIDED IN TABLE 1.

REFERENCE

Service Layer Credits: Sources: Esri, DeLorme, USGS, NPS

CLIENT

TARGA BADLANDS LLC

PROJECT

NEW TOWN TO STANLEY TREE AND SHRUB SURVIVORSHIP

TITLE

REPLACEMENT TREE AND SHRUB PLANTING LOCATION MAP

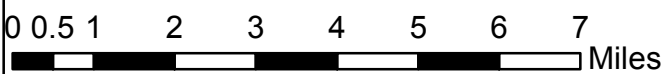
CONSULTANT



YYYY-MM-DD	2017-09-26
PREPARED	RJM
DESIGN	RJM
REVIEW	ARP
APPROVED	JLY

PROJECT No.
1778029

FIGURE
1



IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM 11in

TABLE 1

Table 1
New Town to Stanley Pipeline
2017 Tree and Shrub Survival Count

Landowner	Recipient	Number of Replacements Planted	2017 Count Alive	2017 Count Dead	2017 Count Unknown	Survival Rate	Tree/Shrub Species Planted	Mortality Assessment
Douglas Kinnoin	Stanley Cemetery/Dog Park	7	7	-	-	100%	Downy Hawthorn	N/A
Mike and Julene Lahti	Mike and Julene Lahti	4	-	-	4	0%	Buffaloberry	Not Located
Paul Ness	Paul Ness	15	-	-	15	0%	Buffaloberry	Not Located
Darryl and Pam Locken	Darryl and Pam Locken	26	26	-	-	100%	Green Ash	N/A
Michael and Steven Littlefield	Michael and Steven Littlefield	9	4	-	5	44%	Buffaloberry	Likely Grazed
Jack and Karen Pennington	Steve Pennington	7	-	-	7	0%	Buffaloberry	Not Located
Gary and Sylvia Lahtinen	Nathan Lahtinen	4	2	1	1	50%	Green Ash	Natural Causes
Gary and Sylvia Lahtinen	Nathal Lahtinen	2	-	-	2	0%	Canada Red Chokecherry	Not Located
State of North Dakota	North Dakota Game and Fish Department	4	1	-	3	25%	Buffaloberry	Likely Grazed
Ardell and Mavis Moe	Ardell and Mavis Moe	37	36	-	1	97%	Canada Red Chokecherry	Not Located
Targa Resources LLC	Targa Badlands LLC	35	35	-	-	100%	Downy Hawthorn	N/A
Sherri Teynolds and Tara Salute	City of New Town	13	12	1	-	92%	Green Ash	Damaged During Snow Removal
Total		163 (150 required)	123	2	38	82%²	--	--

Notes:

- 1- Unknown status indicates Golder employees were unable to locate the trees/shrubs. These trees/shrubs were counted as dead.
- 2- The survival rate was calculated using NDPSC mitigation requirements for tree replacement, or 150 trees for this project. Therefore the overall survivorship was calculated by using $(123/150) \times 100 = 82\%$

ATTACHMENT 1



Targa - New Town to Stanley Pipeline Tree and Shrub Survey September 2017

PHOTO 1

View of evidence of livestock grazing on silver buffaloberry planting at North Dakota Game and Fish location. Broken leaves and stems were apparent throughout the plant. One silver buffaloberry planting out of four was located.



PHOTO 2

View of dead green ash tree at Lahtinen residence. Green ash appears to have died of natural causes, no evidence of physical damage to plant was noted.



PHOTO 3

View of downy hawthorn planting at Targa Resources location. Plants averaged three feet in height, all plantings were alive at the time of Golder's assessment.





PHOTO 4

View of a dead green ash planting at the City of New Town location. Green ash likely damaged during snow removal.



PHOTO 5

View of canada red chokecherry plantings at Moe residence. Thirty-six of 37 plantings were located and classified as alive. No evidence of damage around planting locations was recorded.



PHOTO 6

View of silver buffaloberry plantings on Littlefield property. Four of nine plantings located and classified as alive. Cattle activity around planting location makes grazing a likely cause of silver buffaloberry mortality.





PHOTO 7

View of green ash plantings at Locken residence. Five-gallon buckets are used by the Lockens to collect rain water. A Locken family member told Golder that he watered each planting throughout summer.



PHOTO 8

View of Ness property where 15 silver buffaloberry shrubs were planted. None of the plantings were located during Golder's assessment. Evidence of cattle activity on the property makes grazing a likely cause of silver buffaloberry mortality.



PHOTO 9

View of silver buffaloberry plantings on Lahti location. None of the plantings were located. Evidence of cattle activity on the property makes grazing a likely cause of silver buffaloberry mortality at this location.





PHOTO 10

View of downy hawthorn plantings at the Stanley cemetery/dog park location. All seven plantings were classified as alive during Golder's September 2017 assessment.

