8921 Tinney Road, Gores Landing, Ontario

Landscape Context Report

Part 1 of 2

Prepared for:

Heather & Bill Church
8921 Tinney Road
Gores Landing, ON

Prepared by:

Josh Noiseux / Evermeadow LMC
3989 McIntosh Street
Cobourg, ON

February 24, 2023

EVERMEADOW
land management consulting

8921 Tinney Road, Gores Landing, Ontario

Landscape Context Report

Part 1 of 2

Table of Contents:

1. Summary of Observations …… 4 - 6
2. Mapping and Analysis …… 7 - 24
    a. Property in geographic context
    b. Topography + relief
    c. Soil types
    d. Hydrology
    e. Slope + aspect
    f. Historical land use pattern
3. Climate Variables …… 25 - 28
4. *Physical Survey (Incomplete) ……* 29 - 31
    a. Aerial imagery
    b. Site visits
    c. Biological Survey
    d. Invasive Species
5. Preliminary Recommendations …… 32-34
6. Available Supports …… 35- 36

1. Summary of Observations + Recommendations

> "There lies between the Rice Lake and the Ontario, a deep and fertile valley, surrounded by lofty wood-crowned hills, the heights of which were clothed chiefly with groves of oak and pine, though the sides of the hills and the alluvial bottoms gave a variety of noble timber trees of various kinds, as the maple, beech, hemlock, and others. This beautiful and highly picturesque valley is watered by many clear streams of pure refreshing water, from whence the spot has derived its appropriate appellation of 'Cold Springs.' "
>
> – Catherine Parr Traill , *Canadian Crusoes: A Tale of the Rice Lake Plains*, 1852. [1]

Introduction

This research and consulting project has been conducted by Joshua Noiseux of Evermeadow LMC on behalf of the landowners of what will be termed the Church Property (CP), clients Heather and Bill Church. The Church Property is a ~31 acre (12.45 hectare; 124,549 metres square) parcel of agricultural land situated within Hamilton Township, Ontario and nestled between the settlements of Gores Landing (to the north), Plainville (to the west) and Cold Springs (to the south).

Having moved relatively recently to the property, the clients are keen to learn more about the place they now call home. They are particularly eager to learn more about the property's potential to be transformed from a rented-out and "over-used but under-utilized" cash crop

[1] This book is an excellent resource with perhaps the first European descriptions of the immediate area of the Church Property – "Cold Springs" and the "Beaver Meadow".

field to an ecologically restored, biologically abundant site with possibilities for community engagement and education, food production, and collaboration with other ecologically minded farmers. Specifically, the clients' chief goal is to create at the Church Property a space where they can "learn to live in harmony and collaboration with the land." Their hope is to "leave the land in better shape than we found it," which for means they "want to improve the fertility of the soil to support the natural world and human beings."

With these goals top of mind, we have conducted this landscape context report in order to provide accurate, relevant, and actionable information, mapping, and up-to-date data to inform and enrich the client's land management decision making process.

Perhaps most importantly, we hope that our report will provide the clients with an even greater appreciation for the very special piece of land that they now steward.

Landscape + Historical Situation

The Church Property is a 31 acre rectangular (north-south axis) parcel of land located in a small basin between glacially deposited drumlin ridges in the eastern of the Oak Ridges Moraine land formation. It is also within, near to the western boundary, of the Rice Lake Plains, an ecologically sensitive area formerly characterized by open Oak savannas and woodlands and interspersed with examples of the globally rare and endangered tall-grass prairie ecosystem.

The CP is at the junction of a number of formerly diverse biological communities – the Rice Lake Plains, the Maple-Beech dominated forests of the Cold Springs/Cobourg hills, and the local Cedar-Hemlock dominated wetland/creek ecotype. Presently, however, the surrounding landscape is characterized by mono-cultural cash crop fields - predominantly corn, soy, wheat, and timothy/orchard grass/alfalfa hay. Running through the centre of the CP is a seasonal creek path and seasonally inundated wetland area that has been uncultivated for many years. This important hydrological feature drains water from land to the immediate north-east of the CP. The water subsequently flows from east to west in a small creek[2] which drains into the southern shore of Rice Lake at Bewdley.

The area of the CP has been inhabited and managed for thousands of years by a number of indigenous peoples. European colonization took places in waves with the first permanent settlements in the area arising in the early 1800s. Only a few European farms were present in the 1820s, but by the 1840s the area was dotted with numerous farm settlements. Prior to the arrival of Europeans, the area of the CP was inhabited chiefly by the Mississaugas, an

[2] Sometimes, but not always, termed "Cold Creek" – other times called "Beaver Meadow Creek".

Anishnaabe people, and was also frequented by the Mohawk people of the Haudenosaunee/ Iroquois Confederacy. Presently the area and its inhabitants are subject to the 1923 William's Treaties. Recent legislative and widespread advocacy work on settler-indigenous relations has resulted in the Reconciliation efforts of the Canadian and other governments, which are designed to address some of the shortcomings and injustices of the William's Treaties. It is worth noting that the European/settler paradigm of land management and resource utilization has been widely criticized as being fundamentally unsustainable and even unjust. Under settler management, the region of the CP, along with much of North America, has undergone profound transformation and ecological degradation.

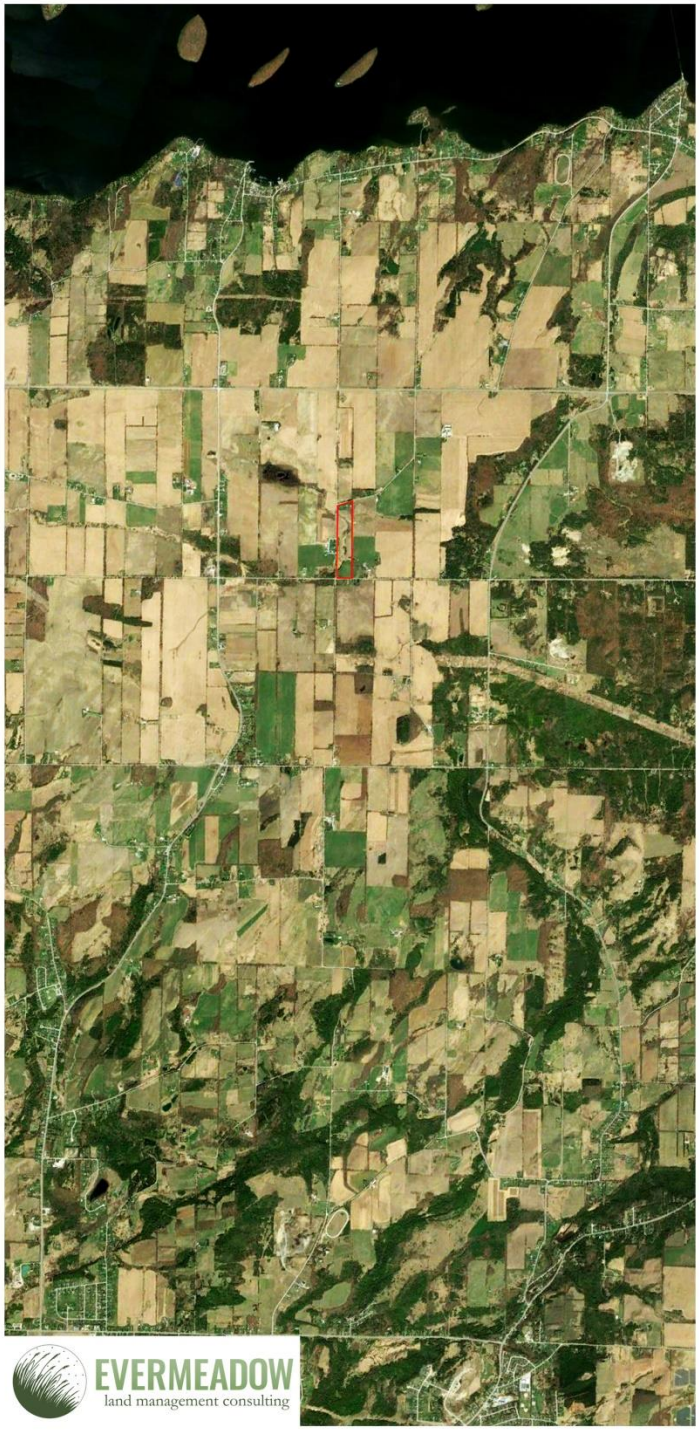
European descended landowners in the region, from the onset of colonization through the present day, have removed large numbers of trees, and native understory and grassland species have been largely replaced by invasive and naturalized Eurasian plants. Prior to this, the landscape was likely managed by indigenous peoples using a combination of hunting, fire and shifting cultivation.

There are remnant pockets of the native plant species, particularly trees such as Oak and Maple. But the dominant landscape type is now open agricultural land with little in the way of soil erosion protection or wildlife habitat. This is particularly the case to the west of the CP, an area of farmland that is the least treed section of all of Northumberland County. To the east, the Northumberland Forest lands are close by, and a number of protected stream paths run from N-S, starting about 10km to the south of the drumlin ridge that borders the CP to the south.

The location of the CP within these degraded agricultural lands, and on the border of more proactively managed "Natural Core" regions of the Oak Ridges Moraine (the Rice Lake Plains + Northumberland Forest) make it an exciting candidate for ecologically restorative land management. The fact that the property straddles the Beaver Meadow creek and wetland adds even more weight to the notion that conscientious and skilful land management here would have substantial beneficial effects. The potential exists for the Church Property to be a small but important bio-diverse jewel – one link in a chain of emerging ecological restoration projects in the region.[3]

[3] Any mistakes, omissions, or inaccuracies within this report are the sole responsibility of Joshua Noiseux and Evermeadow Land Management.

2. Mapping and Analysis – a. Property in geographic context



Property in Geographic Context

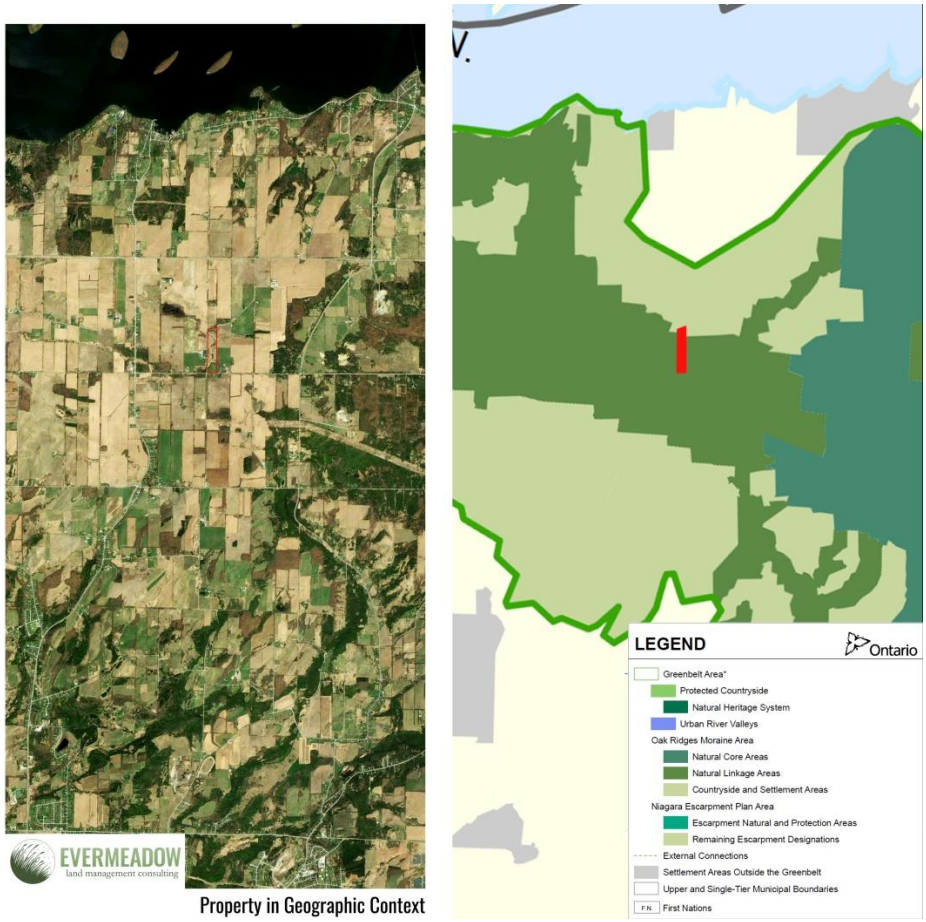
2. Mapping and Analysis – a. Property in geographic context

Above, the Church Property (CP) is outlined in red and is seen in the context of the surrounding region (Hamilton Township, Northumberland County). This image, along with some further contextual knowledge of the regulatory environment (see maps below), illustrates a few important features of the Church property and its situation within the landscape.

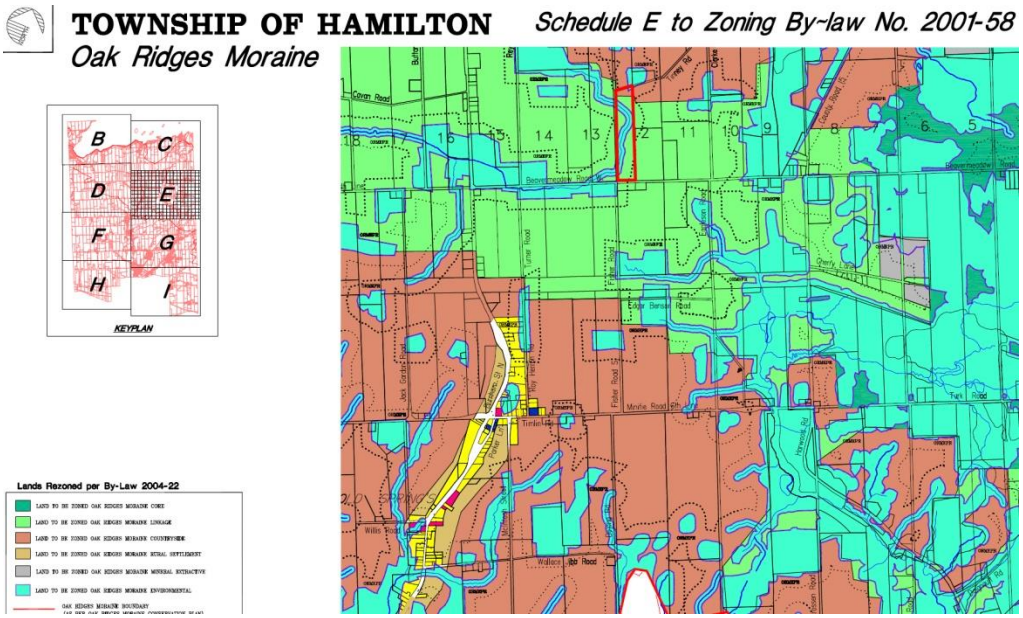
- From an **administrative and regulatory** perspective, the CP is situated within:
    - The Oak Ridges Moraine (ORM), provincially significant ecological feature which is regulated and protected by the *The Oak Ridges Moraine Conservation Act, 2001*. This Act limits some prospective land uses for the CP, as it is within a Natural Linkage Area of the ORM.
    - Hamilton Township, which has incorporated the ORMCA into its own municipal by-law (see below, Schedule E), wherein the CP is crossed by three zoning types: ORM Linkage (the majority of the property), ORM Countryside (the northern portion of the property where the house is located), and ORM Environmental, (along the stream path which runs through the property from North to South).
    - The Ganaraska Regional Conservation Authority, which has jurisdiction over some potential land uses, particularly those that might affect areas zoned ORM Environmental or which are associated with important hydrological features (creeks, wetlands, ponds).

- Despite being within the ORM protected area, the CP is in a significantly **de-forested and open landscape**. Immediately to the east the ORM Core protected area, which corresponds to the Northumberland Forest, is dramatically visible. To the south, a number of streams and creeks that are partly protected by the ORMCA and GRCA have considerable tree cover. To the north, immediate south, and west, the CP is surrounded by some of Northumberland County's most tree-less landscape, an area dominated by cash-crop agricultural production which has seen further removal of tree lanes and hedgerows in recent years.

- Despite being situated within a designated and protected environmentally important area, the CP is part of a region of Northumberland County that is **significantly ecologically degraded**, lacking biodiversity, perennial vegetation cover, and subject to hydrological challenges (see below).



Above: Comparison map indicating the CP's position within the ORM's Linkage Area.
Below: Zoning map showing the CP's 3 zones (Countryside, Linkage, Environmental).



2. Mapping and Analysis – b. Topography

1m Contour Lines

2. Mapping and Analysis – b. Topography + relief

Map 2b. (Topography), above, shows a recent (2021) satellite image of the Church Property overlaid with contour lines derived from a highly accurate 2017 laser imaging (LIDAR) survey of Southern Ontario. Using the LIDAR derived topographic data, we can create maps with contour lines to an extremely high level of precision. In this case, we have chosen 1m intervals between the contour lines, which shows sufficient detail without unnecessarily over-estimating the significance of the topographic changes in the landscape.

There is minimal elevation change within the CP. The highest point (261m) is located near the house along the northern boundary. The lowest point (254m) is near the south west corner where the stream/wetland drains under Linton Road. Between these two points there is only 7m elevation change. This elevation change, however, is confined to a few more significant slopes where the elevation changes suddenly, as the majority of the center of the property (6.33 acres) is almost flat.

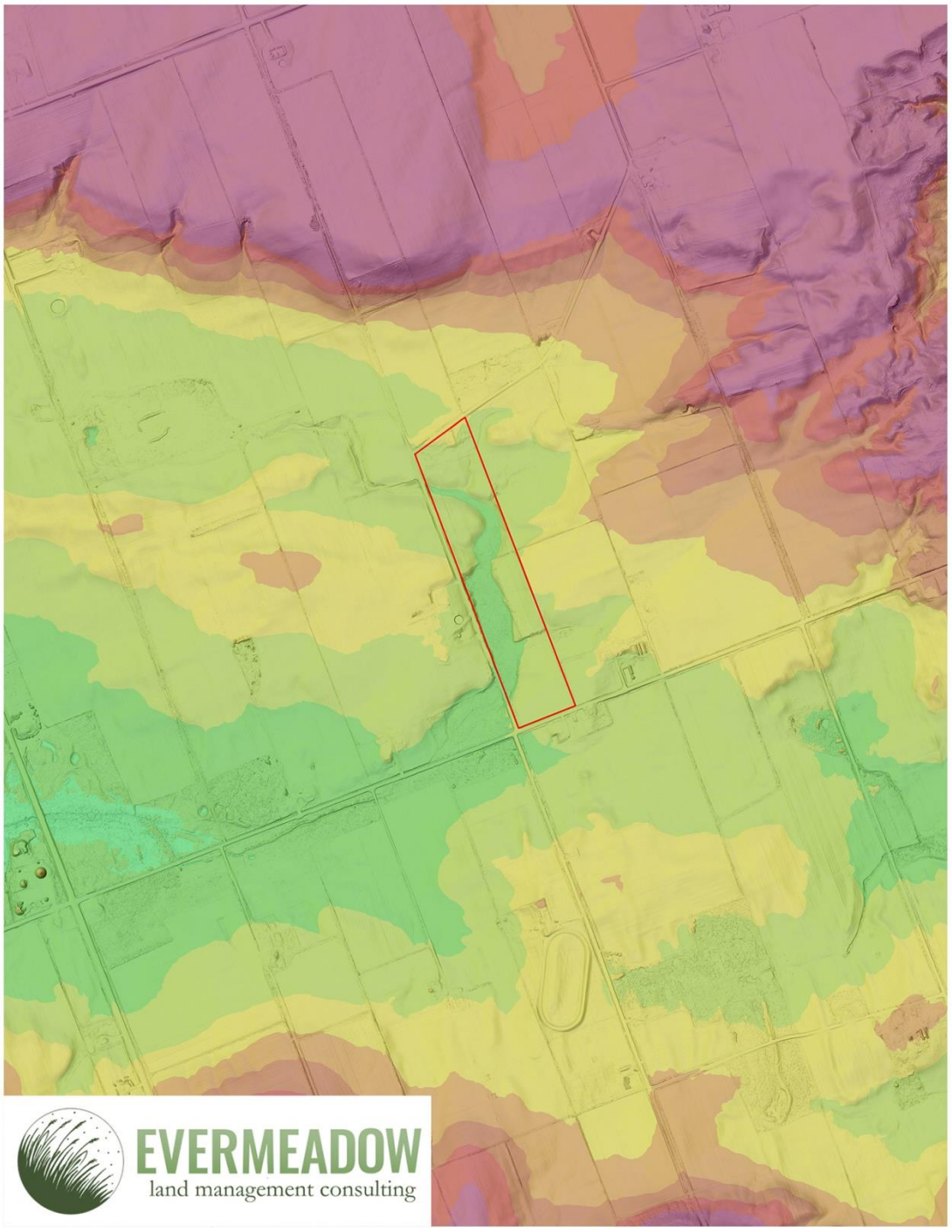
Much useful information can be gleaned from the contour line map by itself, and the dataset used to create it can also form the basis for further detailed illustration of the CP.

Map 2b. (Relief), below, uses the same dataset to illustrate the relief (different elevations, including plateaus, ridges, and valleys)**.** Here, we can see that the CP is located in a small sink or drain, which is connected to the headwaters of a creek that rises in a nearby property to the immediate north west, passes from north to south across the CP, then flows predominantly from east to west, and which finally drains into Rice Lake at Bewdley.

The CP is characterized by being lower and flatter than the surrounding area (greens), which is the reason for its containing a wetland and stream path. To the north, east, and south, the land rises rather suddenly (brown, red, mauve) in an interconnected drumlin ridge system. The region is generally characterized by these teardrop shaped glacial deposits (drumlins). The CP is located within a valley formed by the absence of, and ringed by, these glacial hills.

This means that the CP is an important filter location through which surface water from the surrounding area must pass before moving westward towards Rice Lake. The CP's direct watershed (the area it drains) is approximately 770 acres or 3.12 square kilometres.

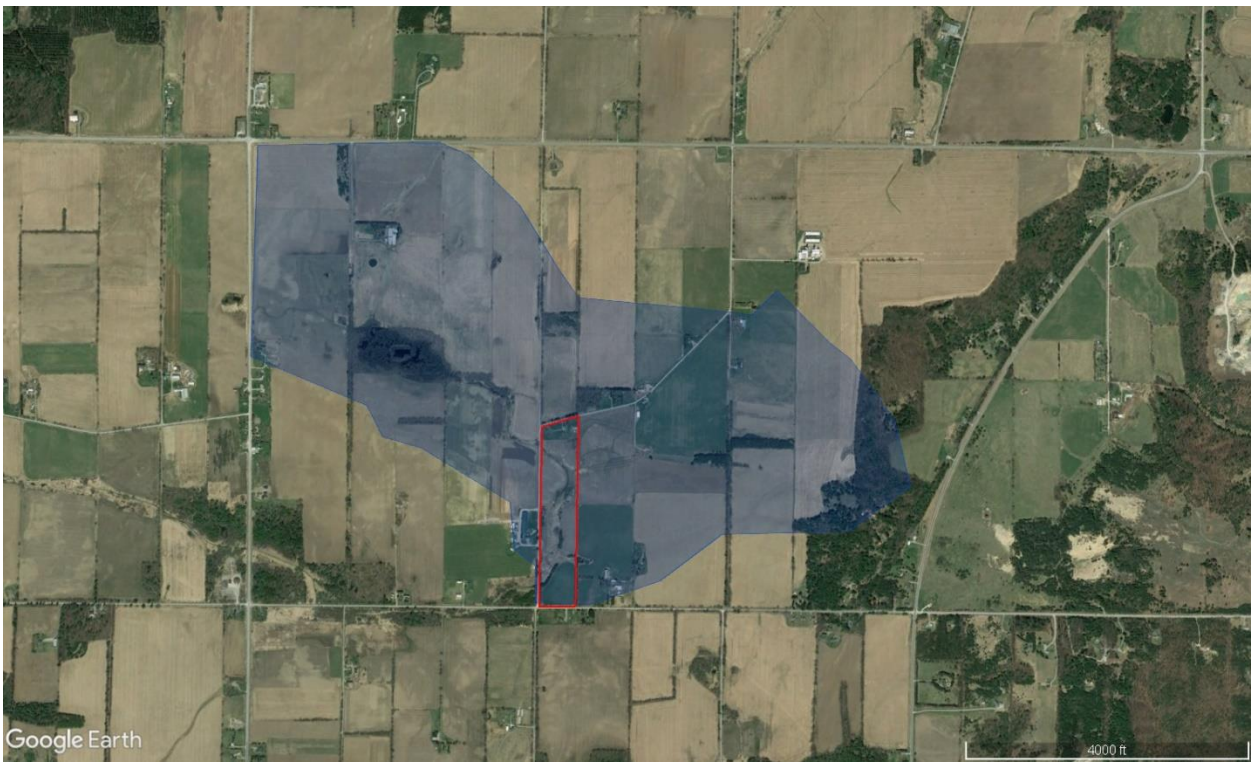
2. Mapping and Analysis – b. Relief



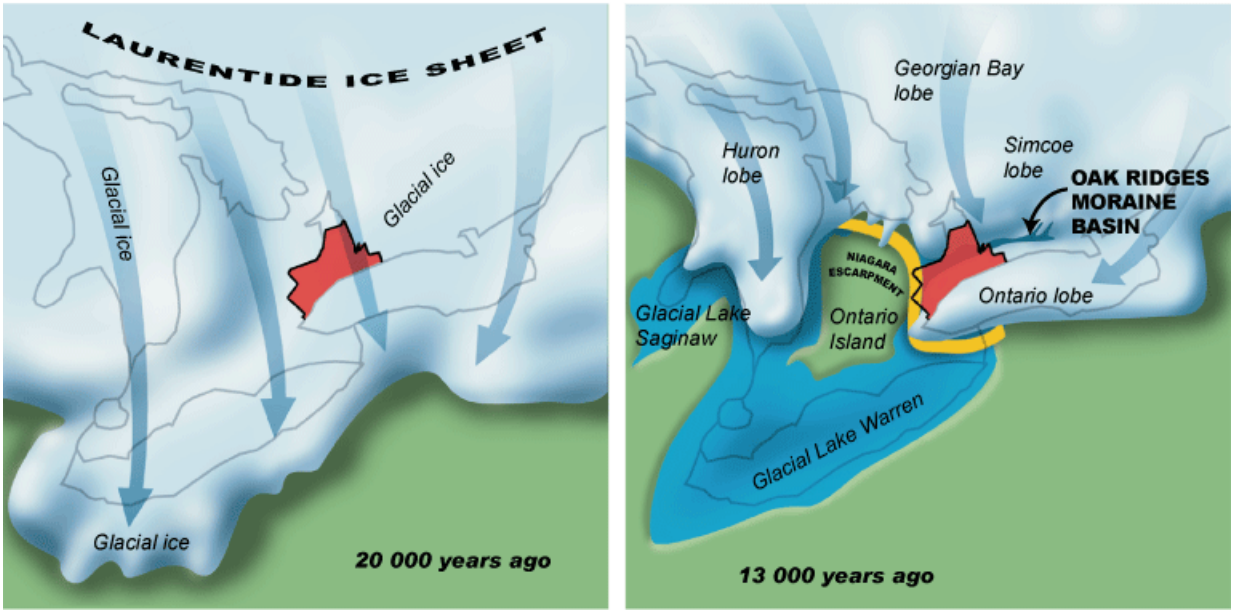
Relief

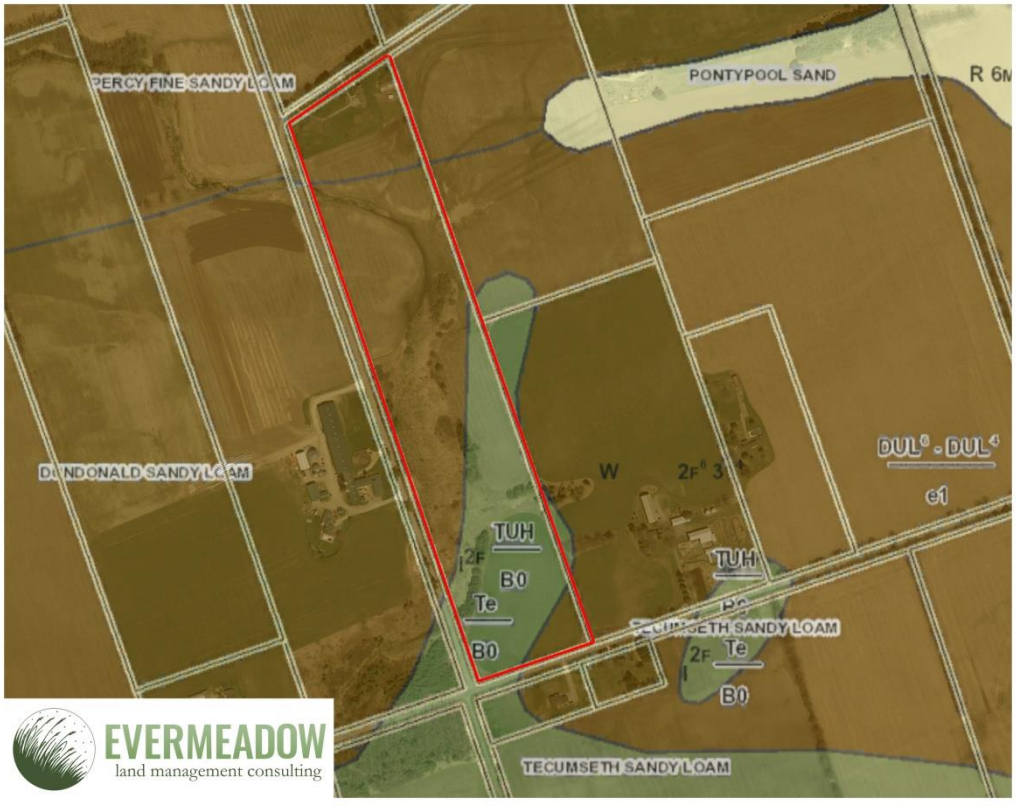
2. Mapping and Analysis – b. Topography + Relief, additional maps

Above: Route of the stream that runs through the CP and then east towards Bewdley.
Below: Approximate boundary of the watershed (~775 acres) that drains through the CP.



2. Mapping and Analysis – c. Soil types





Soil Types

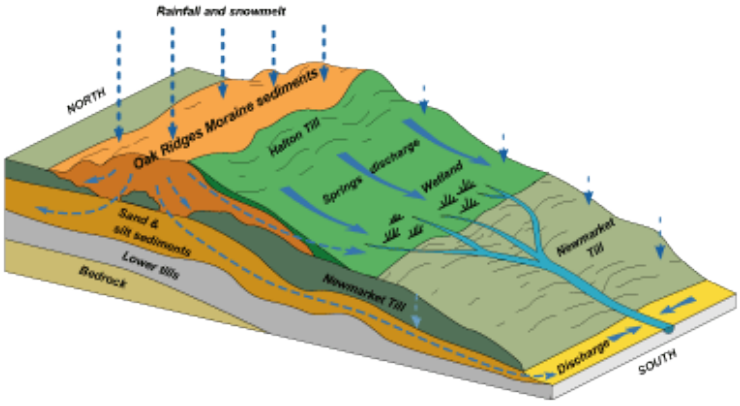
2. Mapping and Analysis – c. Soil types

As discussed, the Church Property is located within the Oak Ridges Moraine, a landscape shaped primarily by the action of glacial ice over the course of the last 13,000 to 20,000 years.

Approximately 20,000 years ago, the area of the ORM was completely buried beneath the 2km thick Laurentide ice sheet. As the climate warmed in subsequent millennia, the ice sheet began to melt and "retreat". By 13,000 years ago, the area of the ORM was an ice free sink surrounded on one side by the Niagara Escarpment and on three sides by the various remnant "lobes" of the Laurentide ice sheet. As the sheet continued to melt, melt waters carried with them massive amounts of glacial till (sediment, gravel, boulders, sand, etc.) which was deposited in layers in the teardrop shaped drumlin hills that now characterize Northumberland County and the region surrounding the CP.

The "overburden", or soil above bedrock, in this area is of glacial origin, and is not composed of decomposing bedrock material. This means that there can be wide variation is soil types within a relatively small region, as the soil parent material has been transported by glacial action across long distances and deposited somewhat arbitrarily. In the case of the CP, the primary base soil types are Dundonald Sandy Loam and Tecumseth Sandy Loam.

Dundonald Sandy Loam is a well-drained sandy soil overtop of calcareous loam or sandy loam till. The soil profile has a dark grayish brown Ah (organic) horizon (layer) about 3 inches thick which rests on a yellowish brown Ae horizon. The Ae horizon is medium acid in reaction and becomes lighter in color with depth. Below the Ae is a brown Bt (subsoil) horizon which contains more clay than the layers above it. The Bt horizon usually rests directly on gray calcarcous loam or sandy loam till. There is considerable variation in the depth of the sandy overburden which ranges from 18 to 34 inches**.** Agricultural production is limited by low fertility. The areas of the CP at higher elevations around the lower wetland area are primarily composed of this soil type.



Tecumseth Sandy Loam is an imperfectly drained soil that forms the soil base of the flat central stream and wetland areas of the CP. The horizons of the soil profile have a more uniform thickness than those of the Dundonald soils, and have mottled colors. The surface soil is very dark brown or black and is about 6 inches thick. The surface soil reaction is slightly acid, but is moderately alkaline in the subsurface horizons. The horizons that occur under the dark surface are 24 to 30 inches thick and yellowish brown in color. Carbonates are present at an average depth of 18 inches but occur in greatest amounts in the gray sands that make up the C (decomposing bedrock) horizon. The Tecumseth soil areas are slightly more fertile than Dundonald, but their capacity for agriculture is limited by their poor draining quality.

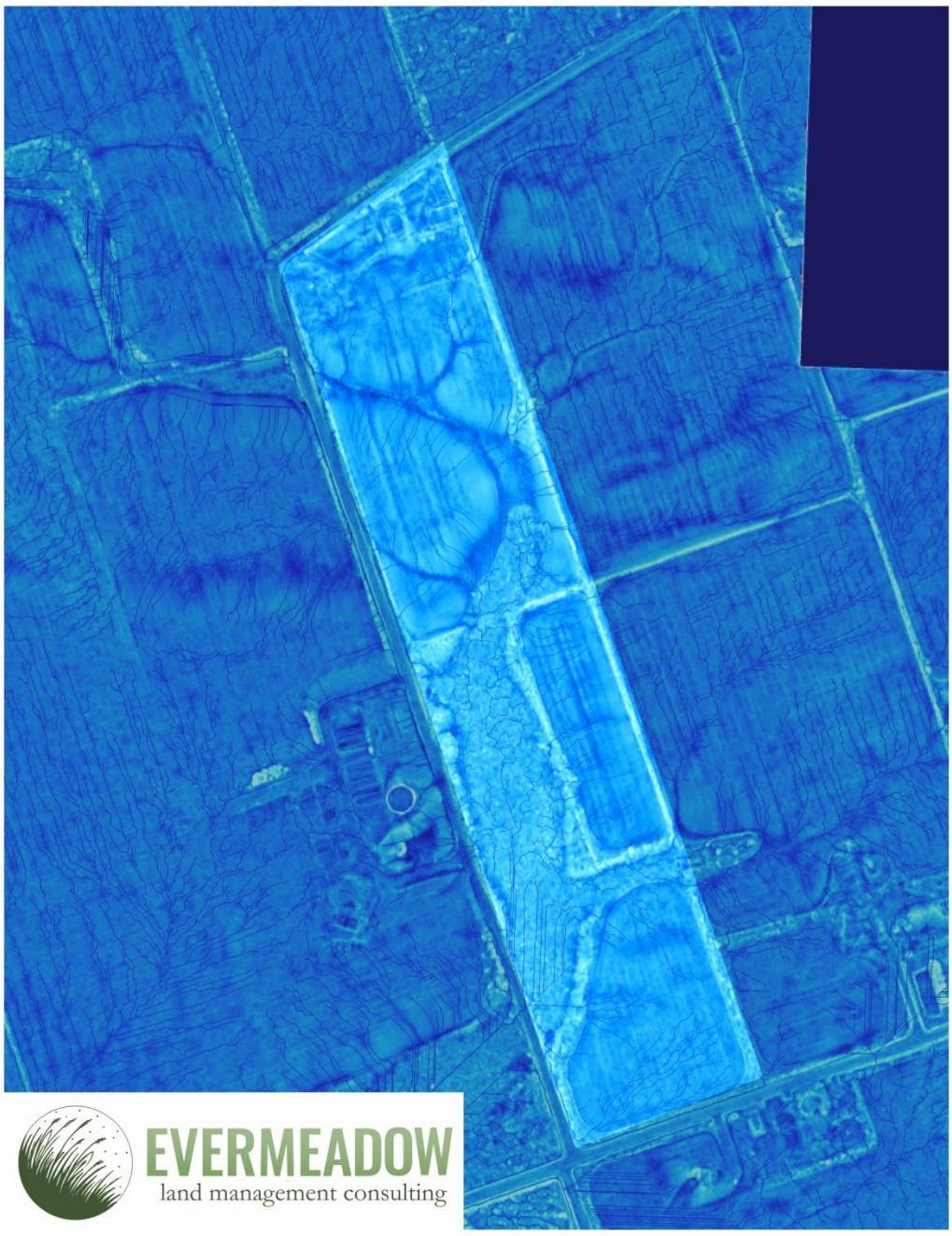
In the case of the CP, the Dundonald Sandy Loam areas have been assigned a Capability for Agriculture rating of **2F6 3T4**. Organic soils in this class have moderately severe limitations that restrict the range of crops, or that require special management practices. In this case the F indicates low fertility, the T indicates adverse topography. Special management practices to protect soil resources here could include no or low-till, perennial cropping (pasture), cover-cropping, and water retention and windbreak landforms.

The Tecumseth Sandy Loam soils at the CP have been assigned a rating of **2F**, which indicates less restrictions or limitations on productivity than class 3, but they do have at least one limitation which restricts their use in some way. In the case of the Tecumseth areas of the CP, there are two primary limitations: poor drainage (owing to flatness, relative lowness, and the soil itself) and inherently low fertility in the soil.

Classes	Description
Class 1	Soils in this class have no significant limitations in use for crops.
Class 2	Soils in this class have moderate limitations that restrict the range of crops or require moderate conservation practices.
Class 3	Soils in this class have moderately severe limitations that restrict the range of crops or require special conservation practices.
Class 4	Soils in this class have severe limitations that restrict the range of crops or require special conservation practices.
Class 5	Soils in this class gave very severe limitations that restrict their capability in producing perennial forage crops, and improvement practices are feasible.
Class 6	Soils in this class are capable only of producing perennial forage crops, and improvement practices are not feasible.
Class 7	Soils in this class have no capacity for arable culture or permanent pasture.
Class 0	Organic Soils (not placed in capability classes).

Above: soil classes and capability for agriculture in Ontario.

2. Mapping and Analysis – d. Hydrology



Topographic Wetness Index + Stream Paths

2. Mapping and Analysis – d. Hydrology

We've already discussed the basic hydrological situation of the Church Property. To recap, it is a low, flattish point in a broad basin formed and surrounded on three sides (N, E, S) by a drumlin ridge system. It drains from north to south, but then the resultant creek flows immediately westward towards Bewdley and Rice Lake.

The hydrological characteristics of the CP are thus chiefly shaped by the above mentioned soil types and topography. Overall, the CP is a poorly draining site with high levels of water retention, resulting in a seasonally inundated wetland as the central feature of the property. The central wetland is extremely flat, with minimal measurable elevation charge from its source point on the northwest corner of the property to the south west corner outlet. The central flat area receives water from four sources (listed clockwise) – the main creek path on the NW corner of the property; a small eroded gully that runs NE-SW on the top east side of the property; a small stream on the lower eastern property edge; and a very small seasonal creek on the west side of the property coming off the ditch of Linton Road.

The map above shows two hydrological features simultaneously: Topographic Wetness Index and Stream Paths.

Topographic Wetness Index is a measure of how likely water is to collect (not to persist, but to pass through) in a given area. The darker the blue, the higher the Wetness Index and the higher the likelihood that that spot will be wetter, at least seasonally when there is surface water run-off. The TWI should be read in conjunction with the topographic contour map, or the slope map (below) to understand the actual likelihood of water to remain in or on the soil at a given point. If the slope is high, even a high TWI score will not result in wet soil, though that spot is still likely to be wetter than a neighbouring site with a lower TWI score. Similarly, an area with a low slope may be wet despite a low TWI score (as in the case of the wetland at the CP) because the water is not moving quickly through the area.

The TWI map can be very useful to determine where water is likely to congregate, where erosion is likely to occur, or where crops will be more or less likely to suffer from the effects of drought or too-high precipitation.

The Stream Paths (dark blue lines) show the main paths at which water collects, accentuating the information provided by the TWI. The stream paths indicate the precise direction of flow of water across the land, and can be used to help make decisions about placement of important landscape features such as water control features (ponds, dykes), gardens, buildings, paths or livestock yards. Together, the TWI and Stream paths can be used to plan features that either need high levels of wetness or, conversely, dry sites.

2. Mapping and Analysis – e. Slope + aspect

Slope

2. Mapping and Analysis – e. Slope + aspect

The **slope map (above)** shows the relative steepness of the land on a spectrum from green (flatter) to red (steeper) and white (very steep). The spectrum is calibrated to this specific property to accentuate differences in slope – so the red areas are not necessarily particularly steep in absolute terms. Nevertheless, the steepest areas of the property – the edges of the stream path north of the wetland – are steep enough that they are subject to significantly greater erosion damage and higher impacts from drought conditions (see property history maps below). It is thus important to take the slope differences into consideration when making future management decisions – the steeper areas are demonstrably more fragile, from a soil conservation perspective, than the surrounding flatter areas.

The **aspect map (below) shows** the cardinal direction of exposure of every point on the CP. The legend for the map is as follows:

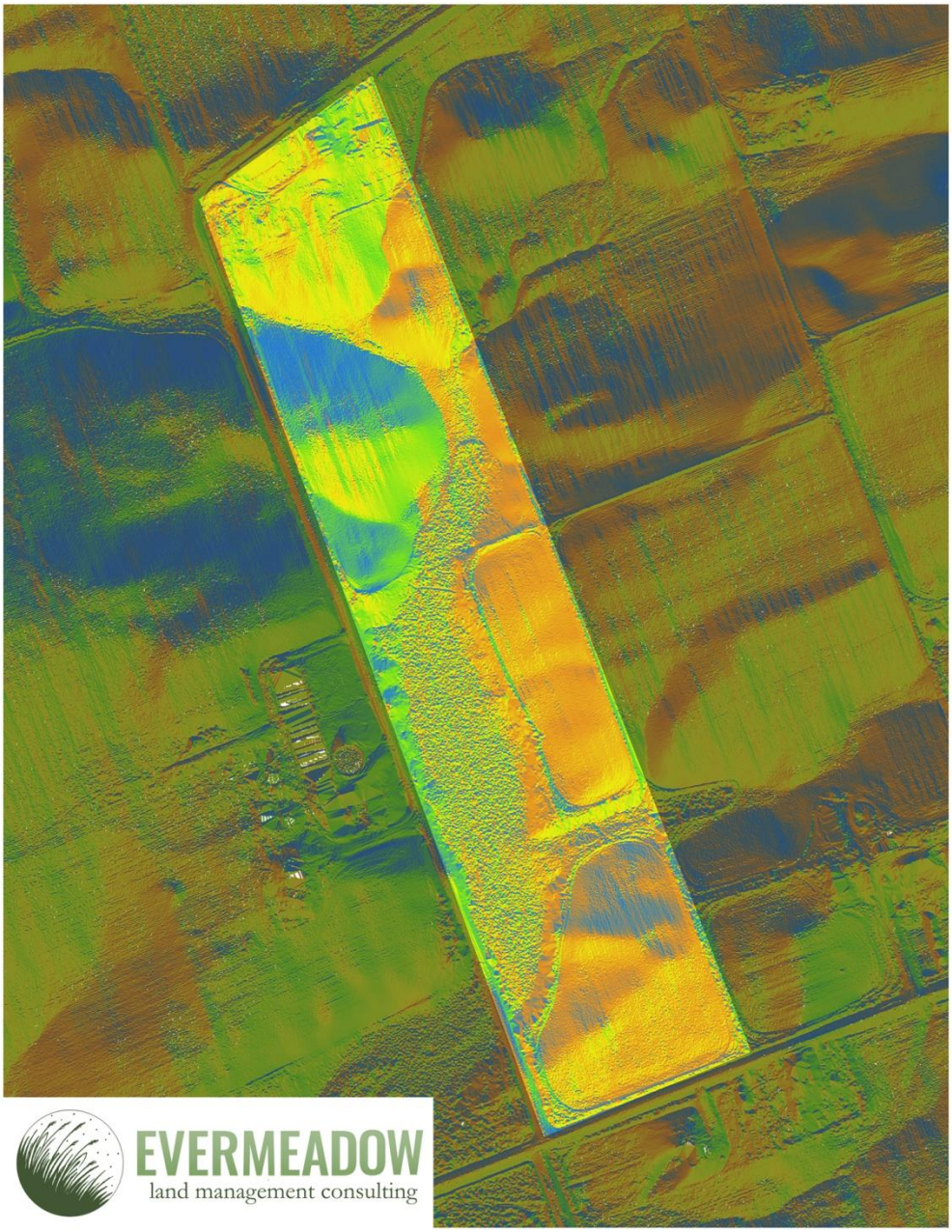
- Gray/blue – North exposure
- Yellow – South exposure
- Lime Green – East exposure
- Orange – West exposure

Combinations or gradations of these colours indicate a site that is exposed to intermediate direction (eg. south south-west is yellowy orange; north-east is blue-green).

The aspect map is useful for two primary purposes. The first is to understand variations in seedling and crop establishment, and plant vigour. The areas with greater southern exposure will, in most, cases, provide better micro-climactic habitat for crop plant species, which will perform slightly better in the south exposed faces of the property.

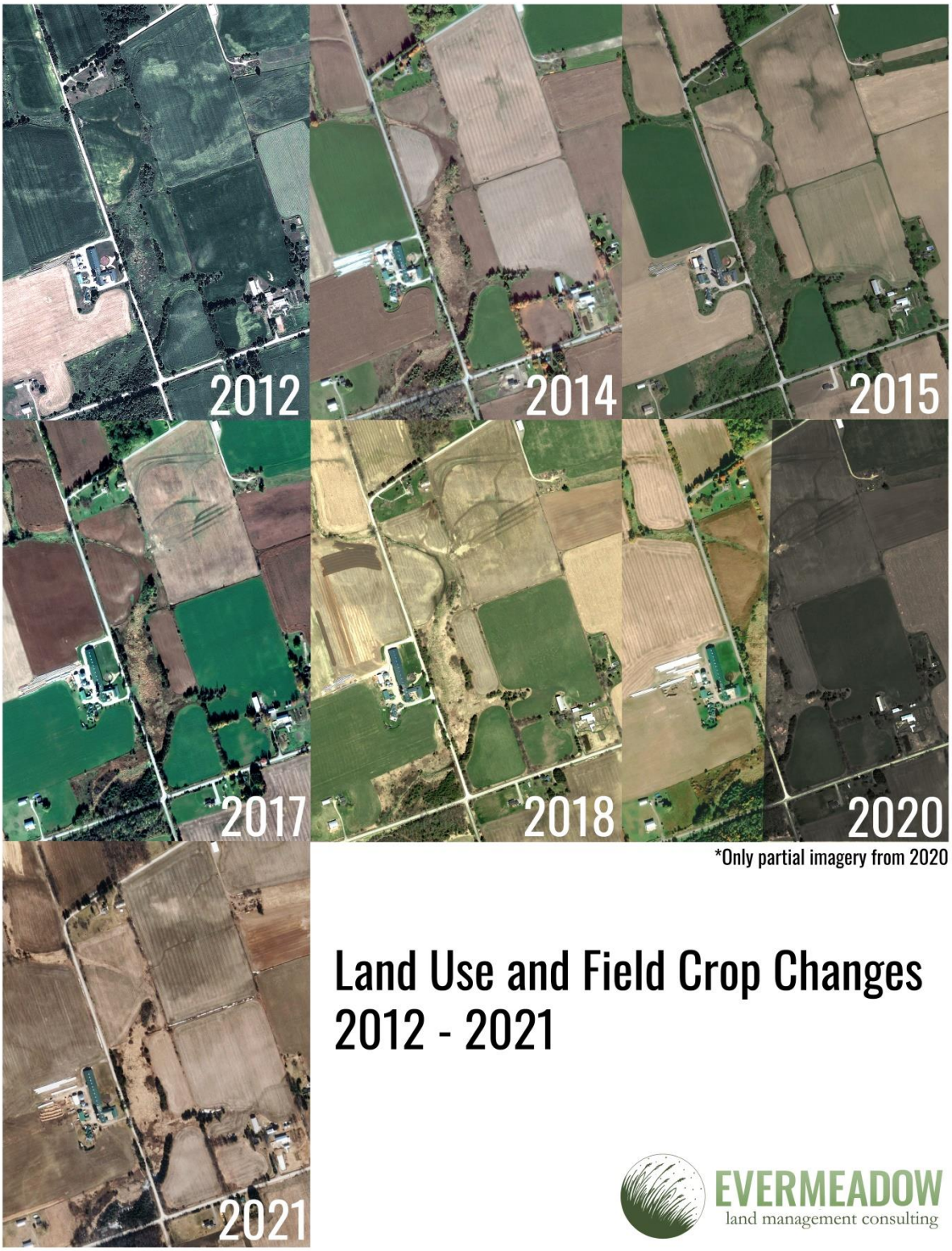
The second is to aid in future management decisions. For example, an annual vegetable garden or crop with a very long growing season and high light demands will do better on a south exposure than a north exposure. The same is true of orchard trees that will thrive best on the southern faces. Relatedly, any future building site or property feature (eg. livestock yard) should take aspect into consideration, both to predict the time-of-day exposure to sunlight and the predominant winds (West generally, Northwest in Winter, Southwest in Summer).

2. Mapping and Analysis – e. Slope + aspect



Aspect

2. Mapping and Analysis – f. Historical use pattern



2. Mapping and Analysis – f. Historical use pattern

Overview/Takeaways:

- **Field crop overuse.** With the exception of the south field, which say a longer tenure as a hay field, the CP's agricultural fields have been almost exclusively in field crops (corn or soy) in the decade between 2012 and 2022. This is counter to widely used crop rotation practices within conventional mechanized agriculture, which generally recommend a grass/hay rotation be planted at least once within a 10 year period, particularly on sites vulnerable to erosion or with low inherent soil fertility. The relentless use of annual field crops over the past decade will have subjected soil to greater erosion pressure (no persistent roots, planting and harvesting activity, bare soil) and chemical exposure (fertilizer, herbicide).

- **Perennial crop underuse.** The converse of the above: greater use of perennial pasture or hay crop would mitigate or eliminate erosion and chemical use concerns. It would also have increased carbon sequestration, soil organic matter, and biodiversity and insect/bird habitat.

- **Visible erosion.** In the 2018 image in particular areas of soil erosion can be seen. These areas are steeper and drier, and therefore subject to much greater wind, water, and mechanical erosion pressure. Over the years, especially when combined with drought, these areas have likely lost considerable top (organic) soil.

- **Drought stress.** The effect of relatively severe drought in 2012 and 2016 is visible in the steeper areas many of the images (2012, 2017, 2018) in the form of reduced crop vigour and exposed soil (less crop residue) after harvest.

- **Wetland composition changes.** From 2012 to 2022, there has been a decrease in perennial grass coverage in the central wetland, and an increase in woody shrubs. Both the grass and the shrubs are primarily of Eurasian origin, but the shrubs may present more concern due to invasiveness (TBD on ground-truth). Generally speaking, a higher percentage of grass indicates greater management ie: periodic grazing, or mowing. This seems to indicate that the central area was at one time actively managed but has in recent years fallen into an under-managed state (as so subject to invasion by non-native woody shrubs etc.). It also appears that it is possible that the wetland has become wetter over the past decade, perhaps due to increase obstruction of the downstream outlet, or perhaps due to changes in vegetation – most likely due to a combination of factors. The image below (2013) shows a considerably drier field than the present day.

Facing northeast in this **2013** photo, the central field is dominated by perennial grass, not true wetland plants such as rushes, cattails and sedges.

Year by Year Field Use

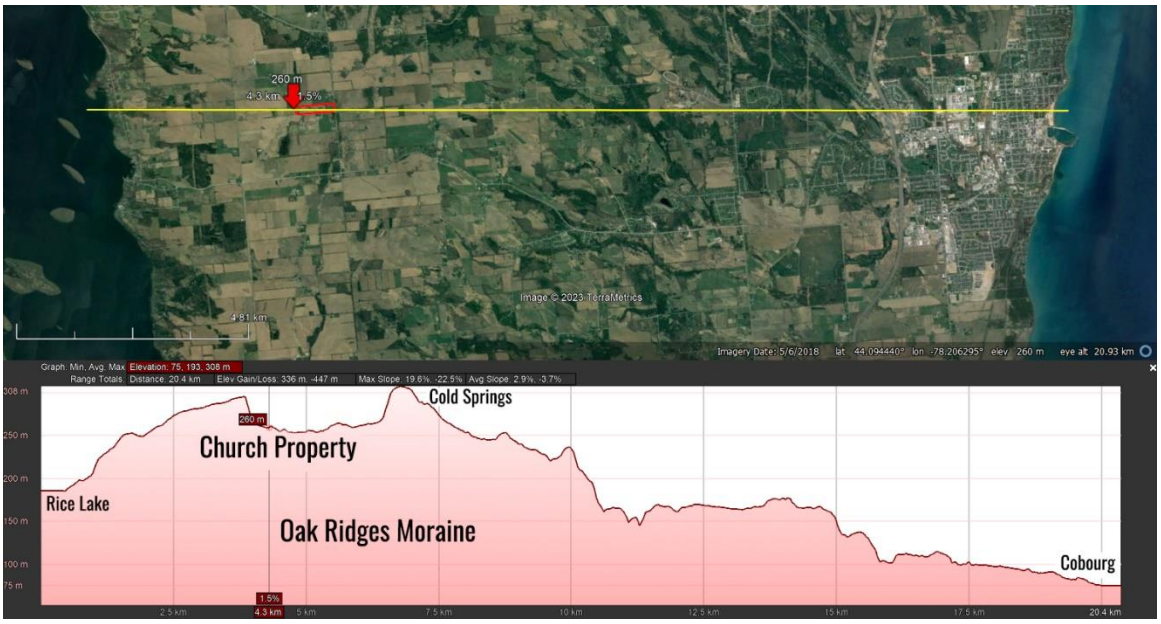
2012: • North: Hay. Drought evident. • East: Hay. • South: Hay. **2014:** • North: Field Crop (corn or soy). • East: Field Crop. • South: Field Crop. **2015:** • North: Field Crop. • East: Field Crop. • South: Hay. **2017:** • North: Field Crop. Erosion evident. • East: Field Crop. • South: Hay.	**2018:** • North: Field crop. Erosion evident. • East: Field Crop. • South: Hay. **2020:** • North: Field crop. • East: Field Crop. • South: Hay. **2021:** • North: Field Crop. • East: Field Crop. • South: Field Crop. • Wetland **2022:** • North: Field Crop. • East: Field Crop. • South: Field Crop.

3. Climate Variables

Summary:

We will not go into great detail regarding climate at the Church property as this information is widely available elsewhere. For detailed climate records and averages see this website. It is worth noting that all historical weather and climate data are derived from official weather stations, of which the closest is at Cobourg. The next closest is north east of Peterborough.

From our observations living in the region for 30+ years and particularly in the last 4 years of operating Evermeadow Farm, we have observed that the weather patterns in Cold Springs/ Plainville/ Gores Landing (and at the Church Property) differ sometimes significantly from that of Cobourg, and that weather apps and forecast services often fail to accurately represent this difference. This chiefly owes to the CP's position north of the big N/S slope of the ORM, and away from the weather station at Lake Ontario.



When attempting to understand and predict weather in the area north of the Cold Springs drumlin ridge "peak" and south of Rice Lake (the "Beaver Meadow Basin"), we have found it useful to take a rough average of weather forecasts and data from Peterborough and Cobourg weather stations. This removes the bias included in the Cobourg data due to the moderating influence of Lake Ontario. In general, the climate at the Church Property will be more extreme than at Cobourg, hotter in summer, and colder in winter by anywhere from 2-5 degrees C on average, with precipitation being on average similar but with more snow than rain.

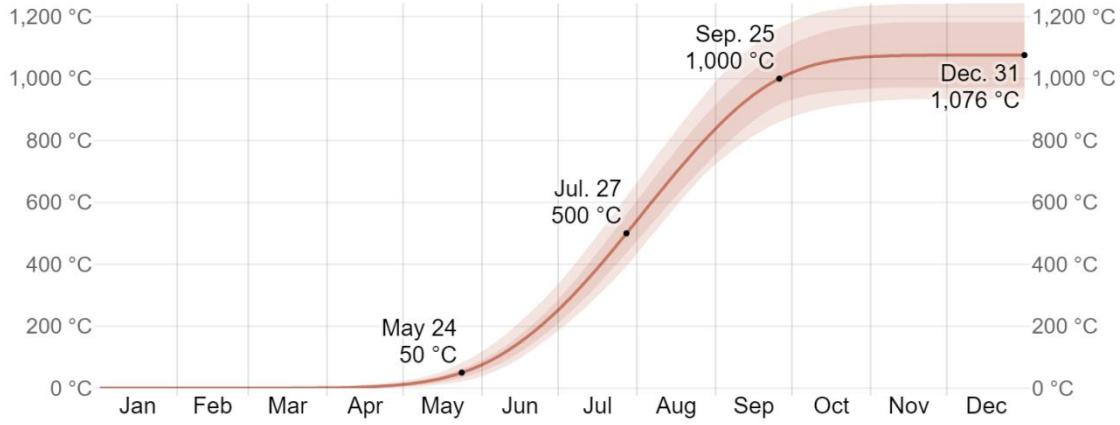
3. Climate Variables

Climate Data at a Glance

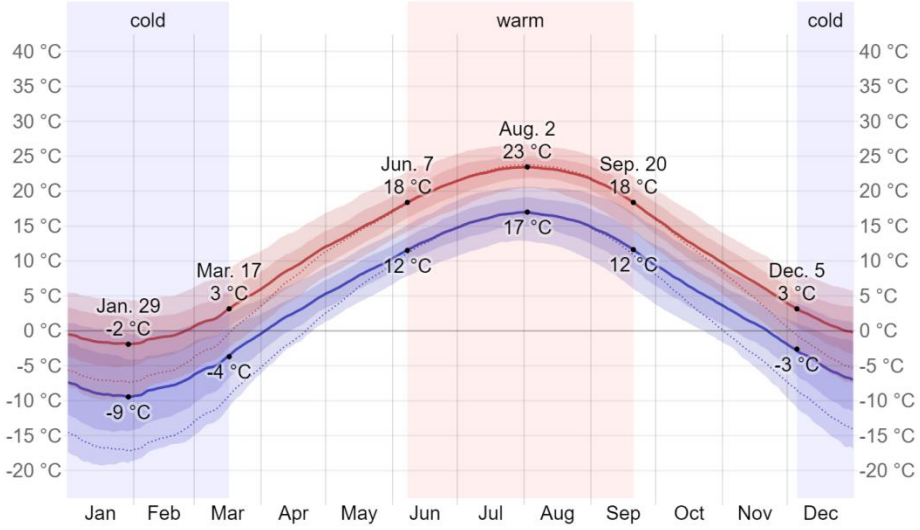
For more information on any of these variables see [this website.]

Frost Free Days: 158
Average Last Spring Frost: May 3rd
Average First Fall Frost: October 8th
Number of Dry Days: 209
Number of Wet Days: 155
Plant Hardiness Zone: 5b (Cobourg itself is 6a)

Growing Degree Days:

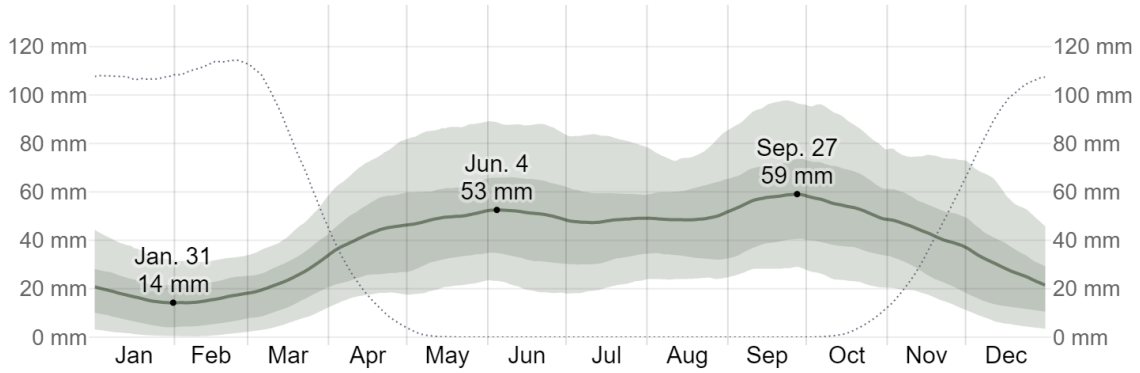


Temperature:

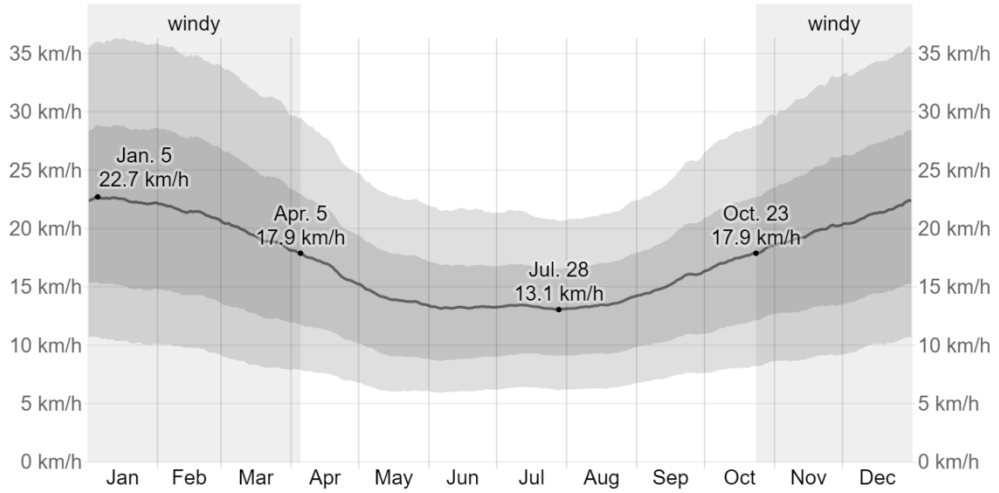


3. Climate Variables

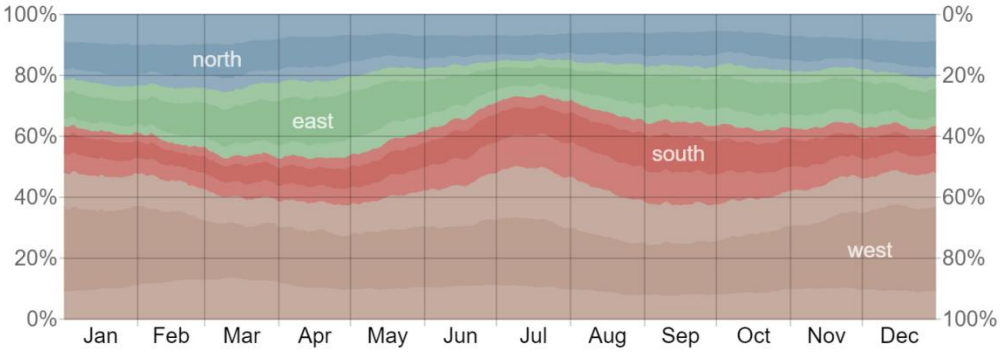
Precipitation:



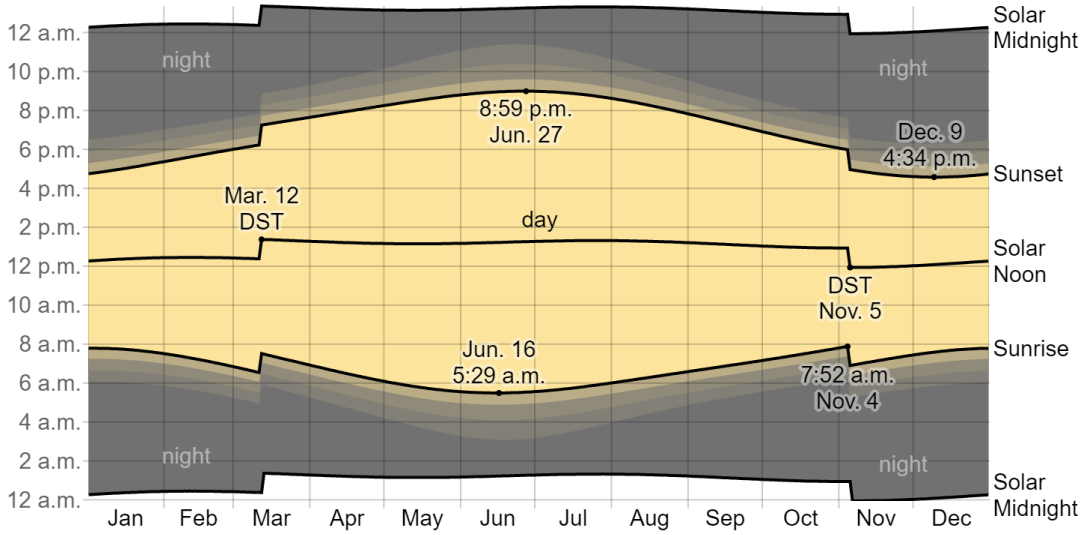
Wind Speed:

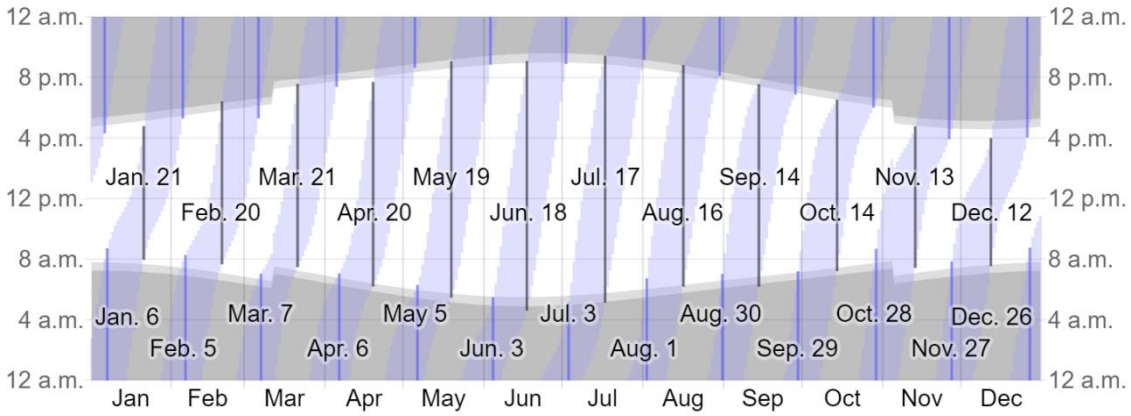


Wind Direction:



Sun and Moon:





The time in which the moon is above the horizon (light blue area), with new moons (dark gray lines) and full moons (blue lines) indicated. The shaded overlays indicate night and civil twilight.

Climate Change:

It is impossible to predict the effects of global warming / climate change with a high degree of accuracy, but most models agree on a few basic notions that are relevant to our case study: the frost free days will gradually increase, with the last frost of spring coming earlier and the first frost of autumn coming later. Overall average annual temperature will increase, by how much is subject to debate. It is likely that there will be more extreme temperature swings, including more extreme heat events, as well as an increased likelihood of moderate to severe drought. Confidence intervals about future precipitation is lower, but it is predicted that precipitation events are likely to be more extreme and will tend to stray from recent historical average patterns as the climate continues to warm. For more information on the possible effects of climate change in southern Ontario, see the Ontario Climate Data Portal.

4. Physical Survey (Incomplete)

The bulk of the physical survey (or “ground truth”) will take place in Spring 2023 and form Part 2 of this report. Part 2 will include:

- Soil sampling (if desired)
- Biological survey (plant + animal species atlas)
- Further aerial drone photography
- Comprehensive invasive species analysis and map

Here we present some preliminary work, which will be fleshed out with additional data and analysis in Spring 2023.

a. Aerial imagery

View of the Church Property looking South, October 2022. In this image we can see the various field types: lawn, field crop (north, east, and south fields) and the central wetland. The cultivated area of the north field extends further into the (seasonal) central stream path than in some years past – perhaps representing a greater erosion risk in this already vulnerable area.

4. Physical Survey (Incomplete) – a. Aerial imagery

These images (above and below) show the central, uncultivated wetland area. Here we can observe the species composition of the area – a mixture of grasses, forbs, and woody shrubs, with few true wetland species (to be confirmed in Pt. 2). Differences in plant composition may indicate differences in soil composition, average wetness, or a combination of factors. This and further aerial imagery will be most useful when combined with detailed observations from the ground in Spring 2023. See digital appendix for more aerial imagery + video.

4. Physical Survey (Incomplete) – b. Site Visits + c. Biological Survey + d. Invasive Species

After our initial tour and site visit in October 2022, we were unable to return to complete the biological survey before the property received significant snow cover. Nevertheless, we were able to make a few observations, all of which will be confirmed and explained further in Part 2.

- **Soil condition**. There appears to be very little remaining organic soil in the Dundonald Sandy Loam portions (the three cultivated fields) – which was observed to be a very fine sand/loam mix, characteristic of the underlying subsoil. With very little in the way of soil coverage – only a small amount of crop residue – the soil was loose and subject to wind and hydrologic erosion. These observations can be confirmed and elaborated by soil sampling in Spring 2023.

- **Tree species.** Along the eastern property line, particularly in the southern third of the property, there are a number of significant, possibly old growth hardwood tree specimens. These include Sugar Maple and Red/Black Oak. The composition of old trees here indicates that the site was historically at least partially forested, but not with a dense Maple/ Beech/ Hemlock canopy as was the case further south in Cold Springs. The CP site was likely to have been a marginal, mixed location between the hardwood forests of the higher slopes, the Rice Lake Plains savannah/ open woodland (the CP is just on the western border of the recognized Rice Lake Plains), and the site specific lowland/wetland species mix which would include Hemlock, Cedar, and Willow species. This intersection of tree-cover types at the CP indicates a high potential for bio-diversity restoration including possibilities for both afforestation and tall-grass prairie (re)- establishment.

- **Wetland characteristics.** It was observed that the central wetland is not *very wet*. It is only seasonally inundated, and there is rarely standing water at the site, except at the southern outlet of the seasonal stream path. The species composition (increasing portion of woody species, decreasing grass species since 2012) likely indicates a decrease in the amount of active management, and inferring that this area was likely managed more actively as either pasture or hay field at some point in the past 50 years or less. There is potential for this area to be re-purposed as a seasonal grazing, with sensitivity to its vulnerable riparian character – a management change which may even help with invasive species mitigation.

- **Invasive species.** A number of invasive species were observed in our short initial site visit: these include Dog Strangling Vine, European Buckthorn, and Autumn Olive. A full account of invasive species populations and suggestions for mitigation will be included in part 2.

5. Preliminary Recommendations

After completing the first of two parts of this report, and keeping the clients' stated goals in mind, here is a list of our preliminary recommendations. Note that both parts of this report constitute the Research phase – which may be followed by a Planning phase. The recommendations here therefore relate to further research, and/or are rather general. We are happy to discuss what a Planning and Implementation phase project could look like, should the clients desire.

1. **Complete Part 2 of this report.** We look forward to completing the second part of the report, which will focus on the biological survey and (optional) soil sampling, as well as additional aerial imagery. This will give us a fuller picture of the biodiversity and species composition baselines, as well as a comprehensive measure of soil health at the property.

2. **Take advantage of available supports.** Research and pursue all available funding opportunities (listed below) to mitigate costs of future projects and maximize expert knowledge and support.

3. **Obtain a Farm Business Number.** Registering through Agricorp for an FBR requires $7,000 gross revenue from farm related activities. It is also the pre-requisite for numerous other beneficial programs and tax perks.

4. **Complete a comprehensive Environmental Farm Plan.** Delivered by the Ontario Soil and Crop Improvement Association (OSCIA), completing the EFP is a gateway to numerous other funding opportunities and is a worthwhile exercise on its merits. Having a well thought out EFP will make every subsequent step easier, even if no funding is acquired directly through the OSCIA.

5. **Establish year-round ground cover.** In terms of soil health, the first and most impactful intervention would be to establish a year-round vegetative cover for the soil, whether that be perennial grass sward (for hay or pasture) or annual based cover crops, or some combination of the two. This will accomplish two main ecological goals, along with many ancillary benefits:
    a. An immediate reduction or elimination of soil erosion; and
    b. The beginning stage of the restoration of soil microbial life and bio-diversity.

    Some of the ancillary benefits include: increased insect, bird, and small mammal habitat; improved hydrologic function; building soil organic matter; reducing or eliminating

heavy chemical use; providing a manageable forage crop that can be used for either grazing or harvested as hay.

6. **Consider partial afforestation.** After establishment of permanent ground cover, judicious planting of native trees from locally adapted seed would be another excellent ecological intervention. We would not recommend wholesale coverage of the property or even any large portion of the property with densely planted trees – this would be counter to bio-diversity, habitat, and economic productivity goals. We particularly advise against any large area planting of a monoculture of coniferous trees. That said, a diverse mixture of native trees and shrubs could act as a windbreak, provide habitat and food for birds and other wildlife, sequester carbon, and help regulate the water cycle on the property. Any afforestation should be carefully planned in consultation with relevant support and funding agencies, such as the GRCA, OSCIA, and ALUS (see Available Supports section below).

7. **Consider pro-active wetland management**. There are a number of possibilities for the central wetland on the CP – all would benefit from consultation with the relevant experts at Ducks Unlimited. Some of the options for management of the central wetland include:
    a. **Do nothing**. This will likely result in the gradual overwhelming of this part of the property with invasive woody shrubs like buckthorn and autumn olive, or possibly the super-invasive Phragmites.
    b. **Graze/mow judiciously in the drier seasons**. The activity of grazing or mowing, when the land is not too wet for access, would favour and invigorate grass and native forbs while reducing invasive and woody species pressure. It would also provide some economic benefit (if grazing or, eventually, harvesting forage/hay).
    c. **Expedite water flow**. By ensuring unobstructed drainage at the SW outlet, and/or installing further drainage works or channels, the central wetland could be maintained, at least seasonally, in a drier state. This is the least ecologically desirable outcome – as it would increase erosion, decrease riparian habitat, and reduce water retention through the drier slopes adjacent to the wetland.
    d. **Retain/impound water in the form of a pond**. It may be possible to work with Ducks Unlimited to capture and store water in a ponded area within the central wetland. This would have numerous ecological benefits, particularly habitat creation, and water filtration.
    e. **Consider tall-grass prairie (re)establishment.** As the CP is on the boundary of the Rice Lake Plains and was historically likely to have been partially vegetated by native tall-grass species such as big and little blue-stem, it may be desirable to attempt to re-establish a native prairie ecosystem in all or part of the fields. The

Nature Conservancy of Canada manages a nearby site – Hazel Bird Nature Reserve – and would be an interested partner in implementing any tall-grass prairie restoration project. A tall grass prairie would not be conducive to conventional agricultural production, but there are possibilities (being explored by Evermeadow Farm and others) of harvesting tall-grass prairie with grazing animals or for hay.

Desmodium canadense, or Showy Tick Trefoil,
associated with restored ecosystems in the Rice Lake Plains.

6. Available Supports

The following is a list of available resources and funding agencies that could support future land management work at the CP. The list is presented in a suggested order of importance or urgency in initiating contact. This is not an exhaustive list of funding opportunities – but it does collect some of the most relevant to the client goals.

1. **National Farmer's Union (NFU).** There are two pre-requisites in order to qualify for many/most farm related funding programs. The first is to join a farm union or association. The options are the Ontario Federation of Agriculture (OFA), the Christian Farmer's Union, or the NFU. The NFU is by far the most progressive and ecologically oriented of the three available farm associations. The second is to obtain a Farm Business Registration Number (see below) through Agricorp. In addition to being a gateway to further funding opportunities, the NFU offers members support in the form of workshops, conferences, research, publications, advocacy, and regular regional meet-ups.

2. **Agricorp**. It is through Agricorp that farms must register for their Farm Business Number. Prior to this, the farm must show at least $7,000 in farm related gross income. It is worth spending considerable effort to achieve this, as the FBR number opens up so many subsequent supports. One simple way to achieve this would be to partner with a tenant farmer to "share-crop" instead of simply leasing the land out. In this arrangement, the land owner and tenant share the expenses and risks of a crop, but also the revenue and profit. This process will take at least a year, as the $7,000 revenue must be shown on an official tax document such as a T1.

3. **Ontario Soil and Crop Improvement Association (OSCIA).** The OSCIA houses a number of funding programs relating to ecological agriculture and stewardship activities. These include Species at Risk Farm Incentive Program (SARFIP) and Species at Risk Partnership on Agricultural Lands (SARPAL), both of which offer cost sharing for projects such as fencing, bird houses, cover cropping, water systems, rotational grazing, tree planting, and hydrological management. In order to be eligible for these programs, the landowner must complete an Environmental Farm Plan (EFP), which is also a pre-requisite for some other government administered funding programs, and is worth doing for its own sake, as it is an excellent management planning tool.

4. **ALUS Ontario.** Somewhat parallel to the programs offered by the OSCIA are those of ALUS, whose mission is the promotion of nature based solutions in agriculture and ecological restoration. ALUS offers incentive, funding, and cost-share programs for things like rotational

grazing, hedgerow establishment, native species planting. Of particular note is their delayed grazing program, which will pay per-acre to leave hay or pasture fields unharvested until after July 15.

5. **Ducks Unlimited Canada.** Ducks Unlimited manages a large scale wetland and pond restoration and creation program that (at least partially) funds wetland creation, restoration, and maintenance on privately held lands. It would be well worth consulting with their local representative to help develop an expert-led plan to maximize the ecological benefits and health of the existing wetland on the property.

6. **Ganaraska Region Conservation Authority (GRCA).** The GRCA must be consulted in the case of major developments or alterations on lands within their jurisdiction, particularly if those lands are zoned ORM Environmental or are otherwise hydrologically significant. In addition, the GRCA manages its own funding and support programs for native tree planting and water management, including their *Clean Waters Healthy Lands* funding.

7. **Ecological Farmer's Association of Ontario (EFAO).** Ontario's preeiminent ecological agriculture association. Membership has many benefits, including access to conferences, workshops, tours, presentations, and research. The EFAO also offers funding for soil-health, farmer-led research, and small-grains programs.

8. **Ontario Federation of Hunters and Anglers (OFHA).** OFHA administers the ALUS program in the Peterborough/Northumberland region, as well as a number of other programs such as the Invasive Species Awareness Program, which can offer support on invasive species mitigation.

9. **Ontario Ministry of Rural Affairs and Agriculture (OMAFRA).** The provincial agriculture ministry is an excellent source of information on all things farming related. Their website is a wealth of information and links to further resources, and they also offer consulting and education through their regional representatives.

10. **The Nature Conservancy of Canada (NCC).** The NCC has a strong interest in restoring ecological function in the landscapes of the Rice Lake Plains, of which the CP is a part. The NCC manages the neighbouring Hazel Bird Nature and is actively working to remove invasive and non-native species and restore a bio-diverse tall-grass prairie to the site.

EVERMEADOW

land management consulting

Evermeadow Land Management Consulting

3989 McIntosh, Cobourg, Ontario
K9A 4J9
info@evermeadow.ca

905-269-3765