

# Rintelmann Permaculture Design

Project Address:

420 County Road 2904, Dodd City, TX 75438

Latitude and Longitude:

(33.60746464705759, -96.1142018666215)



# What is Permaculture?

Permaculture (the word, coined by Bill Mollison, is a portmanteau of permanent agriculture and permanent culture) is the conscious design and maintenance of agriculturally productive ecosystems which have the diversity, stability, and resilience of natural ecosystems.

It is the harmonious integration of landscape and people — providing their food, energy, shelter, and other material and non-material needs in a sustainable way.

Without permanent agriculture there is no possibility of a stable social order.

Permaculture design is a system of assembling conceptual, material, and strategic components in a pattern which functions to benefit life in all its forms.

The philosophy behind permaculture is one of working with, rather than against, nature; of protracted and thoughtful observation rather than protracted and thoughtless action; of looking at systems in all their functions, rather than asking only one yield of them; and allowing systems to demonstrate their own evolutions.

<https://www.permaculturenews.org/what-is-permaculture/>

# What a Permaculture Design is, and What it is Not

A professional Permaculture design is a guiding plan and should be treated as a living document rather than a static blueprint to be followed. We are designing a complex ecosystem that is changing daily, added to that are the inhabitants of the system we are designing. People have needs, desires and goals that change often. Our goal should then be to leave options open for change and restructuring without hindering the effective operation of the ecosystem as a whole.

You are the steward of your landscape, and as such an attitude of childlike curiosity and the love of learning should be held close to your heart. Always be ready to experiment and learn something new. Don't be afraid to push a boundary or change a facet of this design if it seems like a better course of action. This design is intended to shortcut the learning curve, eliminate as many pitfalls as possible, while leaving room for your own flourishes and colorations on the canvas you're creating. Few (if any) components or elements of this design are set in stone.

One of the things a design is intended to be is a template that you lay over your landscape to see what direction it should be developed towards. There will always be small and sometimes large changes you will need to make to fit it into your needs. In warfare there is a saying that "no plan survives contact with the enemy", while this isn't warfare, no permaculture plan or design survives contact with reality. There will absolutely be changes and that's ok. You will learn new things that you want to try, or your wants/needs will change. You'll discover something you don't like and that will change the plan. Roll with it! That's what makes this whole adventure interesting and fun. Try to take from this design, the principles applied to achieving the goals we have discussed. If changes are necessary, make them and see if it works. There are dozens of nuanced reasons for specific design elements that until you are actually working in the system, you may not appreciate or agree with. Just try it first and if it doesn't make sense for your style of management then by all means change it to suit your needs.

Things like fencing and gate placement will shift and change depending on your management style and needs. Always with livestock, err on the side of temporary fencing until that temporary fence stays in place for several years. Once a fence or gate is used 20+ times, you will have a fairly good idea of whether or not it should be made permanent. Some locations by their limiting factors dictate that a fence "must" be made permanent, as is the case with property boundaries and road access. Always keep access in mind and do your best to not paint yourself into a corner with structures or plantings. Always leave yourself an easy way to move a larger vehicle or trailer through a space than you think you might need. 8' gates are not much more expensive than a 6' gate. The prior is much easier to drive through if pulling a garden trailer through via a lawn tractor. And remember that just because a gate is indicated, does not mean it must be there or be kept closed. I've included locations of gates because I know due to workflow that they will most likely be located in that specific spot, or to save you the hassle of placing it in a less advantageous location. Gates are one of those things that people sometimes get hung up on as being a fence and thus should always be a barrier. This isn't necessarily true. As you develop your property and livestock management, you will find a rhythm that works for you.

In short, this design is intended as a direction, not law, as an encouragement, not dictate. It's a sketch on a canvas of which you are the artist painting the elements onto the canvas. This is your masterpiece, and only by owning it will you come to fully appreciate and love living in it. - Nick

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# Climate Survey

## Averages, Frost Dates, Precipitation, Temperatures, Köppen Climate Classification

### **The closest weather station to the design property is the Bonham Weather Station**

- 1) First and last average frost date: First Fall Frost November 1, Last Spring Frost April 2
- 2) Average annual rainfall and average annual snowfall: 42.17 inches rain & 2.6 inches snow
- 3) All time record single day rainfall: 13.30 inches July 03, 1903
- 4) What is the lowest temperature reached in an average year(in what month?): 31.8°F , January
- 5) All time record low temperature (what year?): -5.0°F, February 18, 1910
- 6) What is the highest temperature reached in an average year(in what month?): 95.3°F, August
- 7) All time record high temperature (what year?): 115.0°F, August 10, 1936
- 8) Any other interesting climatic data you run across: Salqīn, Syria (6,740 miles away) is the far-away foreign place with temperatures most similar to Bonham

### Source Link:

<https://weatherspark.com/y/8872/Average-Weather-in-Bonham-Texas-United-States-Year-Round>

<http://www.city-data.com/city/Dodd-City-Texas.html>

<https://www.weatherbase.com/weather/weather-summary.php3?s=329014&cityname=Bonham%2C+Texas%2C+United+States+of+America&units=>

<https://wrcc.dri.edu/cgi-bin/cliMAIN.pl?tx0923>

<https://www.almanac.com/gardening/frostdates/zipcode/75438>



This climate is characterized by relatively high temperatures and evenly distributed precipitation throughout the year. This climate type is found on the eastern sides of the continents between 20° and 35° N and S latitude. In summer, these regions are largely under the influence of moist, maritime airflow from the western side of the subtropical anticyclonic cells over low-latitude ocean waters. Temperatures are high and can lead to warm, oppressive nights. Summers are usually somewhat wetter than winters, with much of the rainfall coming from convectional thunderstorm activity; tropical cyclones also enhance warm-season rainfall in some regions. The coldest month is usually quite mild, although frosts are not uncommon, and winter precipitation is derived primarily from frontal cyclones along the polar front.

The Köppen Climate Classification subtype for this climate is "Cfa". (Humid Subtropical Climate).

The average temperature for the year in Bonham is 63.6°F (17.6°C). The warmest month, on average, is July with an average temperature of 83.2°F (28.4°C). The coolest month on average is January, with an average temperature of 42.6°F (5.9°C).

The highest recorded temperature in Bonham is 115.0°F (46.1°C), which was recorded in August. The lowest recorded temperature in Bonham is -5.0°F (-20.6°C), which was recorded in January.

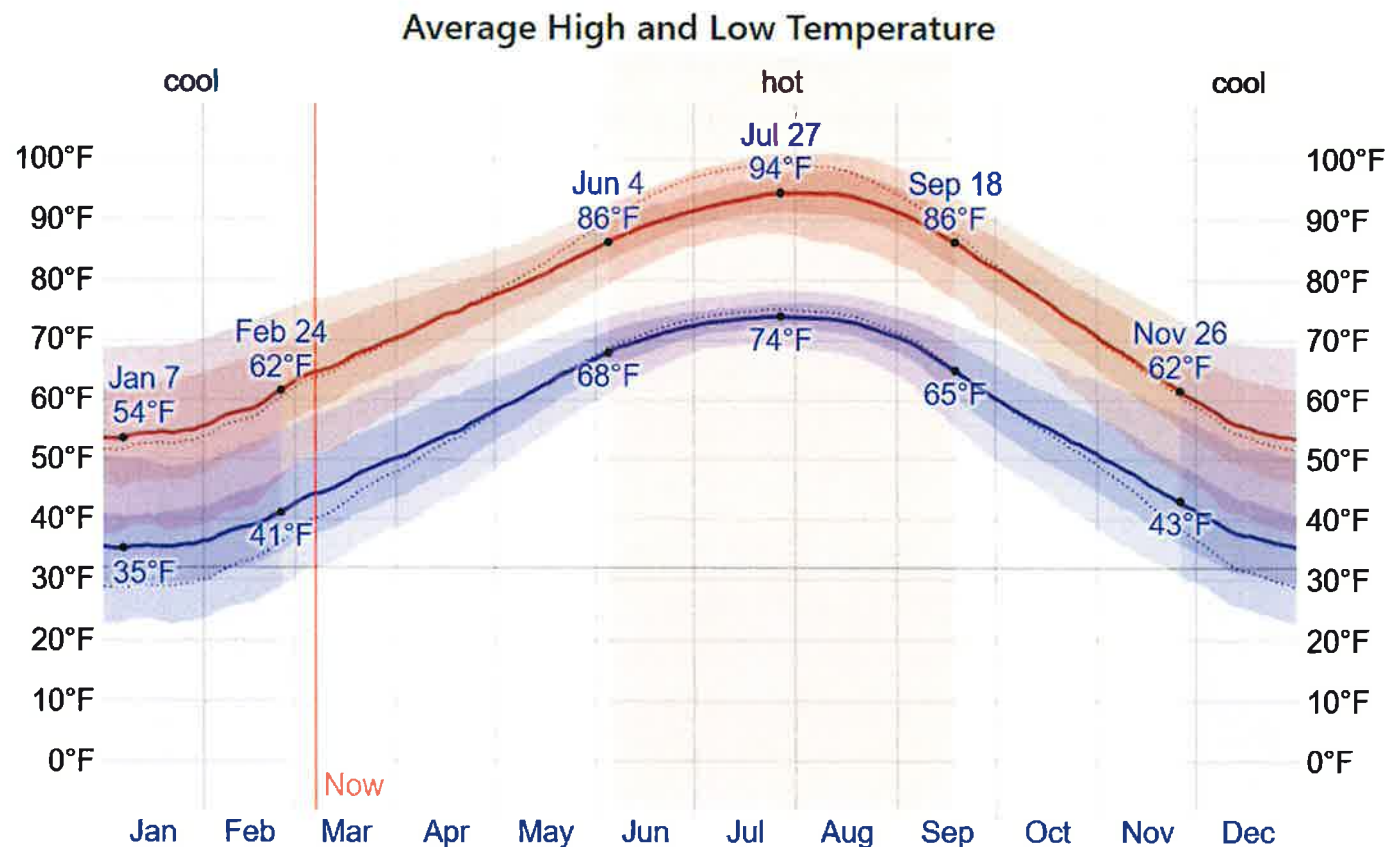
The average amount of precipitation for the year in Bonham is 42.3" (1074.4 mm). The month with the most precipitation on average is May with 5.2" (132.1 mm) of precipitation. The month with the least precipitation on average is August with an average of 2.4" (61 mm). There are an average of 74.0 days of precipitation, with the most precipitation occurring in May with 8.0 days and the least precipitation occurring in July with 5.0 days. In Bonham, there's an average of 2.7" of snow (0 cm). The month with the most snow in January, with 1.1" of snow (2.8 cm).

Source: <https://www.weatherbase.com/weather/weather-summary.php3?s=329014&cityname=Bonham%2C+Texas%2C+United+States+of+America&units=>

# Temperature

The hot season lasts for 3.4 months, from June 4 to September 18, with an average daily high temperature above 86°F. The hottest day of the year is July 27, with an average high of 94°F and low of 74°F.

The cool season lasts for 3.0 months, from November 26 to February 24, with an average daily high temperature below 62°F. The coldest day of the year is January 7, with an average low of 35°F and high of 54°F.



*The daily average high (red line) and low (blue line) temperature, with 25th to 75th and 10th to 90th percentile bands. The thin dotted lines are the corresponding average perceived temperatures.*

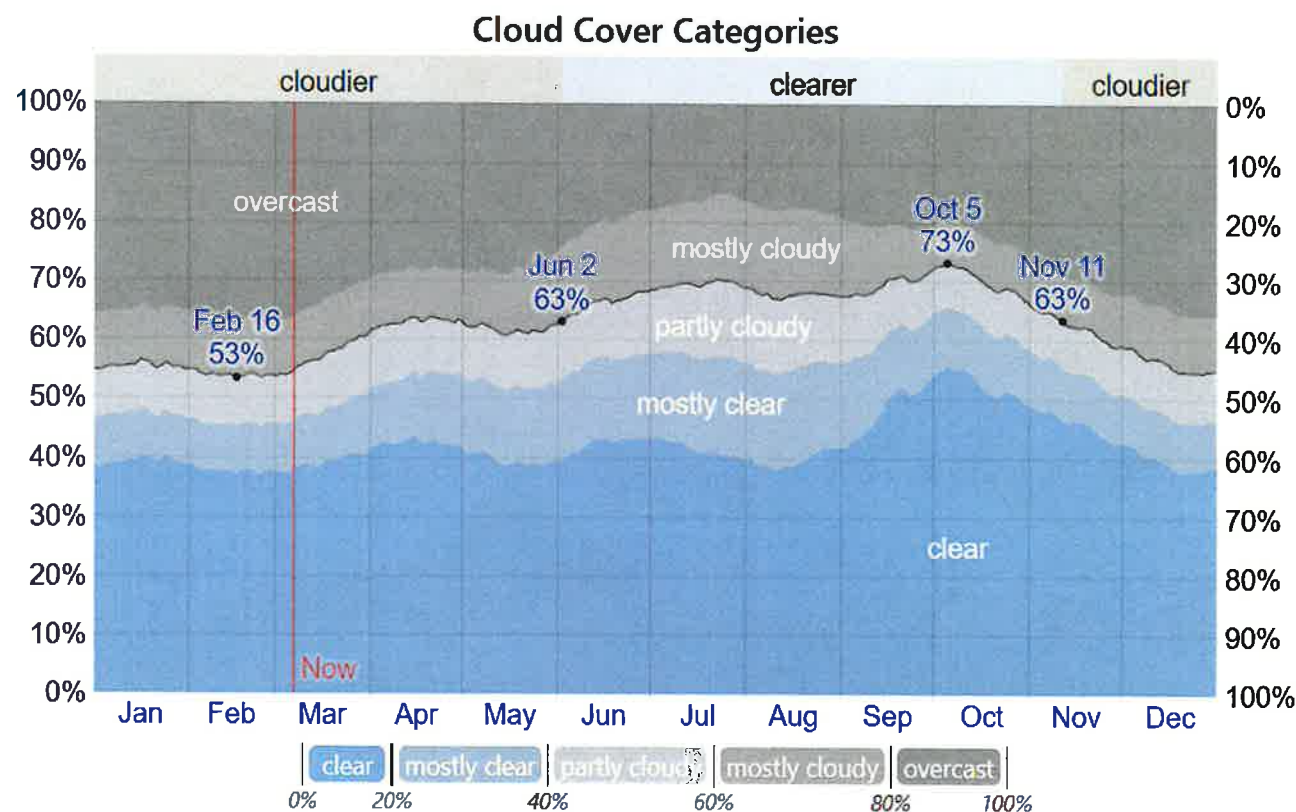
# Clouds

In Bonham, the average percentage of the sky covered by clouds experiences mild seasonal variation over the course of the year.

The clearer part of the year in Bonham begins around June 2 and lasts for 5.3 months, ending around November 11. On October 5, the clearest day of the year, the sky is clear, mostly clear, or partly cloudy 73% of the time, and overcast or mostly cloudy 27% of the time. The cloudier part of the year begins

around November 11 and lasts for 6.7 months, ending around June 2.

On February 16, the cloudiest day of the year, the sky is overcast or mostly cloudy 47% of the time, and clear, mostly clear, or partly cloudy 53% of the time.



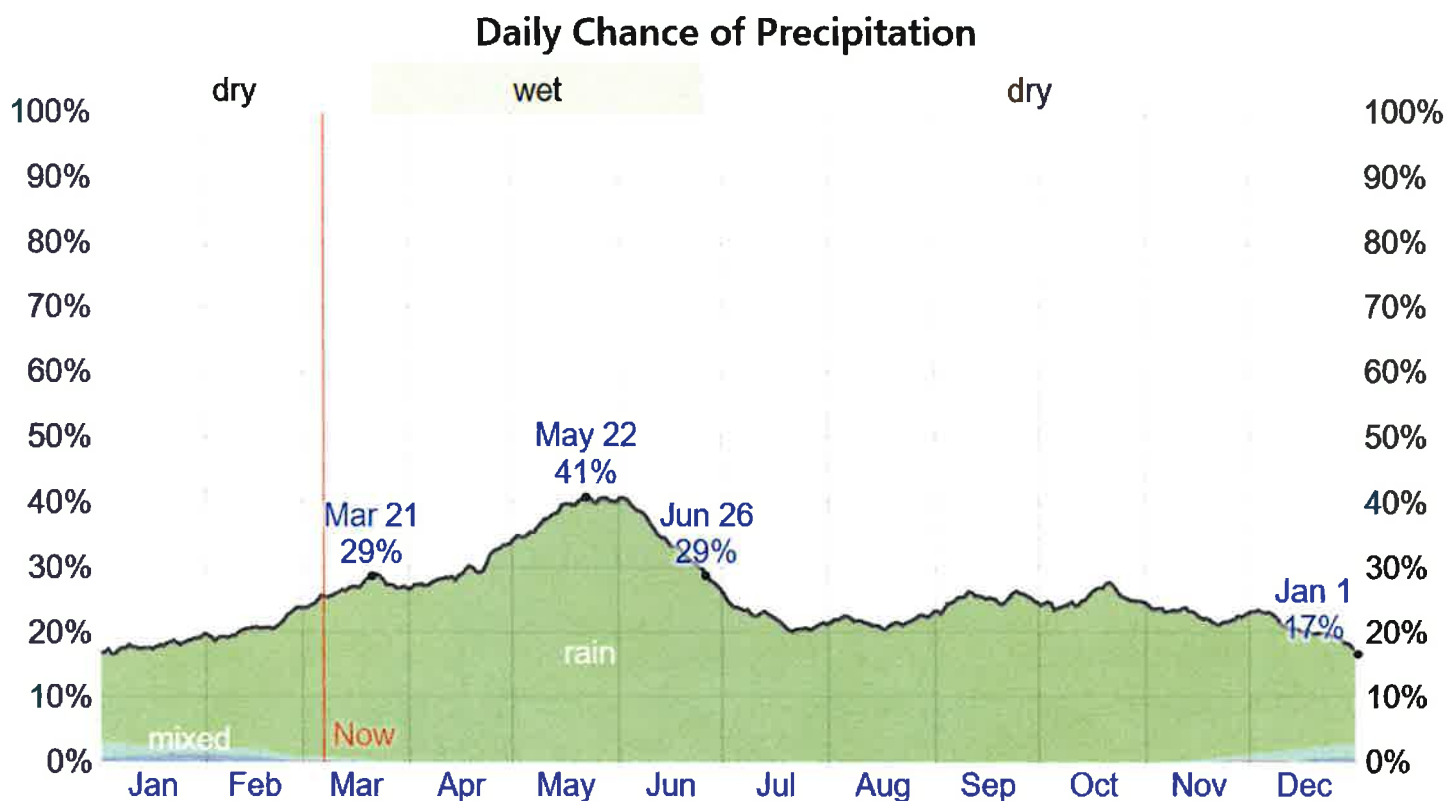
# Precipitation

A wet day is one with at least 0.04 inches of liquid or liquid-equivalent precipitation. The chance of wet days in Bonham varies throughout the year.

The wetter season lasts 3.2 months, from March 21 to June 26, with a greater than 29% chance of a given day being a wet day. The chance of a wet day peaks at 41% on May 22.

The drier season lasts 8.8 months, from June 26 to March 21. The smallest chance of a wet day is 17% on January 1.

Among wet days, we distinguish between those that experience rain alone, snow alone, or a mixture of the two. Based on this categorization, the most common form of precipitation throughout the year is rain alone, with a peak probability of 41% on May 22.



*The percentage of days in which various types of precipitation are observed, excluding trace quantities: rain alone, snow alone, and mixed (both rain and snow fell in the same day).*

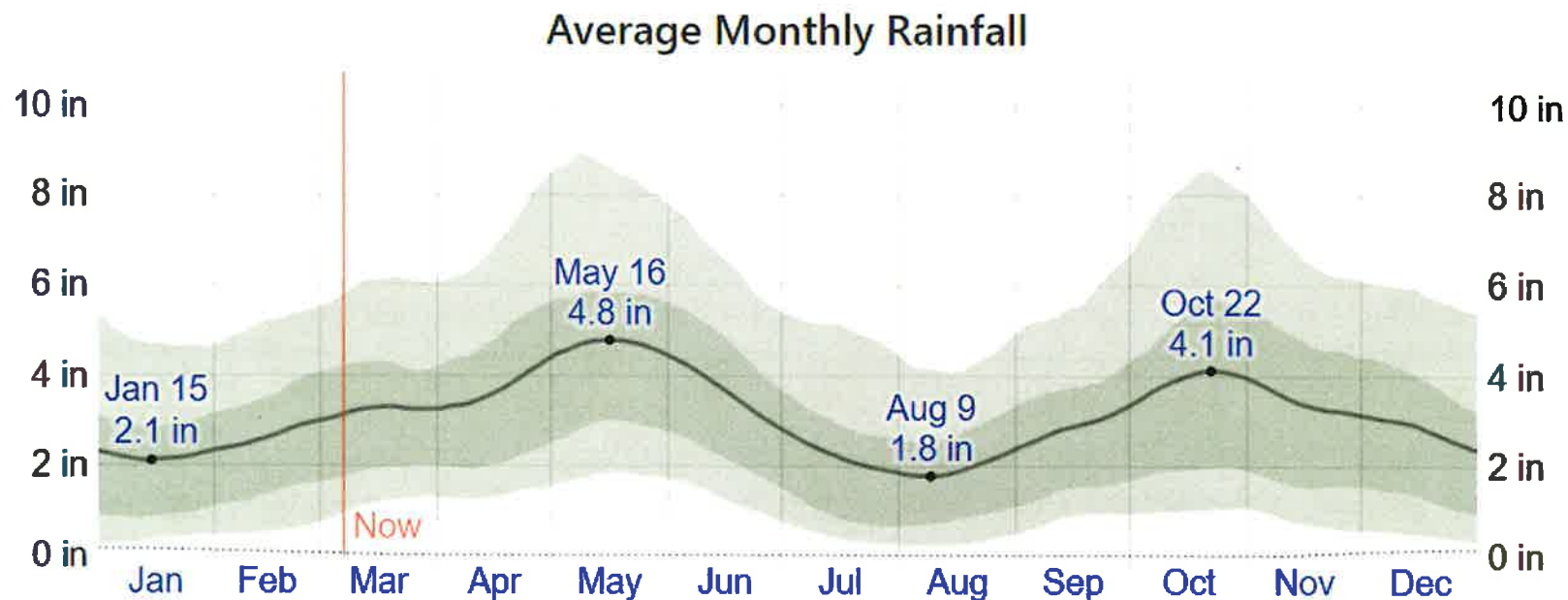


## Rainfall

To show variation within the months and not just the monthly totals, we show the rainfall accumulated over a sliding 31-day period centered around each day of the year. Bonham experiences significant seasonal variation in monthly rainfall.

Rain falls throughout the year in Bonham. The most rain falls during the 31 days centered around May 16, with an average total accumulation of 4.8 inches.

The least rain falls around August 9, with an average total accumulation of 1.8 inches.

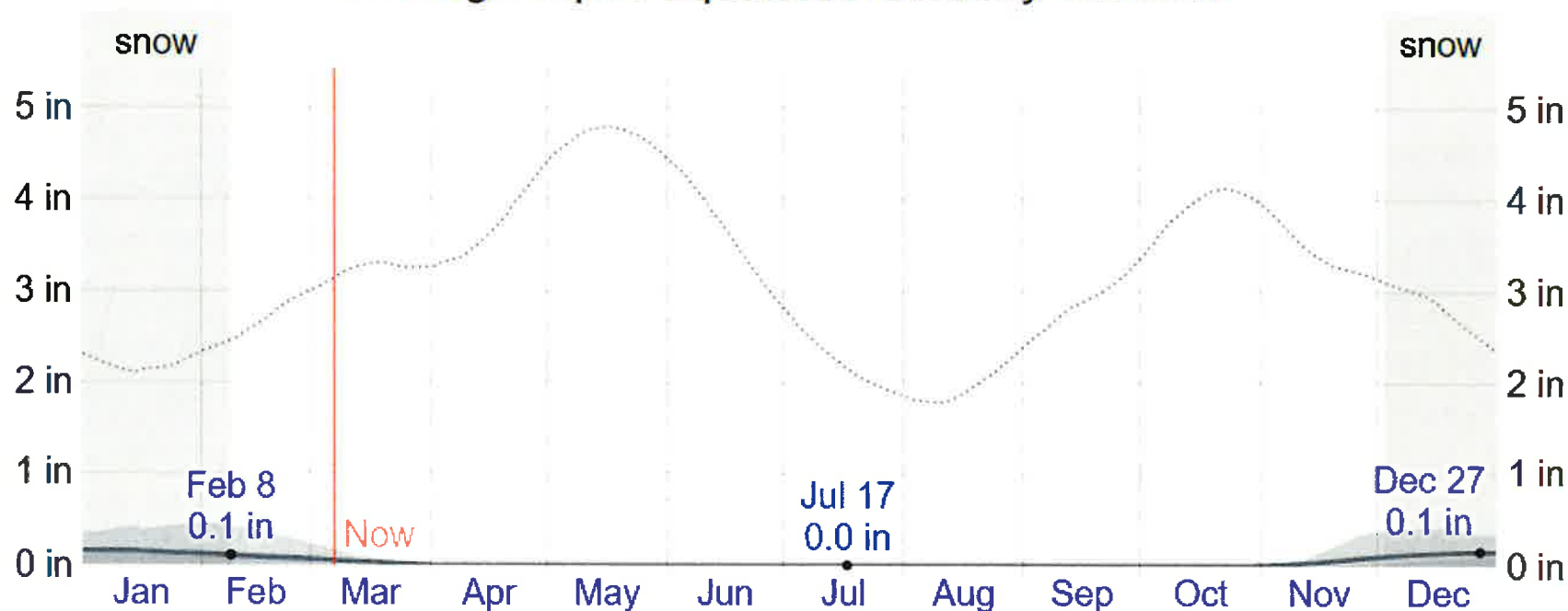


*The average rainfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average liquid-equivalent snowfall.*

# Snowfall

The sliding 31-day liquid-equivalent quantity of snowfall in Bonham does not vary significantly over the course of the year, staying within 0.1 inches of 0.1 inches throughout.

## Average Liquid-Equivalent Monthly Snowfall



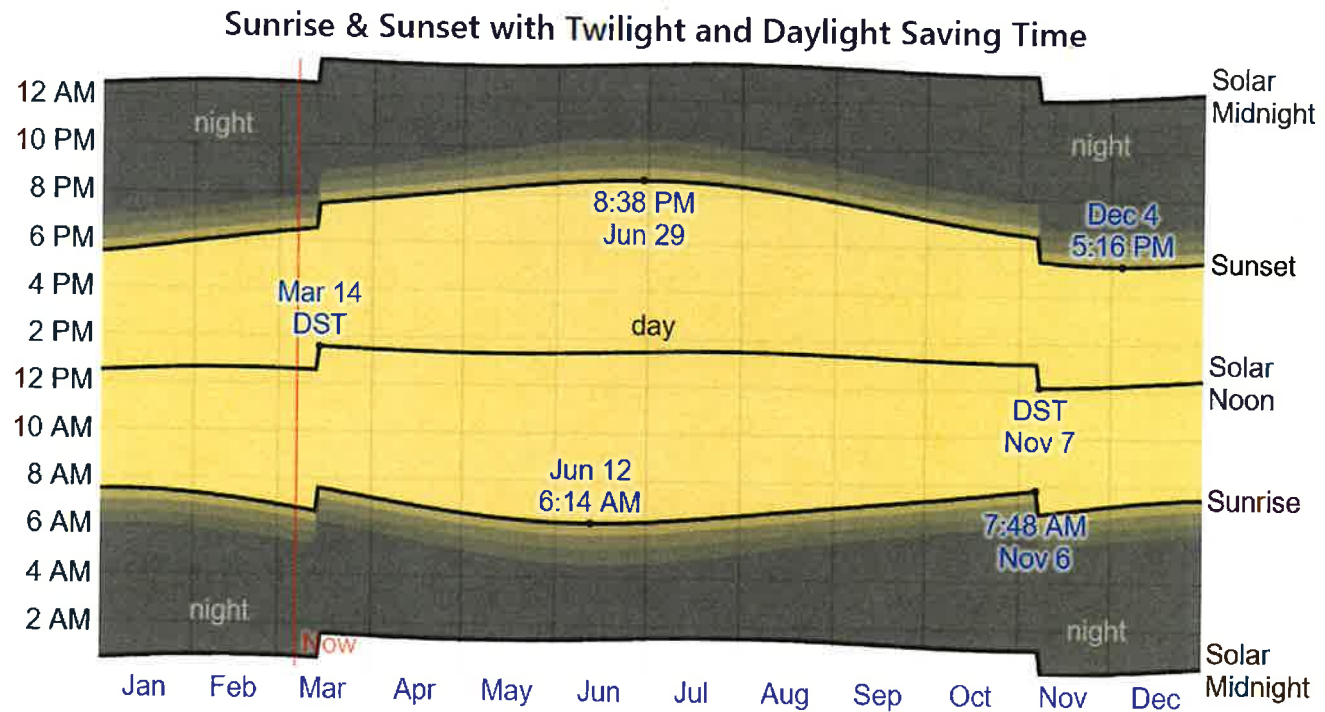
*The average liquid-equivalent snowfall (solid line) accumulated over the course of a sliding 31-day period centered on the day in question, with 25th to 75th and 10th to 90th percentile bands. The thin dotted line is the corresponding average rainfall.*

# Sun

The length of the day in Bonham varies significantly over the course of the year. In 2021, the shortest day is December 21, with 9 hours, 55 minutes of daylight; the longest day is June 20, with 14 hours, 23 minutes of daylight.

The earliest sunrise is at 6:14 AM on June 12, and the latest sunrise is 1 hour, 34 minutes later at 7:48 AM on November 6. The earliest sunset is at 5:16 PM on December 4, and the latest sunset is 3 hours, 23 minutes later at 8:38 PM on June 29.

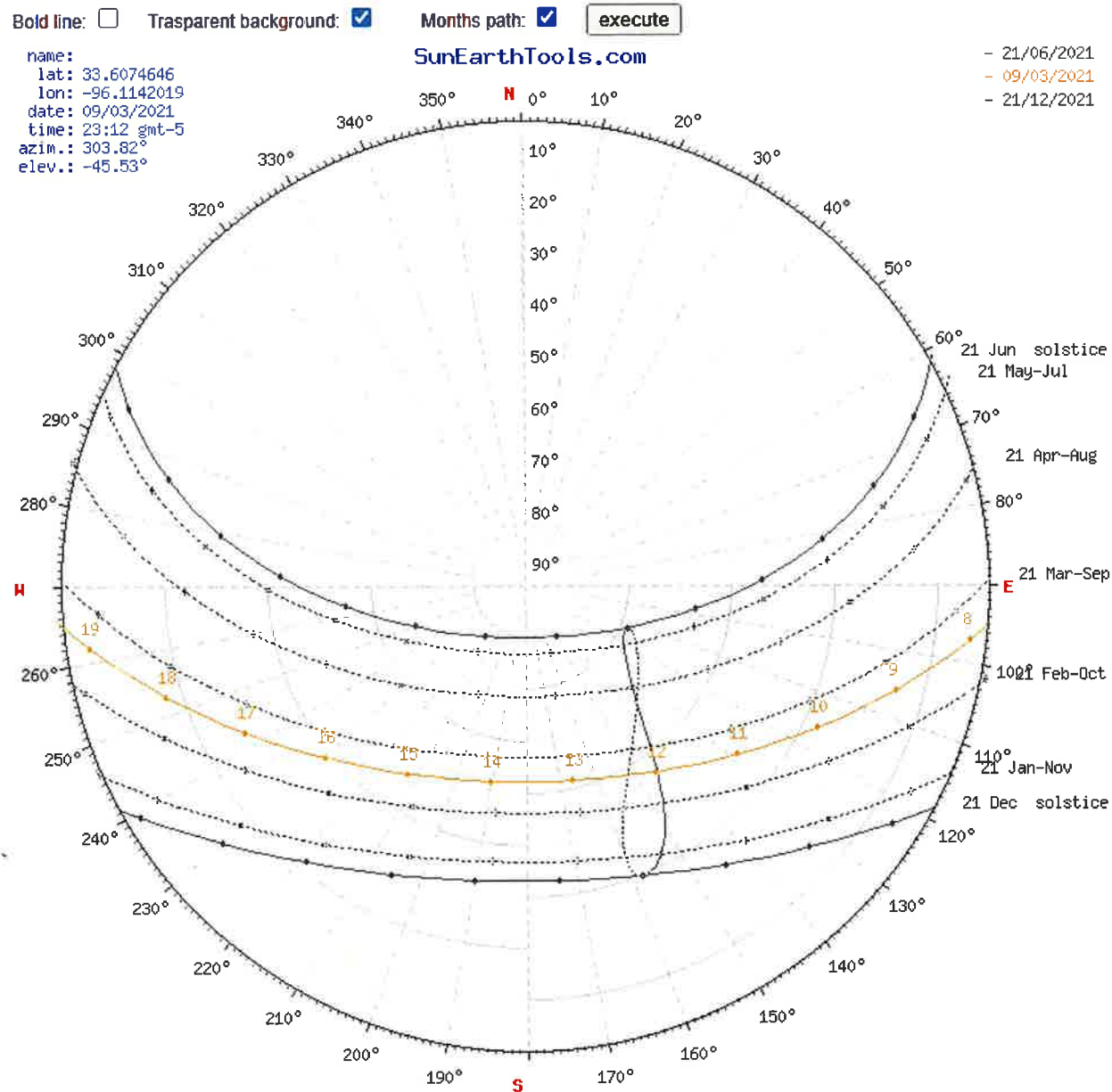
Daylight saving time (DST) is observed in Bonham during 2021, starting in the spring on March 14, lasting 7.8 months, and ending in the fall on November 7.



*The solar day over the course of the year 2021. From bottom to top, the black lines are the previous solar midnight, sunrise, solar noon, sunset, and the next solar midnight. The day, twilights (civil, nautical, and astronomical), and night are indicated by the color bands from yellow to gray. The transitions to and from daylight saving time are indicated by the 'DST' labels.*

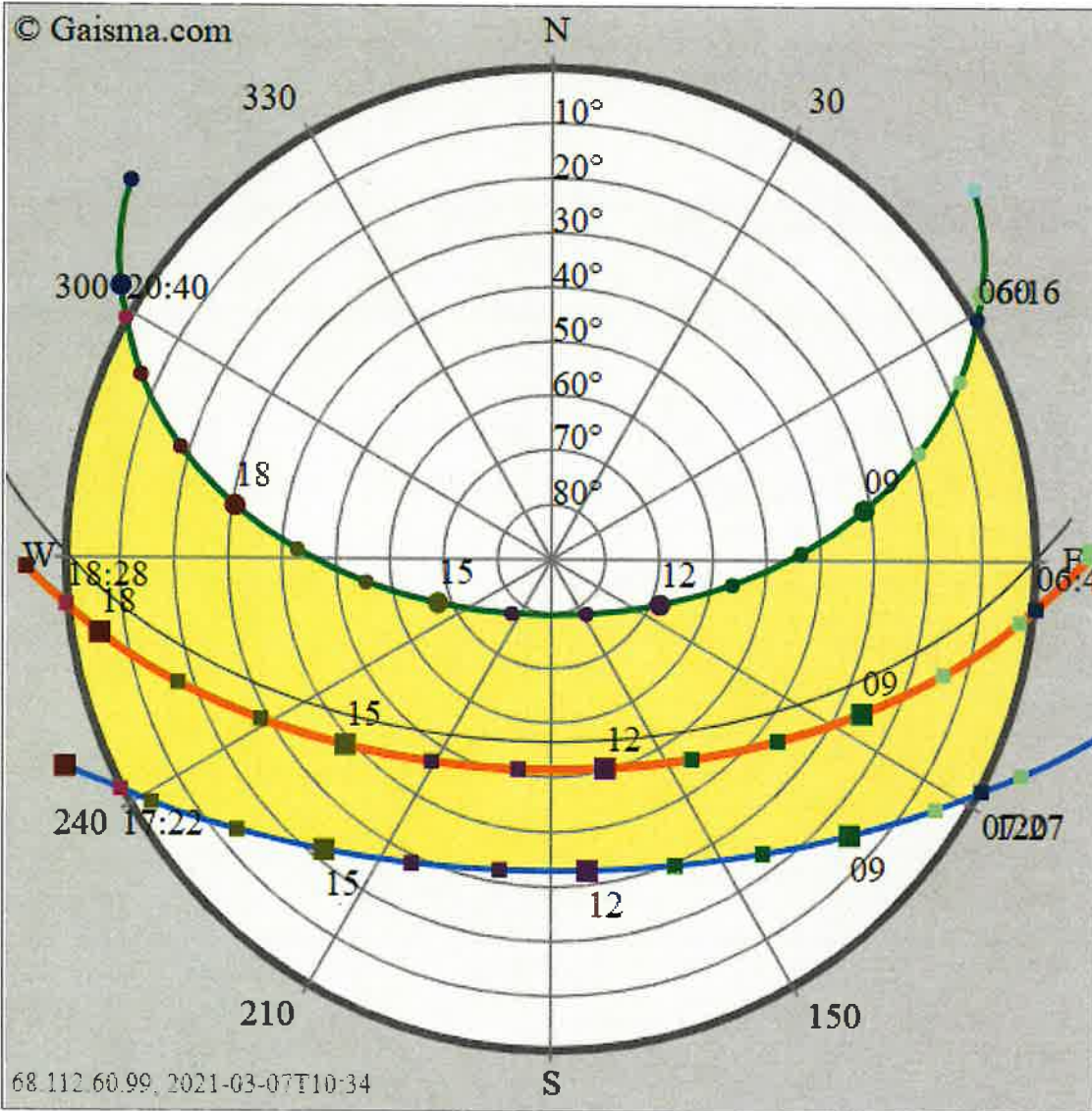


# Solar Aspect





© Gaisma.com



## Sun path

- Today
- June solstice
- December solstice
- Annual variation
- Equinox (March and September)

## Sunrise/sunset

- Sunrise
- Sunset

## Time

- 00-02
- 03-05
- 06-08
- 09-11
- 12-14
- 15-17
- 18-20
- 21-23



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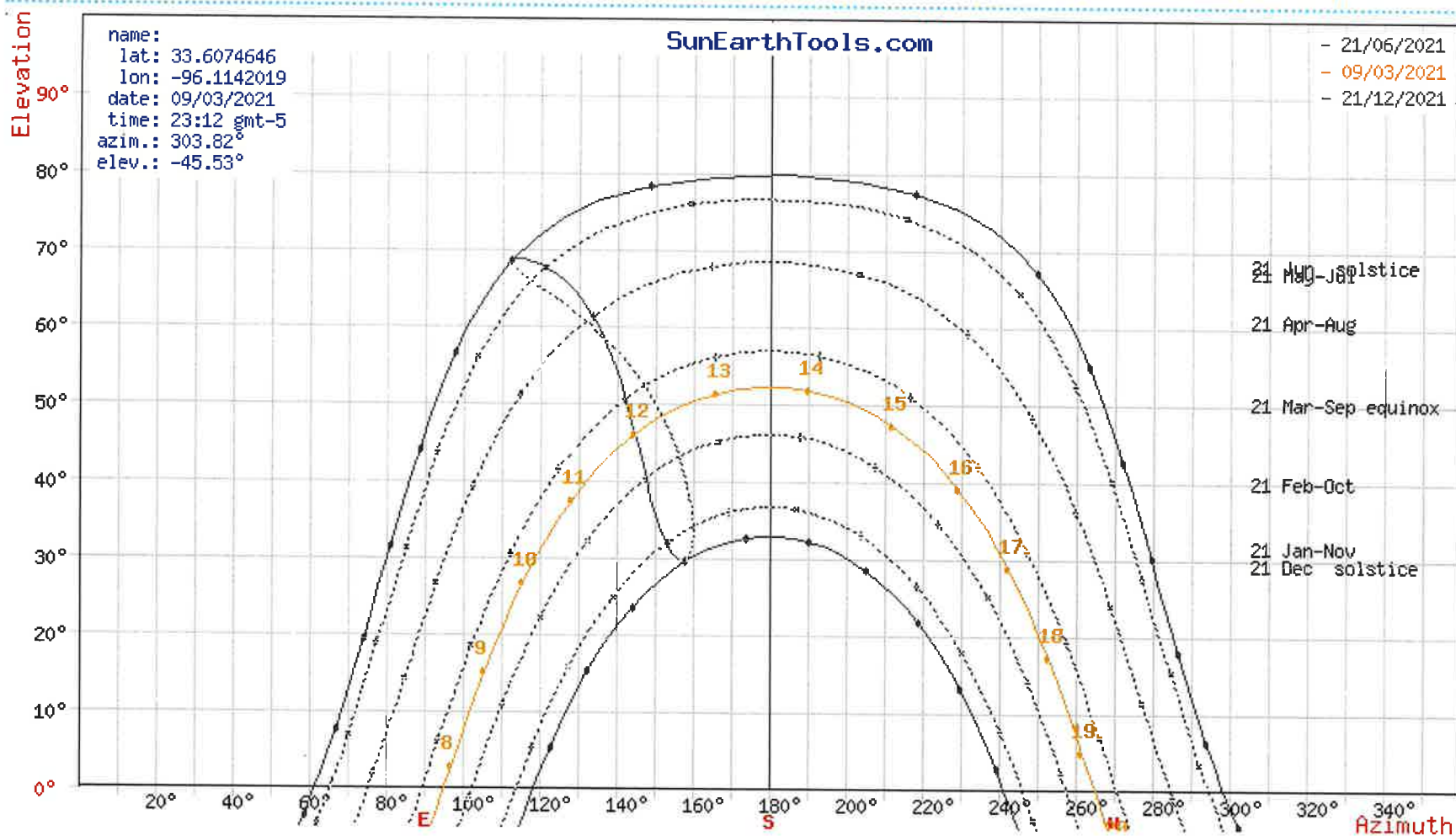
[Chart Cartesian](#)

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[shadow](#)

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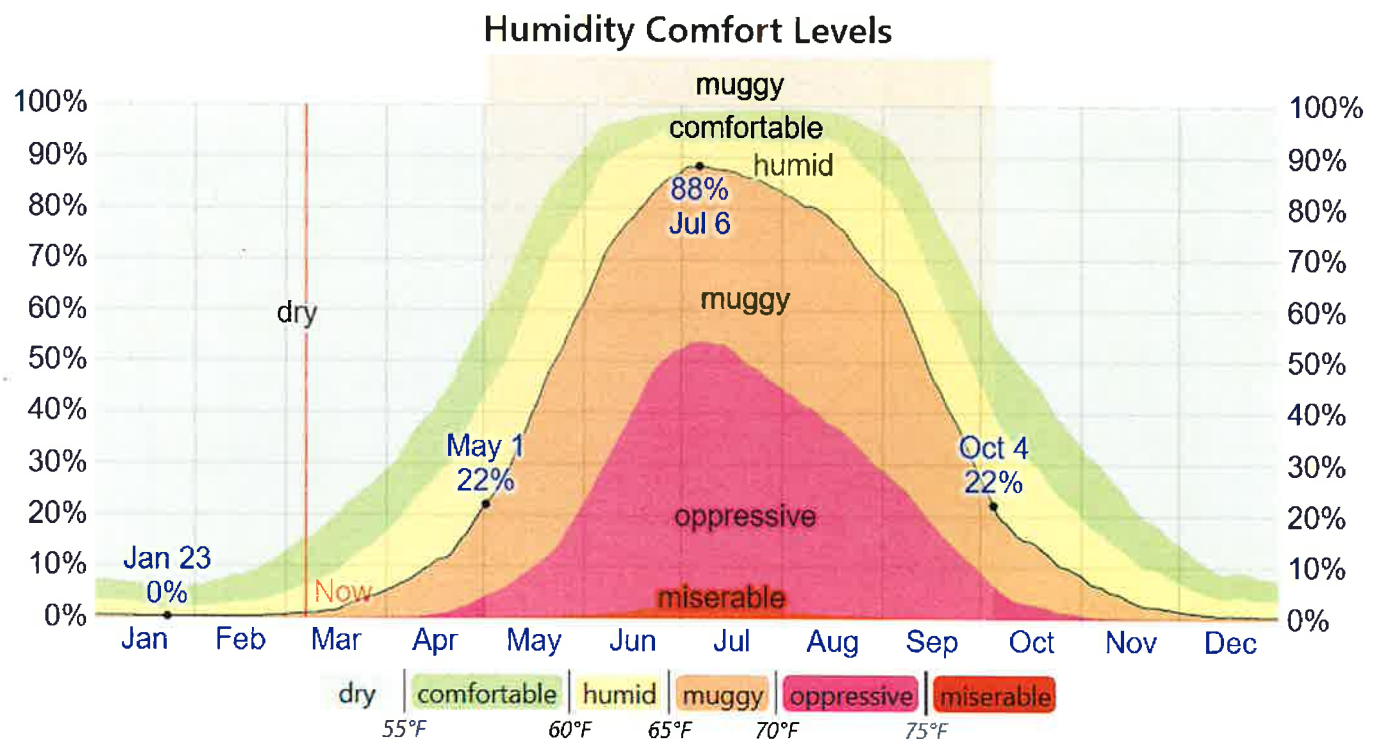


# Humidity

We base the humidity comfort level on the dew point, as it determines whether perspiration will evaporate from the skin, thereby cooling the body. Lower dew points feel drier and higher dew points feel more humid. Unlike temperature, which typically varies significantly between night and day, dew point tends to change more slowly, so while the temperature may drop at night, a muggy day is typically followed by a muggy night. Bonham experiences extreme seasonal variation in the perceived humidity.

The muggier period of the year lasts for 5.1 months, from May 1 to October 4, during which time the comfort level is muggy, oppressive, or miserable at least 22% of the time. The muggiest day of the year is July 6, with muggy conditions 88% of the time.

The least muggy day of the year is January 23, when muggy conditions are essentially unheard of.



*The percentage of time spent at various humidity comfort levels, categorized by dew point.*



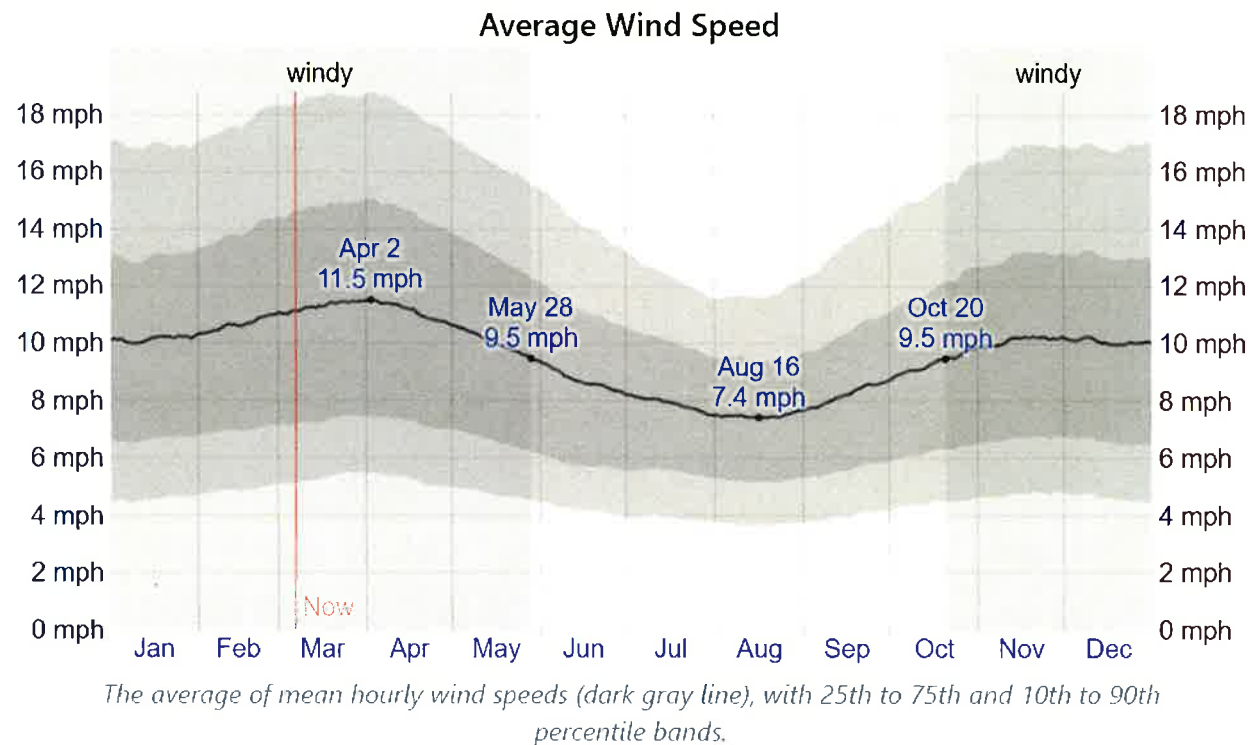
# Wind

This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters above the ground. The wind experienced at any given location is highly dependent on local topography and other factors, and instantaneous wind speed and direction vary more widely than hourly averages.

The average hourly wind speed in Bonham experiences significant seasonal variation over the course of the year.

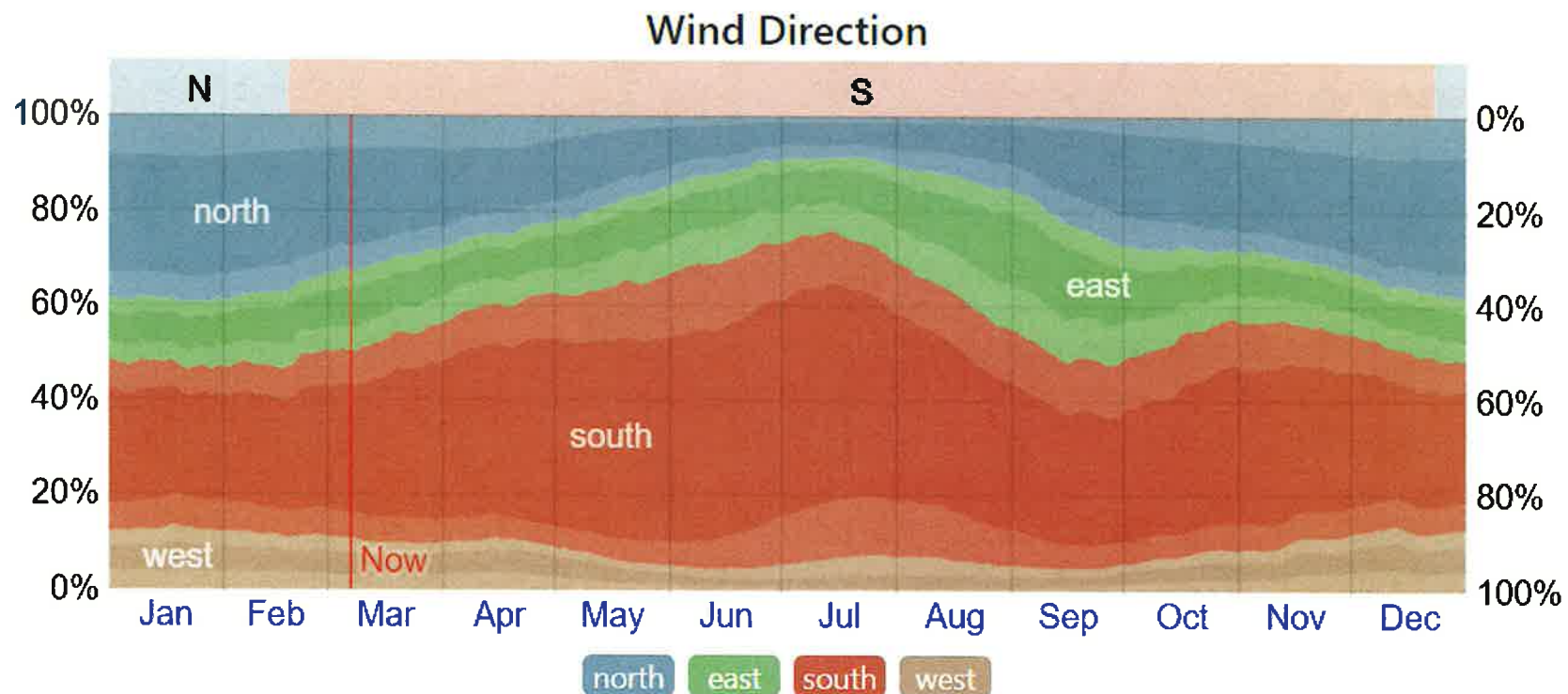
The windier part of the year lasts for 7.2 months, from October 20 to May 28, with average wind speeds of more than 9.5 miles per hour. The windiest day of the year is April 2, with an average hourly wind speed of 11.5 miles per hour.

The calmer time of year lasts for 4.8 months, from May 28 to October 20. The calmest day of the year is August 16, with an average hourly wind speed of 7.4 miles per hour.



This section discusses the wide-area hourly average wind vector (speed and direction) at 10 meters (33') above the ground. The wind experienced at any given location is highly dependent on local topography. The predominant average hourly wind direction in Bonham varies throughout the year.

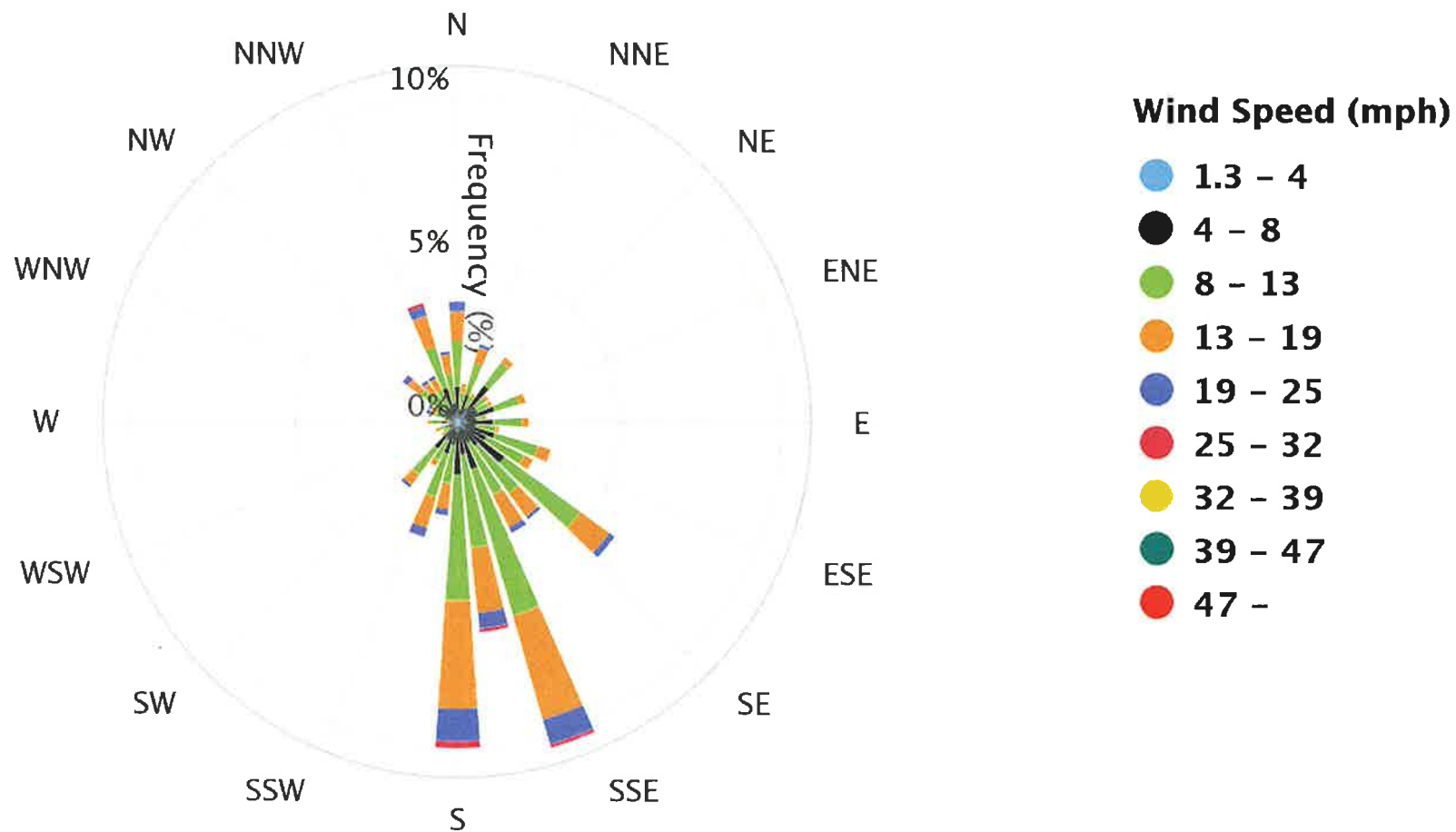
The wind is most often from the south for 10 months, from February 18 to December 23, with a peak percentage of 69% on July 6. The wind is most often from the north for 1.8 months, from December 23 to February 18, with a peak percentage of 38% on January 1.



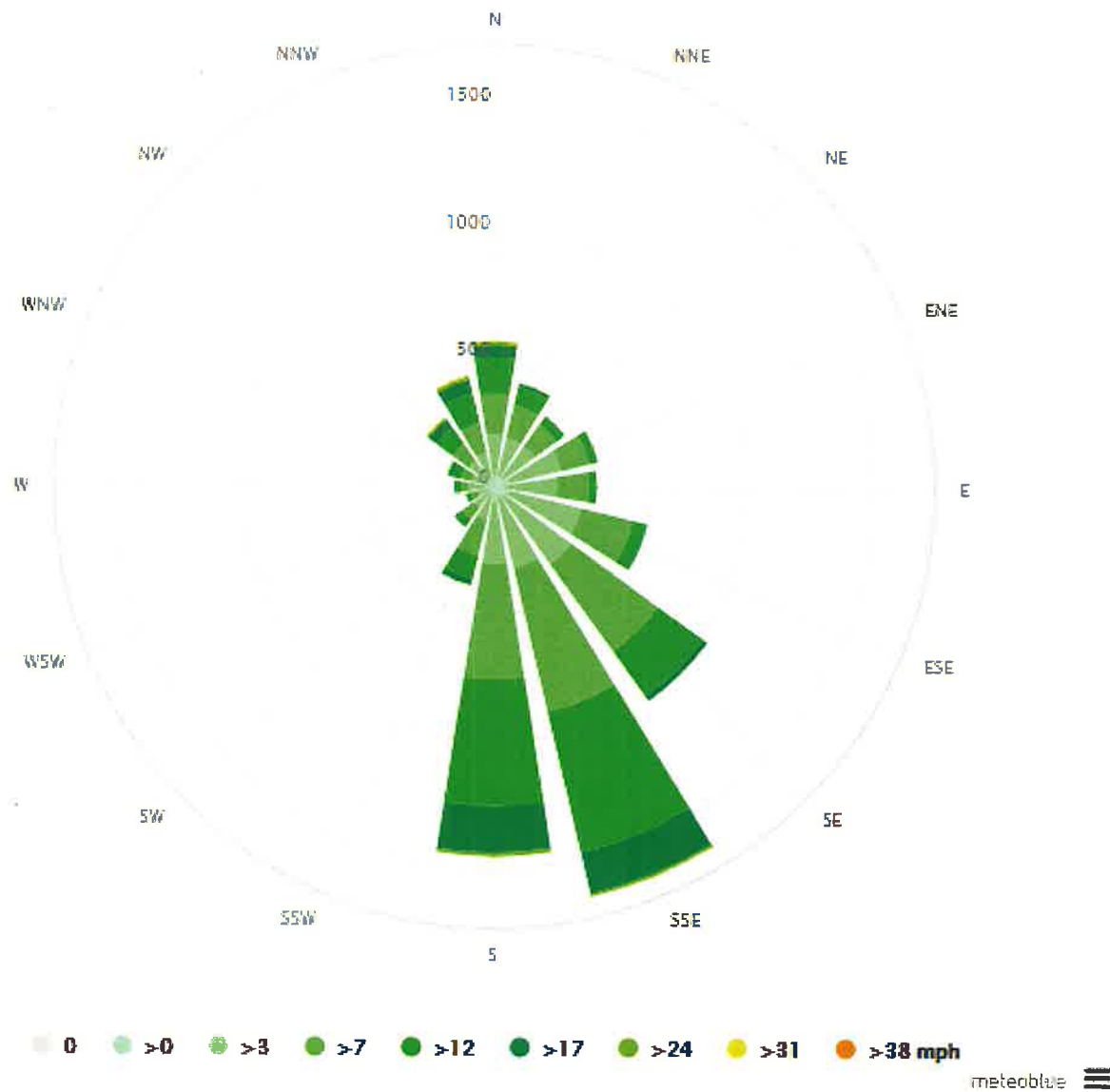
*The percentage of hours in which the mean wind direction is from each of the four cardinal wind directions, excluding hours in which the mean wind speed is less than 1.0 mph. The lightly tinted areas at the boundaries are the percentage of hours spent in the implied intermediate directions (northeast, southeast, southwest, and northwest).*

# DALLAS LOVE FLD (TX) Wind Rose

July 1, 1946 - Mar. 9, 2021  
Sub-Interval: Jan. 1 - Dec. 31, 0 - 23



## Wind rose



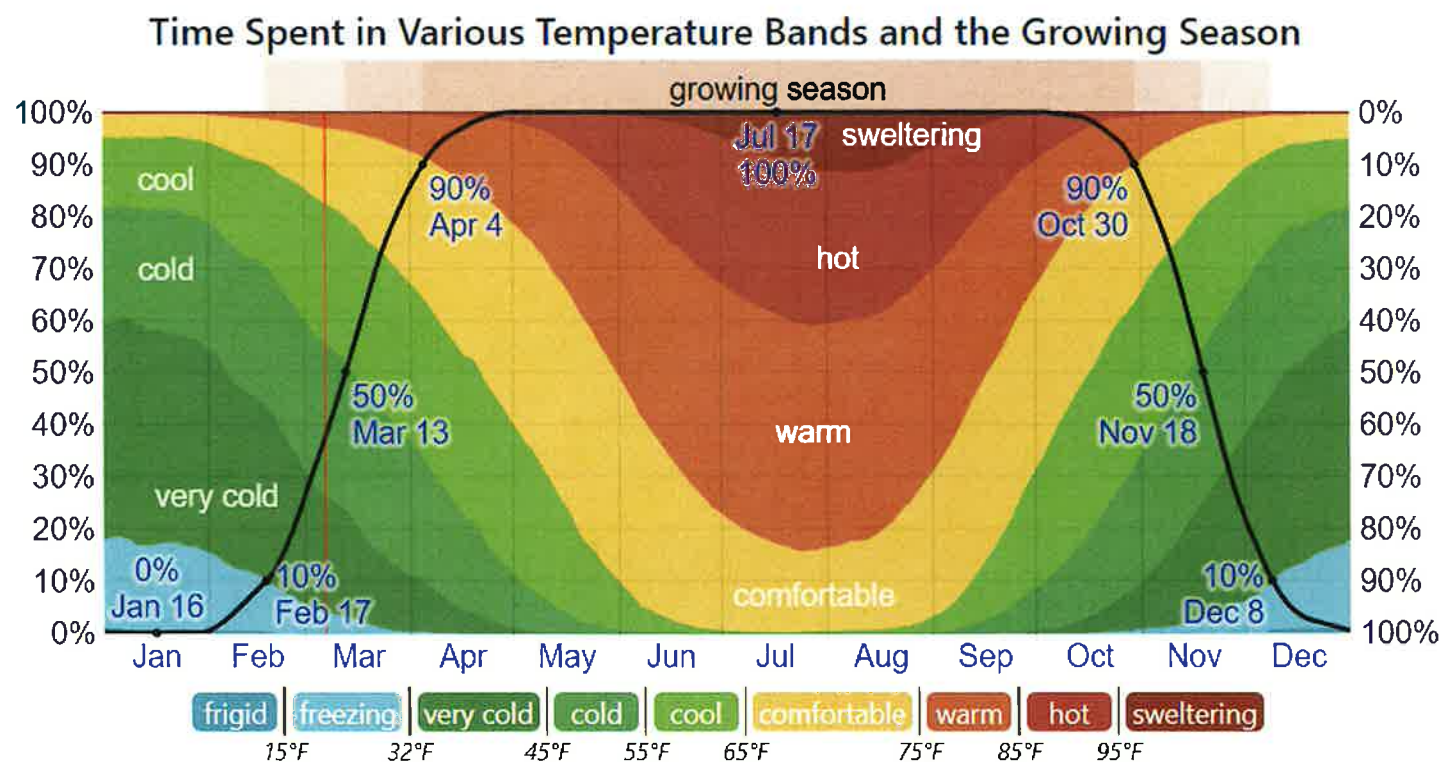
The wind rose for Dallas shows how many hours per year the wind blows from the indicated direction. Example SW: Wind is blowing from South-West (SW) to North-East (NE). [Cape Horn](#), the southernmost land point of South America, has a characteristic strong west-wind, which makes crossings from East to West very difficult especially for sailing boats.



## Growing Season

Definitions of the growing season vary throughout the world, but for the purposes of this report, we define it as the longest continuous period of non-freezing temperatures ( $\geq 32^{\circ}\text{F}$ ) in the year (the calendar year in the Northern Hemisphere, or from July 1 until June 30 in the Southern Hemisphere).

The growing season in Bonham typically lasts for 8.2 months (251 days), from around March 13 to around November 18, rarely starting before February 17 or after April 4, and rarely ending before October 30 or after December 8



*The percentage of time spent in various temperature bands. The black line is the percentage chance that a given day is within the growing season.*

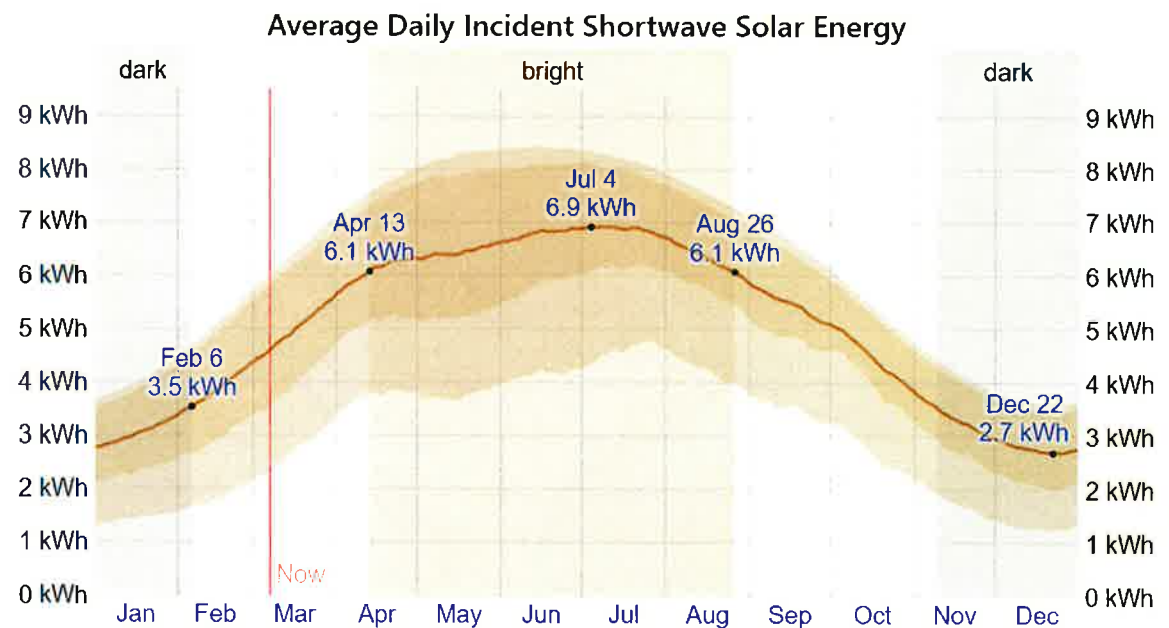
# Solar Energy

This section discusses the total daily incident shortwave solar energy reaching the surface of the ground over a wide area, taking full account of seasonal variations in the length of the day, the elevation of the Sun above the horizon, and absorption by clouds and other atmospheric constituents. Shortwave radiation includes visible light and ultraviolet radiation.

The average daily incident shortwave solar energy experiences significant seasonal variation over the course of the year.

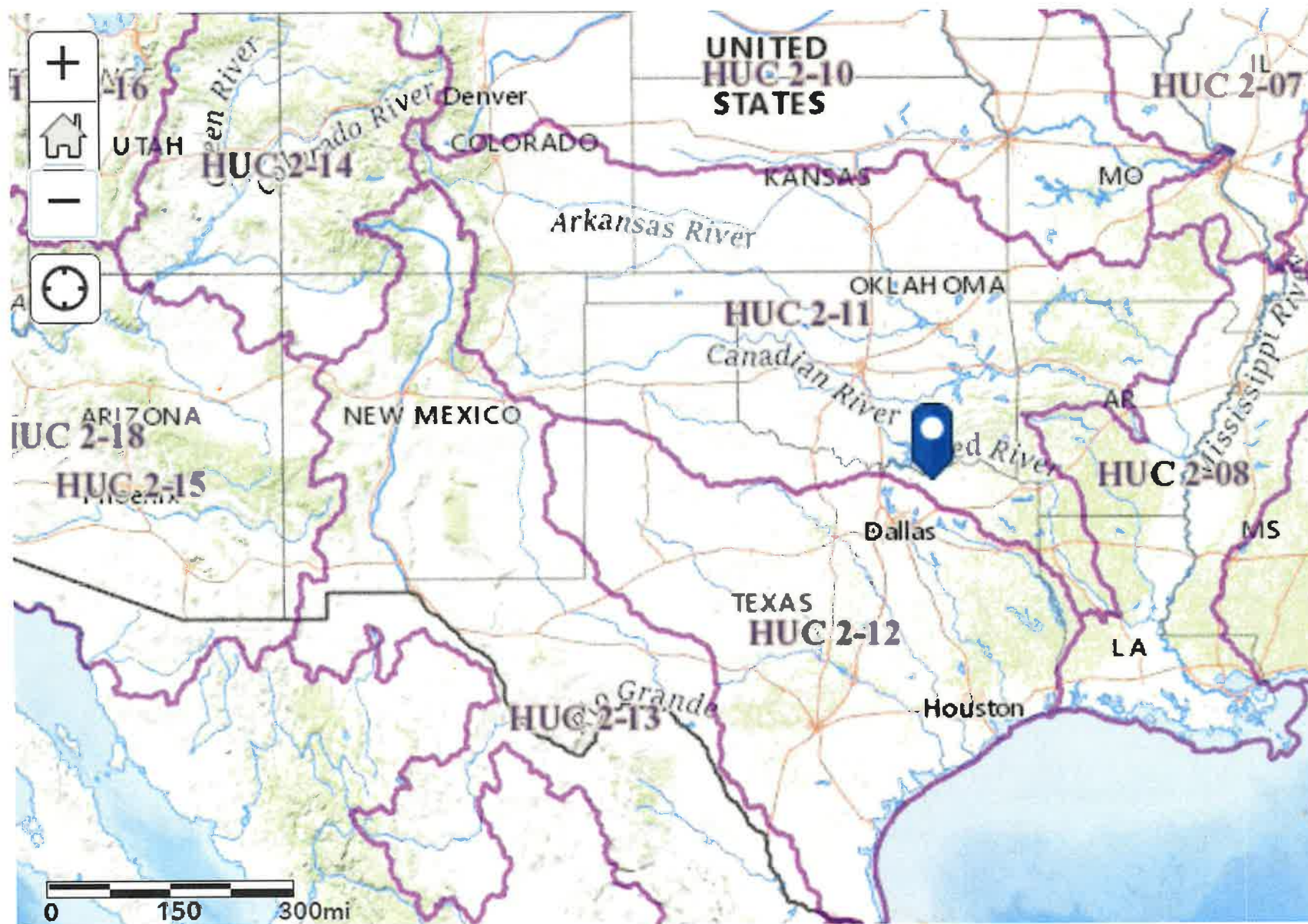
The brighter period of the year lasts for 4.4 months, from April 13 to August 26, with an average daily incident shortwave energy per square meter above 6.1 kWh. The brightest day of the year is July 4, with an average of 6.9 kWh.

The darker period of the year lasts for 2.9 months, from November 9 to February 6, with an average daily incident shortwave energy per square meter below 3.5 kWh. The darkest day of the year is December 22, with an average of 2.7 kWh.

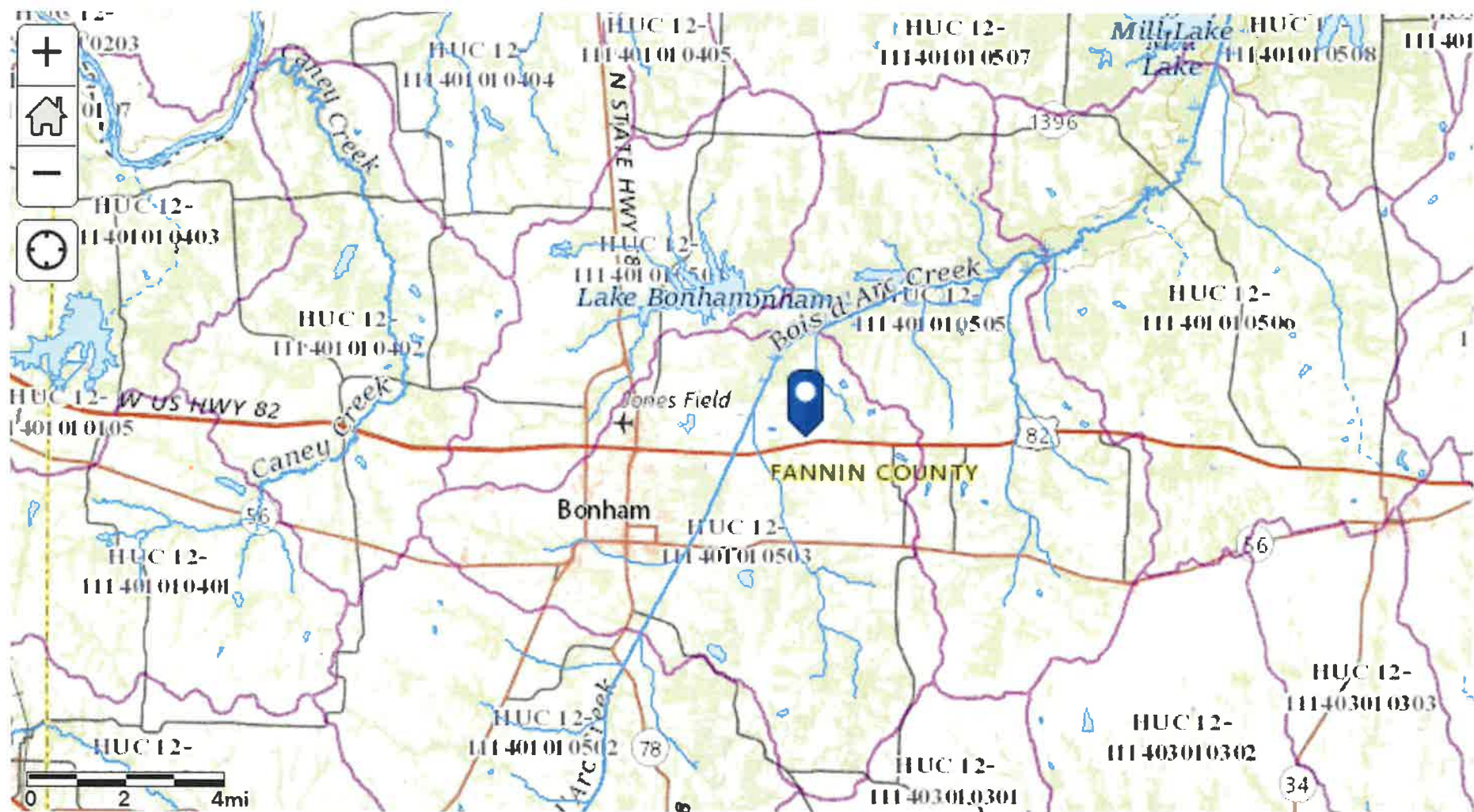


*The average daily shortwave solar energy reaching the ground per square meter (orange line), with 25th to 75th and 10th to 90th percentile bands.*

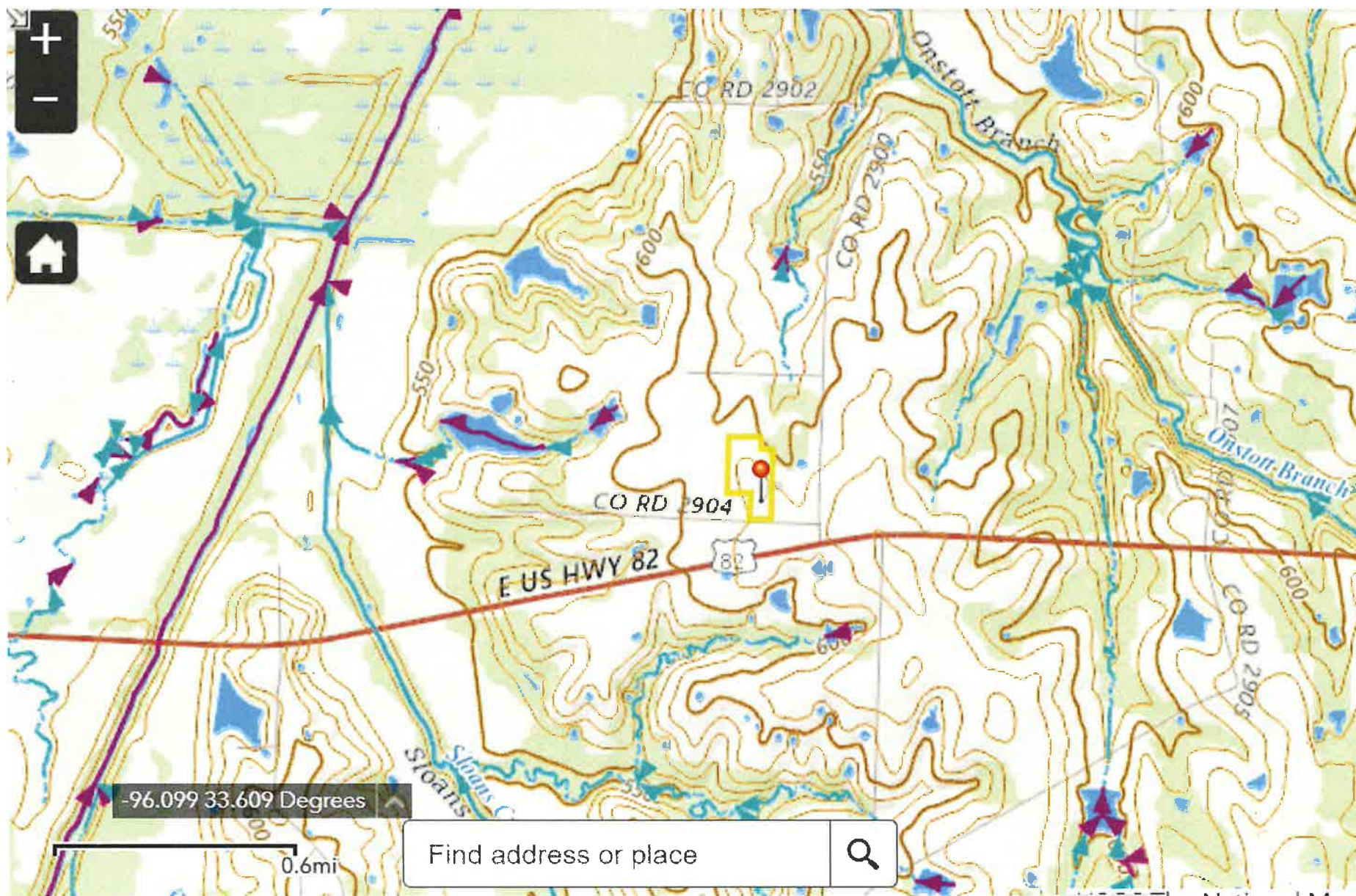
# Watershed Maps



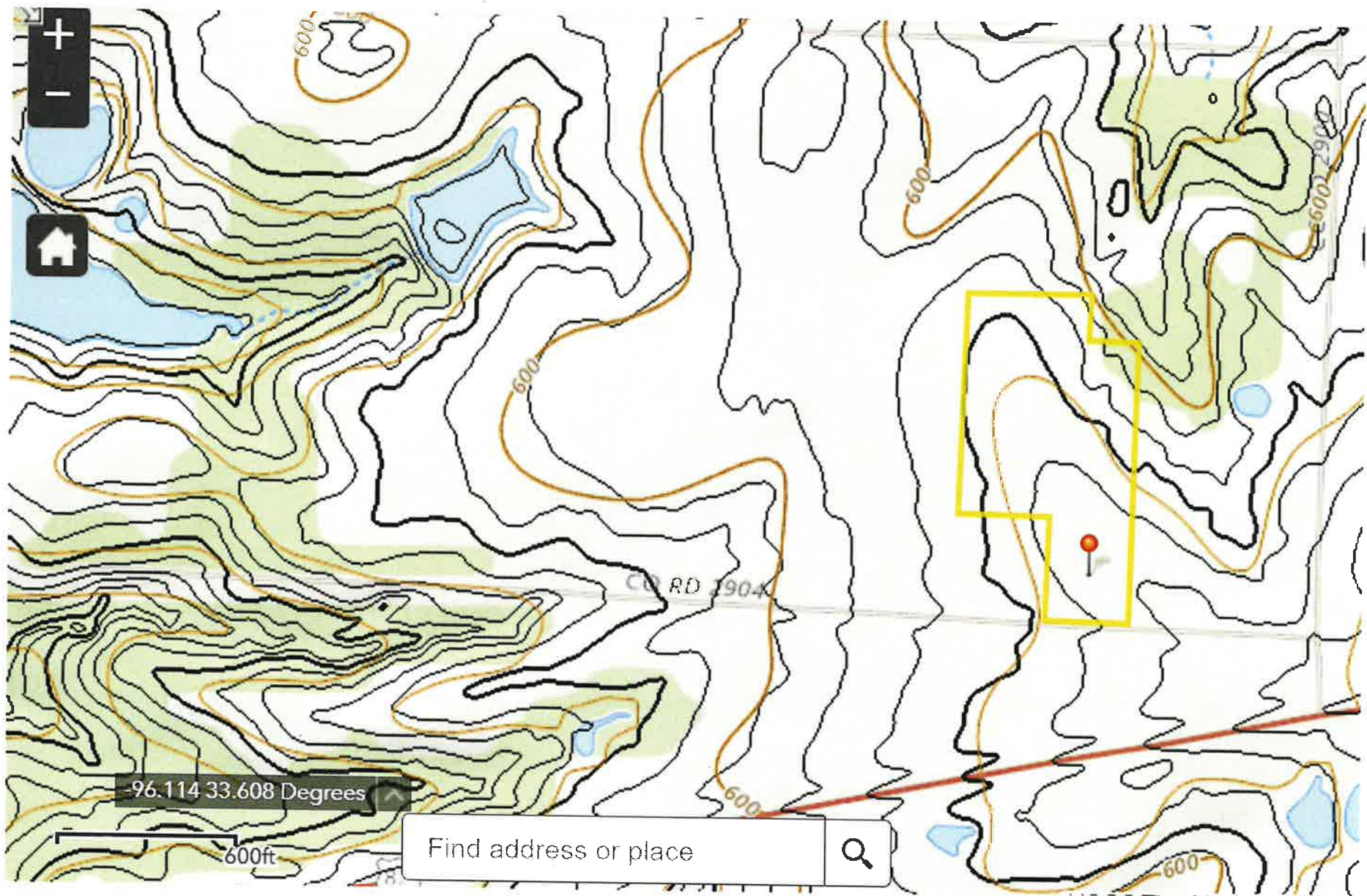














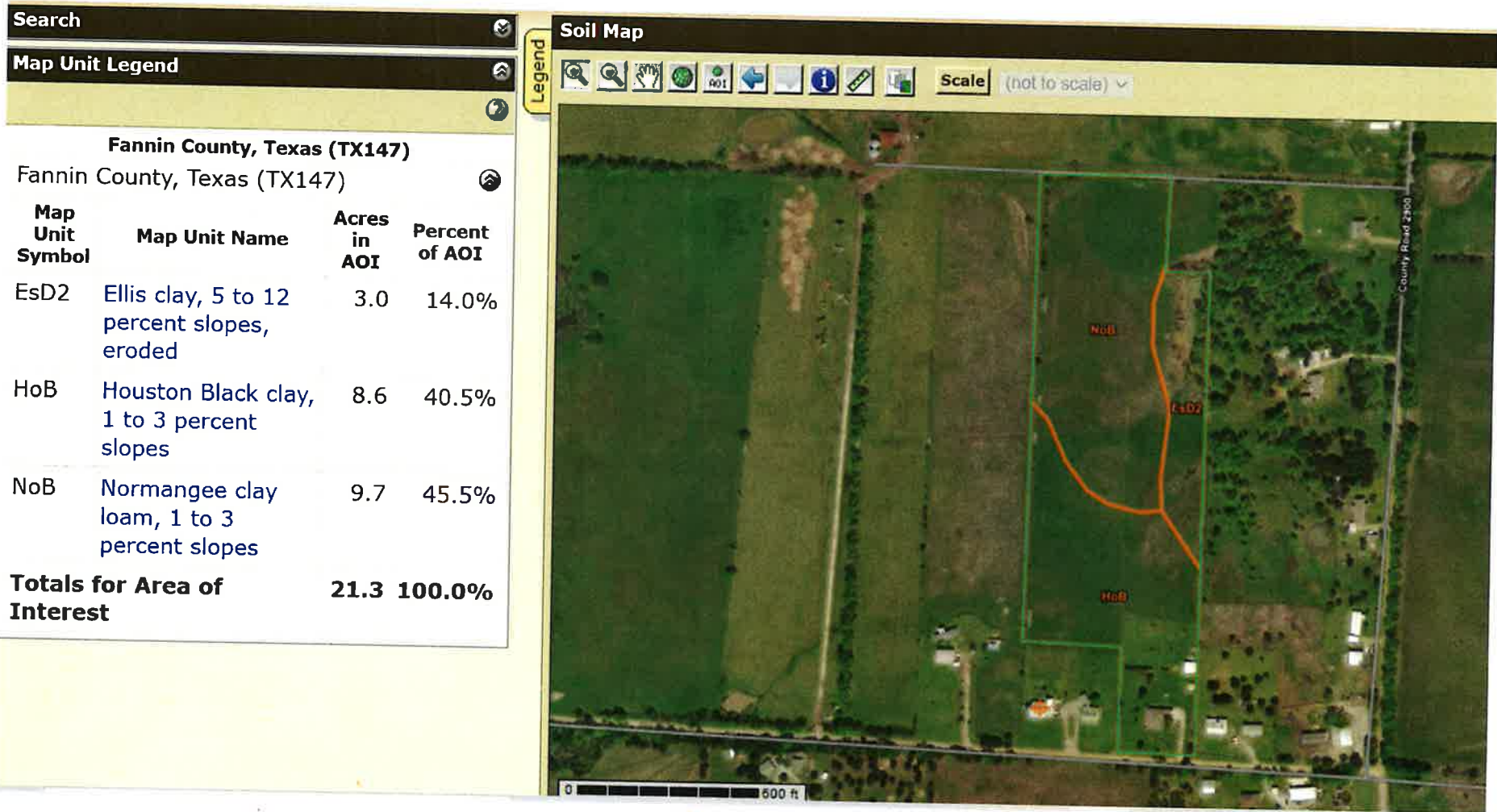
# Topography







# Soil Classifications







Tables — Farmland Classification — Summary By Map Unit

| Summary by Map Unit — Fannin County, Texas (TX147) |                                            |                              |              |                |
|----------------------------------------------------|--------------------------------------------|------------------------------|--------------|----------------|
| Map unit symbol                                    | Map unit name                              | Rating                       | Acres in AOI | Percent of AOI |
| EsD2                                               | Ellis clay, 5 to 12 percent slopes, eroded | Not prime farmland           | 3.2          | 15.2%          |
| HoB                                                | Houston Black clay, 1 to 3 percent slopes  | All areas are prime farmland | 8.7          | 41.7%          |
| NoB                                                | Normangee clay loam, 1 to 3 percent slopes | Not prime farmland           | 9.0          | 43.1%          |
| Totals for Area of Interest                        |                                            |                              | 20.9         | 100.0%         |



Warning: Soil Ratings Map may not be valid at this scale.

# Tables — Ecological Classification Name: NRCS Rangeland Site — Summary By Map Unit

## Summary by Map Unit — Fannin County, Texas (TX147)

Summary by Map Unit — Fannin County, Texas (TX147)

| Map unit symbol                    | Map unit name                              | Rating                    | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------|---------------------------|--------------|----------------|
| EsD2                               | Ellis clay, 5 to 12 percent slopes, eroded | Northern Eroded Blackland | 3.2          | 15.2%          |
| HoB                                | Houston Black clay, 1 to 3 percent slopes  | Northern Blackland        | 8.7          | 41.7%          |
| NoB                                | Normangee clay loam, 1 to 3 percent slopes | Southern Claypan Prairie  | 9.0          | 43.1%          |
| <b>Totals for Area of Interest</b> |                                            |                           | <b>20.9</b>  | <b>100.0%</b>  |





Warning: Soil Ratings Map may not be valid at this scale.

#### Tables — Nonirrigated Capability Class — Summary By Map Unit

##### Summary by Map Unit — Fannin County, Texas (TX147)

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| Map unit symbol                    | Map unit name                              | Rating | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------|--------|--------------|----------------|
| EsD2                               | Ellis clay, 5 to 12 percent slopes, eroded | 6      | 3.2          | 15.2%          |
| HoB                                | Houston Black clay, 1 to 3 percent slopes  | 2      | 8.7          | 41.7%          |
| NoB                                | Normangee clay loam, 1 to 3 percent slopes | 3      | 9.0          | 43.1%          |
| <b>Totals for Area of Interest</b> |                                            |        | <b>20.9</b>  | <b>100.0%</b>  |

#### Description — Nonirrigated Capability Class

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations that show suitability and limitations of groups of soils for rangeland, for woodland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels-capability class, subclass, and unit. Only class and subclass are included in this data set.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.





Warning: Soil Ratings Map may not be valid at this scale.

#### Tables — Irrigation, General — Summary By Map Unit

| Summary by Map Unit — Fannin County, Texas (TX147) |                                            |                  |                          |                                                                    |              |                |
|----------------------------------------------------|--------------------------------------------|------------------|--------------------------|--------------------------------------------------------------------|--------------|----------------|
| Map unit symbol                                    | Map unit name                              | Rating           | Component name (percent) | Rating reasons (numeric values)                                    | Acres in AOI | Percent of AOI |
| EsD2                                               | Ellis clay, 5 to 12 percent slopes, eroded | Somewhat limited | Ellis (100%)             | Slope (0.63)<br>Low water holding capacity (0.07)                  | 3.2          | 15.2%          |
| HoB                                                | Houston Black clay, 1 to 3 percent slopes  | Somewhat limited | Houston Black (80%)      | Slope (0.01)                                                       | 8.7          | 41.7%          |
| NoB                                                | Normangee clay loam, 1 to 3 percent slopes | Somewhat limited | Normangee (85%)          | Excess Salt (0.50)<br>Depth to soft bedrock (0.06)<br>Slope (0.01) | 9.0          | 43.1%          |
| <b>Totals for Area of Interest</b>                 |                                            |                  |                          |                                                                    | <b>20.9</b>  | <b>100.0%</b>  |

#### Table — Irrigation, General — Summary by Rating Value

| Summary by Rating Value            |              |                |  |
|------------------------------------|--------------|----------------|--|
| Rating                             | Acres in AOI | Percent of AOI |  |
| Somewhat limited                   | 20.9         | 100.0%         |  |
| <b>Totals for Area of Interest</b> | <b>20.9</b>  | <b>100.0%</b>  |  |



#### Tables — Order of Soil Survey — Summary By Map Unit

| Summary by Map Unit — Fannin County, Texas (TX147) |                                            |         |              |                |  |
|----------------------------------------------------|--------------------------------------------|---------|--------------|----------------|--|
| Summary by Map Unit — Fannin County, Texas (TX147) |                                            |         |              |                |  |
| Map unit symbol                                    | Map unit name                              | Rating  | Acres in AOI | Percent of AOI |  |
| EsD2                                               | Ellis clay, 5 to 12 percent slopes, eroded | Order 2 | 3.2          | 15.2%          |  |
| HoB                                                | Houston Black clay, 1 to 3 percent slopes  | Order 2 | 8.7          | 41.7%          |  |
| NoB                                                | Normangee clay loam, 1 to 3 percent slopes | Order 2 | 9.0          | 43.1%          |  |
| <b>Totals for Area of Interest</b>                 |                                            |         | <b>20.9</b>  | <b>100.0%</b>  |  |

#### Description — Order of Soil Survey

The Order of a soil survey indicates the level of detail and relative intensity of field observation under which the map unit was developed. The order of a survey is commonly reflected in the scale of mapping, but not determined by it. Rather, the order of a survey is determined by the field procedures used to identify soil components and place map unit boundaries, the minimum permissible size of map unit delineation, and the kind of map unit to which soil components are aggregated.

Order 1 - Very intensive. The soils in each delineation are identified by transecting or traversing or even grid mapping. Soil boundaries are observed throughout their length. Remotely sensed data are used as an aid in boundary delineation. Order 1 surveys are made if very detailed information about soils, generally in small areas, is needed for very intensive land uses.

Order 2 - Intensive. The soils in each delineation are identified by field observations and by remotely sensed data. Boundaries are verified at closely spaced intervals. Order 2 surveys are made if detailed information about soil resources is needed to make predictions of soil suitability and treatment needs for intensive land uses. The information can be used in planning for general agriculture, construction, urban development, and similar uses that require precise knowledge of the soils and their variability.

Order 3 - Extensive. Soil boundaries are plotted by observation and interpretation of remotely sensed data. They are verified by traversing representative areas and by some transects. Order 3 surveys are made where land uses do not require precise knowledge of small areas or detailed soil information. The survey areas are commonly dominated by a single land use and have few subordinate uses. The soil information can be used in planning for range, forest, and recreational areas and in community planning.



Warning: Soil Ratings Map may not be valid at this scale.

#### Tables — Surface Water Management, System — Summary By Map Unit

| Summary by Map Unit — Fannin County, Texas (TX147) |                                            |                  |                          |                                                                           |              |                |
|----------------------------------------------------|--------------------------------------------|------------------|--------------------------|---------------------------------------------------------------------------|--------------|----------------|
| Map unit symbol                                    | Map unit name                              | Rating           | Component name (percent) | Rating reasons (numeric values)                                           | Acres in AOI | Percent of AOI |
| EsD2                                               | Ellis clay, 5 to 12 percent slopes, eroded | Very limited     | Ellis (100%)             | Slope (1.00)<br>Slow water movement (0.99)<br>Water Erosion (0.89)        | 3.2          | 15.2%          |
| HoB                                                | Houston Black clay, 1 to 3 percent slopes  | Somewhat limited | Houston Black (80%)      | Slow water movement (0.99)                                                | 8.7          | 41.7%          |
| NoB                                                | Normangee clay loam, 1 to 3 percent slopes | Somewhat limited | Normangee (85%)          | Slow water movement (0.30)<br>Excess Salt (0.01)<br>Gypsum content (0.01) | 9.0          | 43.1%          |
| <b>Totals for Area of Interest</b>                 |                                            |                  |                          |                                                                           | <b>20.9</b>  | <b>100.0%</b>  |

#### Table — Surface Water Management, System — Summary by Rating Value

##### Description — Surface Water Management, System

The ratings for Surface Water Management, System are based on the soil properties that affect the capacity of the soil to convey surface water across the landscape. Factors affecting the system installation and performance are considered. Water conveyances include graded ditches, grassed waterways, terraces, and diversions. The ratings are for soils in their natural condition and do not consider present land use. The properties that affect the surface system performance include depth to bedrock, saturated hydraulic conductivity, depth to cemented pan, slope, flooding, ponding, large stone content, sodicity, surface water erosion, and gypsum content.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as that listed for the map unit. The percent composition of each component in a particular map unit is given so that the user will realize the percentage of each map unit that has the specified rating.





Warning: Soil Ratings Map may not be valid at this scale.

Tables — Excavated Ponds (Aquifer-Fed) — Summary By Map Unit

Summary by Map Unit — Fannin County, Texas (TX147)

Summary by Map Unit — Fannin County, Texas (TX147)

| Map unit symbol                    | Map unit name                              | Rating       | Component name (percent) | Rating reasons (numeric values) | Acres in AOI | Percent of AOI |
|------------------------------------|--------------------------------------------|--------------|--------------------------|---------------------------------|--------------|----------------|
| EsD2                               | Ellis clay, 5 to 12 percent slopes, eroded | Very limited | Ellis (100%)             | Depth to water (1.00)           | 3.2          | 15.2%          |
| HoB                                | Houston Black clay, 1 to 3 percent slopes  | Very limited | Houston Black (80%)      | Depth to water (1.00)           | 8.7          | 41.7%          |
| NoB                                | Normangee clay loam, 1 to 3 percent slopes | Very limited | Normangee (85%)          | Depth to water (1.00)           | 9.0          | 43.1%          |
| <b>Totals for Area of Interest</b> |                                            |              |                          |                                 | <b>20.9</b>  | <b>100.0%</b>  |

Table — Excavated Ponds (Aquifer-Fed) — Summary by Rating Value

Description — Excavated Ponds (Aquifer-Fed)

Excavated ponds (aquifer-fed) are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, saturated hydraulic conductivity (Ksat) of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the specified use. "Not limited" indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. "Somewhat limited" indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. "Very limited" indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The map unit components listed for each map unit in the accompanying Summary by Map Unit table in Web Soil Survey or the Aggregation Report in Soil Data Viewer are determined by the aggregation method chosen. An aggregated rating class is shown for each map unit. The components listed for each map unit are only those that have the same rating class as listed for the map unit. The percent composition of each component in a particular map unit is presented to help the user better understand the percentage of each map unit that has the rating presented.

Other components with different ratings may be present in each map unit. The ratings for all components, regardless of the map unit aggregated rating, can be viewed by generating the equivalent report from the Soil Reports tab in Web Soil Survey or from the Soil Data Mart site. Onsite investigation may be needed to validate these interpretations and to confirm the identity of the soil on a given site.

# Zones: Description

The Five Zones of Permaculture: Elements which are attended to frequently are located closer to the dwelling and those that need limited contact or thrive in isolation are located further away. The zones are numbered from zero to five:

**Zone 0** - is the origin from which you work. This is your home, your dwelling.

**Zone 1** - is the space surrounding your home and where you spend most of your outdoor time. The systems needing continual observation, frequent visits, work input and complex techniques. Vegetables that need picked or tended daily, chicken nest boxes that need collected daily. In this zone, we arrange nature to serve our needs. This zone is dictated by our energy expenditure and time allocation. We cannot simply decide that something is zone 1, it is dictated as being such by it's inherent nature.

**Zone 2** - is less intensively managed with spot mulched orchards, main crop beds, ranging domestic animals. Orchards, terraces, trellis systems, berry patches and fodder trees are often found in zone 2 intensive areas.

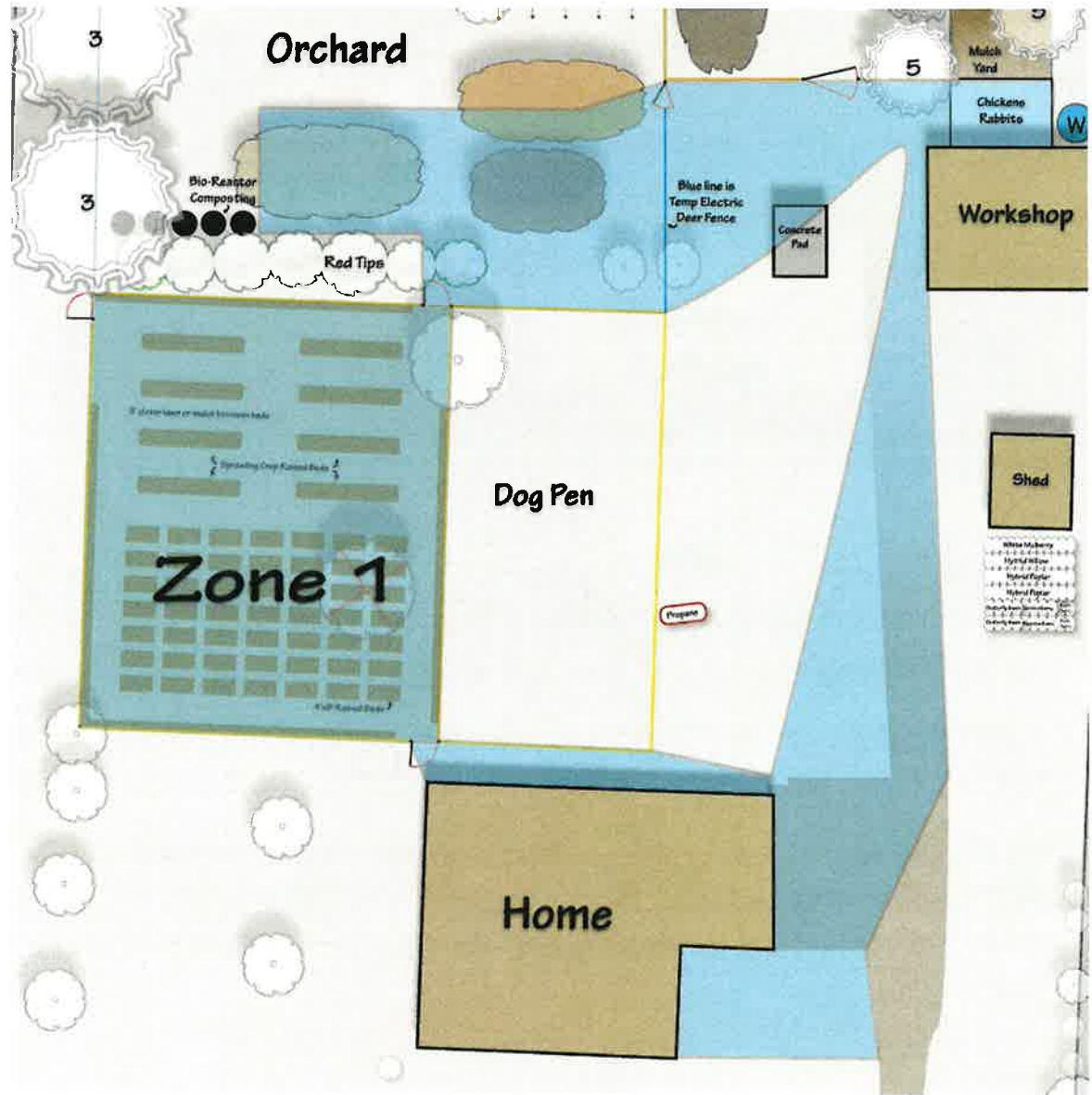
**Zone 3** - is more of a "farm" area. This is commercial scale cropping and cultivation. This is where you grow large scale tree hay that is harvested once or twice a year and managed once in the winter for pruning. Fruit trees that are managed possibly once a month for disease or fertility reasons.

**Zone 4** - is forestry, pastures, and low maintenance food forestry like nut trees that are visited once a year to harvest the mast drop. This is the type of area that is left more to nature and if managed, will be done sparingly or nearly exclusively by livestock partners in your stewardship of the land.

**Zone 5** - is simply the areas left to nature or so unmanaged that they might as well be left to nature. This might be an area that you plant to wildflowers and leave alone, or due to access it might be easiest left alone to grow into whatever wants to live there.

# Zone 1 Map

Here we have in blue, the pathways directly outside the home, the front yard containing the ornamental plantings you decide to implement. Zone 1 is often in my experience a circular route touching all the daily activities. The zone 1 garden space, greenhouse, small livestock like rabbits, chicken and quail. This may in time expand to larger ruminants like sheep, goats, or cattle. It sometimes includes a recreational area or flower garden where you might go daily to care for flowers or just to pick from the seasonal blooms. It often includes the vehicle parking area and paths where you travel to and from those locations. Look at these areas first for any high maintenance or value additions to your landscape.



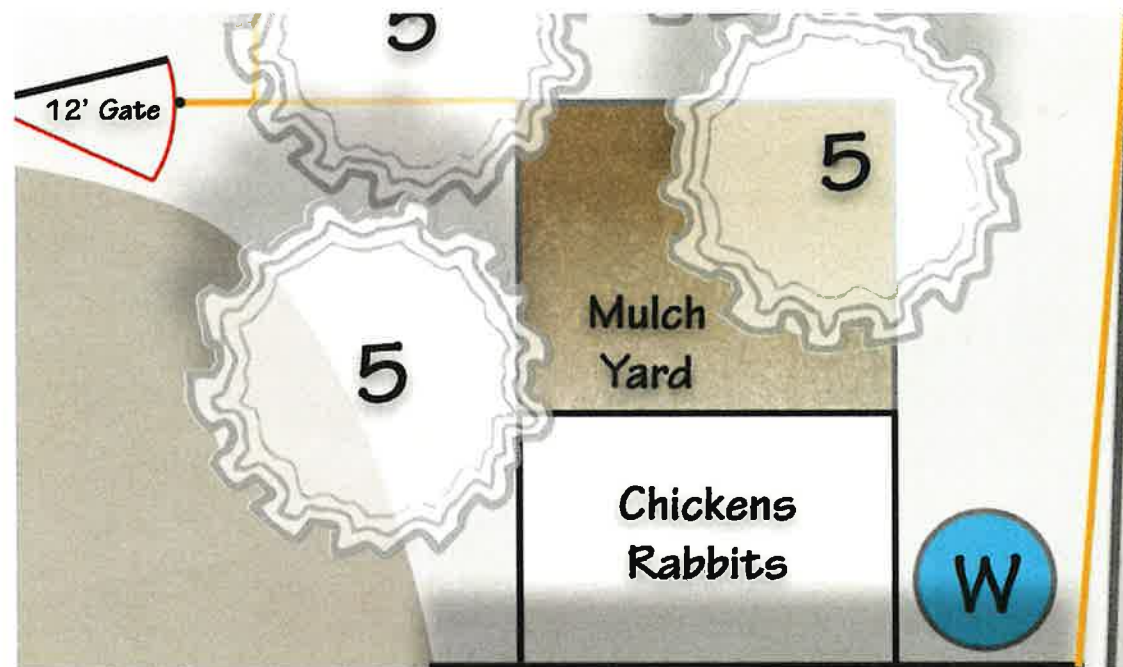


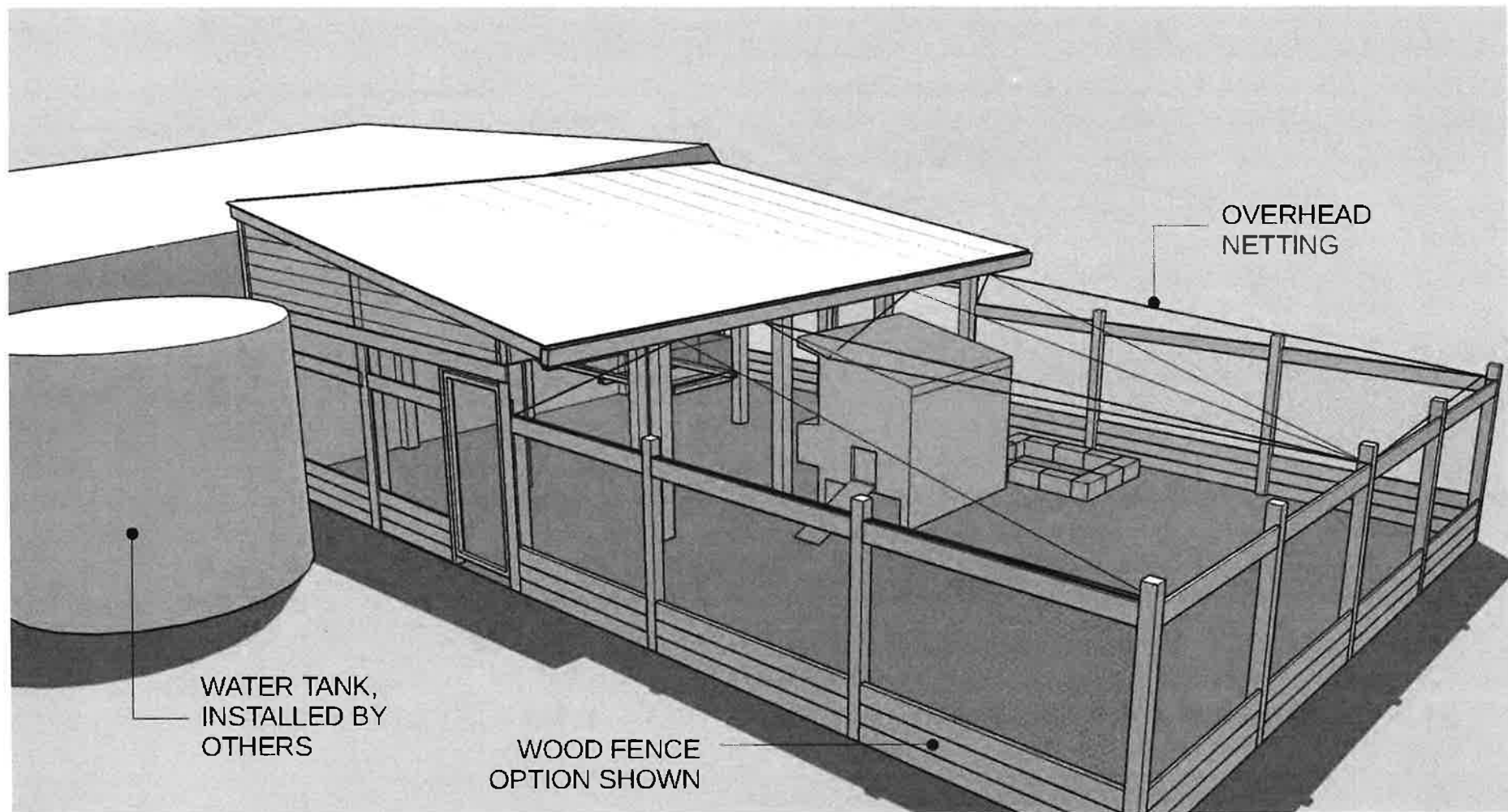
## Chickens & Rabbits

These make good companions. It also makes sense to combine both types of animals in the same type of shelter system. They both need running water, shade, shelter from the elements, and the daily attention of a caretaker. So we've combined both in a stacked system with a suspended rabbit cage over deep bedding that the chickens have access to constantly. They will disturb the rabbit manure and deep

bedding, keeping it dry and aired out. This preserves nitrogen in the manure as well as reducing smell and insect problems. It is suggested to keep one side of the mulch yard accessible to a larger implement for mechanical cleanout as needed. Otherwise yearly or every 2nd year the mulch yard will need to be manually cleaned out. The material will be fantastic when processed through bioreactor composting. It is suggested to use gravity fed water nipples to supply both rabbits and chickens with water. I'm a big fan of Harvey Ussery and his style of chicken keeping. <https://amzn.to/3mKgRa8>

That's a link to his book and it is top on my list for people to read when learning how to keep a backyard flock of chickens. Following this are design images for the chicken and rabbit shelter area.





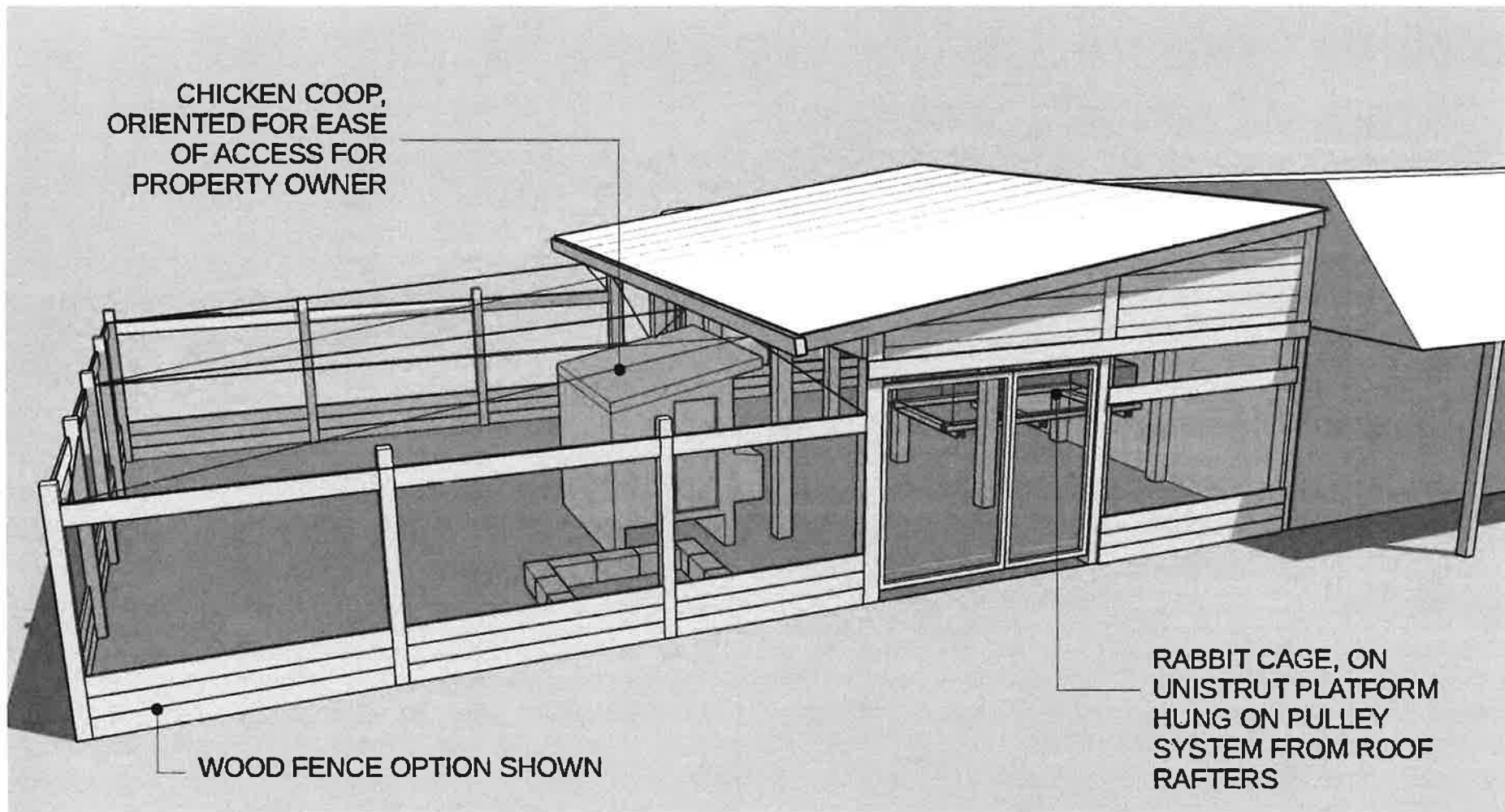
OVERHEAD  
NETTING

WATER TANK,  
INSTALLED BY  
OTHERS

WOOD FENCE  
OPTION SHOWN

NORTH EAST VIEW

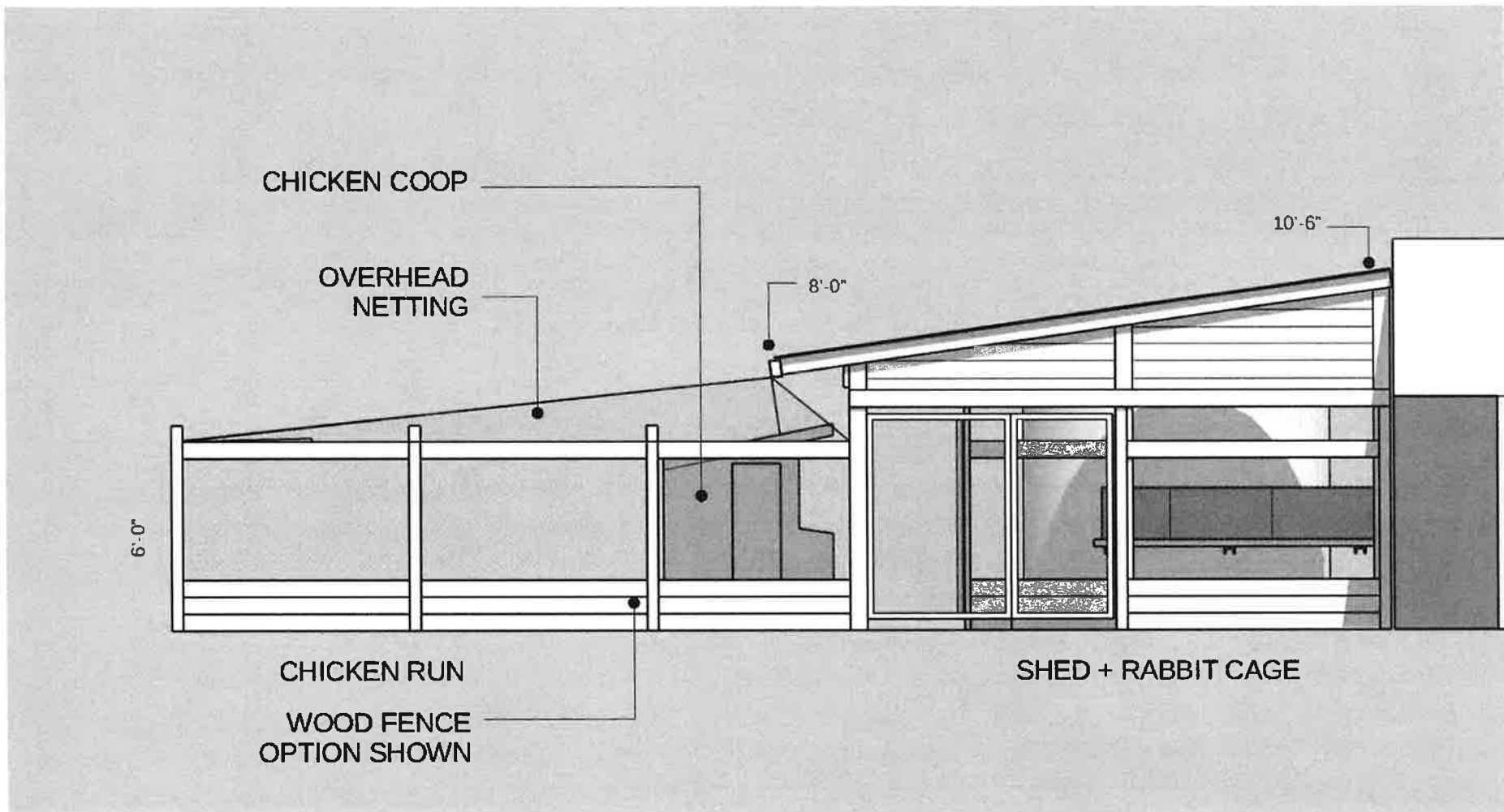
01.23.2021



NORTH WEST VIEW

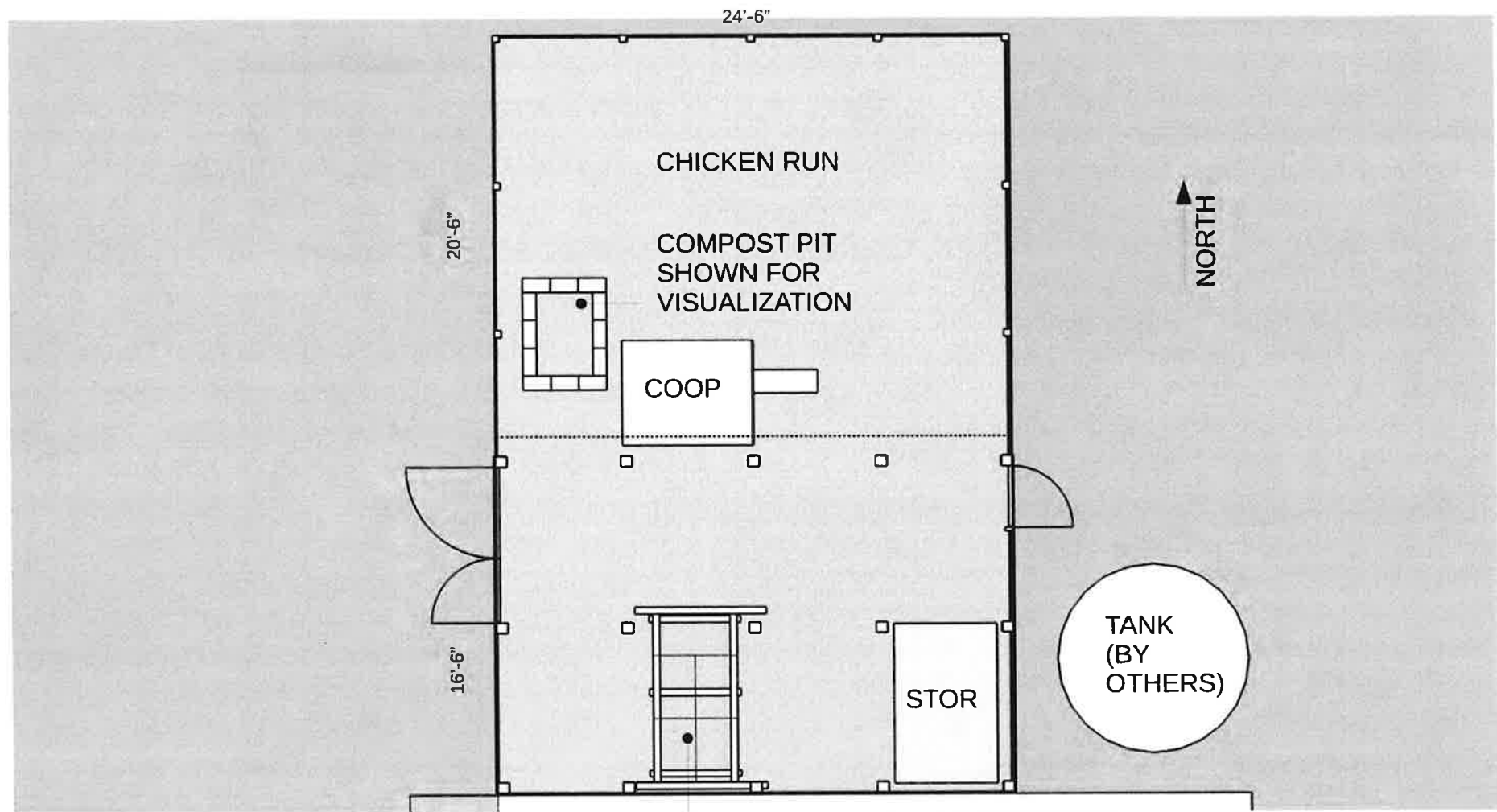
01.23.2021





FRONT VIEW

01.23.2021



# FLOOR PLAN

01.23.2021

RABBIT CAGE, ON UNISTRUT  
PLATFORM HUNG ON  
PULLEY SYSTEM FROM  
ROOF RAFTERS

## English Cottage Flower Garden

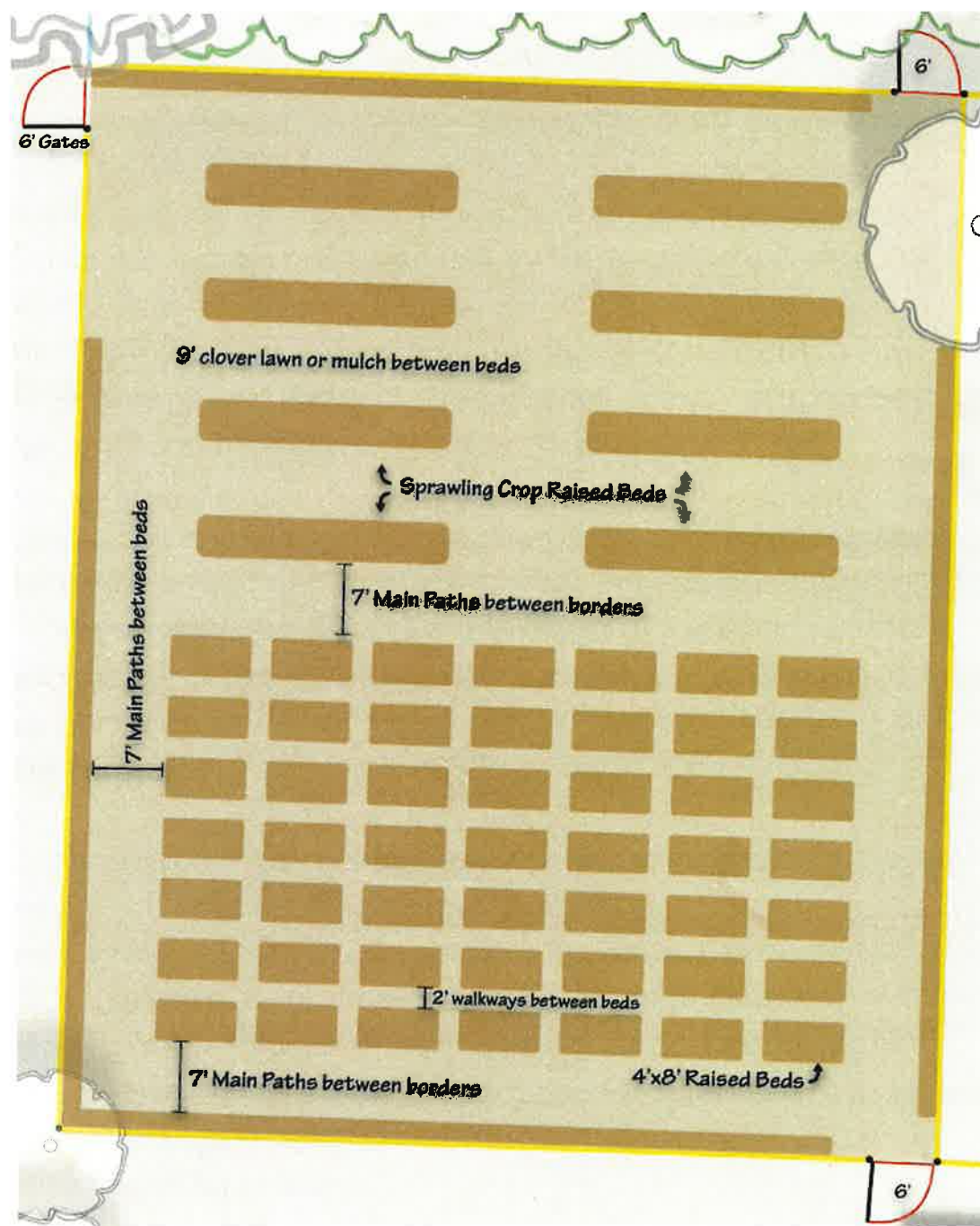
While landscape design and aesthetic landscaping are not really my focus or a particular ability I have, I can make suggestions on styles to fill in those unknown unknowns and bring to light options to you as a client. I think this style of mostly aesthetic landscaping would lend itself well to your location and desires. Here are some examples of what those gardens look like. Including medicinal plants, culinary herbs, and some fruits wouldn't be a bad idea and would extend the usefulness of the space while still being very pleasing to the eye. This is what we discussed for the front entrance and space to the East of the driveway entrance.





# Potager Garden

While I have illustrated a simplified and efficient 4'x8' garden bed size layout, a traditional Potager garden is oftentimes more focused on fitting the location and looking pleasing in its shape, form and function to the gardener. So while you may start in the bottom right corner with 2'-4' beds like depicted in the plan, you may find yourself wanting to expand into a somewhat different configuration or layout to break up the monotony and uniformity. There's always a push/pull between utility and aesthetics. I would rather you enjoy the space and use it, than have an efficient chore that you hate. The Northern half of the garden is set up with longer beds for more of a zone 1-2 type crop use. Sprawling crops and calorie crops will do well here.



# Potager Garden Suggestions

Excerpts from [this article by Louisa Jones](#).

*"In France today, potager design is typically informal, or romantic. Often called the jardin de curé, or country curate's garden, this intimate and sensual style is comparable to that of the English cottage garden, except that it is centered on vegetables rather than flowers. Its inspiration is a complicity with nature rather than a desire to impose order, and this fashion has been fed by the growing influence of organic gardening in France over the last twenty years.*

- A good design includes vertical accents. These can be temporary (a stand of corn, tomato towers, bean teepees, a single angelica plant), or permanent (berry bushes, a small apple cordon). Hedges and walls are also permanent, of course, and can themselves provide food or support for food-bearing plants.
- Potagers are essentially tapestries of myriad colors and shapes. The intermingling of herbs, flowers, and fruits with vegetables requires careful placement of perennials so that they do not interfere with the growth of seasonal crops. Small fruit trees traditionally stand at the edge of the potager, along paths and walls, with strawberries, annual herbs, or flowers planted at their feet. Aggressive herbs like mint or tansy must be contained. All the annuals mix well with vegetables, and may even serve as beneficial companion plants—for example, planting coriander among carrots, said to deter the carrot fly.

Harvesting vegetables without destroying planting patterns is a challenge in a formal *potager* but less so in the romantic variety, with its more luxuriant growth. Two techniques can help: Edge plots with contrasting plants, including herbs and flowers, which will mask bare spots as the season progresses. Choose varieties in keeping with the scale of the garden. Keep free-ranging perennials in bounds with buried strips of metal or plastic. After harvesting, use fast fillers such as chervil or cut-and-come-again salad greens. Many of the latter self-sow and can be moved easily to fill gaps when required. Fast-growing green manures are ideal: both mustard (*Brassica*) and phacelia (*Phacelia tanacetifolia*) are great favorites in France, both being tough as well as beautiful in flower."

## Fast Fillers for the Potager

- Alyssum, sweet (*Lobularia maritima*)
- Basil (*Ocimum basilicum*)
- Chervil (*Anthriscus cereifolium*)
- Beans, bush (*Phaseolus vulgaris*)
- Cress (*Lepidium sativum*)
- Mustard (*Brassica* spp.)
- Parsley, curly (*Petroselinum crispum*)
- Phacelia (*Phacelia* spp.)
- Savory, summer (*Satureja hortensis*)

## Plants for Edging Beds and Paths

- Basil (*Ocimum basilicum*)
- Beans, bush (*Phaseolus vulgaris*)
- Bee balm (*Monarda didyma*)
- Broccoli (*Brassica oleracea*)
- Cabbage, red (*Brassica oleracea*)
- Catnip, low-growing (*Nepeta racemosa* or *N. x faassenii* for edging)
- Cauliflower (*Brassica oleracea*)
- Chives (*Allium schoenoprasum*)
- Cosmos (*Cosmos* spp.)
- Dahlias, dwarf (*Dahlia* spp.)
- Geraniums, fragrant (*Pelargonium* spp.)
- Germander (*Teucrium chamaedrys*)
- Gladiolus (*Gladiolus* spp.)

- Hebe (shrubby veronicas), dwarf (*Hebe* spp.)
- Hyssop (*Hyssopus officinalis*)
- Irises, dwarf (*Iris* spp.)
- Lamb's ears (*Stachys lanata*)
- Lavender, dwarf (*Lavandula* spp.)
- Lettuce (*Lactuca* spp.)
- Mallow (*Lavatera*), annual varieties
- Marigolds, dwarf (*Tagetes* spp.)
- Nasturtium, dwarf (*Tropaeolum majus*)—perhaps mixed with beets
- Parsley, curly (*Petroselinum crispum*)
- Peppers, sweet, hot (*Capsicum* spp.)
- Pot marigolds (*Calendula officinalis*)
- Rosemary (*Rosmarinus officinalis*)
- Rue (*Ruta graveolens*)
- Sage (*Salvia officinalis*)
- Santolina (*Santolina* spp.)
- Savory, summer (*Satureja hortensis*)
- Savory, winter (*Satureja montana*)
- Sedum (*Sedum spectabile* or *Hylotelephium spectabile*)
- Strawberries (*Fragaria* spp.)
- Swiss chard (*Betula vulgaris* var. *flavescens*—white-, red-, or yellow-ribbed)
- Thyme, bush (*Thymus* spp.)
- Violets (*Viola* spp.)



## Self Sowers for the Potager

- Bellflowers, annual (*Campanula* spp.)
- Blanket flower (*Gaillardia* spp.)
- Chervil (*Anthriscus cerefolium*)
- Columbines (*Aquilegia* spp.)
- Coreopsis (*Coreopsis* spp.)
- Corn cockle (*Agrostemma githago*)
- Cosmos (*Cosmos* spp.)
- Evening primrose (*Oenothera* spp.)
- Fennel (*Foeniculum vulgare*)
- Feverfew (*Tanacetum parthenium*, formerly *Chrysanthemum parthenium*)
- Fleabane (*Erigeron karvinskianus*)
- Gaura (*Gaura lindheimeri*)
- Globe thistle (*Echinops ritro*)
- Hollyhocks (*Alcea rosea*)
- Honesty (*Lunaria annua*)
- Larkspur (*Consolida ambigua*)
- Lettuces (*Lactuca* spp.)
- Love-in-a-mist (*Nigella damascena*)
- Mallow (*Lavatera* spp.)
- Marigolds (*Tagetes* spp.)
- Mullein (*Verbascum* spp.)
- Mustard (*Brassica juncea*)
- Narcissi (*Narcissus* spp.)
- Orach (*Atriplex hortensis*)
- Oregano (*Origanum vulgare*)
- Phacelia (*Phacelia tanacetifolia*)
- Phlomis (*Phlomis* spp.)
- Poppy, California (*Eschscholzia californica*)
- Spurge, snow-in-summer (*Euphorbia characias*)
- Speedwell (*Veronica* spp.)
- Sweet peas (*Lathyrus odoratus*)
- Toadflax (*Linaria* spp.)
- Tobaccos, flowering (*Nicotiana* spp.)
- Tulips (*Tulipa* spp.) and other spring bulbs
- Valerian, false (*Centranthus ruber*)
- Violets (*Viola* spp.)
- Wallflower (*Erysimum cheiri*)

## Suggested Gardening Techniques and Fertility Strategies

Jadam Organic Farming methods are suggested. Mulch can be either wood chips or black plastic 20 year weed barrier fabric. If wood chips are abundant, those would be first priority. I prefer in-ground growing post-solarization and continually managed under a wood mulch.

The fertility management should begin with soil tests sent to Logan Labs. "Standard with Extras - \$30" is what you want to order. Remineralization program following Dr Albrecht's and Carey Ream's methods is suggested. I am working on an online tool that may be available late 2021 for easy use. Soil should stay covered in wood chips continually unless uncovered for seed sowing. Compost to build organic matter should be added yearly, ideally from 1 year old material taken from BEAM Bio-Reactors. And as needed, rabbit manure, or mixtures of nitrogenous fertilizers such as blood meal, feather meal, alfalfa meal, cottonseed meal etc...

Once mineral balance is achieved, most of the fertility should be maintained by BEAM compost and nitrogen sources. Complete testing should be done every 3-5 years once mineral balance is achieved. It is suggested that you keep on hand as a prep and hedge against future shortages, the cumulative total of all the mineralogical inputs multiplied by a factor of (.25). This ensures that if your particular plot of land needs to be expanded, or re-amended, you will have a reasonable amount of all of the amendments you would likely need. This should not amount to much of the expensive elements, it will likely be mostly agricultural limestone. After a few years of building fertility you will likely need to dramatically slow down or stop applications of fertility amendments like compost and seed meals.

For seed starting, I like to use a cooler as a germination chamber. You put a heat mat into the cooler with a temp controller, set your moistened flats of seeds in the cooler at the set optimal germination temp, and it normally means I have tomatoes germinating in 2-3 days instead of 1-2 weeks. I normally don't worry about sterilized medium, I just use potting mix, plant the seeds, and get them under lights as soon as germinated. I also keep my seedlings under sunlight as often as possible. The UV helps to keep damping off under control, another thing that helps is having a gentle fan blowing across the seedlings. I put my seedlings under sunlight on sunny warm days every chance, kept under grow lights for 12 hours a day, and had a small fan blowing across them 24 hours a day and had no damping off problems at all.

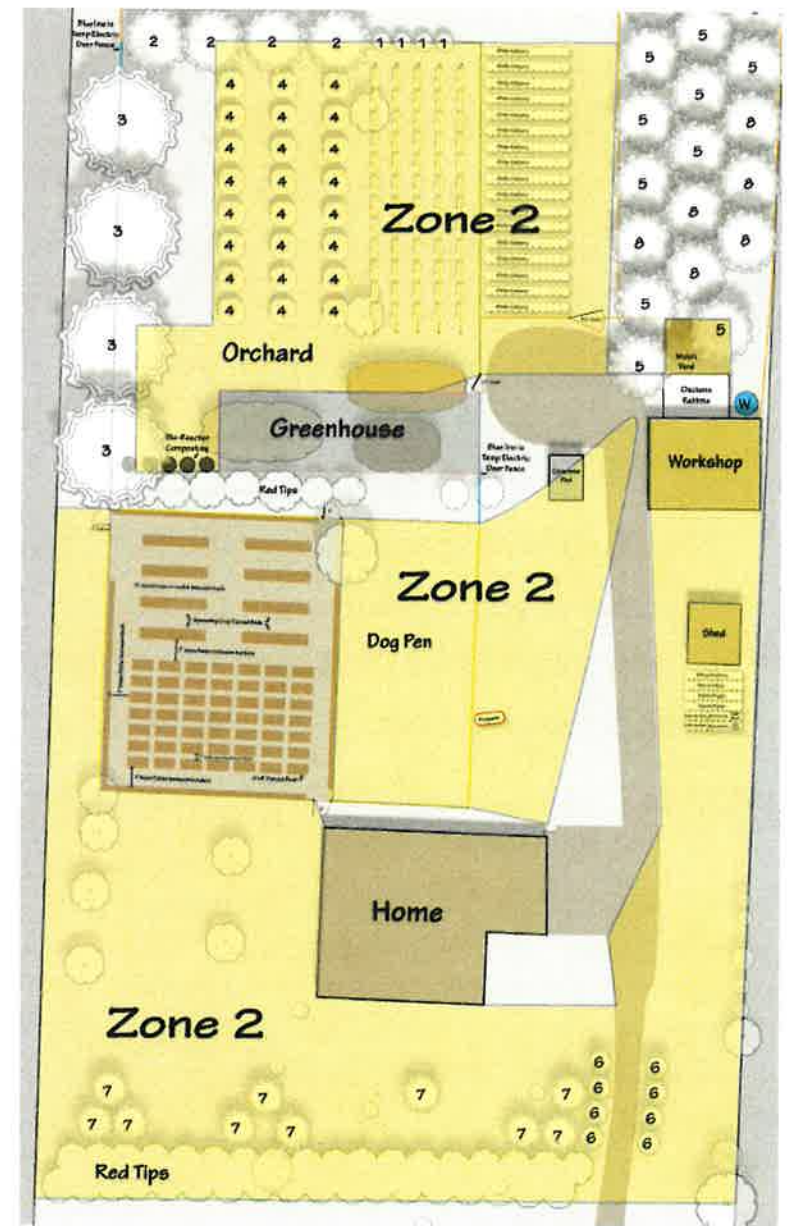
I hear great things about soil blocks for seedling starts. I will be trialling them against proptek trays which I have and love. We will have to see how they perform before I can offer good advice on it. I really like the idea behind the soil blocks for long term economically smart success, so I'm hoping the trial gives me good news. The positives behind it would allow someone to become independent of outside purchases from seed to plate. Assuming your fertility management was already stable and composting was being done, the creation of seed starting medium with the BEAM compost and screened, decomposed leaves or wood chips will make a perfect seed starting soil mix, when using the soil blocks, the tool should last a generation, there is no other components that need to be purchased. If you save your own seed, from seed, through nursery, to garden, to harvest, and preservation or fresh eating, back to seed. All of that should be able to be accomplished 100% independent of outside inputs. This would be game changing for self-sufficiency. My gut instinct says a higher priced tool that makes more blocks at the same time, fabricated with high quality materials, should be a lifetime investment.



# Zone 2 Map

Shown in yellow. These are the areas immediately surrounding our Zone 1 working areas. Pet yards may only need a couple visits a week to tidy up and mow. Mother plants for propagation might need more tending or attention than Zone 3, or might be more valuable due to the time and number of said plants in the ecosystem at the time. They may be phased out of the system as time goes on and enough copies are planted elsewhere, eliminating the need for specific propagation close to the home. Alternatively it may turn into a side income and necessitate keeping production close to the house and where the plants are propagated and sold.

Orchards and small fruits are almost always included in Zone 2 due to their requirements in fertility, mulch, irrigation, and attention. Similarly composting operations like Bio-Reactors should be situated at the periphery of Zone 2. It should be noted that Bio-Reactors require only one or two days of labor a year and as such would be more likely to be a 3rd or 4th Zone, however because of daily irrigation needs, this may necessitate it being placed in Zone 1 when irrigated



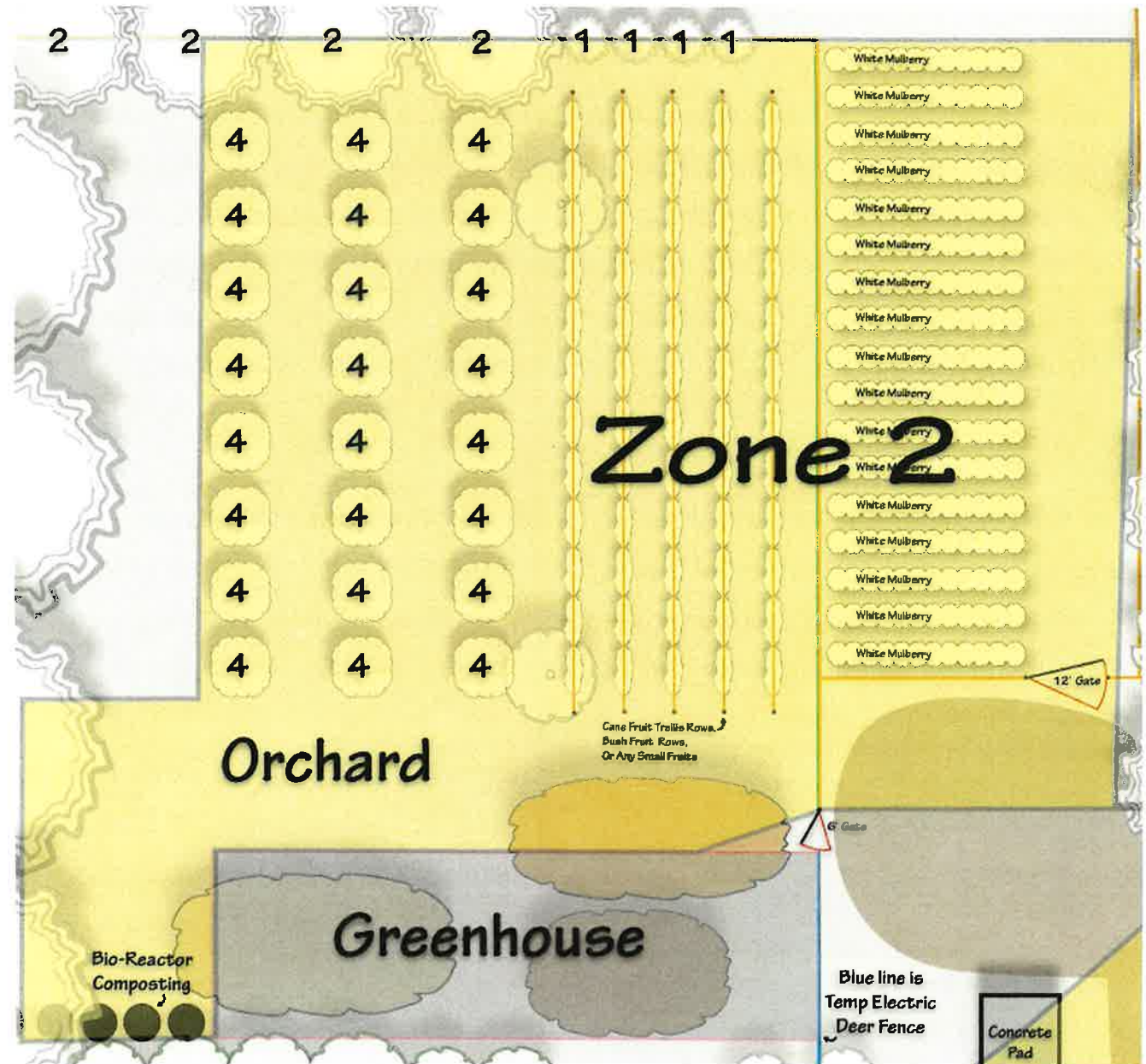
manually or Zone 2 with automated irrigation. Classified as Zone 2 only because of the need to check and make sure irrigation is working properly every week.

Unless workshops are used daily, they are likely more slanted towards a Zone 2, however as stated at the beginning of this document, none of these are specifically set in stone. Needs change and uses shift over the seasons and years. Do not let my assumptions become dogma to be adhered to. At the end of the day, a zone designation means nothing, the use of the thing is what dictates what zone it is included in.

I included the yard as a Zone 2 area because of mowing needs. However this can be reduced by filling corners and curved portions of the yard with trees and shrubs. To further reduce mowing needs simply pick some attractive overstory trees like Lacebark Elm, Redbud, and Dogwood. Then plant underneath, smaller shrubs and large clumping shrubs like Blueberry, Serviceberry, hydrangea (in shady areas), azalea, and anything else that you think looks good. This will slowly build out the treeline from the red tips towards the house, reducing the lawn considerably, while creating a cozy informal glade feeling surrounding the home. The practical effects will be reduced maintenance, road noise, dust, wind, and visual exposure to the road. Increased moisture retention, songbirds, pollinators, and curbside appeal.

## Zone 2 Detail

Starting at the top right of the zoomed image, we have a white mulberry dominated fodder system managed as a coppice lot. Rows spaced approximately 6'-8' apart, 30' long. Assuming the mulberry grows approximately 4' wide between harvests, this allows for a significant portion of fodder to be grown in close proximity to the rabbits and also possible future herbivores like sheep and goats. Grown right alongside the main Easy access road, this makes for quick and easy harvest and maintenance.



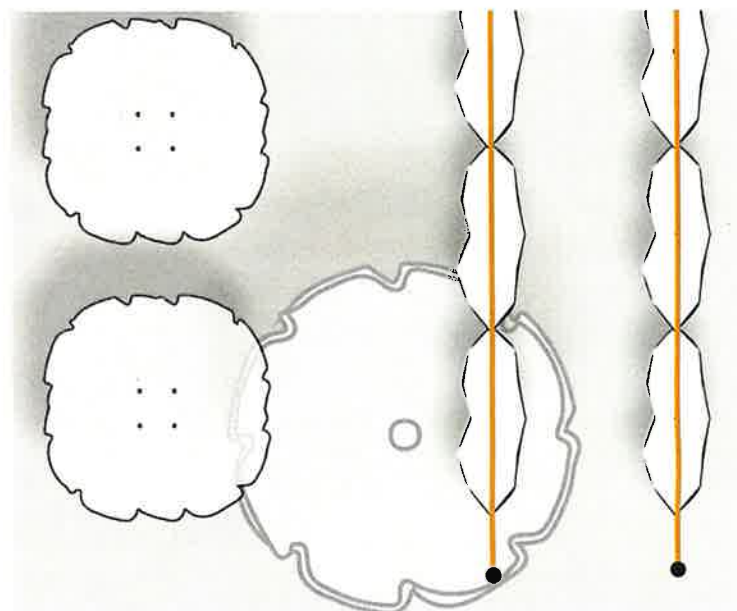


Details on all Fodder in the [Fodder Trees section](#).

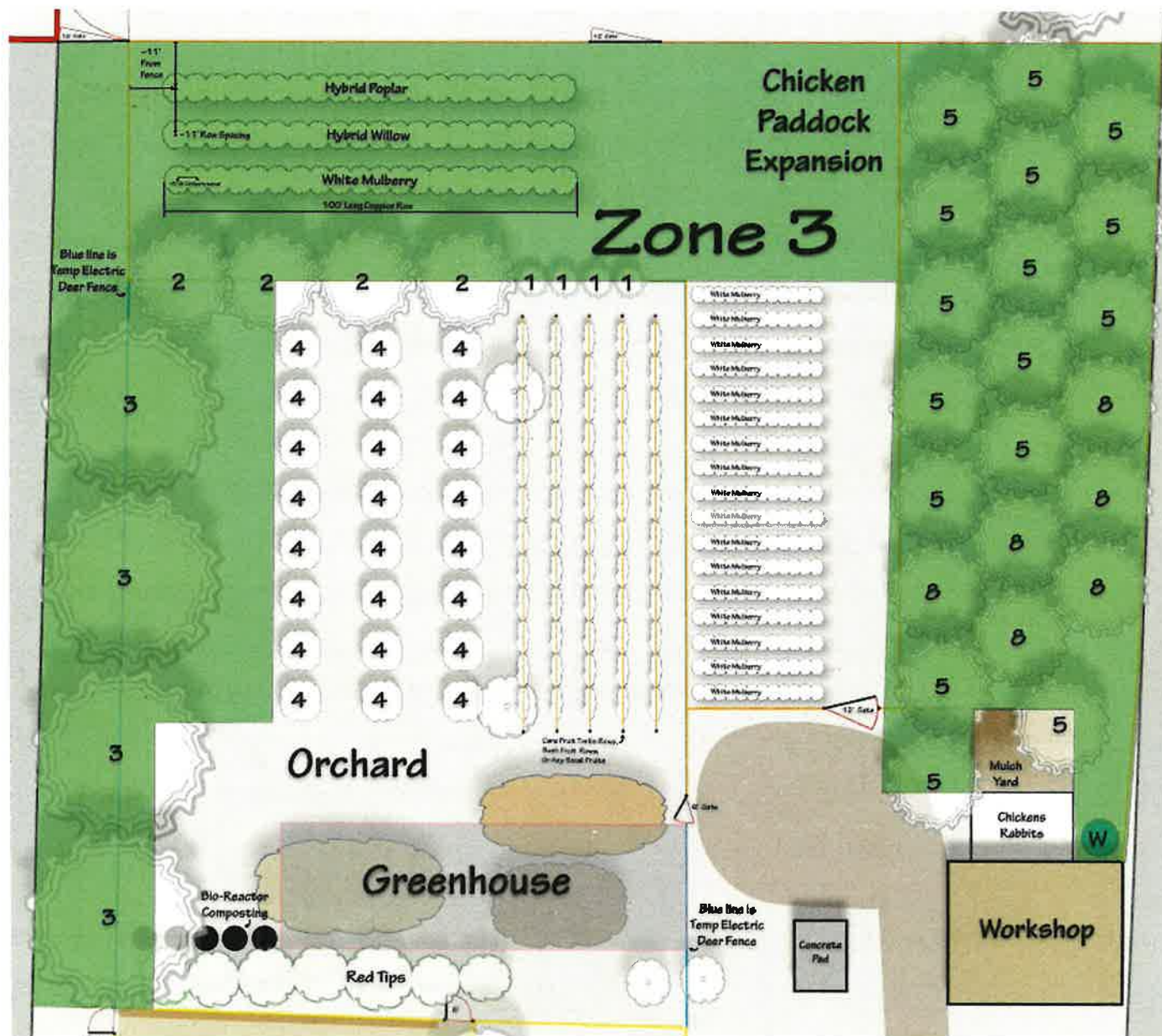
Chickens can be let out to forage under the mulberry coppice lines and under the fruit trees and cane fruit trellis systems as well as among the piles of wood mulch. Similarly you can rotate growing bunnies in tractors between the mulberry rows and inside the orchard to maintain grass height, apply fertility, and to feed them the majority of their nutritional needs before harvesting for meat. This zone should be able to provide enough fodder and pasturage to grow enough rabbits to feed a family of 5 plus 5 large dogs almost exclusively, to put things in perspective. Waste materials are easily recycled in bioreactors situated close to the western access lane.

The tour continues counter clockwise around the margin to hit the "1" Hazelnuts that are marginal for the USDA zone, but with care, might survive and produce well. Next is "2" the Chinese Chestnut which should rock and roll with no problems in your climate. As with all woody species, keep a good layer of mulch down to preserve soil moisture, and to keep the soil cool as well as to build good soil health.

Marked with "4" are locations where you can plant a plethora of fruit trees. I would suggest going with a management style very similar to Dave Wilson's ["Backyard Orchard Culture"](#) system. Illustrated is a layout with a 4 tree grouping spaced in a 24" square pattern. Each one of the dots are the center mark for a fruit tree. I'll include a copy of his instructions in the [Orchard chapter](#).



## Zone 3 Map



## Zone 3 Detail

Shown in green. Here is the chicken's extended paddock with overstory food forest consisting of primarily everbearing mulberry and american persimmon. Feel free to add or substitute whatever trees you desire or learn are good to have as an overstory for poultry. The possibilities are limitless. Use multiple types and heights of trees and shrubs. They will thrive in a forest style system. There is plenty of room to keep birds contained in the forestry area on the right side of Zone 3 allowing open gate passthrough to the back side of the property. Always try to manage animals in such a way that laneways can be kept as open gate drives. A note of caution though, when managing livestock, keeping gates closed is essential to farm security. A flock of sheep or even a couple goats can wreck a landscape given an afternoon of unchecked freedom.

There is room at the top center of this horseshoe for a future structure for housing larger ruminants and keeping them closer to your zone 1. This may change your zones slightly but will, depending on your management style, possibly just include the new structure in your Zone 2.

Continuing counter clockwise we come to a larger main fodder crop set back from the fence approximately 11' or so, with rows spaced about 11' apart, and trees planted around 5' on center. You have room for one, 100' row each of the three main fodder species. This will be detailed in the [Fodder Trees section](#).

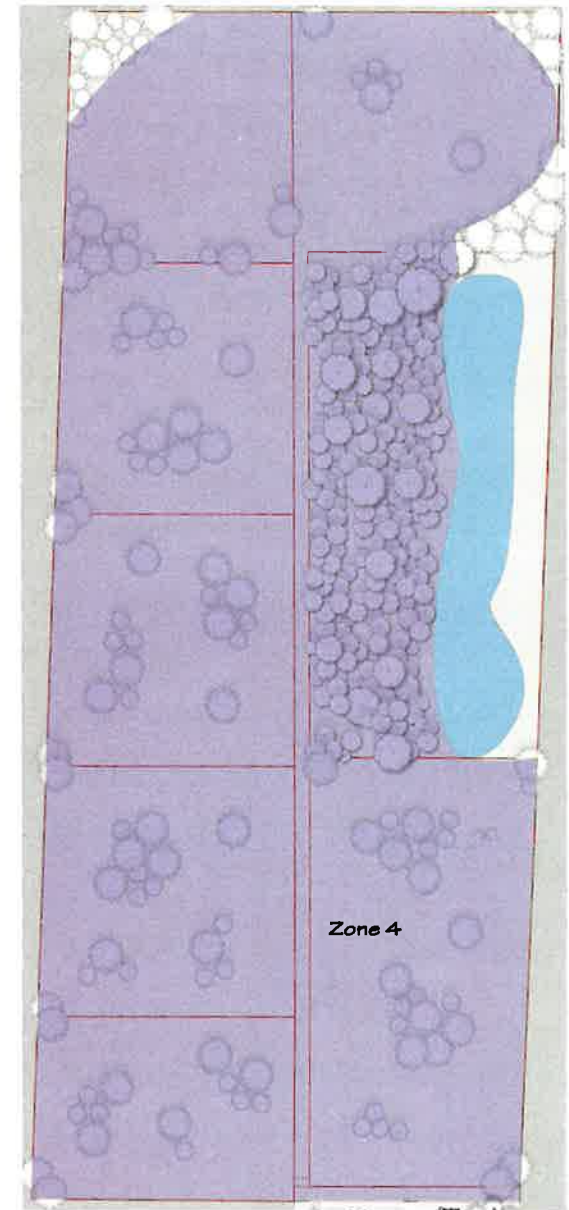
The southern border of Zone 3 at the peak of the arch and continuing down to the left are nut shrubs and trees. These will be solidly in Zone 3 until they get established. I would anticipate around 4-5 years of



moderate attention to fertility, mulch, and irrigation. They will actually be more of a Zone 1-2 for the first year or two. A daily walk along the treeline wouldn't be a bad idea to check on moisture and pest problems like grasshoppers. As they mature, they phase out and into zone 4, but for the sake of this design, the majority of their lifespan will be found in more of a zone 3 area due to the chickens and herbivores that can graze under the canopy.

## Zone 4 Map

This is the largest portion of the property and will likely be used as silvopasture and pure enjoyment of the landscape. As discussed, the layout has been illustrated as having clusters of overstory trees where you can provide shade and wind breakup in the pasture. If desired, the boundaries can be completely planted to trees allowing fencing to be kept under complete shade thereby reducing weed pressure on electric fences. The red outlined paddocks are just there as a representation for what a paddock rotation system might look like. The grazing of the system is entirely dependent upon rain, sunlight, pasture sward health and vigor, stocking density, grazing pressure, and many other factors. This is where developing a "grazier's eye" is critical. This can only really be developed with time and experience. Aim for a reduction in sward height of 50%-65%, that means the animals only eat 50%-65% of the total grass height in the area. If allowed to overgraze, you will put too much pressure on the plants to recover quickly and with good health. These paddocks should start out as temporary fencing to allow you to develop an idea of what they need to consume in a given time. Some people graze for a week in one area, others do daily or twice daily rotations. Again, this all comes down to your particular needs and abilities. If you have only a few animals and aren't going for a large amount of production, simply section off the area into 6 or 7 sections and move the



animals once every other week or even as infrequently as once a month. The closer you can get to daily shifts, the closer you will be to achieving optimal results.

It is always advisable to take soil samples to figure out what your baseline fertility is in the soil and slowly address mineralogical deficiencies starting with calcium and magnesium, then progressing to potassium and phosphorus, sulphur and so forth. Soil tests should be done with Mellich 3 testing and through Logan Labs. Also, using a yearly or twice yearly application of BEAM compost liquid either sprayed or dribbled on pasture (preferably immediately preceding or following a rain) will start moving it towards much greater health.

As for silvopasture plantings, any trees will do fine, I do however tend to lean more towards trees that drop useful food for livestock. Things like White Oak (sparingly), Chinese Chestnut, Hazelnut, Mulberry, Hardy Apple cultivars, hackberry, elm, willow, hybrid poplar are all fantastic options as well. Avoid any type of pit type fruit like cherries, peaches, plums as they can have toxic issues in some animals.

Just to the west of the pond should be planted to trees quite extensively. This can start as quick growing pioneer species like white mulberry, hybrid poplar, and hybrid willow. They can be grown to a height that is tall enough to easily chop down and lay on the soil surface, or allowed to grow to mature height.

Underneath can be added berry bushes, understory trees and fruiting trees to build out a food forest. However, this does not need to be a very structured or complicated thing. Simply fill the spaces with things that will grow and nature will sort itself out. Your goal is to get some tall trees shading out the western border of the pond, producing a canopy for you to walk or drive through on your way down to the pond. It will look thick and brushy for a few years while those trees get some good height, but you will be in a great position to start building a tremendous amount of soil by chopping and dropping those fast growing



trees in place. Try to drop the trees in line with the contour so any water flowing downhill will carry leaves and debris onto the logs thereby trapping debris and slowing overland water flow. This will build soil and improve soil hydrology. It will be the fastest and most efficient way to build a beautiful forest. After trees start to canopy out in 5 years, you will be able to thin the undesirable trees, misshapen and diseased ones, add them to the litter on the forest floor to become more soil. This will free up light, nutrients, and water to the chosen remaining trees and shrubs. You will end up with a beautiful and functional food forest that will have the added benefit of protecting the pond from harsh, hot afternoon light, block westerly wind and reduce evaporation. The forest will also help to improve the water quality for fishing.

One thing to make sure of, is that larger livestock do not have access to the pond. You do not want cattle wading into the water and destroying the riparian areas at the water's edge. You can always set up a small solar pumping setup to move water from the pond and up to a stock tank that overflows right back to the pond. This can improve aeration in the pond while providing unlimited water for your animals. Maintaining a healthy riparian buffer of 12' minimum will greatly increase the health of both your pond and livestock.

As you get the perimeter fence secured and livestock ready, adding a well trained Livestock Guardian Dog to the operation will be essential to keeping a happy and healthy small flock of ducks on your pond. You can always start with a small flock of Muscovies in your orchard area using black concrete mixing tubs for their "ponds". These only need to be dumped every few days and can be strategically placed so that upon dumping, you are both irrigating and fertilizing trees. The ducks will help tremendously with insect control and they're great fun to have around.

# Zone 5 Notes

The remaining areas unassigned a zone or that are so far from any commonly used area are by default relegated to a Zone 5 designation. We call it Zone 5 if it's just a corner that will never be managed, or used. You might as well plant something pretty there, or throw a handful of wildflower seed into the area and let it go. By selecting something at least marginally beneficial and leaving it alone, you can allow nature to seek its own balance with the space and also enjoy the benefit a bit yourself. Otherwise, if it's one of those things where you just have no time to deal with it, just let it go and let it become what it wants to be. You might be surprised at what shows up in those Zone 5 spaces. Sometimes you will have a very interesting plant, tree, or flower all of a sudden pop up and surprise you. Or it might be that a cottontail raises a litter of bunnies, or a wren builds a nest in the space. Value the marginal; that means don't discount the value in a space that is, for all intents and purposes, unmanaged. You might just be pleasantly surprised at what happens.

Some creative uses for Zone 5:

- Pollinator and beneficial insect habitat
  - Wildflower and tree seed balls scattered through the area
  - Pithy stems cut to 6"-12" long, bundled and hung in the area provide native bee habitat
- Bluebird and other types of bird houses set around the margin provide songbird housing
- Set a bench in a shady spot to go and observe nature from time to time
- Or simply an excuse to let yourself off the hook for not having the time or energy to keep an area clean and tidy.
- [100 plant suggestions](#)

# Fodder Trees

Let's start with the mother trees that will be used for propagation material. These are planted in Zone 2 where they are easy to check on, fertilize, irrigate, and mulch as needed. They will be close to hand for cutting as needed for propagation. The purpose of these initial trees is to grow for a year or two and then possibly, depending on health and vigor of the tree, be harvested for shoots. Either hardwood, in the case of hybrid poplar and willow, or softwood shoots in early summer for the white mulberry. The remaining plants will be treated the same way, grown for the purpose of harvesting propagation material.



The idea behind fodder trees is to have a harvestable leaf that can be fed to livestock fresh, dried to use as winter feed, and propagated for expansion of fodder growing systems on the property.

For the first several years, the only focus will be on getting these trees well mulched and fertilized with a decent soil building fertilizer mix focused on organic matter amendments. It's best to apply fertilizer directly to the soil level and cover with mulch or, if already mulched, rake the mulch back and apply in bands as you would if side dressing vegetables. Bone meal or soft rock phosphate, alfalfa meal/pellets, feather meal, and cottonseed meal can all be used if a good pre-mixed fertilizer is not available in your area. Even simple things like chicken laying pellets are a fantastic fertilizer mix for trees. They mostly feed soil life which, in turn, feeds the trees. I would also suggest making JMS to apply to the soil at least monthly

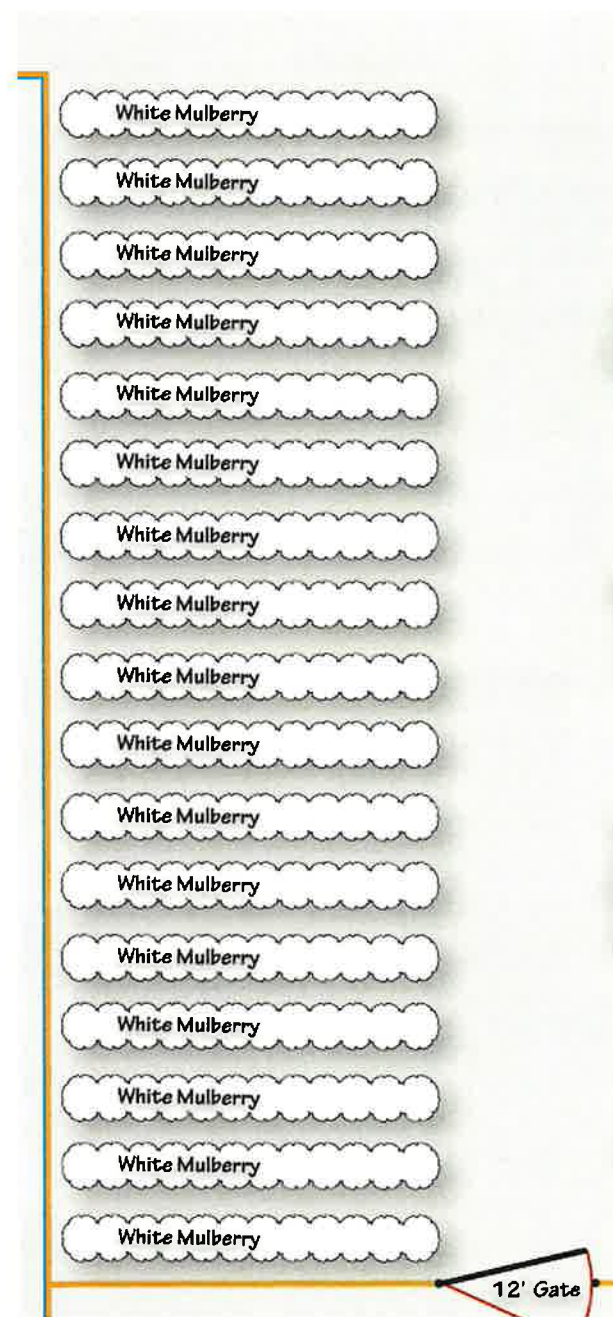


during the first year. This will produce a profound effect on the health of the soil and as a consequence, the health of the trees. Instructions for this microorganism solution can be found on page 167 of JADAM Organic Farming by Youngsang Cho.

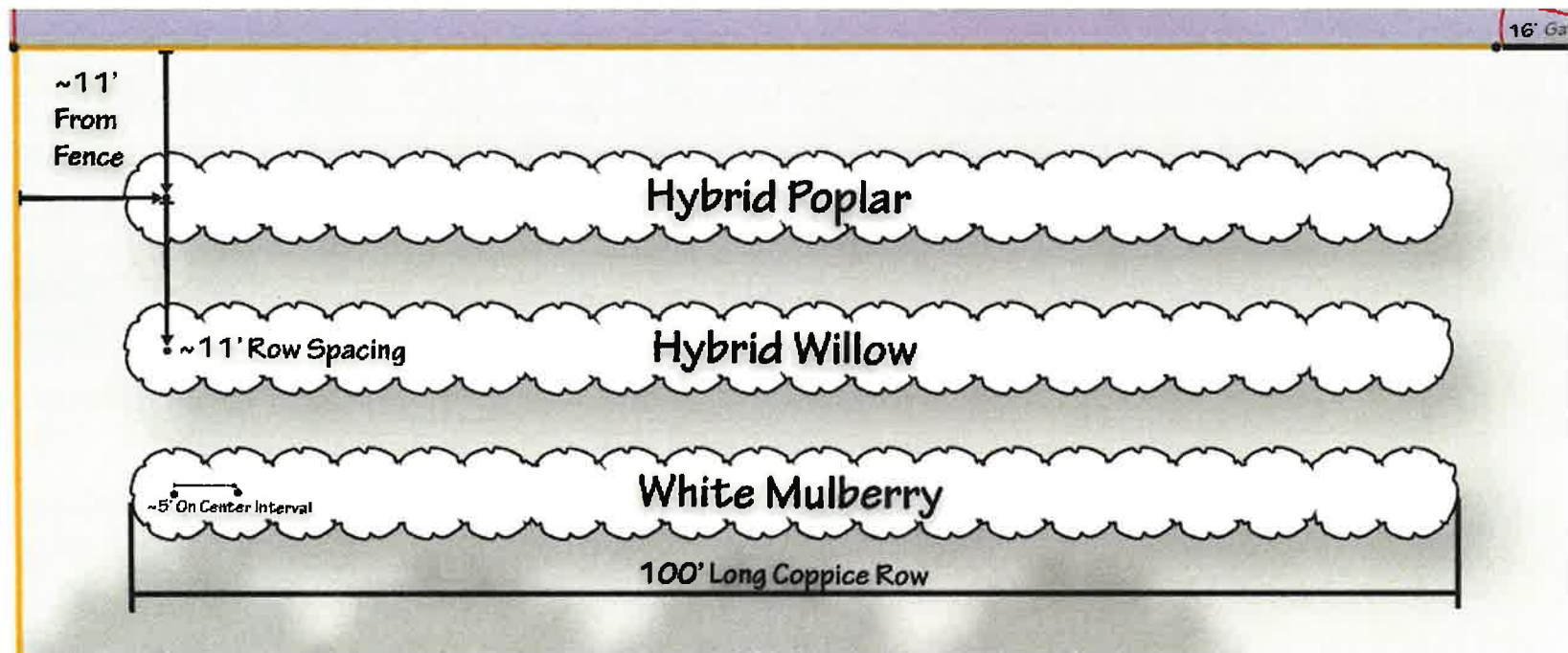
The image to the right is what a possible scale production coppice system would look like if situated to the west of the chicken and rabbit housing area. This would be able to produce a fantastic amount of fresh and drying leaves for your rabbits and poultry. The location would be close to hand for processing and feeding. This would also allow you to have it easily accessible while still maintaining easy access on the East side of the property through to the back of the land. (note: the West access lane is also available)

It is suggested to focus primarily on white mulberry for this area, although any number of trees can be substituted. White mulberry is preferred because of high digestibility, palatability, protein, and low tannins.

It is suggested to start closest to the southern fence adjoining the 12' gate. Then, as you have enough trees, continue planting rows further north.



In the NW corner of Zone 3 we have a fantastic location for a larger scale and less intensively managed system that can be devoted to once yearly harvesting for drying or, if desired, can be periodically harvested for both fresh and drying purposes. As you can see, some suggested spacings are given but are not exactly necessary. Feel free to make clumps or plant this out however you prefer. Just know that rows are the most efficient for maintenance as well as harvesting. These coppiced trees could also be grown instead as a pollard high enough (~5'-6') to not be affected by grazing underneath by goats and sheep. Branches could then be cut selectively during the summer as supplemental feed, dropped in place while allowing animals to strip the leaves from limbs. Stripped branches can then be gathered later in the day while still green and either put through a wood chipper or thrown in a pile for burning as waste, or ideally, to be stripped of side shoots, dried and turned into biochar for inclusion in BEAM compost Bio-Reactors.



# Orchard

## Backyard Orchard Culture

What is Backyard Orchard Culture?

The objective of Backyard Orchard Culture is a prolonged harvest of tree-ripe fruit from a small space in the yard. This is accomplished by planting an assortment of fruit trees close together and keeping them small by summer pruning.



Backyard Orchard Culture Is Not Commercial Orchard Culture

For years, most of the information about growing fruit came from commercial orchard culture: methods that promoted maximum size for maximum yield but required 12-foot ladders for pruning, thinning and picking, and 400 to 600 square feet of land per tree. Tree spacing had to allow for tractors.

Most people today do not need nor expect commercial results from their backyard fruit trees. A commercial grower would never consider using his methods on a 90 ft. x 100 ft. parcel, so why should a homeowner?

Backyard Orchard Culture Is High Density Planting And Successive Ripening

The length of the fruit season is maximized by planting several (or many) fruit varieties with different ripening times.



Because of the limited space available to most homeowners, this means using one or more of the techniques for close-planting and training fruit trees; two, three or four trees in one hole, espalier, and hedgerow are the most common of these techniques.

Four trees instead of one means ten to twelve weeks of fruit instead of only two or three.

Close-planting offers the additional advantage of restricting a tree's vigor. A tree won't grow as large when there are competing trees close by. Close-planting works best when rootstocks of similar vigor are planted together.

As a four-in-one-hole planting, for example, four trees on Citation rootstock would be easier to maintain than a combination of one tree on Lovell, one on Mazzard, one on Citation, and one on M-27.

In many climates, planting more varieties can also mean better cross-pollination of pears, apples, plums and cherries, which means more consistent production.

## Backyard Orchard Culture Means Accepting The Responsibility For Tree Size

Small trees yield crops of manageable size and are much easier to spray, thin, prune, net and harvest than large trees.

If trees are kept small, it is possible to plant a greater number of trees in a given space, affording the opportunity for more kinds of fruit and a longer fruit season.

Most semi-dwarfing rootstocks do not control fruit tree size as much as most people expect. Rootstocks can help to improve fruit tree soil and climate adaptation, pest and disease resistance, precocity (heavier bearing in early years), longevity, and ease of propagation in the nursery. To date, no rootstocks have been developed which do all these things plus fully dwarf the scion.

**Pruning is the only way to keep most fruit trees under twelve feet tall.**

**The most practical method of pruning for size control is *summer pruning*.**

Tree size is the grower's responsibility.

Choose a size and don't let the tree get any bigger. A good height is the height you can reach for thinning and picking while standing on the ground or on a low stool.

Two other important influences on tree size are irrigation and fertilization practices. Fruit trees should not be grown with lots of nitrogen and lots of water. Some people grow their fruit trees the way they grow their lawn, then wonder why the trees are so big and don't have any fruit!



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## Understanding The Reasons For Pruning

It's much easier to keep a *small tree small* than it is to make a large tree small.

Most kinds of deciduous fruit trees require pruning to stimulate new fruiting wood, remove broken and diseased wood, space the fruiting wood and allow good air circulation and sunlight penetration in the canopy.

Pruning is most important in the first three years, because this is when the shape and size of a fruit tree is established.

Pruning at the same time as thinning the crop is strongly recommended.

By pruning when there is fruit on the tree, the kind of wood on which the tree sets fruit (one year-old wood, two year-old wood, spurs, etc.) is apparent, which helps you to make better pruning decisions.





## Summer Pruning For Size Control

There are several reasons why summer pruning is the easiest way to keep fruit trees small. Reducing the canopy by pruning in summer reduces photosynthesis (food manufacture), thereby reducing the capacity for new growth. Summer pruning also reduces the total amount of food materials and energy available to be stored in the root system in late summer and fall. This controls vigor the following spring, since spring growth is supported primarily by stored foods and energy. And, for many people, pruning is more enjoyable in nice weather than in winter, hence more likely to get done.



### Backyard Orchard Culture Means Not Being Intimidated By Planting Or Pruning

Fruit tree planting and pruning needn't be complicated or confusing. When planting, be aware of air circulation. This is important for minimizing disease problems. Check drainage. If poor-draining soil is suspected, consider a raised bed to protect the trees from starving for oxygen when the soil is water-logged. Up to four trees can be planted in a 4x4 foot bed raised at least 12 inches above the surrounding soil. For more trees, shape a larger bed to fit the available space.

Pruning in Backyard Orchard Culture is simple. When planting a bareroot tree, cut side limbs back by at least two-thirds to promote vigorous new growth. Next, two or three times per year, **cut back or remove limbs and branches to accomplish the following:**

## FIRST YEAR

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**At planting time, most bare root trees may be topped** as low as 15 inches above the ground to force very low scaffold limbs or, alternatively, trees may be topped higher than 15 inches (up to four feet) depending on the presence of well-spaced side limbs or desired tree form. After the spring flush of growth cut the new growth back by half (late April/early May in central Calif.). In late summer (late August to mid-September) cut the subsequent growth back by half. Size control and development of low fruiting wood begin in the first year.

**The main exceptions** to the low-cut recommendation above are large caliper bare root peach and nectarine trees (3/4" up), which sometimes do not push new limbs from low on the trunk. Especially when these trees are not fully dormant, they should be topped higher initially, just above any existing lower limbs or at about 28 inches if no lower limbs are present. Once new growth has begun, height may be reduced further.

**When selecting containerized trees** for planting in late spring/early summer, select trees with well-placed low scaffold limbs. These are usually trees that were cut back when potted to force low growth. Cut back new growth by half now, and again in late summer.

### **Two, Three or Four trees in one hole**

At planting time, plant each tree 18 to 24 inches apart. Cut back all trees to the same height. Cut back new growth by half in spring and late summer as above. In the first two years especially, cut back vigorous varieties as often as necessary (very important!).



Do not allow any variety to dominate and shade out the others.

Plant **each grouping** of 3 or 4 trees in one hole at least 18 inches apart (between closest trees) to allow for adequate light penetration and good air circulation.

**Hedgerow plantings:** easiest to maintain when spaced at least three feet apart. Make sure the placement of the hedgerow does not block air circulation and light for other plantings.

**To conserve water and stabilize soil moisture:** apply at least a 4-inch layer of mulch up to 4 feet from a single tree or from the center of a two-, three-, or four-trees-in-one-hole planting.

## SECOND YEAR

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Cut back new growth by half in spring and late summer, same as the first year.

Pruning three times may be the easiest way to manage some vigorous varieties: spring, early summer and late summer.

Single-tree plantings: prune to vase shape (open center, no central leader). Multi-plantings: thin out the center to allow plenty of sunlight into the interior of the group of trees.

All: remove broken limbs. Remove diseased limbs well below signs of disease.

## THIRD YEAR

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**Choose a height and don't let the tree grow any taller.**

**Tree height is the decision of the pruner.**

Whenever there are vigorous shoots above the chosen height, cut back or remove them. Each year, in late spring/early summer, cut back all new growth by at least half.

The smaller one-, two-, and three-year-old branches that bear the fruit should have *at least six inches* of free space all around. This means that where two branches begin close together and grow in the same direction, one should be removed.

When limbs cross one another, one or both should be cut back or removed.

When removing large limbs, first saw part way through the limb on the under side ahead of your intended cut. Do this so it won't tear the trunk as it comes off. Also, don't make the final cut flush with the trunk or parent limb; be sure to leave a collar (a short stub).

Apricots will require more pruning in the summer to control height. Prune as needed (2 to 3 times in the summer) to remove excessive growth. Be careful not to cut too much at one time, as this might cause excess sun exposure and sunburn to the unprotected interior limbs.

To develop an espalier, fan, or other two-dimensional form, simply remove everything that doesn't grow flat. Selectively thin and train what's left to space the fruiting wood.





Don't let pruning decisions inhibit you or slow you down. There are always multiple acceptable decisions - no two people will prune a tree in the same way. **You learn to prune by pruning!**

***For further advice consult your nursery professional.***

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### Backyard Orchard Culture Begins With Summer Pruning!

Smaller trees are easier to spray, prune, thin, net and harvest! With small trees, it's possible to have more varieties that ripen at different times. The easiest way to keep trees small is by summer pruning. There are lots of styles, methods and techniques of summer pruning; most of them are valid. The important thing is to prune!

### Backyard Orchard Culture Means Knowing Your Nursery Professional

The concepts and techniques of Backyard Orchard Culture are learned and implemented year by year. An integral part of Backyard Orchard Culture is knowing your nursery professionals and consulting them when you have questions.

### Backyard Orchard Culture Is The Pride Of Accomplishment

A definite sense of accomplishment and satisfaction derives from growing your own fruit. There is a special pleasure in growing new varieties, in producing fruit that is unusually sweet and tasty, in providing an assortment of fruit over a months-long season, and in sharing tree-ripe fruit with others. These are the rewards of learning and experimenting with new cultural practices and techniques as you become an accomplished backyard fruit grower.

## ULTIMUS DICTUM

There's no excuse for neglected trees, maintenance undone or lack of know-how. Backyard Orchard Culture is an attitude: **Just Do It!**



# Resource List

## Plant and Seed Resources:

Sheffield's Seed Company - <https://sheffields.com> (Lots of seed!! Where I get all my tree seed)

Baker Creek Heirloom Seeds - [www.rareseeds.com](http://www.rareseeds.com) (Garden vegetable seeds)

Cold Stream Nursery - <https://www.coldstreamfarm.net/> (wholesale bare-root trees)

Logee's - [www.logees.com](http://www.logees.com) (unique fruit trees, tropicals and shrubs)

Stark Bro's Nursery - [www.starkbros.com](http://www.starkbros.com) (traditional fruiting plants of all types)

Raintree Nursery - [www.raintreenursery.com](http://www.raintreenursery.com) (unique fruiting plants of all types)

Prairie Moon Nursery - [www.prairiemoon.com](http://www.prairiemoon.com) (native wildflower seeds and plants)

Hancock Farm & Seed Company - [www.hancockseed.com](http://www.hancockseed.com) (wildflower, clovers and cover crop seed)

Coe's Comfrey - [www.coescomfrey.com](http://www.coescomfrey.com) (comfrey supplier)

Marsh Creek Farmstead - <http://marshcreekfarmstead.blogspot.com/p/items-for-sale.html> (comfrey supplier)

Farm Tek - [www.farmtek.com](http://www.farmtek.com) (greenhouses and commercial growing supplier)

## Pest Control:

Deer repellent, I would suggest using Sepp Holzer's bone sauce method, or just use something like a Miracle Tube tree shelter.

<http://www.treepro.com/products/miracle-tube-tree-shelters.html>

Electric fence bait stations to lure deer to get zapped -

<https://www.deerbusters.com/more-fence/electric-fence/electric-baited-deer-fence-parts/electric-fence-deer-pops-bait-stations-24-pack/>

More scent caps, you can make your own just like these -

<https://www.premier1supplies.com/p/scent-caps>

## Plant guild information:

<http://permaculturenews.org/2012/12/19/practical-plants-database/>

<http://www.beetlemoose.com/PlantDB/charSelect.php>

<http://wildgreenyonder.wordpress.com/2009/07/30/atriplex/>



## Livestock:

Dorper sheep and St Croix sheep, as well as Katahdan sheep, Nubian Goats, or LaMancha Goats. Also Lowline Black Angus or Black Irish Dexter cattle are all tops in my opinion as far as meat quality and taste, as well as marketability.

## Suggested Reading:

Introduction to Permaculture - Bill Mollison

The Intelligent Gardener - Steve Solomon

Soil Science for Gardeners - Robert Pavlis

The Frugal Homesteader - John Moody

Winning the War on Weeds - John Moody

The New Seed Starters Handbook - Nancy Bubel

Pruning and Training – The American Horticultural Society

The Holistic Orchard – Michael Phillips

The Resilient Farm and Homestead – Ben Falk

## Fencing:

I like Premier for fencing materials

They sell a Speedrite line of chargers that are great. Always over charge your fences. If you think a 20 mile charger will work, get a 50. If you think a 50 is pushing it, get a larger one. You rarely have a problem with a fence having too much charge, you often have problems with a fence not having enough charge. I have an really like the Speedrite 3000 charger. I want the 6000i charger with remote to make maintenance easier. Cyclops 3 joule and 6 joule energizers are fantastic. I have one and recommend it highly.

For birds, I like the perma-net system over the older style electronet. It's heavier, stronger, has more posts than the old style. It is harder to move, but it holds up to abuse and animal pressure better.

If you want to paddock shift larger animals, I am a fan of the poly-wire and poly-rope products. Always get good quality fence materials. You will regret it if you don't.

## Cover crop and Overseeding:

Winter Pea - spring or fall

Turnip - spring or fall

Daikon radish - spring or fall

Lettuce - spring or fall (you can get lettuce seed real cheap in bulk, an oz goes a long way)

Cowpea - (plant anytime after the last frost of the spring and before first frost)

Clover - Most clovers should be seeded very early spring or in the fall September-October is a good time

Partridge Pea (nitrogen fixer, grows 4'-8' tall)

Lespedeza (nitrogen fixer, helps worm livestock)

Sainfoin (nitrogen fixer, non-bloating, helps worm livestock, preferred over alfalfa)

Crotolaria juncea (Sunn Hemp) (great nitrogen fixer, great forage, builds a lot of biomass)

Buckwheat (spring-fall)

Dixie Reseeding Clover (Fall)

Dutch White Clover (Fall is best, but can be sown most of the year)

Vetch [common or hairy] (Fall)

Oats (Fall)

Wheat (Fall)

Barley (Fall)

Ryegrass (Fall)

For most things, just pick 4 of the appropriate season seed and put them down, some of my favorite mixes are as follows:

Spring: Ryegrass, Partridge Pea, Spring Wheat, Turnip, Daikon radish, Cowpea, Dutch white clover

Summer: Cowpea, Dutch white clover, Partridge Pea, Buckwheat

Fall: Crimson Clover, Wheat, Ryegrass, Oats, Hairy Vetch, Dutch white clover, Daikon Radish, Turnip, Winter Pea

### Inoculant:

If you order seed from Hancock (which I suggest) they have lots of good information on each type of seed including what type of inoculant to use and how to use it. Great information there.

### Grafting Resources:

I suggest learning how to do a "cleft", "whip and tongue" and "Bark" grafts. They are all very versatile and will work great for most applications.

When grafting I use a real sharp knife and I like to use what's called "Para Film or Buddy Tape" I get rolls that are either 1/2" wide to 1" wide. Buddy Tape is the best.



A tool that I've been wanting to try is a whip and tongue grafting shear, pricey, but I think it would be well worth having if you plan on doing a bunch of grafting. If it helps you produce 10 fruit trees then it essentially pays for itself vs the standard price of a \$25 fruit tree.

<http://www.graftingsystems.com/index.php/scionon-tools/tools-products/graftingshears>

Rootstock resources (for grafting):

[www.raintreenursery.com](http://www.raintreenursery.com)

<http://www.cumminsnursery.com/rootstocks.htm>

<http://www.cameronnursery.com/products/rootstocks.htm>

<http://www.treco.nu/Rootstock.htm>

[http://www.willamettenurseries.com/fruit\\_tree\\_seedlings](http://www.willamettenurseries.com/fruit_tree_seedlings)

Gardening:

JADAM book is wordy but has good info.

The Intelligent Gardener - Steve Solomon (this goes deep into soil fertility but Steve's writing style leaves much to be desired. He's an inspirational writer but sometimes he jumps around a bit and goes a little deeper than is needed in places. Still the information is so good, I highly recommend it.)

Soil Science for Gardeners - Robert Pavlis (This is a much more approachable soil science book that is full of both excellent information, and some wrong info, I disagree with the author on his opinion on minor minerals being unimportant or unresearched as well as several other items. However it is a fantastic book and recommended.)

## Companion Planting

<http://www.organicgardening.com/learn-and-grow/companion-planting>

<http://www.motherearthnews.com/organic-gardening/companion-planting-guide-zmaz81mjzraw.aspx>

<http://www.companionplanting.net/>

## Tree ID

<http://www.arborday.org/trees/whattree/>

<http://texastreeid.tamu.edu/>

[http://forestry.about.com/od/aboutforestry/tp/id\\_tree\\_guides.htm](http://forestry.about.com/od/aboutforestry/tp/id_tree_guides.htm)

## Misc

-Sun seeker app is pretty cool for finding solar angles