Management Plan for Converting Old Use Agricultural Land to an Active Christmas Tree Farm

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A Management Plan submitted to
the Graduate Faculty of
North Carolina State University for
The Master of Forestry Program

Elma Farm Management Plan

Converting Agricultural Land to a Christmas Tree Farm

Landowner:	Shirley Donnelly
Total Acreage:	60 Acres (managed acres)
Location:	3481 Bullis Rd., Elma, NY, 14059. The farm is located in the town of Elma, NY, 18 miles southeast of Buffalo N.Y. (a city of roughly 255,000 people), near Lake Erie and 42 miles South of Lake Ontario.
Coordinates:	42.839971 North, -78.591504 West

Prepared by:	William Braun
Date prepared:	28 October 2022

Executive Summary

This project assesses the conversion of an agricultural farm to a Christmas tree plantation. The current property owners are considering shifting the land use to a choose-and-cut Christmas tree plantation. The region is experiencing shrinking agricultural land use due to an aging generation of farmers and a dramatic change in regional land use. The current owners are familiar with traditional agricultural farming; however, the family has never managed a crop like Christmas trees. The landowners are considering an alternative crop as a practical means of generating revenue, preserving the property as farmland, and providing a recreational location for the community. The Elma Farm is ranked among the best airable land in Western New York, placing the farm in the top 10% for production capability in the state's nearly 7 million acres of farmland. Since the farm's inception almost 150 years ago, it has been continuously owned and farmed by the same family.

The farm is in the town of Elma, which is in Erie County, Western New York State. The farm is uniquely situated outside several large towns and is conveniently less than an hour's drive from the city of Buffalo (population of 250,000). The farm, established in 1875, covers approximately 63 acres, which includes the original homestead and outbuildings.

The purpose of this project is to assess the farm's viability as a Christmas tree farm and to develop a management plan to transition from current use to a Christmas tree farm that includes agritourism operations. The conversion assessment factors include land use history, geography, site characteristics, tree species, soils, and other characteristics.

Research found the site geography, soils, and other characteristics are favorable for growing Canaan fir (Abies balsamea var. phanerolepis), Concolor fir (Abies concolor), Douglas fir (Pseudotsuga menziesi), Fraseir fir (Abies fraseri) and Scotch pine (Pinus sylvestris). A financial analysis suggests the Christmas tree plantation would be economically viable after 6 years and would recoup the initial investment of converting the traditional agriculture operations to a Christmas tree operation within 10 years.

Based on these findings, it is recommended the landowners convert the agricultural farm to a multi-crop Christmas tree plantation, dedicating 15 acres to a Christmas tree plantation, 5 acres to a pick-your-own vegetable stand and community tourism, and 30 acres to leased farmland. This recommendation is based on two assumptions external to the analysis: (1) the current owners can finance the initial investment, and (2) can absorb the lack of positive cash flow for the first six years.

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Landowner Objectives:

The objective of this management plan is to outline and develop a strategy for converting an old use agricultural family farm to an active Christmas tree farm (Figure 1). This is being done to achieve the following landowner objectives.

- Develop a more lucrative form of income for the farm
- Preserve the property as farmland
- Provide a recreational location for the community

Figure 1: Family Farm Home, Elma, NY

The number of active farms operating in the region has steadily gone down in recent decades. The landowners know that because of urban creep and the expansion of both commercial and private property development, the most lucrative option would be to sell the property. Real estate developers would pay highly for the property and convert it into developed real estate. Another revenue enhancing option would be to lease the land to the state for the development of wind turbines or solar farms. However, the land has sentimental value as a farm for the family, due to the land being farmed by the family since it was established (Figure 2). For this reason, the family does not want to sell the land or convert the land to a renewable energy site. Instead, the family would like to convert the farm from a traditional agricultural farm to one that will yield more passive income, while not dramatically altering the environment of the site.

Figure 2: Field of Wheat Currently Being Cultivated on the Elma Farm

When considering converting the farm to a Christmas tree farm, it is important to frame the style of Christmas tree farming operation that will be employed. In the U.S., Christmas tree farms fall into three general categories. First are the small artisanal retail farming operations (around 30 to 100 acres). These farms cater to a niche audience- primarily families that want the experience of cutting down their own tree coupled with fun seasonal activities at the farm. In addition to trees, these farms host seasonal events like hayrides, pumpkin patches, animal petting and hot chocolate stands. The next type of farming operation is the mid-level growers (500-1,000 acres), and they will provide trees to the small growers like the choose and cut Christmas tree farms, as well as the larger growers to supplement their tree stock. Finally, there are massive tree farms that host thousands of acres of Christmas trees, with many acres dedicated to seasonal rotations. These growers are primarily providing trees for consumers who buy the trees wholesale and sell in bulk. The proposal outlined in this management plan would be adopting the retail style small farm operation and cater to a target audience of young families looking to select the perfect Christmas tree.

Although urban creep is traditionally seen as detrimental by agricultural land managers, the current location of the farm and its proximity to a major city (Buffalo), it's suburbs (Tonawanda, Cheektowaga and West Seneca) and several large townships (East Aurora, Orchard Park, Attica) provides the landowner with a very unique opportunity. The establishment of an agrotourism farm, focused on consumers looking for fun family activities

with a seasonal or agricultural theme, would satisfy an untapped niche market in the area. Tourist farms have become ever more popular since COVID 19 pandemic. Families looking for fun and educational activities outdoors can find a wide range of activities for adults and children on agritourism oriented farms. A farm-based entertainment site could host demonstrations of traditional or historical farming practices, corn mazes, wine or beer tasting, vegetable picking, Christmas tree cutting, hayrides and educational tours. The venue would showcase the life and daily activities of a farmer and create a wholesome and positive experience around farming for both adults and children.

Property History and Description:

The farm is located in an area that was once the bottom of a shallow sea millions of years ago. In more recent history, about 12000 years before present, the land was shaped by giant prehistoric proglacial lakes that formed and later retreated at the end of the last ice age (Figure 3 and 4). Today, these lakes are still in existence although greatly reduced in size. To the north and west of the farm are Lake Ontario and Lake Erie, approximately 50 miles and 20 miles distant respectively (Figure 5). The property is currently established on what was once a riverbed and later flood plain for a giant lake estuary (Figure 6).

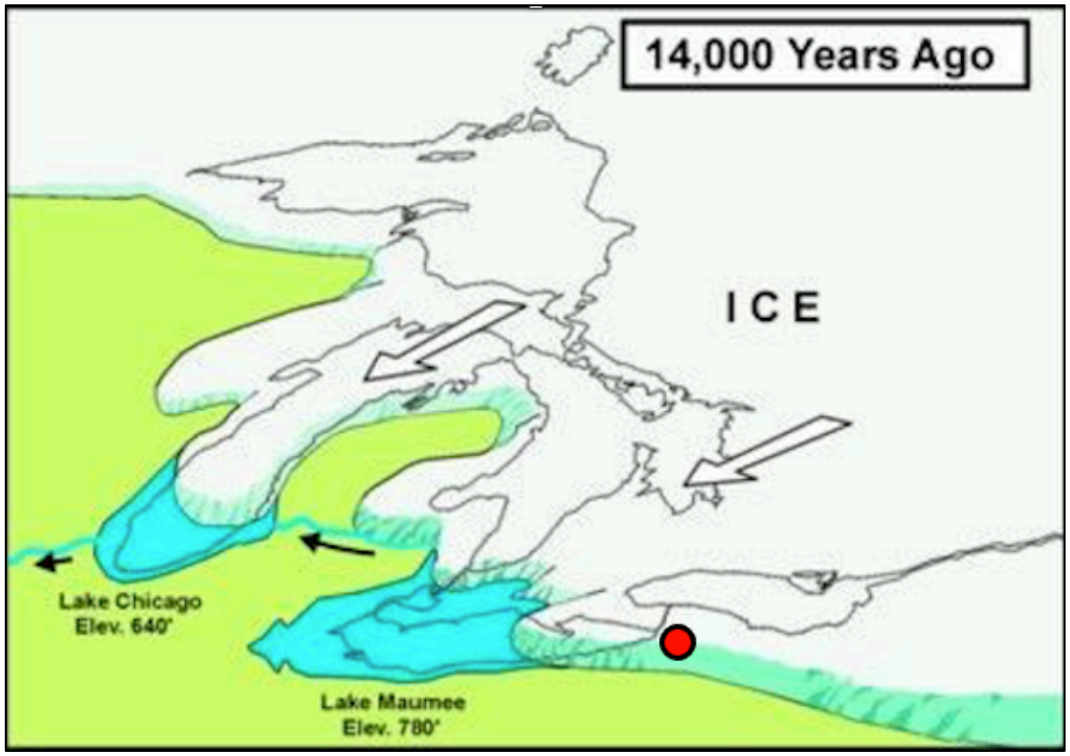

Figure 3: Recession of Glaciers and the Development of Lake Ontario and Lake Erie 14000 BP (Red Dot marks Farm), Gillies, J. (2009, June 11). *Lake levels report weighs Great Lakes Basin's glacial legacy: Great lakes echo*. Great Lakes Echo | Environmental news of the Great Lakes region.

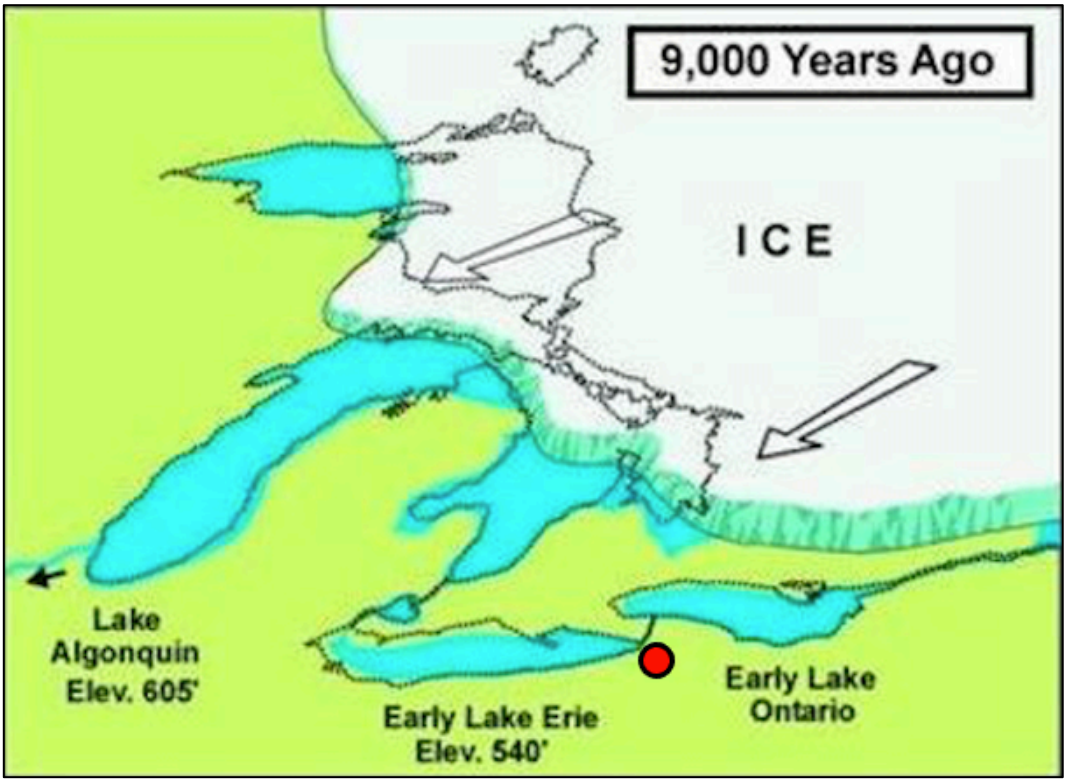

Figure 4: Recession of Glaciers and the Development of Lake Ontario and Lake Erie 9,000 BP, (Red Dot marks Farm) Gillies, J. (2009, June 11). *Lake levels report weighs Great Lakes Basin's glacial legacy: Great lakes echo*. Great Lakes Echo | Environmental news of the Great Lakes region.

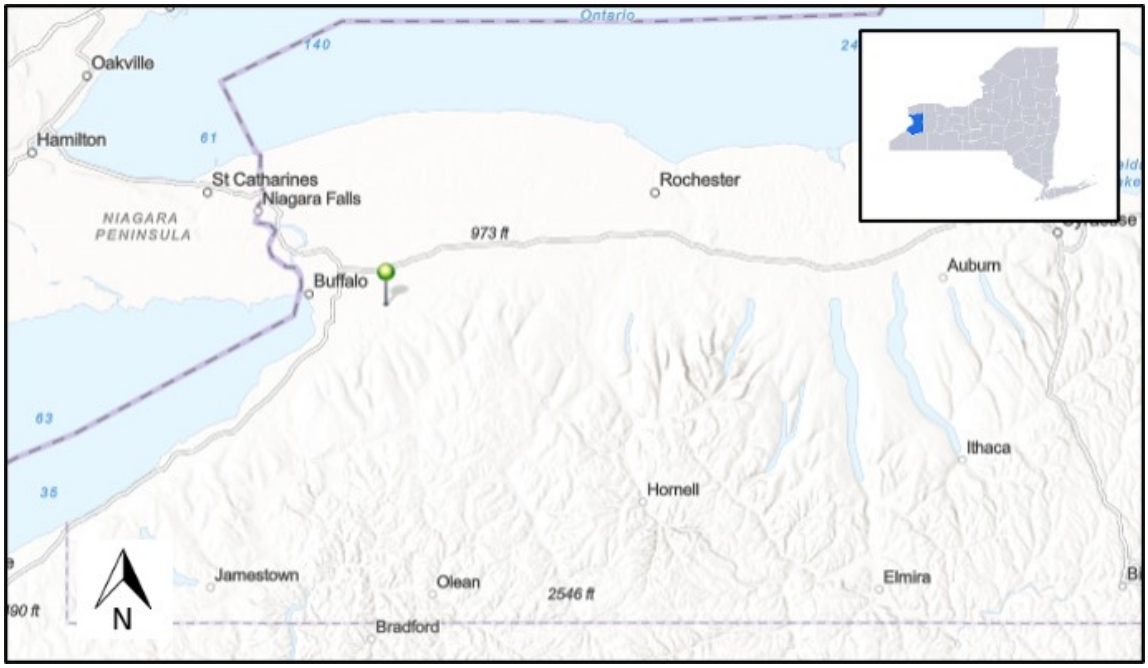

Figure 5: Area Map of the Western New York Region with Marker Showing Elma Farmhouse

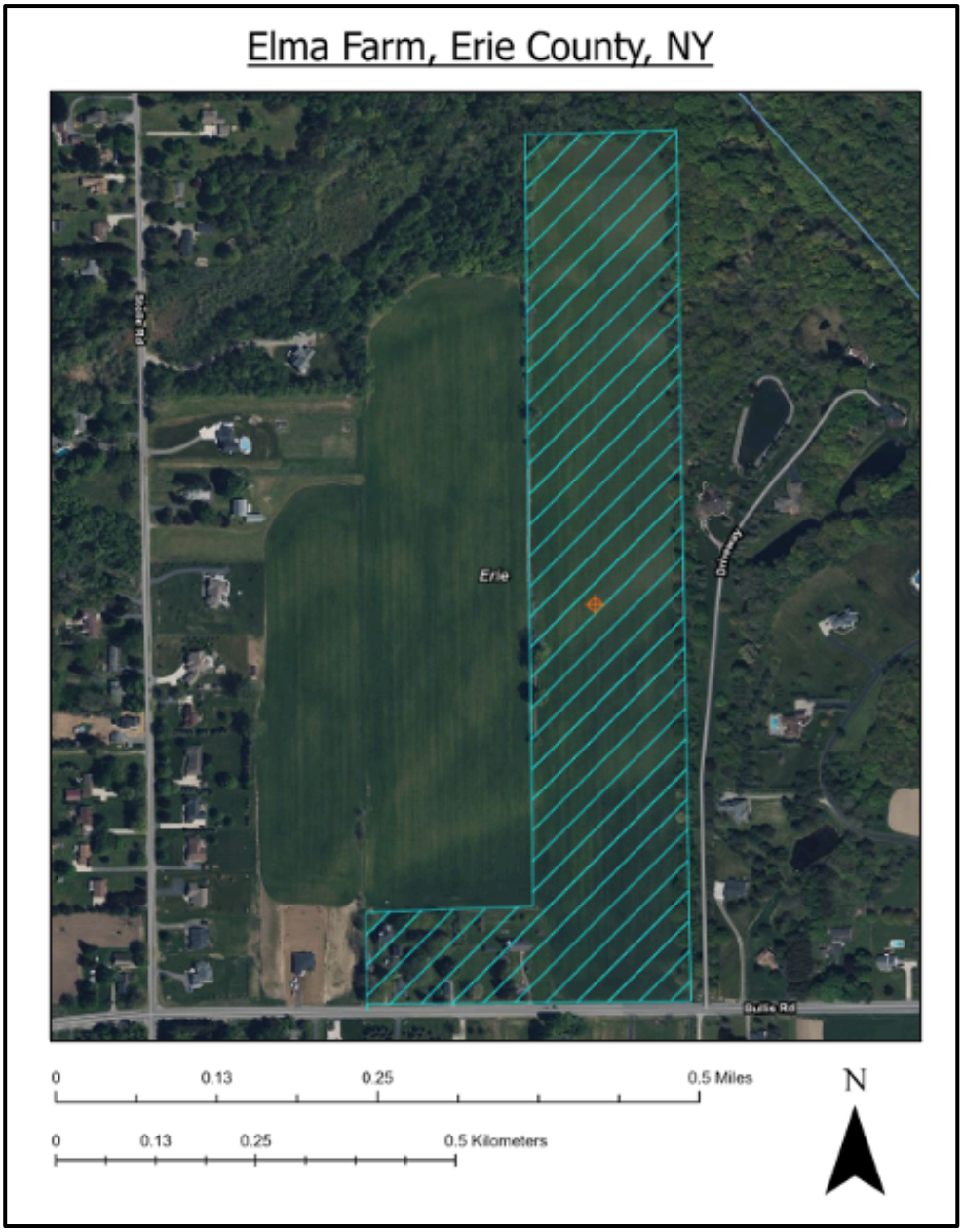

Figure 6: Map Detailing the Elma Farmhouse and Farmland

Recent history (1800s – Present day). Because of the rich organic soil and prime location near two freshwater streams (the area around what would be known as Erie County, NY) was clear-cut and converted to farmland. Immediately West of the property you have the remnants of what was once a prehistoric river – currently named Big Buffalo Creek (Figure 7). Bordering the property on the north and northwest you have Little Buffalo Creek. To give you an idea of how old the lakes in the region are, in both Big and Little Buffalo creek, when the water is low, you can find the fossilized remains of Devonian period sea creatures captured in the limestone rock. Thousands of years of sediment deposits have created a rich organic soil layer several feet deep around the farm.

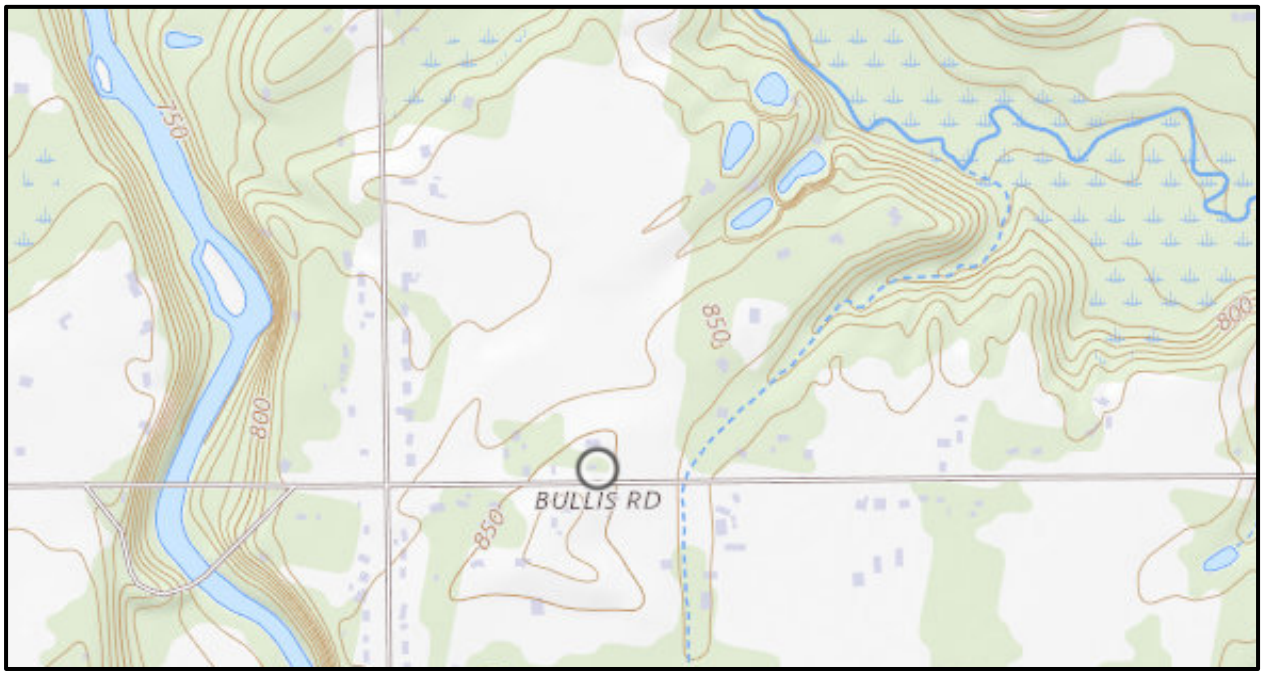

Figure 7: Topographic Map of the Elma Farm

Hence the land was cultivated for farming by many families in this region (Figure 8). The soil on the farm is a deep black/brown with an abundant organic layer. Any stones present in the soil are smooth like the stones found along a stream bed. The Farm itself sits along an east/west running road and the neighboring property is also a farm. In the northernmost portion of the farmland is a small forest that stretches down the eastern side in a thin strip providing some privacy from the adjacent neighborhood. The forested land surrounding the farm is typical for New York with eastern white pine, red maple, sugar maple, American beech, tulip poplar, eastern hemlock, hickory, Norway spruce, black cherry, noble fir, red oak, and elm (though almost all of the elm trees have been decimated by Dutch elm disease). The site is comprised of low rolling hills and sits roughly 820 feet above sea level. In the past, the farm hosted crops of corn, soybeans, and wheat, as well as a dairy cow operation. Because of the farm's sentimental value and history as a traditional agricultural farm going back to the 1870s, the land managers do not want to sell the land for real estate development. However, leasing the land for farming has not been profitable in recent years.

Figure 8: Historic Image of Elma Farm circa 1880s, *Early history of Elma*. Early History of Elma. (n.d.). Retrieved October 30, 2022, from https://www.elmanyhistory.com/Early-History-Of-Elma/

Current Land use:

The property is being leased to a large farming conglomerate and is still in use - growing corn, soybeans, and wheat. The family also leases parts of the property for hunting. The area surrounding the farm has slowly transitioned from a predominantly farming community to a series of suburban neighborhoods and urban development. As the effects of urban sprawl extend from surrounding towns and cities, like East Aurora and Buffalo, most farms in the area have been sold off and converted to housing developments. This occurrence, coupled with an aging class of farmers who are experiencing ever-increasing financial hardships when competing with mega-farms, has caused the demographic of the region to dramatically shift in the last 30 years. The State of New York has also provided a lot of young farmers the opportunity to lease land to the state for solar farms and wind turbines to improve the state's green footprint.

Site Characteristics:

The Elma farm experiences the relatively cool summers and frigid winters of Western New York as it is situated in the great lakes' region of the state. Annual average temperatures for the farm rarely go above 86°F in the summer and can be expected to regularly drop below 4°F in the winter (Figure 9). The regional average precipitation rate on an annual basis is approximately 39 inches of rain and 85 inches of snow (Figure 10). Especially unique about the Elma Farm is the presence of ancient glacial deposits. As stated previously this unique piece of geologic history makes the soils of this site particularly suited for agricultural operations. Most Christmas trees perform best in well-drained, loamy soils with 5.5-7.0 pH level. Management of soil fertility and pH can improve production and quality. A target soil pH of 6.0-7.0 is

recommended for the species selected, which can be found in the next section. However, once tree planting is initiated the soil will self-regulate at around 5.5 pH. At the time of planting for a variety of species, 5.8-6.0 pH is the recommended pH level. Different species can tolerate a variety of pH levels in the soil between low 5s and high 7s based on various regional and weather-related factors. After conducting soil samples across the farm, the current average soil pH for the site was at 7.0 pH. This pH level was most likely the result of current farming operations and the time of year the samples were taken – the soil base line can be expected to stabilize around 6.4.

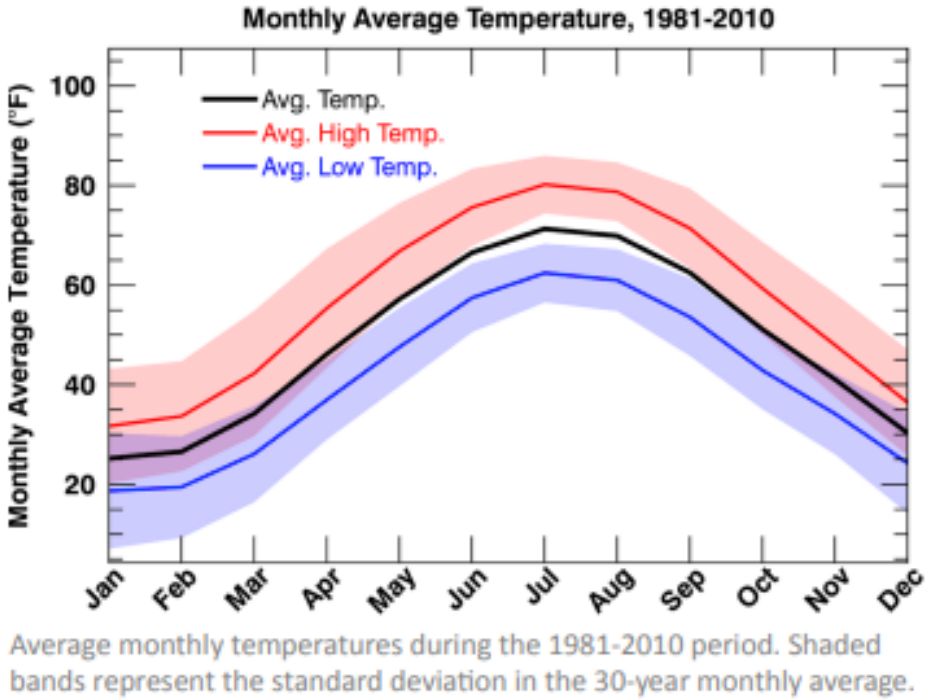

Figure 9: Average Monthly Temperature (°F) Buffalo NY, GLISA Team, University of Michigan. "Historical Climatology: Buffalo, New York." *Https://Glisa.umich.edu/Media/Files/BuffaloNY_Climatology*, Oct. 2010.

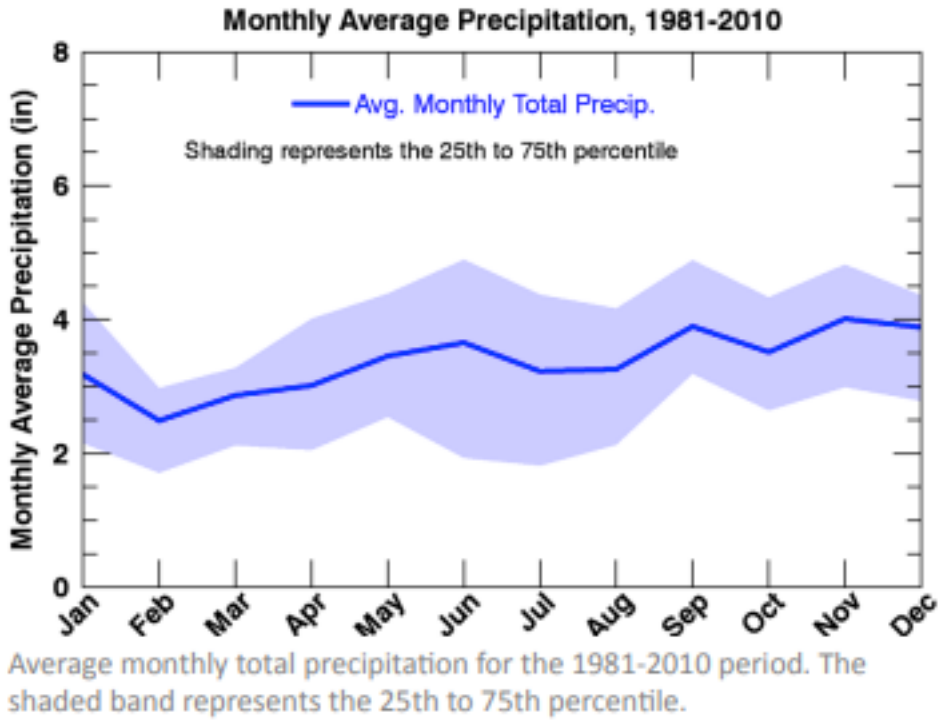

Figure 10: Average Monthly Precipitation (in) Buffalo NY, GLISA Team, University of Michigan. "Historical Climatology: Buffalo, New York." *Https://Glisa.umich.edu/Media/Files/BuffaloNY_Climatology*, Oct. 2010.

Species Characteristics:

Most Christmas tree farms grow a host of pine and fir species based on factors like temperature, annual rainfall, geography, and soil composition for their region. For the purposes of simplicity and ease in starting the Christmas tree operation, 5 species have been chosen that are suitable for the site. These species are Canaan fir (Abies balsamea var. phanerolepis), Concolor fir (Abies concolor), Douglas fir (Pseudotsuga menziesi), Fraser fir (Abies fraseri) and Scotch pine (Pinus sylvestris).

Native to a small pocket of West Virginia, Canaan fir is a species that has many similarities to both Balsam fir and Fraser fir in both appearance and growth (Figure 11). It is unique, however, because of its ability to perform well in habitats not so well suited for other Abies species. It can handle soils with less than perfect drainage and is much more cold-tolerant. The latter reason being one of the motives behind why it was selected as one of the initial crops for the farm. In Western New York it is not uncommon to lose a full season's worth of growth due to a late frost. Because Canaan fir breaks bud later in the spring this makes it particularly suited for the region. Canaan fir thrives in cooler climates and will perform best in deep, well drained sites with lots of moisture. These characteristics make the farm site perfect for this species. When planting Canaan fir, a treatment plan for pests such as balsam twig aphid, spider mites and wooly adelgid must be implemented.

Figure 11: Canaan Fir, *Conifer seeds A-O by Latin name*. Tree Seed Online Ltd. (n.d.). Retrieved October 28, 2022, from https://www.treeseedonline.com/store/c2/Conifer_Seeds_A-O_by_Latin_Name.html

Concolor fir or White fir, is a true fir that is native to the western US (Figure 12). However, it has been transplanted to the northeast as a Christmas tree crop. It is also uniquely suited for the cold climate and significant snowpacks experienced in the Great Lakes region of Western New York. As a species, Concolor fir performs well in a large variety of soil conditions and pH levels. If the Concolor fir is getting sufficient water, it is relatively unaffected by cold temperatures and a limited growing season. As a Christmas tree, the Concolor fir has good form, holds its needles well and is a particular favorite because of its aromatic citrusy scent. Some Concolor firs are more susceptible to late frost damage than others. However, seeds sourced from the rocky mountain region, or an inland mountain grower will increase the trees hardiness and reduce its risk for cold weather damage.

Figure 12: Concolor Fir, *Conifer seeds A-O by Latin name*. Tree Seed Online Ltd. (n.d.). Retrieved October 28, 2022, from https://www.treeseedonline.com/store/c2/Conifer_Seeds_A-O_by_Latin_Name.html

Douglas fir is another western species of tree that has been transplanted to farms across America because of its popularity as a Christmas tree (Figure 13). It is one of the more popular species of Christmas trees for consumers. However, in Western New York it has seen a decline in its popularity among farms in recent years due to its susceptibility to several bacterial and fungal infections. The Douglas fir also seems to be more susceptible than other Firs to different species of insects and invasives, like the Balsam woolly adelgid. Despite these obstacles, it is still popular as both a Christmas tree and as a landscape tree. When planting, special attention needs to be given to selecting a site with good drainage. A clay/loam soil with around 5.5 to 6.0 pH will provide the best site for growth performance. Planting must come in conjunction with a well thought out pesticide and fungicide treatment plan.

Figure 13: Douglas Fir, *Conifer seeds A-O by Latin name*. Tree Seed Online Ltd. (n.d.). Retrieved October 28, 2022, from https://www.treeseedonline.com/store/c2/Conifer_Seeds_A-O_by_Latin_Name.html

Native to the mountains of North Carolina, Fraser fir is the most popular Christmas tree in New York (Figure 14). Some of the many reasons for its popularity include excellent needle retention, flexible limbs, beautiful blue green color, great form, and classic Christmas tree fragrance. Fraser fir performs best when planted on well drained sites and is well adapted for cold harsh winters with moderate cool summers. When planting for the best results avoid sites with standing water, as the Fraser fir is susceptible to root diseases. Cone removal is also a critical element to management when growing Fraser fir. This is done to avoid the resulting cone stalks and reduced tree form. Another consideration is soil pH. Unlike most firs, Fraser fir requires much lower pH levels. Soil pH should be 5-5.5 pH to achieve the best growth results.

Figure 14: Fraser Fir, *Conifer seeds A-O by Latin name*. Tree Seed Online Ltd. (n.d.). Retrieved October 28, 2022, from https://www.treeseedonline.com/store/c2/Conifer_Seeds_A-O_by_Latin_Name.html

Although not native to the northeast, Scotch pine, which is native to Europe, was introduced in North America in the 1600 and 1700s (Figure 15). The location of the farm in Western New York puts the tree in its naturalized habitat in the northeastern Lake states region. Scotch pine is often grown as a Christmas tree because it is one of the least demanding with regards to site preparation. Because scotch pine is such a hardy tree it can sustain significant drought as well as dramatic temperature fluctuations. Similar to Canaan fir, Scotch pine breaks bud very late, meaning it is not as susceptible to late season frost damage. Inside the naturalized range of Western New York, Scotch pine can be observed growing alongside black cherry, red maple, sugar maple, American beech, quaking aspen, and eastern white pine (all of which are present in the farm sites adjacent wooded areas). Scotch pine also responds well to shearing and holds a pleasing full form.

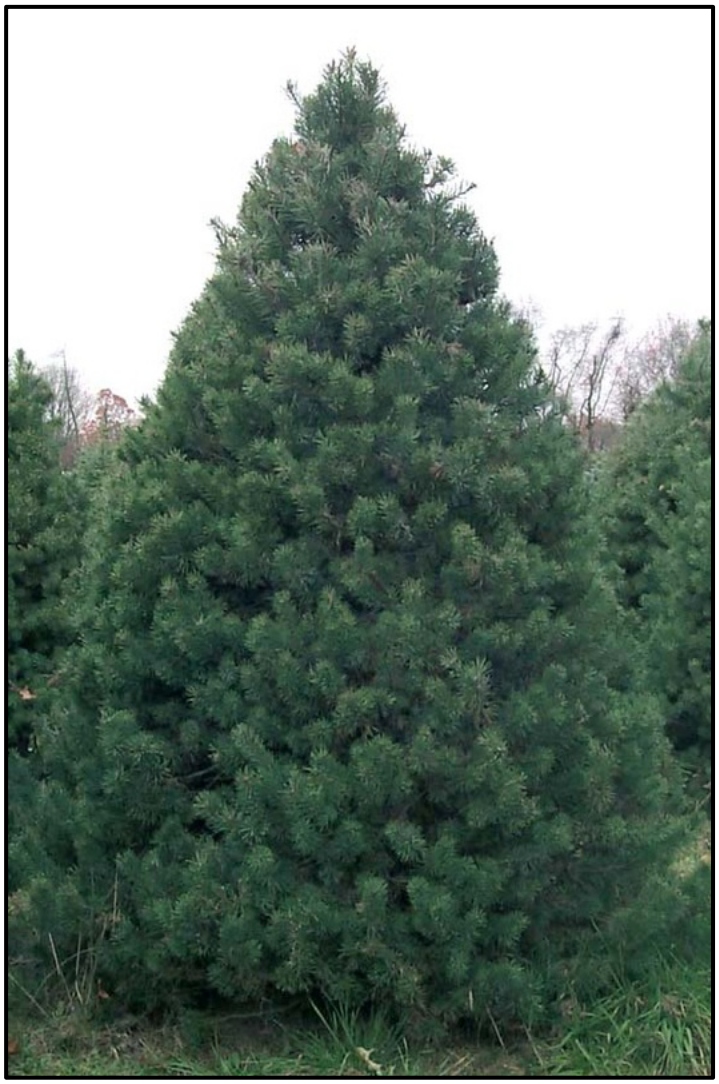

Figure 15: Scotch Pine *conifer seeds A-O by Latin name*. Tree Seed Online Ltd. (n.d.). Retrieved October 28, 2022, from https://www.treeseedonline.com/store/c2/Conifer_Seeds_A-O_by_Latin_Name.html

Soil Characteristics:

To determine the best course of action for converting this farm, data was collected and analyzed, focusing on measurable standards. Of the measurable criteria for determining the suitability of converting old use agricultural land to a tree farm - determining if the field had a "hard pan" was critical, as breaking-up the "hard pan" would create an enormous and costly hurdle. After establishing a "hard pan" as the foremost obstacle to developing a Christmas tree farm, the second priority became evaluating the site's soil. Evaluating the nutrients present, as well as the presence or absence of a "hard pan" helped to determine the likelihood for success regarding the establishment of a Christmas tree farm.

The 60-acre farm was subdivided into 13 subsections for soil sampling. Each soil sample was conducted to a depth of 24 inches, to determine if a hard pan exist and to collect soil for a

soil analysis. Based on sampling it does not appear that a hard pan has developed on the site. This is atypical for a site with such extensive use, but the lack of a "hard pan" is possible. The site was relatively rock and debris free, probably from generations of farming.

Across the 13 subsections, 10 soil samples weighing no more than 15 ounces were collected using a 24-inch auger and placed in a sterile 5-gallon bucket. At the end of the collection of 10 individual samples, the soil was mixed into a single sample (Figure 16). In theory, this sample will be representative of the subsite being studied. After each of the 13 subsections had been sampled in the same manner, the bags were marked with the corresponding sub site section, and the soil samples were sent off to the Cornell University for testing. The resulting examination allowed for a comprehensive analysis of soil health, nutrient availability, and pH.

Figure 16: Soil Sample and Soil Packaging

After collecting, logging, and shipping the samples for testing, the following results were published in a soil sample report, contained in Appendix A. Soil sample results from the 13 subsections indicated "Optimum, High or Very High" levels of phosphorus (P), potassium (K), calcium (Ca) or magnesium (Mg). The soil mean pH was 7.0 with the buffer pH being 6.4 as the mean across all soil samples from the farm.

The sites usable farmland was comprised of about 58.7% Alton soils with a fine gravelly loam consistency, 21.1% is a Blasdell channery silt loam and 4.6% of soils being an Arkport very

fine sandy loam. The remaining soils are comprised of 1.9 % Colonie loam fine sand and 4.5 % Niagara silt loam. The other 9.2% of soils are wooded or under the farmhouse, barn and outbuilding and unusable for tree planting at this time. Descriptions of each soil complex on the farm is listed below (Figure 17).

Figure 17: Soil Composition and Subsections for the Main Farm

These brief descriptions are from the National Cooperative Soil Survey in cooperation with the United States Department of Agriculture (USDA) found online at Natural Resource Conservation Service USDA government website (NRCS,2022). The five main soil types (Figure 18-22) are representative of glacial outwash deposits and are soils commonly found in the northeast.

***AmA, AmB, AmC**: "Alton series soils are local to NY and PA and are known for being very deep, well drained soils formulated in gravelly glacial outwash deposits. These soils can be found on terraces, alluvial fans, and the remnants of beach ridges. Saturated hydraulic conductivity in the mineral soil is above 40 inches. Mean annual temperature is 49 degrees F." (NRCS website,2022)*

Figure 18: Alton Series Soils

***BiB**: "Blasdell soils are local to NY only and are a series of soils that consist of very deep, well drained soils formed in water-sorted materials. It is often dominated by fragments from local shale bedrock. The mean annual temperature is 50 degrees F." (NRCS website,2022)*

Figure 19: Blasdell Series Soils

ArE, ArD *"The Arkport series soils are local to NY, MI and OH and consist of very deep, well drained soils formed in glacio-fluvial deposits. A predominant characteristic is the presence of high contents of fine and very fine sand. These soils have thin horizontal bands of loamy material in the subsoil. Saturated hydraulic conductivity is high throughout the mineral soil. Mean annual temperature around 49 degrees F." (NRCS website,2022)*

Figure 20: Arkport Series Soils

CuB: *"The Colonie series consists of very deep, well drained to excessively drained soils formed in glaciolacustrine, glaciofluvial, or eolian deposits dominated by fine sand and very fine sand. They are on nearly level to steeply dissected slopes on Wisconsinan age lake plains, dunes, outwash plains, beach ridges, and deltas. Saturated hydraulic conductivity is high through very high in the mineral soil. The mean annual temperature is about 49 degrees F." (NRCS website,2022)*

Figure 21: Colonie Series Soils

NfA: *"The Niagara series consists of very deep, somewhat poorly drained soils formed in silty glacio-lacustrine deposits. These soils are in level to slightly concave areas on lake plains and in valleys. The mean annual temperature is 48 degrees F." (NRCS website,2022)*

Figure 22: Niagara Series Soils

Based off soil sampling conducted in the summer of 2020, the farmland is considered prime quality farmland (Table 1). This rating is based on evaluation standards set by two non-government organizations, Agro-One and Dairy One, Cornell Cooperative Extension and New York State Department of Agriculture and Markets. This means the land is ranked in the top 10% of the roughly 7 million acres of airable farmland in the state of New York. The fact the site is prime quality farmland, and based on soil sampling, there appears to be no significant risks to growing Christmas trees (Agro-One and Dairy One Soil Report, Appendix A).

Table 1: Soil Sample Results for Subsites Surveyed on the Elma farm

Element lbs./acre	Site A1	Site A3	Site A4	Site A5	Site A6	Site A7	Site A8	Site A9	Site B1	Site B2	Site B3	Site B4	Site B5	Mean Average:
Phosphorus (P)	8	26	16	11	20	89	26	185	3	2	3	2	2	30.23
Potassium (K)	153	169	216	242	210	343	197	166	162	103	142	126	109	179.85
Calcium (Ca)	1118	2142	1712	1926	2429	4268	2547	1941	5446	13506	6036	4770	6575	4185.85
Magnesium (Mg)	147	141	131	178	227	211	204	162	377	435	409	355	369	257.38
Iron (Fe)	5	3	6	4	2	3	4	6	2	6	3	2	2	3.69
Magnesium (Mn)	10	12	10	17	18	22	20	13	14	55	23	19	12	18.85
Zinc (Zn)	0	0	0	1	1	2	1	0	1	0	1	1	1	0.69
Aluminum (Al)	46	37	55	42	33	6	36	69	13	24	9	8	8	29.69
Soil pH	6.6	6.8	6.9	6.4	6.7	7.4	7.2	7	7	7.7	7.2	7.1	7.1	7.01
Buffer pH	6.4	6.4	6.5	6.3	6.4	0	0	0	0	0	0	0	0	6.40
% Org. Mat.	1.8	2.7	2.3	2.9	2.8	3.4	2.5	2.8	4.4	3.2	4.7	3.8	5.3	3.28

Landowner Objectives and management goals:

When looking at research about how best to manage land - a mosaic template is often the most beneficial. Often land managed solely for a timber crop will underperform below its highest potential. However, when elements of silvopasture are employed land managers see improved returns when compared to homogenous site management techniques. Although this operation would not be traditional silvopasture - it would benefit from a "multi-crop system" or phased crop conversion. The Christmas tree farm will be starting from scratch, and as a means of offsetting cost related to this startup it will be important to use a blended stand approach. Because it is not reasonable to plant all 60 acres at once for Christmas trees – the farming operation will require several considerations and alternative forms of income while the farm is being converted. To optimize returns, and to protect against single crop risk, a multi-crop template for the lands management would integrate phase crop conversion to Christmas trees, pick-your-own vegetable crops and some leased agricultural land. The total initial Christmas tree conversion associated with this plan is 15-acres for trees, 5-acres of pick your own fruits or vegetables and 40-acres of leased farmland (60 total acers). In the 6th to 10th year of operation, a revenue optimization plan – based on revenue yields from the various operations – would inform future land management choices. For that reason, the management objectives will be slowly phased in as the farm is converted from a traditional agricultural operation to that of a 15-acre Christmas tree farm.

Phase I: Initially the farm will be split into two simultaneously running sites. Around 40 acres of land will be allocated to run business as usual (leased farmland used for traditional farming operations). The remaining 20 acres will be converted to Christmas trees and pick your own fruits and vegetables. The first year of planting is designated Year 0 (referenced as Y-0 for the rest of the paper) and will have 1.5 acres of trees planted. Eventually, at least 15 acres of property will be planted exclusively with Christmas trees. Planting is recommended to occur following the last freeze in spring and continue through August. If the soil is not too hard, and 2-3 weeks has passed since the last freeze seedlings will perform well. Some farmers will plant into early fall but avoid planting after September. That first year the farm will see 1.5 acres planted with **Canaan fir, Concolor fir, Douglas fir, Fraseir fir and Scotch pine** in a 5ft x 5ft spacing. This will be around 1,742 trees per acre and 2,613 trees per 1.5-acre stand. Retail agrotourism events hosted on the remaining 5-acres of property will be augmented with seasonal "pick your own" fruits and vegetables. The remaining 5-acres of the 20-acres of fields will be converted to pumpkin and other gourd species. Additional crops like strawberries and watermelons will also be grown on this site. These pick your own crops will allow for supplemental income in the off season and allow the farm to establish a base of customers while the trees are maturing. When looking at similar farms in the region, this seemed to be the near unanimous plan of operation. As the trees grow, the income from other seasonal events will provide steady income and generates a consumer base.

Phase II: Each year for nine years following the initial planting in Y-0 another 1.5 acres will be planted. This will give the tree farm depth of operations and allow for multiple field harvests. After ten years the farm will have 15 acres dedicated to Christmas trees. A schedule of activities for each 1.5-acre stand is in Table 2. Each stand will receive yearly pesticide and

herbicide treatments. Cover crops and mowing will be employed to keep weeds and volunteers to a minimum. Each stand can be harvested during a 3-year window with roughly 25-35% of the trees coming available for harvest in 6 years (Y-6), 50-60% of trees available for harvest in year 7 (Y-7), reaching the target height of 7-10 ft, and the remaining trees being harvested or removed the final year (Y-8) in preparation for re-planting. The third year a stand is open for harvest the remaining trees will be cut for wreath and garland production. After final harvest any roots will be removed and mulched, and the stand will be prepped for planting. After this third year, a stand will be completely clear and open for replanting in the spring and early summer. This rolling harvest allows the landholder the opportunity to utilize as many of the trees on their property as possible to improve returns on investment. This harvest cycle will also allow for a roughly 100% crop return after year Y-8. By this point, only 30 acres of farmland will be allocated for leased farmland and continue to grow crops like corn, soybeans, and wheat. The remaining 5 acres will continue to be allocated to crops that will support the year round agrotourism element of the business operation. This variety of crops will allow the landowners to diversify income streams and reduce risks in the event they experience unexpected complications or poor harvests with one or more of the crops.

Phase III: This phase can be initiated by the landowners at their convenience, and it allows for multiple courses of action. The family can continue to manage the split sites for both agritourism and traditional farming operations. Or, each year that passes, the land holders can allocate more and more of the farm to Christmas trees and reduce the standard farming footprint. This will slowly transition the farm over to a full time Christmas tree farm that also hosts seasonal pick your own fruit and vegetable patches in the off season.

Table 2: Schedule of Activities for 1.5-acre Stand

Season	Activity
Early and Late Spring	Cover Crops, Application of Herbicides, Cultivation and Planting Operations, Fertilize Established Tree Stands, Inspect for Insects, Infestations
Summer	Shearing, Inspections, Light Fertilization, Preliminary Inventory
Fall	Harvest Preparations
November and December	Measure and Tag Trees for Cutting
Late Winter after Seasons Harvest	Inventory Sales and Equipment

Full cycle operations for individual Stands:

Early and Late Spring:

Cover Crops – just before tree planting, using a cover crop like Dutch white clover can help improve tree growth and reduce stand management efforts. Dutch clover can fix nitrogen in the soil and help reduce weeds inside the tree stand. Dutch clovers small stature also allows

for even the smallest seedlings to get sunlight; while its dense ground cover growth holds in moisture and keeps soil temperatures low.

Application of Herbicides – every farmer knows each stand will require its own unique cocktail of herbicides. However, some of the more commonly used in this region of Western New York are fluazifop-butyl (Garlon) and glyphosate (Roundup). As with any herbicide product, the landowner will utilize the manufacturer's label for specific instructions about preparation and application at the stand. For licensing contact the Erie County Bureau of Forestry, 95 Franklin St., Buffalo, NY 14202 (716-858-8355), or complete an on-line application with the Department of Environmental Conservation, at NY.Gov (518-474-7497) to apply for the training and necessary permits (Figure 19).

Figure 23: Western New York Pick and Cut Farm Before Mowing, Herbicide, and Pesticide Treatment

Cultivation and Planting Operations – bare root 2-0 and 1-0 seedlings will be planted by hand over a 1.5-acre stand. Roughly 70% or 1,568 trees at each stand will be made up of Canaan fir, Concolor fir and Fraser fir. Douglas fir (523 trees) accounts for 20% and the final 20% will be made up of Scotch pine (523 trees).

Fertilize Established Tree Stands – utilizing a high nitrogen fertilizer and spreading it in a circle around the base of the tree will allow for the best growth form season to season. A 10-5-5 or 15-10-10 fertilizer will be employed as the trees will be using a lot of nitrogen in the initial years of growth. In areas where the phosphorus is low (based on soil samples data) a higher P rate can be applied. When inspecting the trees, one should insure there are no signs of

"burning". Burning is when too much fertilizer is being applied or being applied directly onto the tree. This will draw moisture away from the roots or tree, causing the brown "burning" of the needles.

Inspect for Insects, Infestations - and take any needed actions. In the **Pests, Disease and Weather Protection** section I will cover in more detail what infestations to look out for and how best to eradicate said crop disturbance.

Summer:

Shearing - tree stands with appropriate age trees and continue mowing operations. Some species will require more shearing than others but in general the tree can be sheered as early as 2 years. Each year that passes the tree will require more intensive shearing – but by 4 or 5 feet tall the tree should start to develop a good form. Growing season can vary depending on weather and a variety of other factors but in general early summer is the best time for trimming and shearing.

Inspections - during the summer, when the weather gets warmer, it is critical that farmers inspect for aphids and other pests or diseases. If discovered, spray pesticides as necessary for insects and diseases. Keep in mind it may be required to burn the affected trees if the damage is too great and the remaining crop is at risk of contamination.

Fertilization - As the growing season for these trees will be short, it may be possible to conduct a second fertilizing operation as needed. This will ensure the most growth possible from year to year.

Preliminary Inventory - In late summer, make a preliminary inventory of trees for the upcoming season's harvest. Landowners will be looking to harvest around 25-35% of trees in their 6th year of growth, 50 - 60% in year 7 and with the remaining stock harvested in year 8. Poor growth trees can be turned into wreaths and garlands and sold to ensure you are getting the most out of the investment.

Fall:

Harvest Preparations - most efforts at this time are focused on preparation for the harvest. Organizing the labor force for the harvest season and farm activities is critical. Some cost-effective methods to supplement the work force would be utilizing scout troops, church groups, or asking for volunteers. It is also important to continue to inspect trees for insect activity. Also examine trees for color and needle retention. If needed, using a color spray and needle treatment can help the trees look their best going into the harvest season.

Although not part of the primary management plan, leasing the land for hunting is also an income option during the fall season. The hunting activity will help supplement profits and reduce deer and other animals grazing on new tree growth.

November and December:

Measure and Tag Trees for Cutting - having some pre-cut trees available for simple pickup will help reduce inventory. Anywhere from 10-20% of trees ready for harvest can be pre-cut and sold at the farm, on off-site lots, at grocery stores or other locations given interested buyers are available. Some years it might be necessary to supplement tree stock with wholesale trees from another grower. In the beginning, before multiple stands are ready for harvest, in the event of a bad season, or the demand is greater than anticipated – you can always supplement your stock.

Late Winter after Seasons Harvest:

Inventory Sales and Equipment – it will be critical to inventory sales after the season. Look at what trees performed best, and what trees had the highest demand among consumers. This information will determine what seedlings to order for the next season's planting. It will also be important to inventory fertilizers, pesticides, and equipment and fill orders for next season.

Pests, Disease and Weather Protection:

The weather in Western New York can be harsh and unpredictable. It has become even more unpredictable as climate change continues and summer temperatures rise, and winters shorten. However, even with global climate change, winters in this region are very cold and long, with limited sunlight, a very short growing season, and many snap cold fronts during the spring season (Figure 24). In recent years summers have been equally harsh - with severe drought and increased insect activity. Possibly the most frustrating complication for farmers in this region is the inconsistent weather in spring. Weeks of warm weather can be followed by a late freeze – killing much of the new growth each year for the Christmas trees. For this reason, some farmers will only get 7 years of growth in 10 years' time. Also, with warmer weather, insects, blight, and invasives are all more active in the Northeast. Nearly all farmers used pesticides and herbicides to manage the risk of insect damage, invasives, weeds and prevent the loss of crops. In most cases, if an infestation is discovered, the farmer will conduct an early harvest and burn the effected trees to prevent spread.

Figure 24: Frost Damage to New Growth, Bert Cregg, M. S. U. E. (2022, January 21). *Don't panic over frost damage to trees and shrubs*. MSU Extension. Retrieved October 28, 2022, from https://www.canr.msu.edu/news/dont_panic_over_frost_damage_to_trees_and_shrubs

Aphids like the balsam twig aphid suck the juices from the needles and bark. These aphids will stress the trees and deform the bark and needles (Figure 25). This will hurt resale value and reduce overall profits. Aphids, although small, can be seen with the naked eye. When identified spot spray the affected area. If the damage is limited, a simple shearing will clean the tree up. However, if not caught right away, aphid damage might mean the tree is no longer sustainable for retail. Other insects, like spider mites, Balsam woolly adelgid and others, will need to be addressed in a similar way. If identified early enough and treated with pesticides, the damage can be mitigated with shearing. If left un-treated, the tree, and more importantly, the stands, will be at risk.

Figure 25: Aphids and Aphid Damage, Government of Canada, N. R. C. (2015, July 24). *Balsam twig aphid*. Government of Canada, Natural Resources Canada, Canadian Forest Service. Retrieved October 30, 2022, from https://tidcf.nrcan.gc.ca/en/insects/factsheet/5549

Fungal infections like Needle casts, brown spot and root rot are also prevalent in this region of New York (Figure 26). Needle casts are fungal diseases that cause the needles of the trees to fall off. To avoid spreading always sterilize tools when shearing and avoid cutting on wet, cold days as this can cause the fungus to spread very easily. Brown Spot is a fungal infection that causes needles to turn brown and fall off. The species most at risk for this is Scotch pine. Fungicides can be used to prevent brown spot. If brown spot is discovered, cut the tree close to the base and burn it to prevent spread. Root rot is a fungus that effects the root collar of the tree. It can be identified easily as one can see the white fungus growing around the base of the tree under the bark. Needles will turn yellow or brown and the tree will start to produce more sap because it is under stress. Treating the trees with a fungicide and removing any trees, as well as the roots, will prevent spread.

Figure 26: Fungal Damage, Confrey, M. (2014, May 14). *Is needle cast affecting your conifers?* Early's Farm & Garden Centre. Retrieved October 30, 2022, from https://www.earlysgarden.com/resources/gardening-tips-a-tricks/item/310-what-is-needle-cast

Summary of Management Plan:

Ultimately, the absence of a “hard pan”, the prime soil composition, geographic region, annual rainfall, and temperature zone all lead to this site being an excellent location for establishing a Christmas tree farm. The unique silvicultural characteristics of **Canaan fir, Concolor fir, Douglas fir, Fraser fir and Scotch pine** provide a unique blend of trees that will perform well on this site and over time can be improved to provide the best crop yield. Based off the data collected from the soil survey and site review, the trees can be planted at a 5ft x 5ft interval - allowing for roughly 2,613 trees per 1.5-acre plot. This spacing will allow for little or

no risk of competition for nutrients or light while maximizing stand area density. The farmland's excellent soil composition, and open spaces will allow for maximum leaf area index (LAI). These elements coupled with use of a cover crop, routine shearing, pest, and herbicide treatments will allow for the optimal 6–8-year growth time. After ten years of planting the farm will have an operational 15 acres of Christmas trees, allowing for 2-3 year rolling harvests of around 2,613 trees harvested and sold after the first stand cycles reach maturity.

Predicted Cash Flow:

The following is a summary of estimated cash flow for the next 25 years assuming the management plan is implemented:

Based on market analysis for the region, a Christmas tree sold at retail can cost anywhere from $75.00 to upwards of $95.00 depending on height, form, and color. The Cornell Cooperative Extension suggests that farmers charge on average around $12.00 to $15.00 per foot of Christmas tree. Assuming this estimation is correct, and the farmer would sell most trees around 7 ft in height, the average return for a single tree sold would be roughly $85.00 (Table 3). Continuing to work off averages it can be estimated that seedlings on average will cost around $0.97 (Table 4).

Table 3: Estimated Values and Total Trees Per Stand

Value of:		
Xmas Tree	$	85.00
Avg Cost per Seedling	$	0.97
Trees/Stand (1.5acres)		2,613

Table 4: Average Cost Per Seedling When Purchasing 500 or More Seedlings

Average Cost of seedlings (500+)			
Bare Root Seedling	Hight in Inches	Years of Growth	Cost
Canaan fir	6-12	2-0	$1.02
Concolor fir	5-10	2-0	$0.84
Douglas fir	6-12	2-0	$0.79
Fraseir fir	5-10	2-0	$1.35
Scotch Pine	5-10	2-0	$0.84
Avg Total Cost:			$0.97

When looking at bulk purchases for herbicides, insecticides, and machinery (equipment costs) the farm will spend around $1,087.00 on planting, $830.00 for stand maintenance, $1175.85 for harvest operations and $2534.61 for seedlings ($0.97 per seedling) per stand. All expenses are factored using the 1.5-acre stand rather than the standard 1-acre stand. This

means the total estimated cost of operations per stand each year is roughly $5627.70 (Table 5). This assumes planting a stand with roughly 70% Canaan fir, Concolor fir and Fraser fir. 20% Douglas fir and the final 20% will be made up of Scotch pine. The percentage can change based on tree performance and consumer demand, but in general we can expect costs to remain comparable.

Table 5: Yearly Expenses (Per Stand)

Yearly Expenses (Including seedlings):			
Items	Cost Per Stand	Items	Cost Per Stand
Planting	$1,087.00	Harvest	$1,175.85
Site Preparation	$200.00		
Manual Lime Application	$30.00		
Manual Herbicide Application	$15.00		
Manual Fertilizer Application	$40.00	Seedlings	$2,534.61
Liquid insecticide Application	$150.00		
Mowing	$45.00		
Tagging & Marking	$50.00		
Cutting	$50.00		
Baling Trees	$250.00		
Maintaining	$830.00	Total Operations Costs:	$5,627.46

Until the farm is in full operations in Y10, yearly operations costs will fluctuate. The farm will only see two years (Y8 and Y9) of planting, maintenance, harvest, and replanting operations. This put the total operations cots at their highest in Y8 ($15,889.07) at and Y9 ($16,719.07). Once the farm is operating on a sustained productions schedule in Y10 - total operations costs to maintain 10 stands (at 1.5-acres per stand), Plant one stand and harvest three stands simultaneously will stabilize at $13,097.46 per year.

Because the farm will operate on a 3-year rolling harvest, the first year a tree stand is eligible for retail is in Y6, cutting roughly ~30% of its trees (Table 6). In the second year a stand is open to harvest the stand will have roughly another 55% (Table 6) of the original 100% of trees eligible for cutting (In other words ~85% of a stand's trees should be sold by the second year a stand is open). The remaining 15% of trees left on the stand in the third year of harvest operations can be cut and turned into wreaths and garlands. Landowners will see slightly diminished profits on year 6 (~30% of full harvest on stand Y6). Year 7 harvest will see ~85 of full harvest (55% on stand Y6 and 30% on stand Y7). Year 8 will yield 100% of the potential harvest, with 3 stands in operation (15% on stand Y6, 55% on stand Y7 and 30% on stand Y8). Gross profit on average after year 10 will be approximately $222,105.00 per year (Table 7).

Table 6: Gross Annual Operations Costs for Y0-Y8

		Y0	Y1	Y2	Y3	Y4	Y5	Y6	Y7
$ 2,534.61	Plating (seedling)	Px1	Px1	Px1	Px1	Px1	Px1	Px1	Px1
		$3,621.61	$3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61
$ 830.00	Maintain/site	Mx1	Mx2	Mx3	Mx4	Mx5	Mx6	Mx7	Mx8
		$ 830.00	$1,660.00	$ 2,490.00	$ 3,320.00	$ 4,150.00	$ 4,980.00	$ 5,810.00	$ 6,640.00
$ 1,175.85	Harvest							Hx.3	Hx.6
								$ 352.76	$ 705.51
$ 1,087.00	Planting (labor)								
	Total	$4,451.61	$5,281.61	$ 6,111.61	$ 6,941.61	$ 7,771.61	$ 8,601.61	$ 9,784.37	$10,967.12

(Note: diminished harvest for Years 6 and 7)

Table 6 continued: Gross Annual Operations Costs for Y9-Y15

		Y8	Y9	Y10	Y11	Y12	Y13	Y14	Y15
$ 2,534.61	Plating (seedling)	Px1	Px1						
		$ 3,621.61	$ 3,621.61						
$ 830.00	Maintain/site	Mx9	Mx10	Mx10	Mx10	Mx10	Mx10	Mx10	Mx10
		$ 7,470.00	$ 8,300.00	$ 8,300.00	$ 8,300.00	$ 8,300.00	$ 8,300.00	$ 8,300.00	$ 8,300.00
$ 1,175.85	Harvest	Hx1	Hx1	Hx1	Hx1	Hx1	Hx1	Hx1	Hx1
		$ 1,175.85	$ 1,175.85	$ 1,175.85	$ 1,175.85	$ 1,175.85	$ 1,175.85	$ 1,175.85	$ 1,175.85
$ 1,087.00	Planting (labor)	Rx 1	Rx1	Rx1	Rx 1	Rx 1	Rx 1	Rx 1	Rx 1
		$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61	$ 3,621.61
	Total	$15,889.07	$ 16,719.07	$ 13,097.46	$ 13,097.46	$ 13,097.46	$ 13,097.46	$ 13,097.46	$ 13,097.46

(Note: Increased Cost of Operations in Year 8 and 9)

Table 7: Gross Profit, Operating Costs, and Net Profit Per Stand

	Per Stand (1.5 acres)
Gross Profit	$ 222,105.00
Avg Op Cost	$ 5,622.23
Net Profit	$ 216,482.77

Because the farm will have no trees eligible for harvest for the first 5 years as it is being converted to a Christmas tree farm the "Christmas tree" operation will not be profitable. It will only start to yield net positive return in year 6 with a Present Value (PV) of $44,927.12 and a Net Present Value (NPV) sum of around $9,862.34 (Table 8).

Table 8: Net Present Value (NPV) Calculations for 25 years

Int.	Year	Cost (Annual Cost)	Yield (trees per 1.5acre)	Price ($/Tree)	Gross Revenue ($/trees sold)	Net Revenue	PV	NPV
0.04	0	$4,451.61	0	$ -	$ -	$ (4,451.61)	$ (4,451.61)	$ (4,451.61)
	1	$5,281.61	0	$ -	$ -	$ (5,281.61)	$ (5,078.47)	$ (9,530.08)
	2	$6,111.61	0	$ -	$ -	$ (6,111.61)	$ (5,650.53)	$ (15,180.61)
	3	$6,941.61	0	$ -	$ -	$ (6,941.61)	$ (6,171.07)	$ (21,351.67)
	4	$7,771.61	0	$ -	$ -	$ (7,771.61)	$ (6,643.20)	$ (27,994.88)
	5	$8,601.61	0	$ -	$ -	$ (8,601.61)	$ (7,069.90)	$ (35,064.78)
	6	$9,784.37	784	$ 85.00	$ 66,631.50	$ 56,847.14	$ 44,927.12	$ 9,862.34
	7	$10,967.12	2221	$ 85.00	$ 188,789.25	$ 177,822.13	$ 135,130.20	$ 144,992.55
	8	$15,889.07	2613	$ 85.00	$ 222,105.00	$ 206,215.93	$ 150,679.96	$ 295,672.51
	9	$16,719.07	2613	$ 85.00	$ 222,105.00	$ 205,385.93	$ 144,301.43	$ 439,973.94
	10	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 140,637.29	$ 580,611.22
	11	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 135,228.16	$ 715,839.38
	12	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 130,027.08	$ 845,866.46
	13	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 125,026.04	$ 970,892.50
	14	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 120,217.34	$ 1,091,109.84
	15	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 115,593.60	$ 1,206,703.44
	16	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 111,147.69	$ 1,317,851.13
	17	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 106,872.78	$ 1,424,723.91
	18	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 102,762.29	$ 1,527,486.19
	19	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 98,809.89	$ 1,626,296.09
	20	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 95,009.51	$ 1,721,305.60
	21	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 91,355.30	$ 1,812,660.90
	22	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 87,841.63	$ 1,900,502.53
	23	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 84,463.11	$ 1,984,965.64
	24	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 81,214.53	$ 2,066,180.17
	25	$13,927.46	2613	$ 85.00	$ 222,105.00	$ 208,177.54	$ 78,090.89	$ 2,144,271.06

However, by year 10 the Christmas tree portion of the farm will have an NPV of around $580,611.22 (over 10 years, assuming 100% harvest sold). Therefore, in those first 6 years it is critical that the farm utilize the money earned from the agricultural lease as well as the agritourism events, in addition to any other supplemental operations to cover the initial startup cost of farming.

Ultimately despite the risk of poor harvest, slow consumer action and unforeseen operational costs, after 10+ years of operations the farm will be a very lucrative investment. Because of the multiple revenue streams generated from multi-crop operations, leased farmland, scalable business practices and agrotourism opportunities in the area this endeavor provides a very diverse and safe business opportunity. These projections only account for current prices related to seedlings, Christmas tree demand and estimated operation costs. Each year of operations these numbers and projections will need to be reviewed and updated to reflect the current market prices and inflation.

Timeline of Operations:

Planting and harvest schedule:

Year	Acres	Stand Y-0	Stand Y-1	Stand Y-2	Stand Y-3	Stand Y-4	Stand Y-5	Stand Y-6	Stand Y-7	Stand Y-8	Stand Y-9	Stand Y-10	Stand Site Index Trees	Stand Havest Trees
Y-0	1.5	Plant											2,613	0
Y-1	1.5		Plant										2,613	0
y-2	1.5			Plant									2,613	0
Y-3	1.5				Plant								2,613	0
Y-4	1.5					Plant							2,613	0
Y-5	1.5						Plant						2,613	0
Y-6	1.5	Rolling Havest 1						Plant					2,613	783
Y-7	1.5	Rolling Havest 2	Rolling Havest 1						Plant				2,613	2220
Y-8	1.5	Clear & Plant	Rolling Havest 2	Rolling Havest 1						Plant			2,613	2613
Y-9	1.5		Clear & Plant	Rolling Havest 2	Rolling Havest 1						Plant		2,613	2613
Y-10	1.5			Clear & Plant	Rolling Havest 2	Rolling Havest 1						Plant	2,613	2613
Y-11	1.5				Clear & Plant	Rolling Havest 2	Rolling Havest 1						2,613	2613
Y-12	1.5					Clear & Plant	Rolling Havest 2	Rolling Havest 1					2,613	2613
Y-13	1.5						Clear & Plant	Rolling Havest 2	Rolling Havest 1				2,613	2613
Y-14	1.5	Rolling Havest 1						Clear & Plant	Rolling Havest 2	Rolling Havest 1			2,613	2613
Y-15	1.5	Rolling Havest 2	Rolling Havest 1						Clear & Plant	Rolling Havest 2	Rolling Havest 1		2,613	2613
Y-16	1.5	Clear & Plant	Rolling Havest 2	Rolling Havest 1						Clear & Plant	Rolling Havest 2	Rolling Havest 1	2,613	2613
Y-17	1.5		Clear & Plant	Rolling Havest 2	Rolling Havest 1						Clear & Plant	Rolling Havest 2	2,613	2613
Y-18	1.5			Clear & Plant	Rolling Havest 2	Rolling Havest 1						Clear & Plant	2,613	2613
Y-19	1.5				Clear & Plant	Rolling Havest 2	Rolling Havest 1						2,613	2613
Y-20	1.5					Clear & Plant	Rolling Havest 2	Rolling Havest 1					2,613	2613
Y-21	1.5						Clear & Plant	Rolling Havest 2	Rolling Havest 1				2,613	2613
Y-22	1.5	Rolling Havest 1						Clear & Plant	Rolling Havest 2	Rolling Havest 1			2,613	2613
Y-23	1.5	Rolling Havest 2	Rolling Havest 1						Clear & Plant	Rolling Havest 2	Rolling Havest 1		2,613	2613
Y-24	1.5	Clear & Plant	Rolling Havest 2	Rolling Havest 1						Clear & Plant	Rolling Havest 2	Rolling Havest 1	2,613	2613
Y-25	1.5		Clear & Plant	Rolling Havest 2	Rolling Havest 1						Clear & Plant	Rolling Havest 2	2,613	2613

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Appendix 1: Soil Sample Report

Appendix A:
Cornell University College of Agriculture Extension, Agro-One and Dairy One Soils Analysis Report

Soils Analysis Report

with Agro-One Nutrient Guidelines
generated by Cornell University

Also sent to:
WILLIAM BRAUN

Dairy One
730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085080**
Field/Location:	A1 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	8					
Potassium (K)	153					
Calcium (Ca)	1,118					
Magnesium (Mg)	147					

Element	Value	Element	Value	Element	Value
Soil pH	6.6	Manganese (Mn), lbs/acre	10	% OM	1.8
Buffer pH	6.4	Zinc (Zn), lbs/acre	0		
Iron (Fe), lbs/acre	5	Aluminum (Al), lbs/acre	46		

Sample Information Summary

Soil Name: Alton
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085080**
Field/Location:	A1 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085090**
Field/Location:	A3 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	26					
Potassium (K)	169					
Calcium (Ca)	2,142					
Magnesium (Mg)	141					

Element	Value	Element	Value	Element	Value
Soil pH	6.8	Manganese (Mn), lbs/acre	12	% OM	2.7
Buffer pH	6.4	Zinc (Zn), lbs/acre	0		
Iron (Fe), lbs/acre	3	Aluminum (Al), lbs/acre	37		

Sample Information Summary

Soil Name: Alton
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

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- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085090**
Field/Location:	A3 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085100**
Field/Location:	A4 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	16					
Potassium (K)	216					
Calcium (Ca)	1,712					
Magnesium (Mg)	131					

Element	Value	Element	Value	Element	Value
Soil pH	6.9	Manganese (Mn), lbs/acre	10	% OM	2.3
Buffer pH	6.5	Zinc (Zn), lbs/acre	0		
Iron (Fe), lbs/acre	6	Aluminum (Al), lbs/acre	55		

Sample Information Summary

Soil Name: Alton
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085100**
Field/Location:	A4 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085110**
Field/Location:	A5 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	11					
Potassium (K)	242					
Calcium (Ca)	1,926					
Magnesium (Mg)	178					

Element	Value	Element	Value	Element	Value
Soil pH	6.4	Manganese (Mn), lbs/acre	17	% OM	2.9
Buffer pH	6.3	Zinc (Zn), lbs/acre	1		
Iron (Fe), lbs/acre	4	Aluminum (Al), lbs/acre	42		

Sample Information Summary

Soil Name: Phelps
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085110**
Field/Location:	A5 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085120**
Field/Location:	A6 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	20	[redacted]				
Potassium (K)	210	[redacted]				
Calcium (Ca)	2,429	[redacted]				
Magnesium (Mg)	227	[redacted]				

Element	Value	Element	Value	Element	Value
Soil pH	6.7	Manganese (Mn), lbs/acre	18	% OM	2.8
Buffer pH	6.4	Zinc (Zn), lbs/acre	1		
Iron (Fe), lbs/acre	2	Aluminum (Al), lbs/acre	33		

Sample Information Summary

Soil Name: Alton
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Dairy One Agronomy Services

Lab Sample ID:	**74085120**
Field/Location:	A6 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085130**
Field/Location:	A7 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	89					
Potassium (K)	343					
Calcium (Ca)	4,268					
Magnesium (Mg)	211					

Element	Value	Element	Value	Element	Value
Soil pH	7.4	Manganese (Mn), lbs/acre	22	Aluminum (Al), lbs/acre	6
Iron (Fe), lbs/acre	3	Zinc (Zn), lbs/acre	2	% OM	3.4

Sample Information Summary

Soil Name: Blasdell
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

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- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085130**
Field/Location:	A7 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085140**
Field/Location:	A8 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	26					
Potassium (K)	197					
Calcium (Ca)	2,547					
Magnesium (Mg)	204					

Element	Value	Element	Value	Element	Value
Soil pH	7.2	Manganese (Mn), lbs/acre	20	Aluminum (Al), lbs/acre	36
Iron (Fe), lbs/acre	4	Zinc (Zn), lbs/acre	1	% OM	2.5

Sample Information Summary

Soil Name: Colonie
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

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- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 or www.dairyone.com for interpretive information. 4M

Soils Analysis Report

with Agro-One Nutrient Guidelines
generated by Cornell University

Also sent to:
WILLIAM BRAUN

Dairy One
730 Warren Road
Ithaca, NY 14850
Phone: (800) 344-2697
Fax: (607) 257-1350
www.dairyone.com

Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085140**
Field/Location:	A8 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085150**
Field/Location:	A9 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	185					
Potassium (K)	166					
Calcium (Ca)	1,941					
Magnesium (Mg)	162					

Element	Value	Element	Value	Element	Value
Soil pH	7.0	Manganese (Mn), lbs/acre	13	Aluminum (Al), lbs/acre	69
Iron (Fe), lbs/acre	6	Zinc (Zn), lbs/acre	0	% OM	2.8

Sample Information Summary

Soil Name: Niagara
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

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Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Lab Sample ID:	**74085150**
Field/Location:	A9 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085160**
Field/Location:	B1 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	3					
Potassium (K)	162					
Calcium (Ca)	5,446					
Magnesium (Mg)	377					

Element	Value	Element	Value	Element	Value
Soil pH	7.0	Manganese (Mn), lbs/acre	14	Aluminum (Al), lbs/acre	13
Iron (Fe), lbs/acre	2	Zinc (Zn), lbs/acre	1	% OM	4.4

Sample Information Summary

Soil Name: Darien
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

For assistance interpreting your report, contact your local Cooperative Extension office at 716-652-5400 or http://cce.cornell.edu/Pages/Default.aspx for a complete list of Cornell Cooperative Extension offices.

Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

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Dairy One Agronomy Services

Lab Sample ID:	**74085160**
Field/Location:	B1 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085170**
Field/Location:	B2 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	2	[redacted]				
Potassium (K)	103	[redacted]				
Calcium (Ca)	13,506	[redacted]				
Magnesium (Mg)	435	[redacted]				

Element	Value	Element	Value	Element	Value
Soil pH	7.7	Manganese (Mn), lbs/acre	55	Aluminum (Al), lbs/acre	24
Iron (Fe), lbs/acre	6	Zinc (Zn), lbs/acre	0	% OM	3.2

Sample Information Summary

Soil Name: Darien
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	20	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

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Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Soil & Plant Program 2019 NAPT Participating Laboratory

Cornell University College of Agriculture and Life Sciences

Dairy One Agronomy Services

Lab Sample ID:	**74085170**
Field/Location:	B2 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.
- Soil pH is unusually high. Most christmas tree species do not grow well at high pH, consider a different soil site.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Dairy One Agronomy Services

Lab Sample ID:	**74085180**
Field/Location:	B3 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	3					
Potassium (K)	142					
Calcium (Ca)	6,036					
Magnesium (Mg)	409					

Element	Value	Element	Value	Element	Value
Soil pH	7.2	Manganese (Mn), lbs/acre	23	Aluminum (Al), lbs/acre	9
Iron (Fe), lbs/acre	3	Zinc (Zn), lbs/acre	1	% OM	4.7

Sample Information Summary

Soil Name: Darien
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	0	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

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Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 or www.dairyone.com for interpretive information. 4M

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Lab Sample ID:	**74085180**
Field/Location:	B3 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

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Dairy One Agronomy Services

Lab Sample ID:	**74085190**
Field/Location:	B4 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	2	[redacted]				
Potassium (K)	126	[redacted]				
Calcium (Ca)	4,770	[redacted]				
Magnesium (Mg)	355	[redacted]				

Element	Value	Element	Value	Element	Value
Soil pH	7.1	Manganese (Mn), lbs/acre	19	Aluminum (Al), lbs/acre	8
Iron (Fe), lbs/acre	2	Zinc (Zn), lbs/acre	1	% OM	3.8

Sample Information Summary

Soil Name: Darien
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	20	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

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Nutrient recommendations provided by Cornell University.

These are general comments. Always consult with your crop adviser for recommendations specific to your farm.

- Without weed control, weeds will steal most fertilizer and N fertilizer is not recommended.
- N is most effective when applied in the spring.
- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

 [redacted] or www.dairyone.com for interpretive information. 4M

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Lab Sample ID:	**74085190**
Field/Location:	B4 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

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- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

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Dairy One Agronomy Services

Lab Sample ID:	**74085200**
Field/Location:	B5 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

Element	lbs/acre*	Very Low	Low	Optimum	High	Very High
Phosphorus (P)	2	[redacted]				
Potassium (K)	109	[redacted]				
Calcium (Ca)	6,575	[redacted]				
Magnesium (Mg)	369	[redacted]				

Element	Value	Element	Value	Element	Value
Soil pH	7.1	Manganese (Mn), lbs/acre	12	Aluminum (Al), lbs/acre	8
Iron (Fe), lbs/acre	2	Zinc (Zn), lbs/acre	1	% OM	5.3

Sample Information Summary

Soil Name: Darien
Sample Depth: Subsurface
Ground Cover: No
Crop Code: TRE
Type: Maintenance

Soil Fertilizer Recommendations (1=current yr, 2=next yr, etc.)

		tons / acre	lbs / acre		
Year	Crop	Lime	N Range	P2O5 Range	K2O
1	Christmas Trees, Establishment	0.00	0	20	0.00

Comments - Improve yield and plant quality as well as protect the environment with proper fertilization.

* Modified Morgan analysis results reported in pounds per acre.

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- P2O5 and K2O are most effective when broadcast and mixed with the soil prior to planting, but can be top dressed.
- More information: Cornell Natural Resources circular.

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Lab Sample ID:	**74085200**
Field/Location:	B5 SB
Date Sampled:	06/22/2021
Date Tested:	07/02/2021
Statement ID:	WILLIAM BRAUN
Description:	
County:	Erie

F

Emails/Phones: WILLIAM BRAUN: wgbraun@ncsu.edu

- N not needed for establishment. Apply 20 - 30 lbs/acre of N in the following year.
- Increase rate by 10 lbs/acre each year, to maximum of 50 - 60 lbs/acre of N.
- An additional 20 - 30 lbs/acre of N may be applied in late summer of a harvest year, if needed for best foliage color development.

 [redacted] or www.dairyone.com for interpretive information. 4M