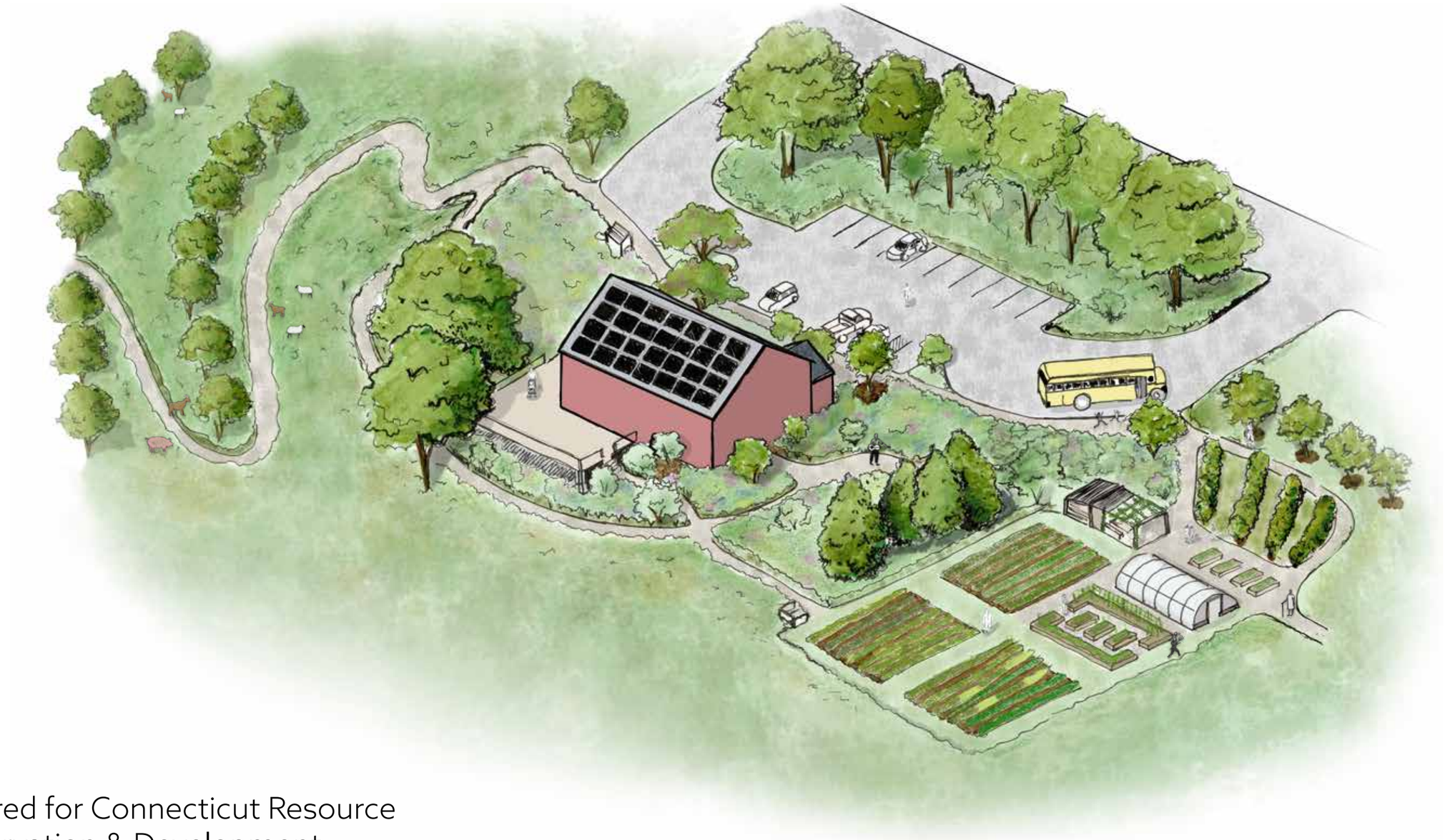
Seeding Community at Randall Farm



Prepared for Connecticut Resource Conservation & Development

Randall Farm, Lebanon, Connecticut
Conway School, Spring 2022

Designed by
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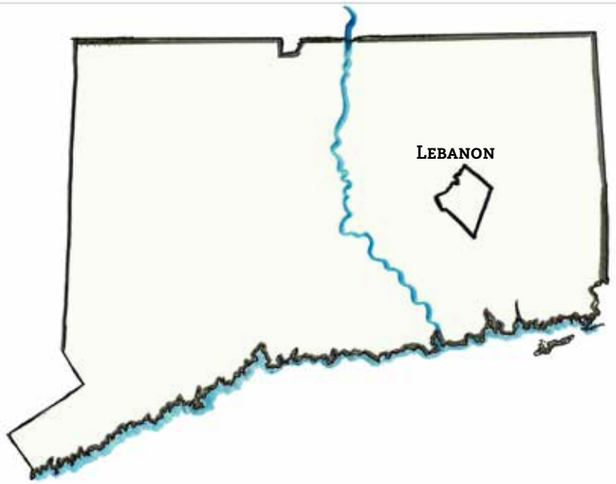
Client Vision

Connecticut Resource Conservation and Development

Connecticut Resource Conservation and Development (CT RC&D) is a 501(c)(3) statewide non-profit organization with a mission to "cultivate a diverse, equitable and resilient Connecticut through partnership-driven solutions to enhance natural resource conservation, agriculture, and rural economies." CT RC&D operates numerous programs supporting the state's agricultural economy by providing assistance and technical training for farmers, and by partnering with town governments, educational institutions, and other organizations.

Building on its existing programs, CT RC&D is now developing the Lebanon Affordable Farm Access Project and Connecticut Agricultural Center. CT RC&D has identified the Randall Farm in Lebanon, Connecticut, as a potential site for this project, and are working closely with the town government, the Randall family who are the current property owners, and partner organizations to develop this vision.



Lebanon Affordable Farm Access Project and Connecticut Agricultural Center at Randall Farm

CT RC&D's vision for its project at Randall Farm includes a cooperative farm that is affordable for farmers, demonstrations of regenerative agriculture, and opportunities for agricultural education. To support their vision, CT RC&D has identified spatial design goals and contracted with students from the Conway School to develop a master plan for the Randall Farm site. This project is in its early stages and the farmers who will be living and working on the site have not yet been identified. The designs proposed in this document are conceptual and will need to be refined as farmers are identified and engaged with CT RC&D.

CT RC&D's Project Goals

Affordable for Farmers: CT RC&D aims to create a cooperative farm that provides opportunities for new farmers to grow their agricultural businesses. A key aspect of this is lowering the financial barriers of farming by providing farmers with access to land, housing, and shared farming resources.

Demonstration of Regenerative Agriculture: CT RC&D would like to showcase regenerative agriculture on Randall Farm, and intends to work with farmers interested in using a diverse array of regenerative agriculture practices which build soil, sequester carbon, support wildlife habitat, and protect natural resources including water. CT RC&D would like all of these efforts to include climate resilience.

Opportunities for Education: CT RC&D would like to host educational programs on Randall Farm, engaging with other farmers, students from the nearby high school, and others from the greater community. It would like educational programs to take place on the working landscape, in educational gardens and on production plots as well as in an indoor space on the property. In addition to on-site agricultural education, CT RC&D hopes that the farming cooperative and education center can serve as a model for other communities looking to support farmers and agricultural landscapes and livelihoods.

Design Goals for Randall Farm

Site potential locations for farmer housing:

- 3-7 houses of 500 to 700 square feet each
- 2 parking spaces per housing unit
- Connections to septic systems, wells, and electric utilities

Site potential locations for farming infrastructure, including:

- Livestock barns
- Greenhouses and hoophouses
- Farm access roads
- Storage and wash/pack area

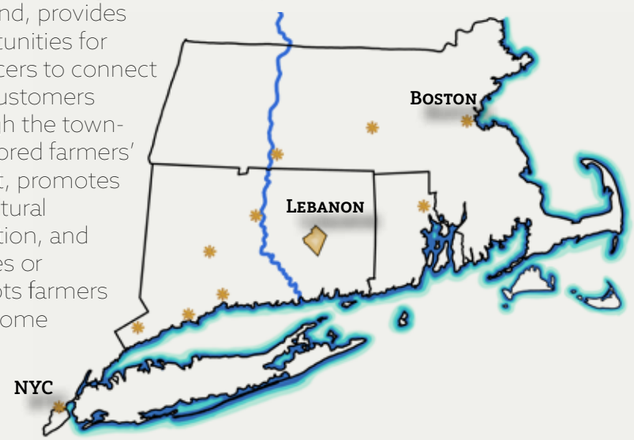
Site potential locations for an Education and Event Center, which would also house CT RC&D offices:

- 2600-3200 square feet
- Parking for 25 vehicles
- Parking space for school buses and large farm trucks

Design for long-term affordability and sustainability, including siting infrastructure in areas to maximize energy efficiency.

Lebanon, CT

The Town of Lebanon takes pride in its farming community and agricultural landscape. The town contains nearly 10,000 acres of farmland, 5,500 of which are conserved in perpetuity. The roughly 160 farms in town represent dairy and beef farms, plant nurseries, poultry, vegetable farms, and numerous farms producing specialty products including honey, wine, and syrup. Farming has historically been a major part of the Lebanon's economy, and continues to be today. To support the agricultural economy, the town government actively campaigns to fund the preservation of additional farmland, provides opportunities for producers to connect with customers through the town-sponsored farmers' market, promotes agricultural education, and reduces or exempts farmers from some taxes.



While Lebanon is a relatively small farming community with a population of about 7,200, it is situated near a number of urban centers, and within fifty miles of six cities with populations over 100,000. Farming communities such as Lebanon are crucial to the functioning of regional food systems that support numerous urban centers. Acknowledging this, CT RC&D aims to support the farmers in these communities, especially new farmers and farmers from underserved communities. Lebanon is 95% white (2017 Town Profile), with a median age of 45. This places Lebanon as the town with the highest percentage of white residents in New London county, and a town with a slightly older age demographic as compared to the state and county averages. The median household income in Lebanon is $89,375, 35% higher than the county and 27% higher than the state median household income levels. In order for CT RC&D to connect with new farmers from underserved communities, it may need to connect with communities beyond Lebanon.

Community At Randall Farm

CT RC&D aims to connect with a variety of people on site including resident farmers, educators, students, visitors, and those from partner organizations.

Farmers

At the core of CT RC&D's vision for Randall Farm are the resident farmers. With this project, CT RC&D intends to provide opportunity for new farmers and farmers from underserved communities to build equity and grow their farm businesses. The farmers will need to inform the types of agriculture that will happen on site (including livestock), the types of structures necessary for operations, the vehicular access requirements, the acreage needed to support their operations, and more. Final designs exclude spatial layouts for resident farm businesses, as the farmers have not yet been identified and will have specific visions and goals for their farming operations.

Farmer housing: CT RC&D has identified cost of housing as one of the greatest barriers to equitable access to farmland. Thus, they aim to provide housing for farmers and their families on site. Given that this project aims to support underserved communities, potentially BIPOC and veteran communities, it is critical that site layout, including the location of housing, is informed by these communities. As Lebanon is a predominantly white community, it is very important to discuss safety needs with the identified farmers in the design process. Connecting with the individuals who may live on site, incorporating their input, and providing farmers with autonomy to make design decisions may help to ensure the site layout is informed, appropriate, and efficient.

Lyman Memorial High School & Lebanon Regional Agricultural Science & Technology Center

Lyman Memorial High School, located .75 miles from Randall farm, hosts an Agricultural Sciences & Technology program. CT RC&D has identified an opportunity for students in this program to engage with the farm, through managing demonstration plots, participating in farm programs, and playing an active role in stewarding the landscape. CT RC&D is considering long term partnerships with the school, and the potential of acquiring easements for trail connectivity between the school and the Randall Farm property.

Program Educators & Attendees

CT RC&D wants to promote agricultural education and knowledge sharing on site through workshops, events, and demonstrations, engaging with the public, partner organizations, and educational institutions.

CT RC&D Staff

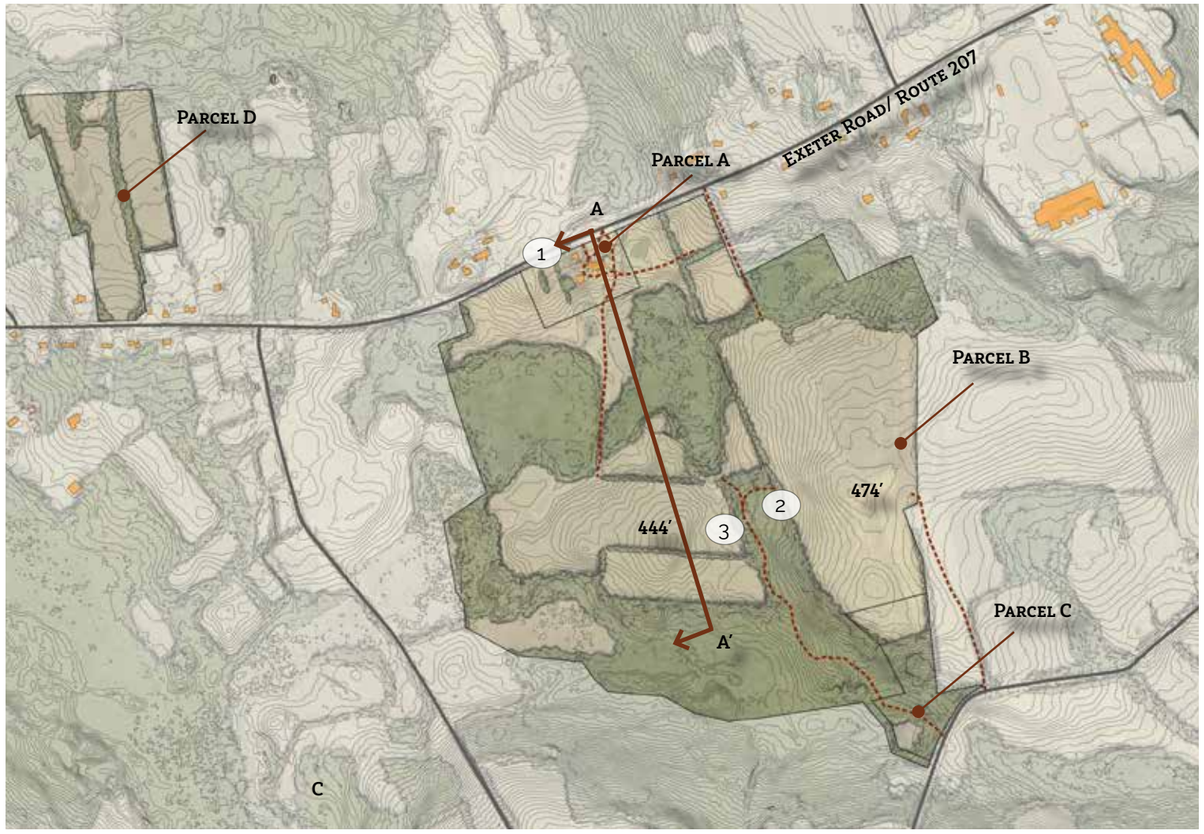
CT RC&D envisions Randall Farm as a hub for its programs, with staff offices and intern housing. Site design will need to accommodate for public engagement and space for internal operations.

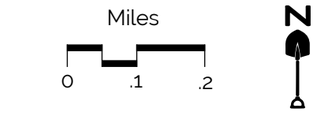
Other Visitors

In addition to resident farmers, staff, and program attendees, CT RC&D hopes to provide accessible spaces for the public to engage with the landscape and farm businesses. Additionally it would like to provide options for event rentals on site, which could help finance farm operations.

Site Overview

The Randall Farm property spans 232 acres of rolling hills, large agricultural fields, wetlands, and forest, and comprises four parcels; three of these are contiguous and a 21.75-acre parcel is located 0.4 miles away off Exeter Road. The 6.5-acre Parcel A is where the current buildings are centralized, including the farmhouse and barns. Parcel B is 195 acres, all of which is under an agricultural conservation easement. Parcel C is 8.9 acres, and sits at the southern edge of the property off York Road. Parcel D is the extra 21.75-acre detached parcel. The property is currently owned by Louise "Teddy" Randall and her family, who have partnered with CT RC&D to envision the future of the farm. The analyses for this design project focus primarily on the three contiguous parcels.





Buildings
Public Roads
Farm Access Roads
2 foot contours
Constructed Ponds

Multiple large, old-growth "wolf" trees can be found in the forest on the property. Their wide branching pattern indicates that the area was previously open. Many stone walls on the property also indicate that areas that are now forested were previously open pasture.

Conservation Easement

194 acres of Randall Farm is under an agricultural conservation easement, which was placed on the property in 1986 by George and Louise Randall. This easement conveyed the development rights to the state. While this easement does restrict the type and extent of development which can happen on the property, it does permit the development of residences for "persons directly incidental to farm operation," buildings for animals, roadside farm stands and farm markets, and facilities for storage of equipment and farm produce. While the writing of the easement does allow flexibility to build on the conserved parcel, the client will need to secure the appropriate permits before building, and confirm that plans comply with the easement.

Current Farming Operations

Approximately 90 acres are leased to a local dairy farm for conventional production of corn and hay, and approximately 10 acres are in active pasture. Crops are grown and harvested with conventional methods, involving regular use of heavy machinery, tilling, and herbicides such as Round-Up.

Large corn fields are sprayed with herbicides early in the growing season. These large monocultures provide little vegetative biodiversity or habitat.

Below: Buildings including a historic barn, historic farmhouse, and additional farm buildings are clustered on the northern side of the property.

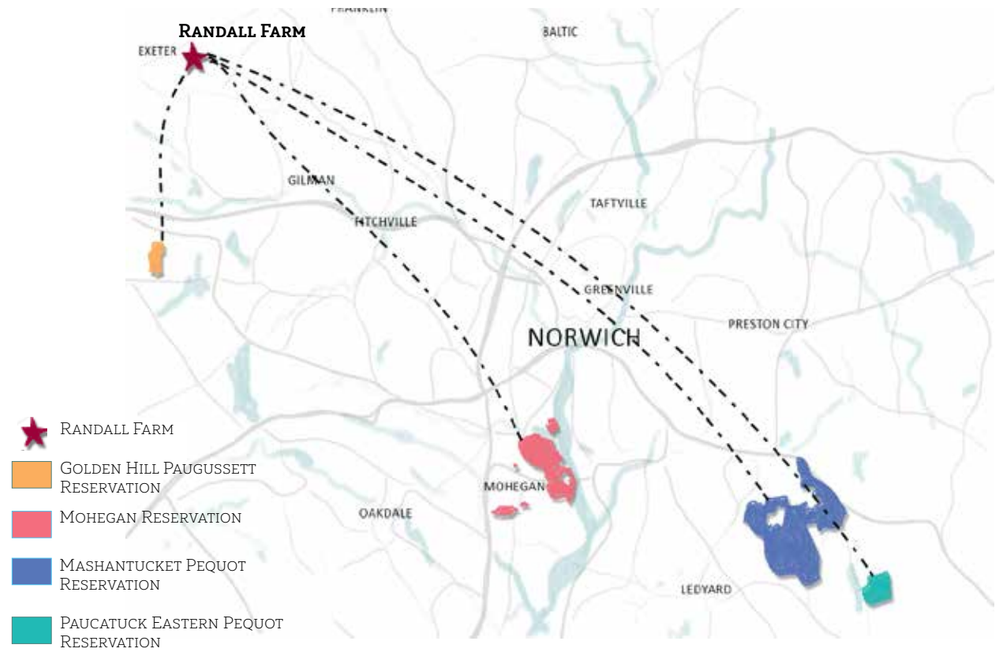
Indigenous Land

What is now called Lebanon is the homelands of the Mohegan Tribe, who migrated to the Thames River Valley in the 1500s. The sovereign nation has over 2,100 active members today and a reservation located approximately 12 miles southeast of the Randall Farm.

The greater northeastern region is the ancestral homelands of a mosaic of indigenous tribes; there is a long and diverse history of indigenous stewardship of these lands (native-land.ca). Despite the atrocities of settler-colonial violence, including forced removal, genocide, and cultural assimilation, Indigenous tribes continue to demonstrate resilience and celebrate their cultures locally and regionally today. Just as the Mohegan Tribal nation has a reservation nearby, there are many tribes with an active presence in the area.

Mohegan means wolf people in the Mohegan Language.

Mohegan tradition supports symbiotic and enduring relationships among species and land. The people of the Wolf have long practiced sustainable hunting, in addition to herbal medicine and regenerative agriculture. They believe that all living things and ancestors are on the Trail of Life, guided by their past and present. They are a culture dedicated to learning, growing, and building resilience for generations to come (www.mohegan.nsn.us).



Tribal Reservations within 20 Miles of Randall Farm

The Golden Hill Paugussett reservation is just 5 miles away from the Randall Farm, the Mashantucket Pequot reservation is 17 miles away, and the Paucatuck Eastern Pequot Reservation is 20 miles southeast.

As CT RC&D aims to restore and diversify the relationships between people and the land to promote resilience in agriculture and community, there are opportunities to connect with and learn from native people who have long practiced regenerative land stewardship.

Indigenous artifacts and possessions have been found near the Randall Farm. If any indigenous artifacts are found during implementation of this project, the Mohegan Tribe should be contacted and construction should pause immediately to allow the sovereign nation to make informed decisions about what to do with important artifacts and afford time for ceremonies. The Mohegan tribe's contact information is listed on their webpage. It is also possible that artifacts belong to a different tribe or cultural group, given the diverse range of tribes that have long settled and interacted with this landscape.

Post-European Contact

Since the arrival of European colonizers, the landscape has seen dramatic changes. As the farm has undergone changes in ownership, different farming practices and management have shifted the physical characteristics of the landscape.

Early colonial land management oversaw significant clearing of forests in Connecticut, and stone walls throughout Randall Farm may indicate a history of open pasture.* However, some currently-forested areas of the farm appear to be forested at least as far back as 1934, as seen in aerial imagery. These forested areas coincide with wetlands on the property, and may have not seen significant agricultural use at any point.

1934 Aerial Imagery of Randall Farm

The Randall Farm property has hosted many farmers since at least the 1700s. Some families worked and lived on the property for decades, while others held shorter tenures. The latter group included a number of Jewish immigrant farmers, who were connected with the landscape through the Jewish Agricultural & Industrial Aid Society, which sought to support Jewish immigrants in establishing themselves in rural communities. This aspect of the landscape's history mirrors the potential for the Randall Farm property to host new farmers in the future, as part of CT RC&D's vision.

2020 Aerial Imagery of Randall Farm

**Stone walls are often assumed to be colonial structures. However, there is evidence in New England that some of these structures may predate the arrival of European colonizers, and could have been used by native people before European contact (Gage 2008).*

Current Hub

All of the existing buildings are located on the 6.48 acre parcel on Exeter road. These buildings include the historic farmhouse, historic barn, "chicken coop", and garage. The farmhouse is the current home of Louise "Teddy" Randall, who has lived here since 1960, when she and her husband George purchased the property. While other structures on the farm previously had more specific purposes, they are now primarily used for storage of farm equipment and relics of the farm's history. As CT RC&D develops their on-site programs and farmers begin to work and reside on the farm, these spaces have the potential to be used in many different ways. This may include farm storage, farmer workshops and CT RC&D offices, housing, or potential space for larger gathering and event rentals.

Parking

Gravel driveways lead guests and residents to the old farmhouse and the northern side of the barn. Permanent parking for residents is adjacent to the farmhouse, while informal visitor parking occurs on turf. There is no signage, and no clear indication of where or where not to park.

Utilities

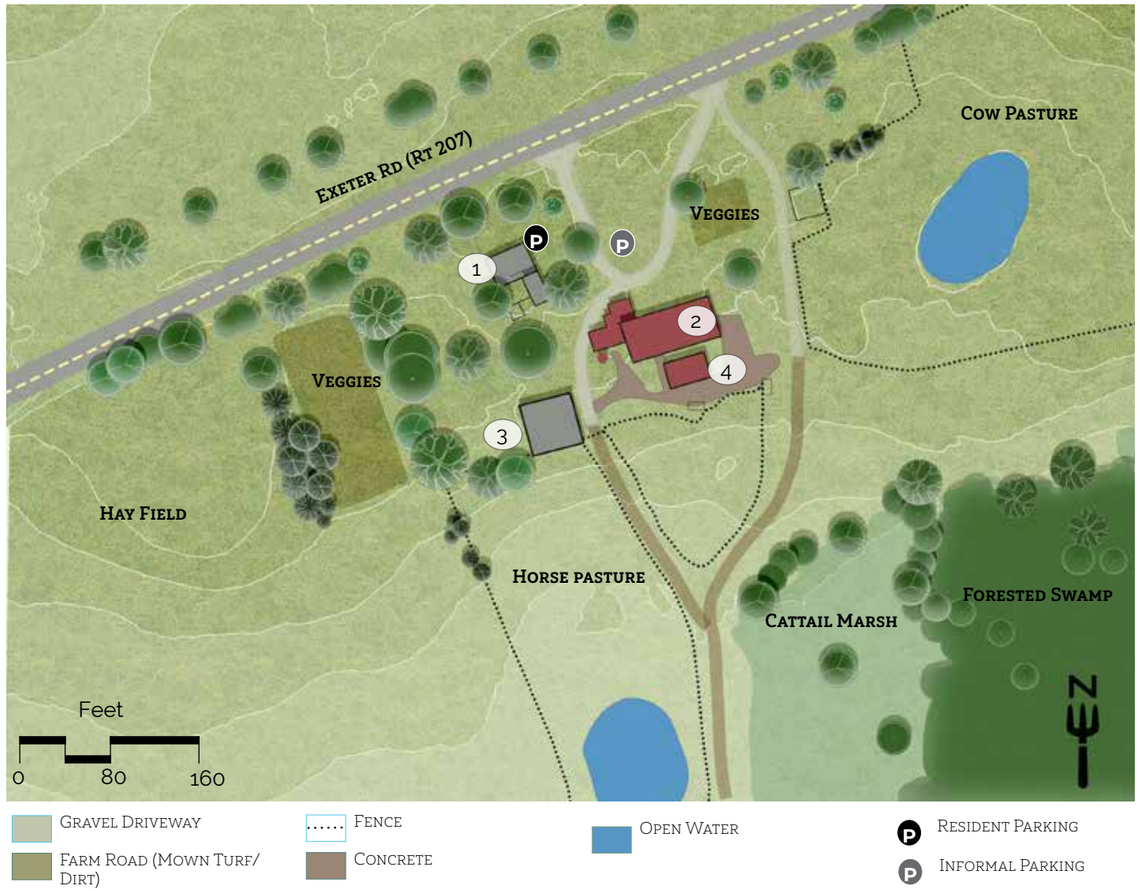
Electric poles line the north right of way along Exeter road. The farmhouse connects to the electric grid via above ground wires that connect to the north eastern side of the old farmhouse. The house is served by a private well, and has its own septic system. A strip of PV solar panels is located on the south facing roof of the barn.

Livestock

The horse pasture enclosed with the "chicken coop" is currently used for one horse, while two others roam around the other enclosed areas. A small herd of cows pastures the enclosed area to the east of the barn. Both of these enclosed livestock yards include an open water pond.

Vegetable Gardens

A tilled garden is located to the west of the farmhouse. In recent years this area has been used for annual vegetable production.



Existing Structures

Farmhouse

2,820 S.F.

4 bedroom, 2 bathroom On National Historical Registry

C. 1750

The historic farmhouse may be used for future farmer housing, or for CT RC&D offices.

Barn

3,200 S.F.

National Historical Register

19th c.

The large, historic barn has a hay loft, grain silo, office, and milking parlor. It is used for general storage. CT RC&D has identified interest in potentially renovating the space to be suitable for rustic event rentals.

"Chicken Coop"

3, 200 S.F.

19th c.

Two-story structure currently used for storage and a horse barn. Large garage doors allow for vehicle entry.

Garage

884 S.F.

Late 20th c.

Simple structure currently used for storage.

Access & Circulation

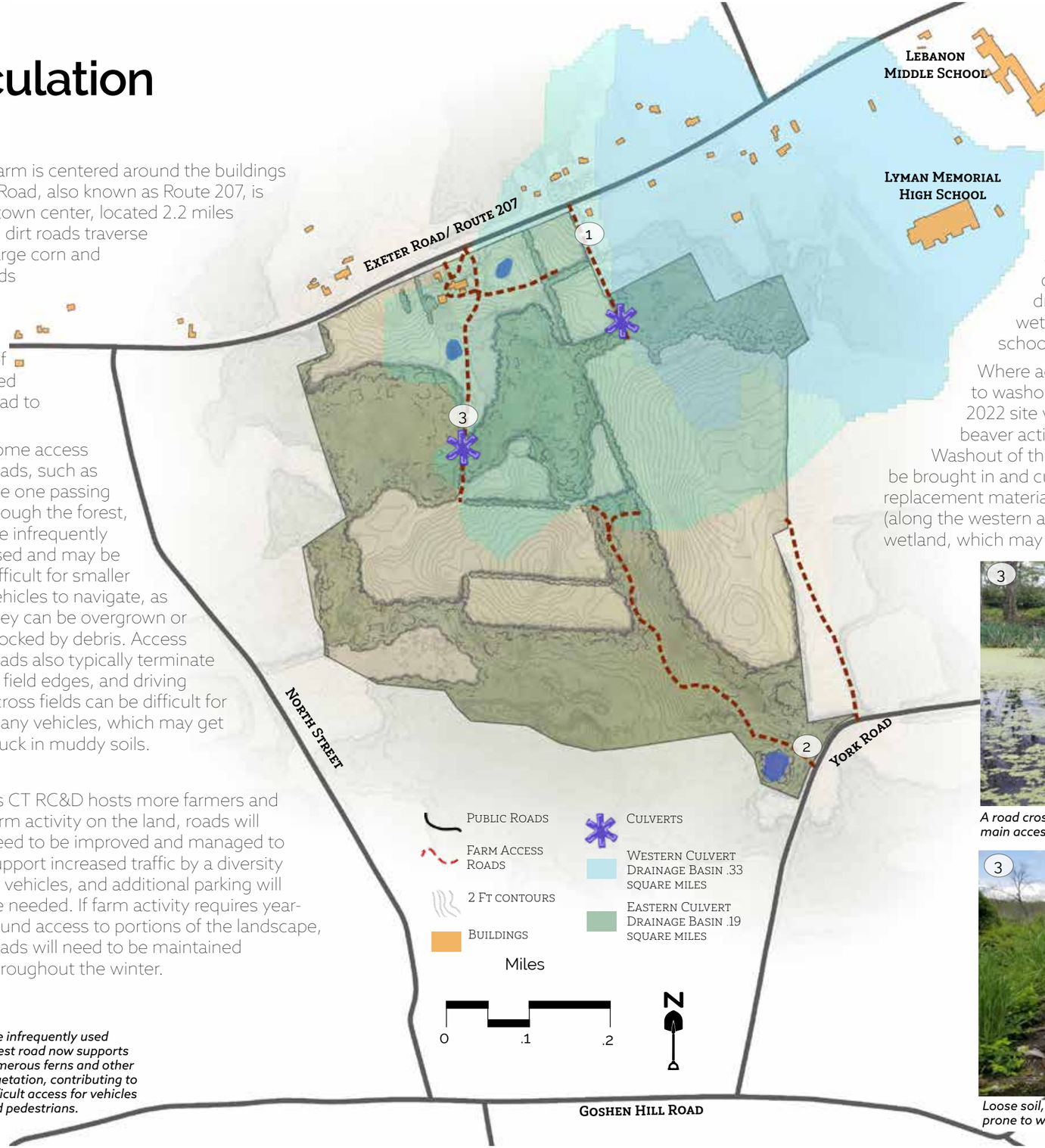
Daily circulation and parking on the farm is centered around the buildings located on 1041 Exeter Road. Exeter Road, also known as Route 207, is a main road connecting to Lebanon town center, located 2.2 miles to the east. On the site four unpaved dirt roads traverse the farm and provide access to the large corn and hay fields on the property. These roads are primarily used by farmers operating large equipment such as tractors. Two of these roads extend from Exeter Road on the north side of the main property, and two are located off of York Road, a lightly-used dirt road to the south of the property.

An access road passes through a neighboring property to the east.

Some access roads, such as the one passing though the forest, are infrequently used and may be difficult for smaller vehicles to navigate, as they can be overgrown or blocked by debris. Access roads also typically terminate at field edges, and driving across fields can be difficult for many vehicles, which may get stuck in muddy soils.

As CT RC&D hosts more farmers and farm activity on the land, roads will need to be improved and managed to support increased traffic by a diversity of vehicles, and additional parking will be needed. If farm activity requires year-round access to portions of the landscape, roads will need to be maintained throughout the winter.

The infrequently used forest road now supports numerous ferns and other vegetation, contributing to difficult access for vehicles and pedestrians.



Wetland Crossings

The two access roads branching off Exeter Road cross wetlands that bisect the property, and use culverts to manage water flow. The eastern culvert drains an area of .19 acres, while the western culvert downstream drains an area of .33 acres. These drainage basins include open fields, some forest and wetland, and the large parking lot of the nearby high school, which may contribute higher rates of runoff.

Where access roads intersect wetlands the roads are prone to washout and flooding, which was observed during an April 2022 site visit and described by the land owner. Reported beaver activity in the wetlands also contributes to flooding. Washout of the roads can be costly to repair, as new material must be brought in and culverts replaced periodically. Site visits revealed that replacement material from a recent repair on the main wetland crossing (along the western access road) was washing out into the surrounding wetland, which may have negative impacts on wetland health.

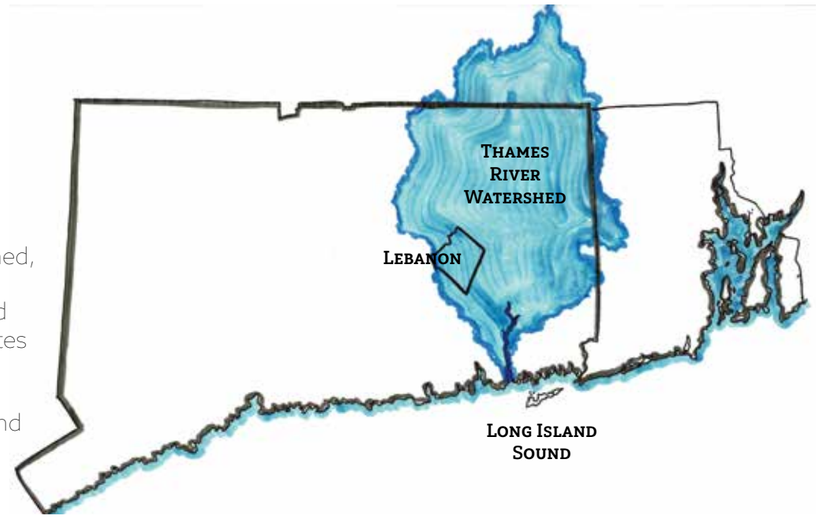
A road crossing a wetland is used to access the southern fields. This road is the main access road from the northern side of the property to the southern fields.

Loose soil, rocks, and woody debris deposited during a recent culvert repair are prone to washout into the wetland.

Water Resources

Thames River Watershed

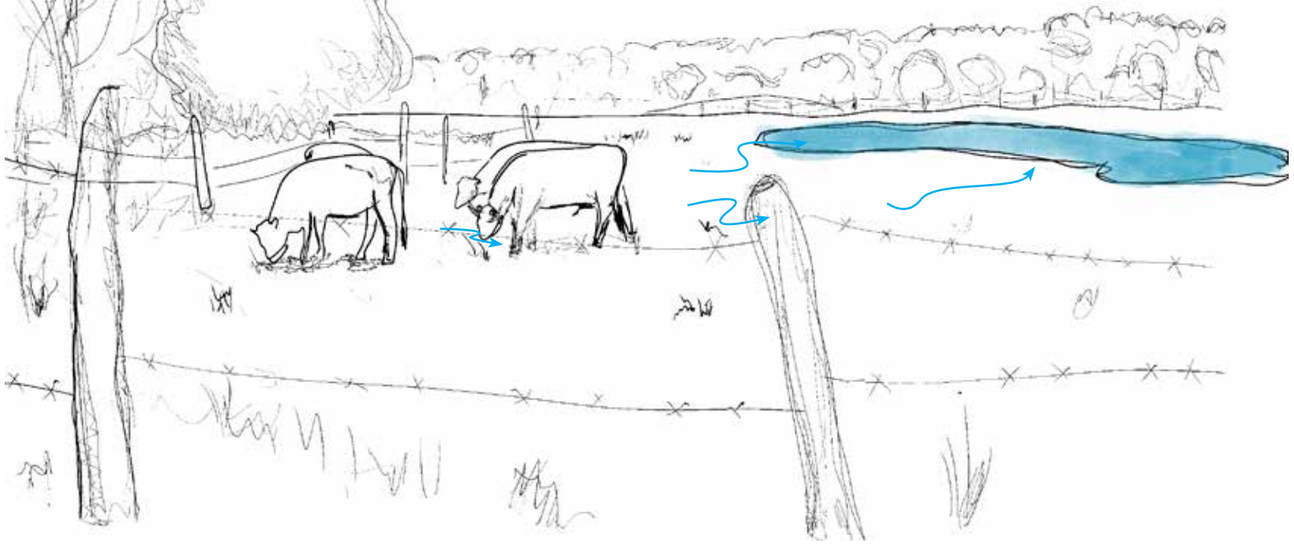
Randall Farm is located within the Thames River watershed, which spans 1,471 square miles in eastern Connecticut, southern Massachusetts, and western Rhode Island, and drains into Long Island Sound. The watershed incorporates the Yantic, Five Mile, Moosup, Natchaug, Pachaug, Quinebaug, Shetucket, and Willimantic Rivers and their tributaries in addition to the Thames River main stem, and includes many acres of developed and agricultural land.



Impacts of Agriculture on Water Quality and Wetlands

Runoff from agricultural land may carry harmful pathogens such as E. coli, and nutrient-rich runoff that contributes to turbidity and eutrophication downstream, which adversely affects sensitive aquatic species (EPA). Whether contaminants are from agricultural activity, runoff from developed areas, or other sources of contamination, poor water quality in some water bodies is a concern in and around Lebanon. The nearby Pease Brook, which some wetlands of Randall Farm drain into via the Hinckley Brook, is considered a Category 5 impaired water body, according to the EPA, as e. coli detection exceeds the total maximum daily load.

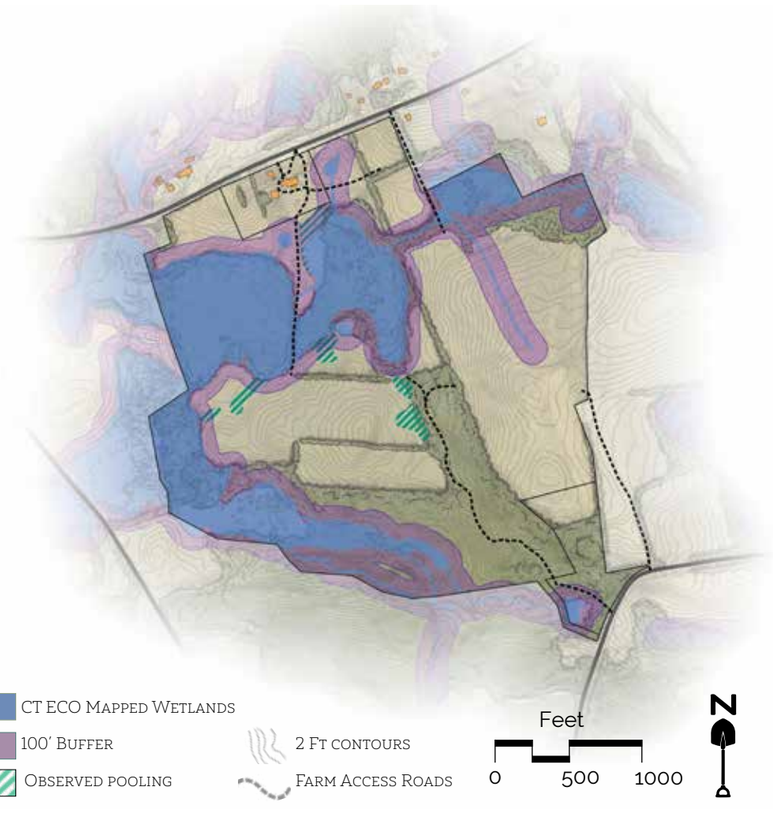
Wetlands are a prominent feature in the landscape at the Randall Farm, and agricultural activity around them may affect their health, as well as the health of wetlands and water quality downstream. On the farm there are multiple ponds encompassed by pasture, with little vegetation to intercept runoff from manure. Other contaminants, such as tar from tires piled near the wetland, or glyphosate from application to fields, may also negatively impact wetland health and water quality.



Wetlands at Randall Farm

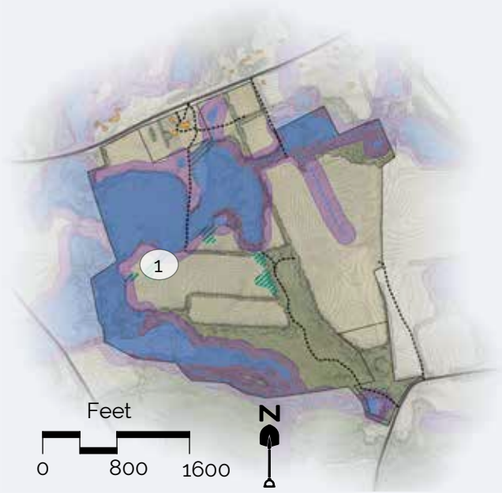
Connecticut Environmental Conditions Online (CT ECO) mapped wetlands are shown on fifty-nine acres of the property, mostly coinciding with forested lowlands, and include ponds, streams, marshes, and forested swamps. The Town of Lebanon requires permits for any new construction or disturbance of greater than 5,000 square feet within the 100' buffer zone. Existing infrastructure and land in active agriculture are exempt from this bylaw. Existing roads on Randall Farm may be improved upon without a new permit. Land in active agriculture within the buffer zone, including livestock yards and pastured land, is also exempt from the permitting process. While ongoing agriculture is permitted, some practices such as heavy pasturing and tilling are not suitable for wet areas.

Though allowable, maintaining the existing roads in wetlands may have ecological consequences. The small size of the existing culverts has detrimental implications for wildlife; they consistently dam and clog, which can cut off critical pathways for smaller species such as amphibians and fish. Furthermore, ongoing maintenance and repair of roads in wet areas can have high long-term costs that may increase with changing climate conditions (See Flooding & Climate Change, sheet 10).



Wetland Habitats

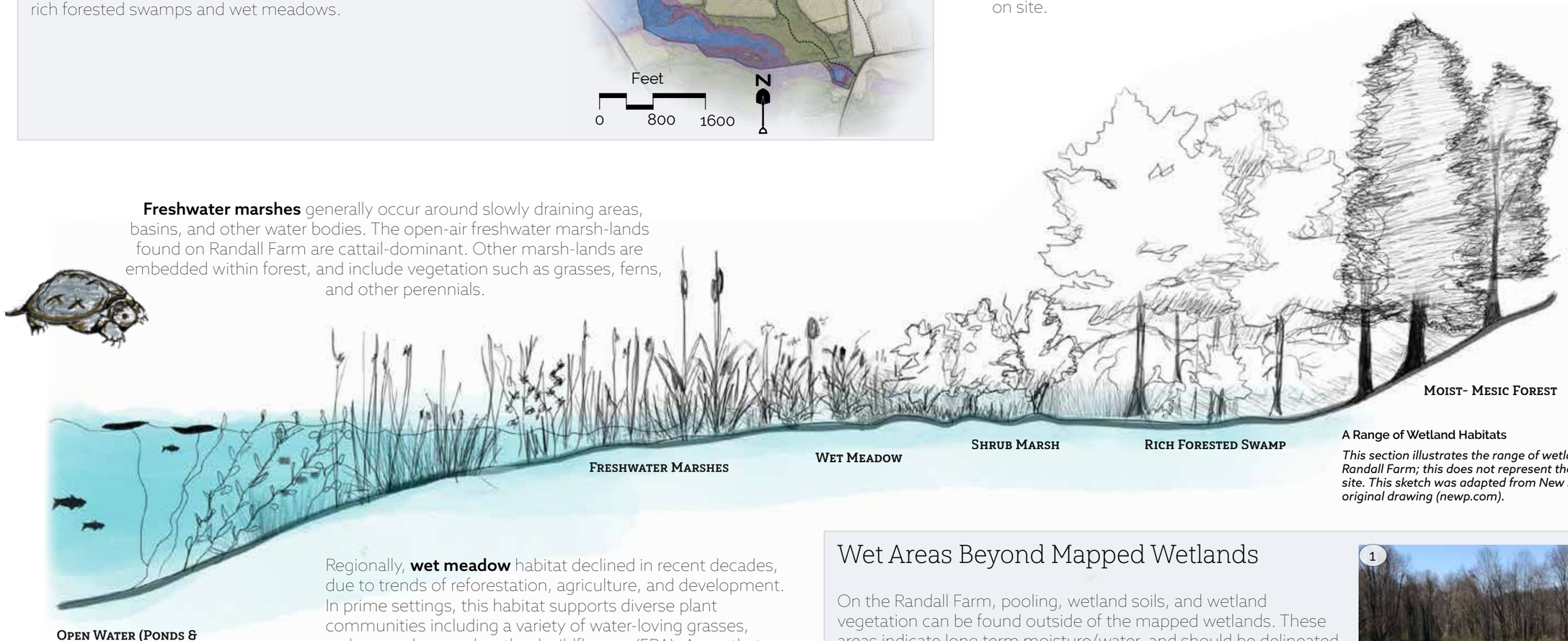
Wetlands play a critical role in promoting climate resiliency, supporting biodiversity, and providing critical ecosystem services such as water quality control, flood mitigation, and habitat. Wetland soils sequester eight times more carbon than upland soils. The loss of ecosystem services provided by wetlands would be costly, and some of these services are irreplaceable, so it is imperative that wetland ecosystems are protected. At the Randall Farm, there are distinctive wetland habitats that provide important biodiversity value. These include freshwater marshes, rich forested swamps and wet meadows.



Rich Forested Swamps typically occur at low to mid elevations in slowly draining depressions or at the margins of stream valley bottoms, where higher pH and/or nutrient levels are associated with rich flora (Conservation Gateway). On site, this habitat occurs in both isolated patches and embedded in larger mesic forest surrounding streams. Skunk cabbage, red maples, and speckled alder are a few of the common native species observed within this habitat on site.

Acer rubrum trilobum, a Facultative Wetland variety of Red Maple, is abundant in Randall Farm's forested swamps.

Freshwater marshes generally occur around slowly draining areas, basins, and other water bodies. The open-air freshwater marsh-lands found on Randall Farm are cattail-dominant. Other marsh-lands are embedded within forest, and include vegetation such as grasses, ferns, and other perennials.



A Range of Wetland Habitats

This section illustrates the range of wetland habitats found on Randall Farm; this does not represent their spatial distribution on site. This sketch was adapted from New England Wetland Plant's original drawing (newp.com).

Regionally, **wet meadow** habitat declined in recent decades, due to trends of reforestation, agriculture, and development. In prime settings, this habitat supports diverse plant communities including a variety of water-loving grasses, sedges, rushes, and wetland wildflowers (EPA). Areas that could be wet meadow on site are currently pastured or mowed. Wet meadows can provide habitat for pollinators that benefit agricultural productivity, while also removing pollutants from surficial runoff.

Wet Areas Beyond Mapped Wetlands

On the Randall Farm, pooling, wetland soils, and wetland vegetation can be found outside of the mapped wetlands. These areas indicate long term moisture/water, and should be delineated by a soil scientist if construction or other use is being considered in that area.

Cattails, a wetland plant, growing in a corn field.

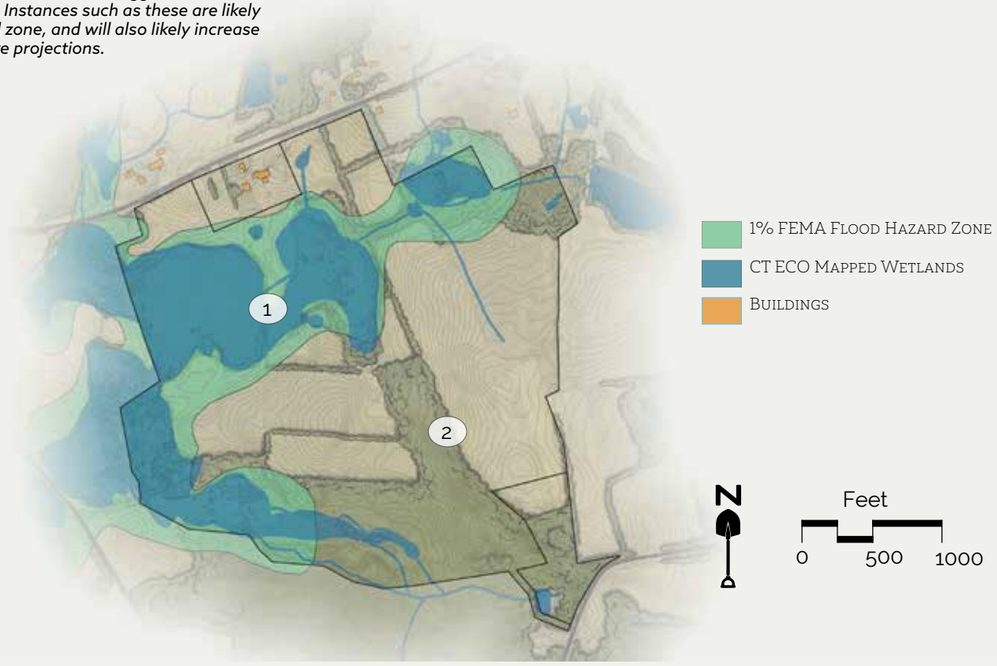
Flooding

1% Flood Hazard Zone

Several factors increase the risk of flooding. Areas adjacent to water bodies such as rivers or coastlines are typically considered at higher risk, and additional factors such as poor drainage and impervious surfaces may contribute to higher risk of flooding. FEMA produces Flood Hazard Maps to identify areas most at risk of flooding. **Anything with a greater than 1% risk of annual flood is considered at high risk.** The 1% risk of annual flood was previously referred to as the 100-year flood zone.

A road washout due to a clogged culvert and high water. Instances such as these are likely in the flood zone, and will also likely increase with climate projections.

Approximately 80 acres of the Randall Farm property falls within the 1% flood zone, which surrounds most of the wetlands on site. While these mapped flood zones may be suitable for a variety of agricultural practices, structures should not be built in these areas. Repairing and maintaining infrastructure damaged by flooding can be costly, and insurance companies using flood-hazard mapping often charge higher rates to insure construction in the 1% annual flood hazard zone. Siting housing, work spaces, and barns in flood zones can also risk the safety of humans and livestock. Additionally, construction in flood zones may disturb wetland and marginal ecosystems that are important in mitigating the negative effects of flooding by slowing and filtering water. With climate change bringing wetter conditions to Connecticut, the actual risk of flooding may be higher than 1% annually in many of these areas. In order to reduce future costs and promote ecosystem resilience and human health, construction should not occur in mapped flood zones.

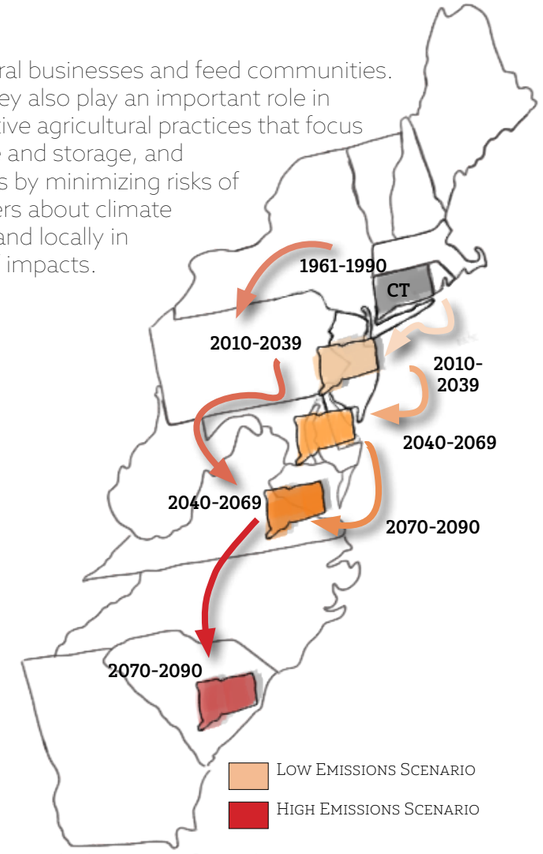


Climate Change

Farmers rely on healthy landscapes to sustain their agricultural businesses and feed communities. Farms are not only essential to feeding communities, but they also play an important role in combatting the worst impacts of climate change. Regenerative agricultural practices that focus on energy efficiency, diversifying vegetation, carbon capture and storage, and boosting soil health can help farmers sustain their livelihoods by minimizing risks of climate damage (UCSUSA). CT RC&D aims to educate farmers about climate resilient agriculture using regenerative practices. Regionally and locally in Connecticut, climate change is projected to have a range of impacts.

The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) at UConn has identified key impacts of climate change in Connecticut by 2050:

- Significant increase in average annual temperatures, with largest increase expected in summer and in fall.
- Increase in heat waves: currently warm spells occur 4 times a year. In 2050, they will occur 8 times a year.
- Fewer frost days: 124 days presently will decrease by 39 days by 2050.
- Growing season expected to increase approximately 35 days by 2050.
- Increase of annual precipitation with the largest increase expected in winter and spring.
- Number of heavy rain days is projected to increase, increasing flood risk.
- Decrease in summer water availability (with greater evapotranspiration), which is expected to increase drought risk. (CIRCA)



Climate projections suggest Connecticut may see temperature patterns more similar to South Carolina by as early as 2070 (UCSUSA).

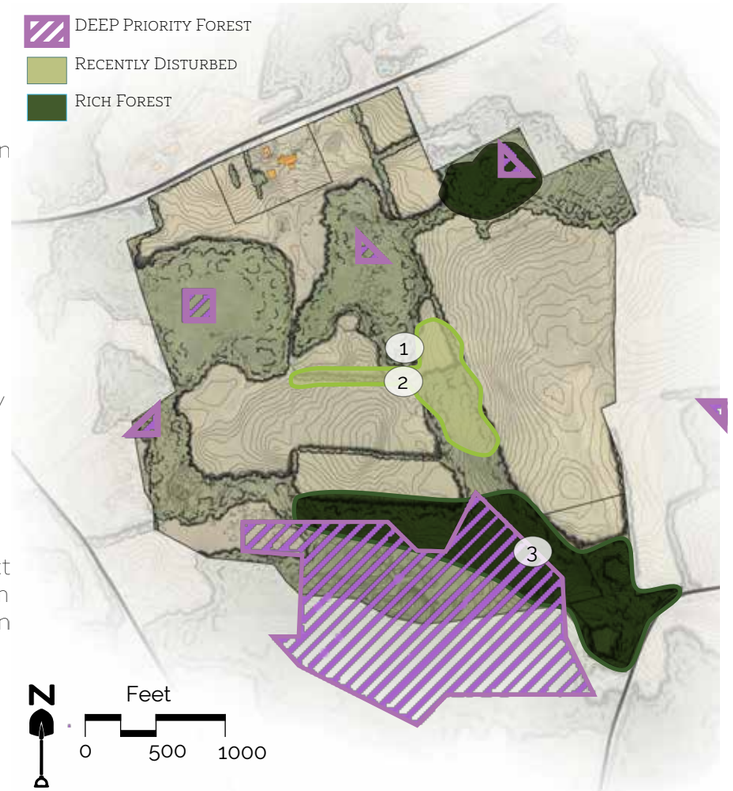
Ash trees on Randall Farm are suffering the effects of emerald ash borer, a pest that will have further impact on forests as warmer temperatures expand its range and extend its breeding season.

These changes will have a direct impact on the landscape of the Randall Farm property, affecting the composition of local ecosystems and the farming operations taking place. While some changing conditions may be favorable for farmers, such as an elongated growing season, others will have adverse effects, such as increased frequency of drought and flooding. Furthermore, local agriculture will grow increasingly important as regions that the national and global food system rely on, such as California, may not be able to keep up production in the face of climate change. Regional climate resilience efforts should preserve important farm soils for agriculture, and support local farmers. This includes educating new farmers, and providing resources for equitable access to land.

Forests

Forests provide a range of important services to all beings, including energy and food production, water and air quality control, carbon capture and storage, wildlife habitat, cool microclimates, resources for local economies, cultural significance, and recreational opportunities. The costs of replacing these services would be very high; in some cases replacement would not be possible.

Approximately 100 acres of the Randall Farm site is forested. Forest composition varies throughout the site, showcasing a range of tree species; common trees include red maple, yellow birch, black cherry, and ash. Other trees include hickory, black birch, white pine, white oak cottonwood, and spruce. Forests and forest margins are critical to the survival and migration of wildlife and pollinators. These habitats are especially important in agricultural communities such as Lebanon, where large agricultural fields with low biodiversity and habitat potential can blanket a landscape. On site, forested narrow forested patches between fields connect three larger forested patches, located on the southern, northeastern, and western property edges.



Rich Forest

Rich biodiversity is found beyond the 21 acres of identified Priority Forest in the southern forested region of the site. Small changes in topography result in microclimates that influence the mosaic of vegetation. Trees are diverse in both age and species. Diversity supports climate resilience, because the greater range of species that exist within the forest, the less likely that one event (such as a pest, or a major storm) would result in the decline of the entire forest.

Randall Farm's mesic forests support a diverse range of species.

Most of the trees in this section are mid-successional; however, several large, old growth trees can be found in this region. Those larger, legacy trees likely survived any previous clear cutting over the last two to three centuries. Old growth trees store the most carbon, and continue to provide important habitat even once they are no longer living.

Discarded tires and a rock pile in a young successional forested area are surrounded by multiflora rose.

Juniper growing near a forest edge.

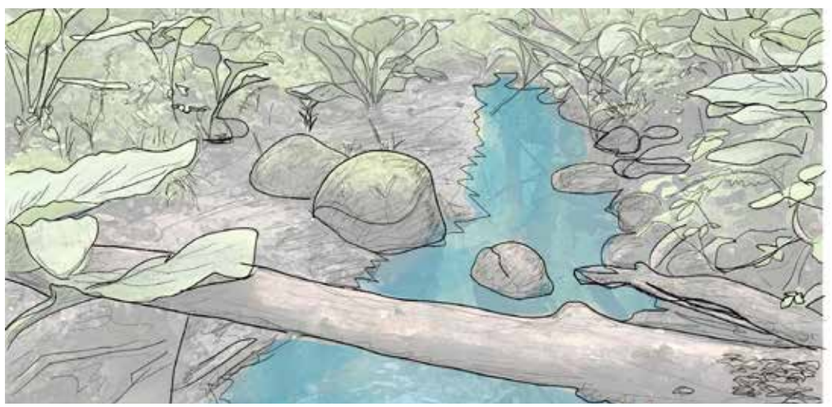
"Disturbed" Forest

Some forested areas show signs of more recent disturbance and/or clearing. An area showing greater disturbance is located just north of the richer, biodiverse forested region. The presence of juniper, an early successional species, may be an indication of previous clearing. Within this area there are several gravel and tire piles, in addition to a heightened presence of aggressive species such as multiflora rose and tartarian honeysuckle. This area closely borders agricultural fields, and it is also possible that, due to proximity, this area received higher pollution from agricultural runoff. Near this disturbed forest area is an old agricultural field that has transitioned into meadow, as it is reportedly too wet and rocky for typical crop production. While this area is not ideal for crops, it may have potential for rotational grazing. Grazing in this area could help manage aggressive invasive species, and prevent the wetland meadow habitat, which is regionally uncommon in New England, from further succession.

Fungi grow in Randall Farm's rich forests.

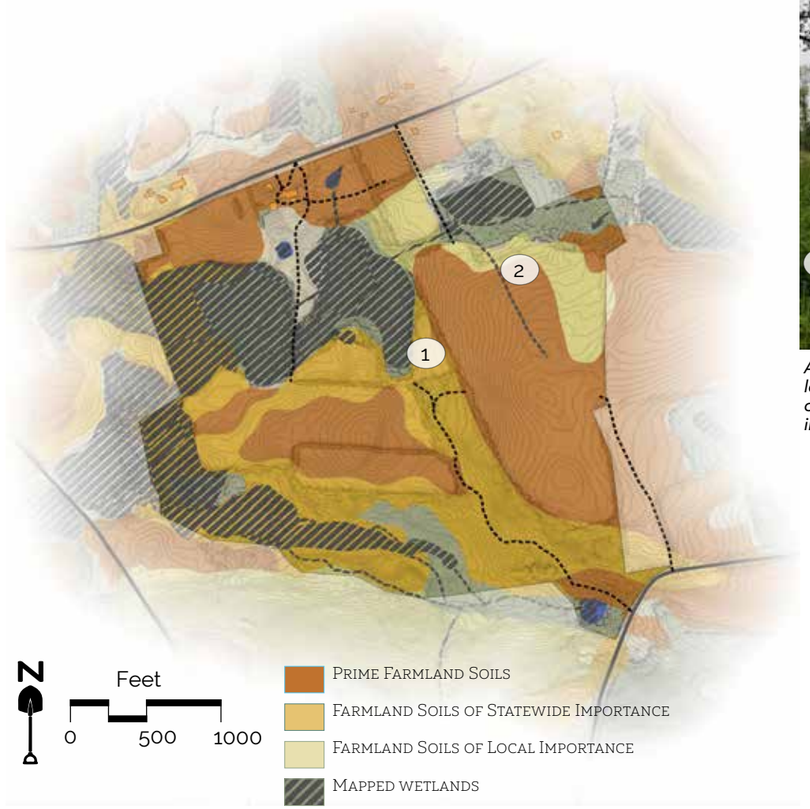
Priority Forest for Protection

In 2020 the Connecticut Department of Energy and Environmental Protection (DEEP) compiled a Forest Action plan, which assesses critical forest resources to preserve and outlines the steps to promoting statewide resilience through forest-based initiatives. In this report, the DEEP identified Priority Forest for protection. These areas were identified for their biodiversity value, contiguous acreage, and projected climate resilience. 21 acres of the southern forested region on site has been identified as Priority Forest. While these 21 acres already fall under conservation easement, the easement does allow for development for agricultural purposes. It is legally permissible to convert forest on site to active agriculture, or necessary infrastructure (such as farmer housing, buildings, roads, etc.) It is also possible to harvest forest products as a form of agriculture.



Forests provide critical protection to water bodies, especially in regions where agricultural runoff may be a source of pollution. On site, forested areas surround several open water bodies and perennially wet areas, including two streams and a large pond in the southeast corner.

Soils

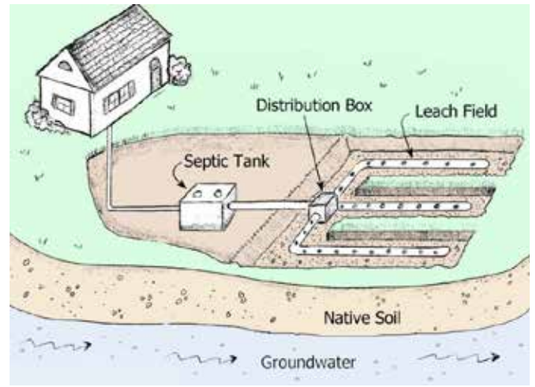


Agricultural Soils

Randall Farm has abundant farmland soils, with 182.9 acres of the 231.9 acre site considered Prime Farmland Soils or farmland soils of statewide or local importance, and covering nearly all areas outside of the wetlands. This USDA designation refers to soils with the physical and chemical characteristics most suitable for agricultural production. However, decades of intensive agricultural practices, including regular tilling, use of heavy machinery, and use of herbicides may have degraded these soils through compaction and reduced soil organic matter. On site investigation revealed that some soils in areas rated as "Prime Farmland Soil" were very rocky, and areas of pooling may indicate limited drainage or high groundwater levels.

A meadow grows on a former field, which the landowner reports is very gravelly, wet, and difficult to cultivate. This area is mapped as Farmland soils of local importance.

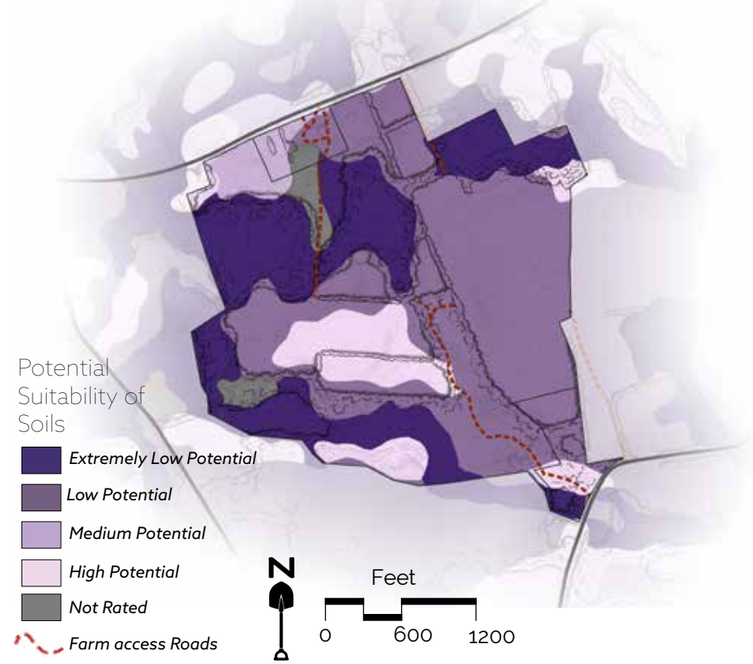
Erosion in a corn field reveals rocky and sandy soils that appear to have little soil organic matter.



Leach fields must be sited on soils with drainage of at least one inch per twenty minutes and be at least 18 inches above groundwater and four feet above ledge rock. Excessively drained soils may require greater depths to bedrock and water. Graphic courtesy of buildingadvisor.com.

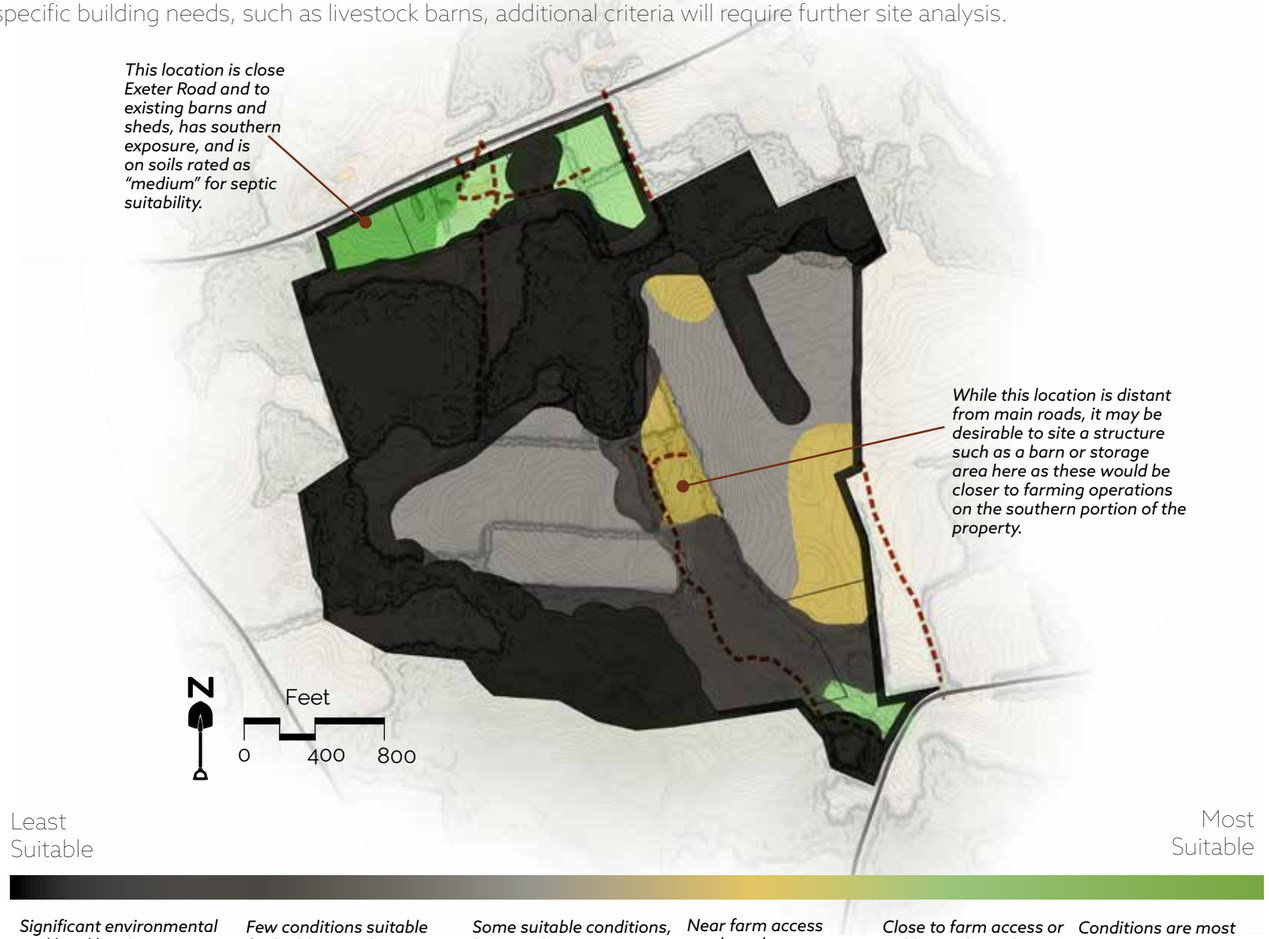
Soil Potential for Septic Suitability

Structures including housing and an event center sited on the property will need septic systems, which have specific soil requirements. CT DEEP produces maps of "soil potential ratings for subsurface disposal systems" using NRCS Web Soil Survey data. This mapping indicates the potential of soil to meet requirements for conventional subsurface sewage treatment systems, typically consisting of a septic tank and leach field. On the Randall Farm most of the area is rated as "Extremely Low" to "Low" potential for septic suitability, with the lowest rated areas coinciding with the wetlands. While there is an expanse of "medium" potential suitable soil in the center of the farm, building here would require significant roadwork traversing the farm, which may be costly and would convert prime farmland. Areas of "medium" and "high" potential suitability close to existing public roads, such as in the northwestern and southern potions of the property should be prioritized. "Low" potential areas may also be considered if other desired criteria of the location, such as proximity to existing roads and solar gain, are met, which may justify the potential costs of engineering a system on less suitable soils. Prior to construction, percolation tests will need to be conducted to determine soil suitability and inform system design.



Siting Infrastructure

The combination of factors that determine which locations on Randall Farm are most suitable for building farmer housing and necessary farming structures include proximity and connection to existing public roads, aspect and solar gain, potential soil suitability for septic systems, low flood risk, and legal protections of wetlands and setback minimums. Additional considerations, such as protection of forest ecosystems and interest in minimizing development to farmland also informed which portions of the landscape are most suitable for siting structures. As CT RC&D and farmers identify specific building needs, such as livestock barns, additional criteria will require further site analysis.



Energy Efficiency

Maximizing energy efficiency when deciding where to build can help to save on potential long term costs and minimize the farm's carbon footprint. These additional considerations will support CT RC&D's sustainability and affordability goals.

Solar

Siting buildings in locations with southern aspect that receiving direct sunlight can support passive solar and use of photovoltaics. Housing and greenhouses are structures that will need to be in constructed in sunny areas at Randall Farm.

Fuels

Circulation through the property should be considered when siting structures, roads, and farming operations, and design should minimize the need for frequent and excessive driving across the property. Long roads through the property may be costly to construct and maintain, and if regularly-accessed spaces are spread out across the property traffic may contribute to a larger carbon footprint. Roads should be sited to optimize farmer access to their plots, especially if the farmers are to cover the costs of fuel. This will help keep farming affordable for farmers, and promote energy resilience.

Microclimates

Using natural microclimates is a passive strategy for saving energy. For example, deciduous tree canopy can provide cooling shade to a building in summer months while ensuring the building receives enough light in winter months. Another example is creating windbreaks that can protect buildings from prevailing winds from the northwest.

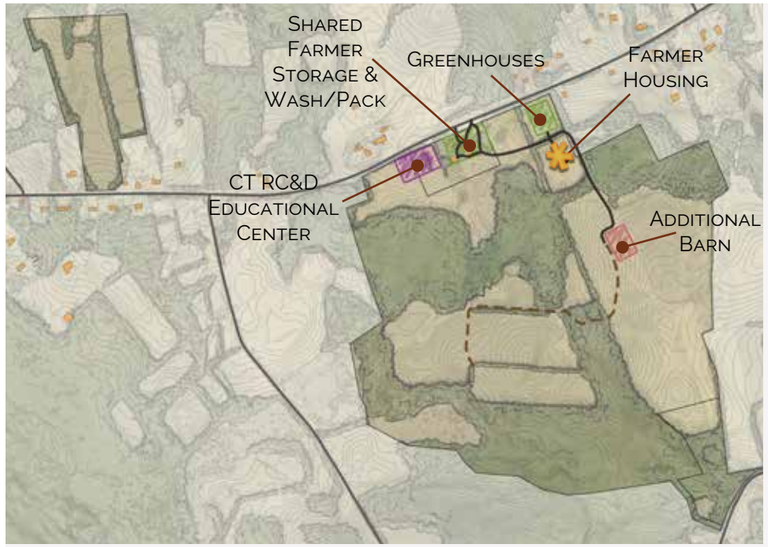
Water Efficiency

Though climate research shows wetter conditions in the coming years, longer-term projections indicate that increased drought could be on the horizon for Connecticut. Even with uncertainties around the future of climate change, drought is not entirely uncommon for this region. Cisterns, rainbarrels, and other water capture systems can be installed on existing and new buildings to repurpose rainwater into usable water for drier months.

Geothermal

CT RC&D is interested in the potential to use geothermal heating and cooling systems for housing, as an alternative to conventional furnace heating using fossil fuels. While these systems can be costly to install, they are a reliable, carbon neutral way to heat and cool buildings. Further site analysis will need to be conducted at Randall Farm to determine which areas are most suitable for geothermal systems.

Preliminary Design Concepts



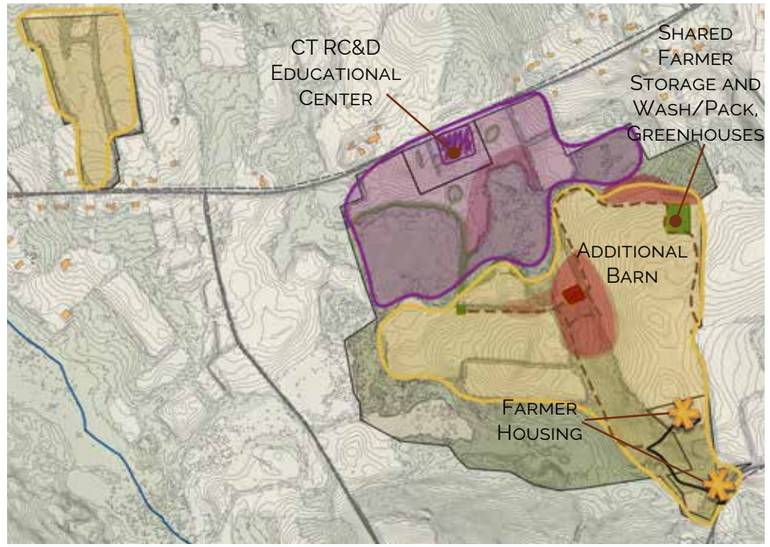
Development is concentrated along Exeter Road and on the north side of the property. A new event space is sited on a hill on the northwestern side of the property. The existing barns are used as shared farm space, with storage, wash/pack, and work space. New greenhouses are sited on the northeastern side of the property, and to the south is the farmer housing. The existing eastern farm access road is renovated, and serves as the only wetland crossing and access point to the southern fields.

Pros

- Most buildings are located near existing roads, reducing the need to construct and maintain new roads through the property.
- All buildings have southern exposure for solar energy.
- The new event space has views of wetlands and agricultural spaces.
- The southern expanse of forest remains undeveloped.

Cons

- Farmer housing is somewhat close to shared and public spaces, and farmers may feel they lack privacy.
- Housing is sited on "low potential" soils for septic suitability.



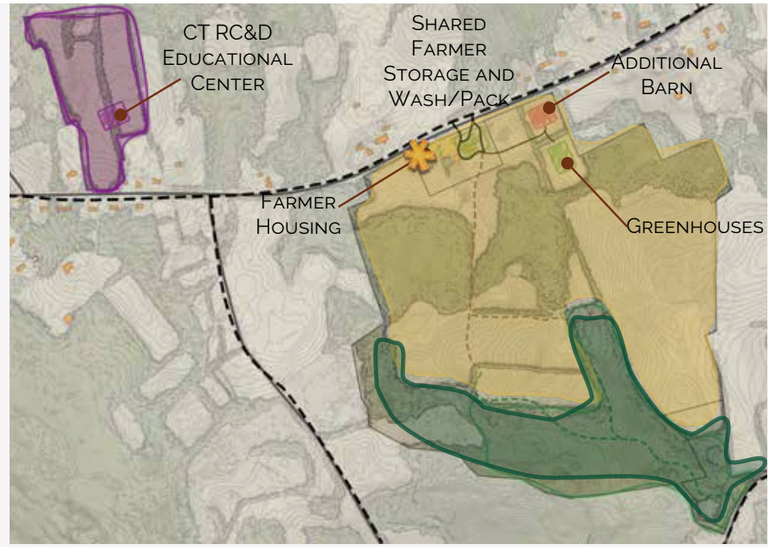
In this concept the farm is split into two "zones." CT RC&D manages the northern side of the property, where it hosts extensive agricultural demonstration plots and educational programs. Resident farmers manage the land to the south of the wetlands. In this design wetland crossing is limited to pedestrian traffic, and vehicle access to the southern fields is via York Road.

Pros

- Ample space for CT RC&D to operate educational programs.
- Farmers have more privacy.
- Wetlands are protected, with minimal impact from roads and vehicles.
- A boardwalk through the wetland offers additional opportunity for recreation and education.
- Priority forest is protected.

Cons

- Additional roadwork is required to connect farmer housing to York Road to the south, which may be costly.
- Lack of vehicular connection between north and south sides of the property may be inconvenient, and would require vehicles to travel on public roads.
- Some tree cutting would be required for roadwork, or to build farmer housing, though it avoids priority forest.



In this concept the additional twenty-acre parcel to the northwest is used as CT RC&Ds demonstration farm and educational center, and the main portion of the Randall Farm property is reserved for resident farmers. Walking tails are proposed in the southern forest for public recreation.

Pros

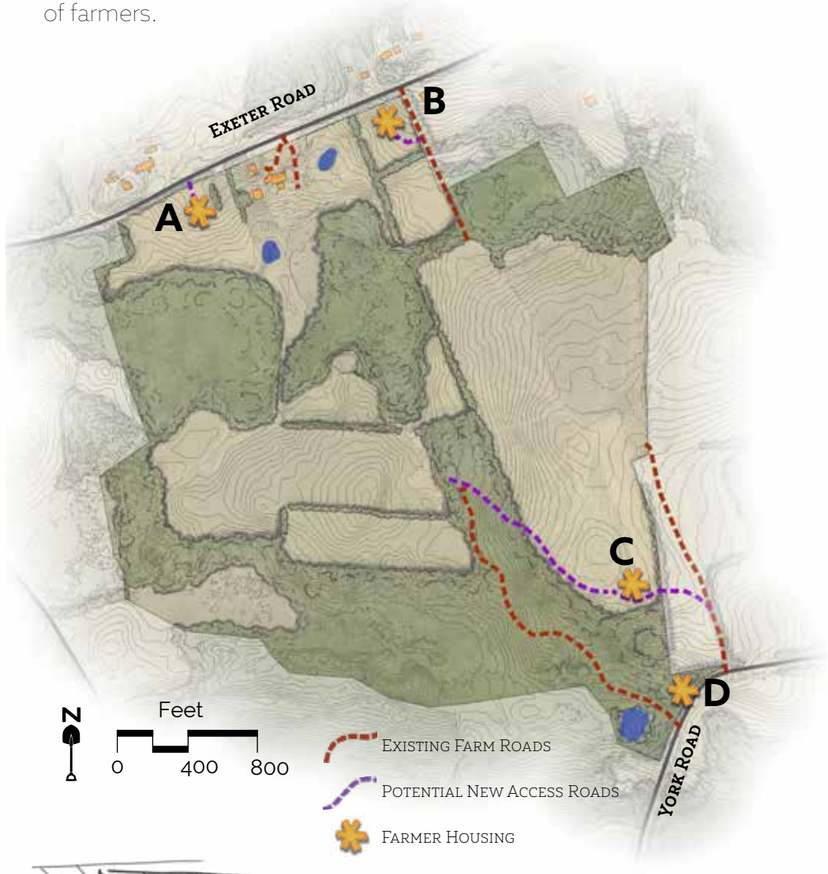
- Provides CT RC&D ample space to operate a demonstration farm and educational center.
- Resident farmers have more privacy, as public space is separate.
- Development is concentrated along Exeter Road, limiting the need for private roads maintained year-round.

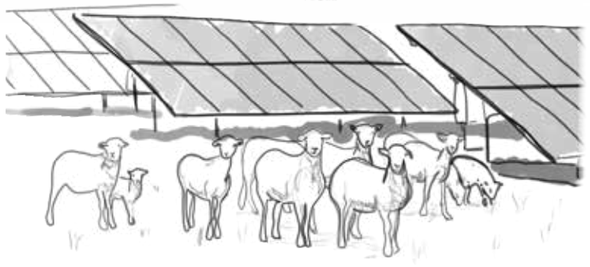
Cons

- Fewer opportunities for educational programs to interact with resident farmers.
- CT RC&D space would require new construction of buildings, roads, and other necessary infrastructure.

Suitable Locations for Farmer Housing

Farmer housing has been identified as a major financial barrier to farming. Providing farmers with on site housing could make farming more accessible to those who cannot afford to move to Lebanon and/or commute daily. On the Randall Farm there are numerous locations that are suitable for siting housing, and housing could take multiple configurations. Some examples of these configurations are shown at right, ranging from a clustered layout to having housing more dispersed in the landscape. The final design and layout of the housing will be influenced by the size of housing, the length of residence, whether housing is intended for families or individuals, the relationship of farmers to the broader programs that CT RC&D operates on the landscape, and the individual needs of farmers.





Agrisolar can make up for any solar loss from building in areas with minimal solar exposure.

Site A: The location on the northwestern side of the property is close to Exeter Road and the existing farmhouse and barns. Close proximity to the historic barn, farmhouse, and other existing structures is convenient if those spaces are shared and frequently used by farmers working and living on the site. This location is also on soil rated as "medium potential" for septic suitability, potentially keeping costs of septic system installation to a minimum (though percolation tests and on-site investigation will determine what system is appropriate.) This location is on a slope with southern aspect with high potential for solar. This location may not afford farmers maximum privacy from the road, though vegetative buffers could supplement.

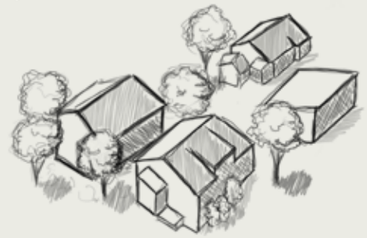
Site B: The location on the northeastern side of the property provides convenient access to the existing structures on the farm. Close proximity to Exeter Road and the existing access road on the eastern side of the property would require limited construction of new farm roads. This location is gently sloping with a southern aspect ideal for passive solar and PVs. While this location is on "low potential" soils for septic suitability, percolation tests should be conducted to assess their true potential.

Site C: This location affords resident farmers more privacy, as it is separated from the front of the property, which may serve as a hub for CT RC&D activity and programs. This area is on a southern slope ideal for solar energy. Siting housing on the 8.9 acre un-conserved parcel would avoid the potential conflict of construction on the parcel under a conservation easement, though it would require significant improvements to either of the existing farm roads extending from York Road to the south. The soils in this area are rated as "low potential" for septic suitability, though percolation tests should be conducted.

Site D: This location on the southeastern edge of the property allows resident farmers privacy while also having convenient access to the publicly-maintained York Road to the south. Building here would require clearing some trees, though the materials may be used for mulch or other construction on the farm. While this site may not be the best for photovoltaics, solar panels could potentially be integrated into other parts of the landscape, such as a pasture. The forested location may also provide a cool microclimate, reducing energy needs for summer cooling. This site is on soils with a "high" potential for septic suitability.

Housing Layouts

Cluster Housing



- Houses close together with shared outdoor space
- Tighter community feeling
- Outdoor spaces can be communally maintained
- Shared parking lot
- Fewer roads and driveways to connect houses

Co-housing

- Houses close together to share septic and road access
- Each house has private outdoor space
- May share parking lot or each have own 2-car parking lot

Dispersed

- Houses are separate, with greater distance between
- More privacy for residents
- May need more roads through the property; each house would need own parking lot
- May not be able to share septic systems if too far apart

Final Design Overview

This final design ensures the landscape honors its working legacy for generations to come, while accommodating a wide variety of activities, including agriculture, education, and recreation. While this landscape is the home to the principle farmers who work here, it also has space for the public to engage with. Opportunities for recreation and education on the property can also draw in a customer base for the agricultural enterprises on the farm, and allow for CT RC&D to continue to connect with the wider community.

Design Focus Area

1. Educational Center & Teddy's Gardens (P.17)
The newly constructed educational center and flexible building space sits atop a hill and conveniently off Exeter Road. This space is surrounded by educational gardens with universally accessible paths.

2. Flexible Barn Space (P. 18)
The historic barn is rehabbed and hosts a variety of uses by farmers and CT RC&D, and can be used as a work space, storage area, or for gatherings and events. Landscaping around the building creates an inviting and functional space, and can accommodate farm vehicle and pedestrian traffic.

3. Permaculture Orchard (P.17) (P.20)
Southwest of the newly constructed educational center is a permaculture orchard with accessible path. This could be operated as a U-Pick orchard, creating an engaging activity to draw people to the farm.

4. Universally Accessible Trails & Educational Wetland Boardwalk (P. 17, 18, & 20)
A universally accessible path winds through the orchard and educational gardens, connects the educational center and historic barn, and leads to a boardwalk loop through the wetland. Informative signs educate visitors of the wetland habitats on site, the function of wetlands, and the importance of protecting them, creating an opportunity for recreation and education.

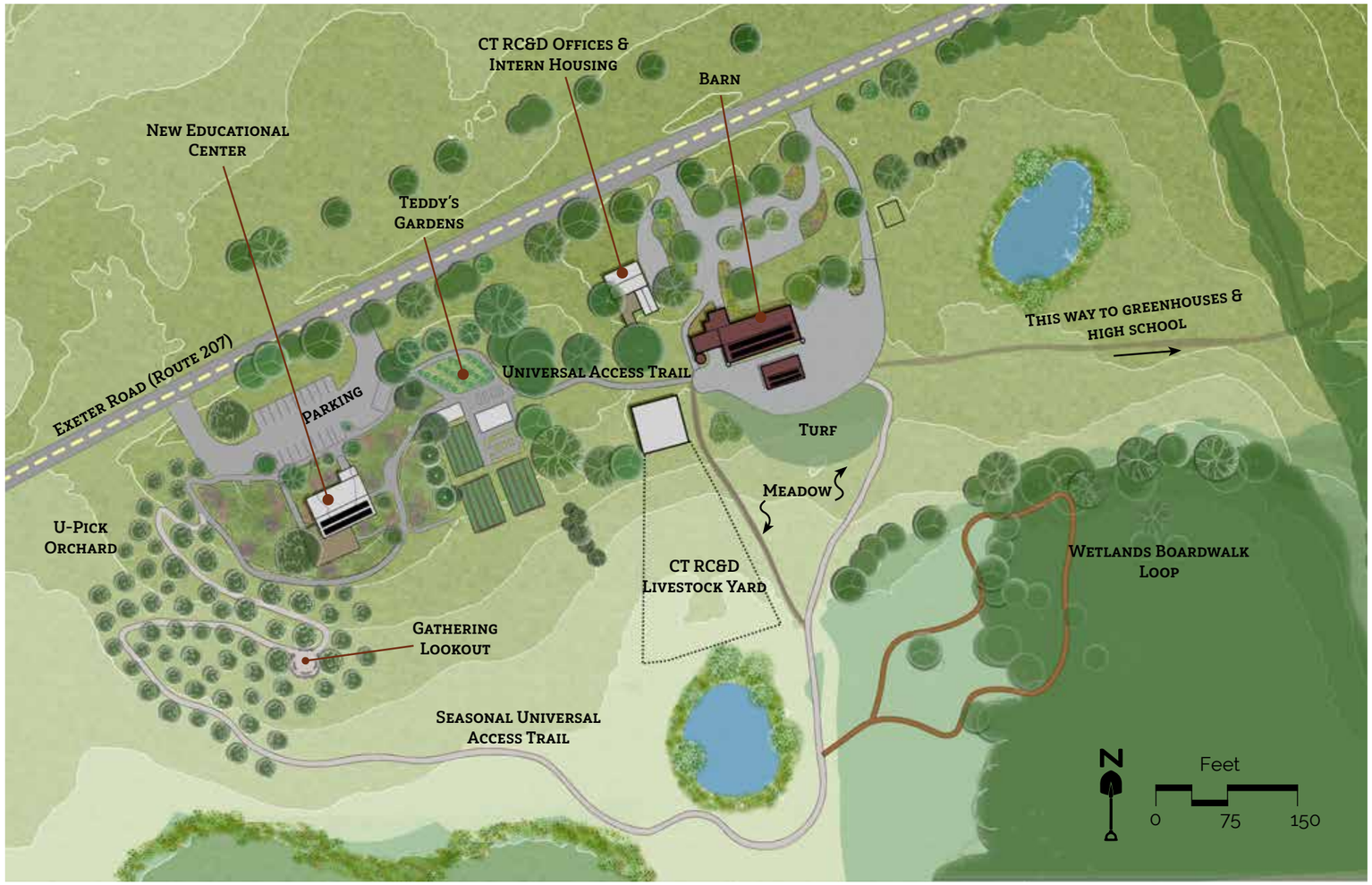
5. Revegetated Wetland Core (P. 19)
The central access road crossing a wide expanse of wetlands is decommissioned and revegetated. This supports wetland health and function, and reduces the need to maintain and repair multiple roads crossing wetlands. Seasonally wet meadows are also maintained as part of the agricultural landscape, and are part of a rotational grazing schedule. Open water, such as the ponds on site, have a revegetated buffer to help intercept agricultural runoff and limits negative impact to water quality.

7. Southern Field Access Road (P. 22)
Vehicle traffic from the northern side of the property accesses the southern fields via the eastern access road. The wetland crossing point is improved with either a box culvert or a timber bridge. For roads that are regularly used year-round, a gravel road should be installed.

6. Greenhouses
Greenhouses are clustered on the northeastern side of the property, with convenient access to Exeter Road and the barns and structures on the northern side of the property. Rows of trees to the north and west act as windbreaks, protecting the greenhouses from wind damage. Gentle slopes with a southern aspect provide ample sunlight with minimal need for grading in preparation of building.

Design Focus Area Overview

With the exception of the farmer housing, most development is concentrated on the northern side of the property around the existing barns, sheds, and house. These spaces are used for CT RC&D programs and events, and may serve as a hub for farmer activity. This area is also the central public interface for the farm. Educational gardens, wetland boardwalks, and trails invite people to explore and learn about the agricultural landscape and local ecosystems. Flexible buildings can be used for CT RC&D and farm events , such as workshops, trainings, or pop-up markets, or rented fr private events. Formalized driveways and parking create clear traffic patterns and limit impact of vehicles on the landscape.



Rotational Grazing

Rotational grazing maximizes the health and productivity of agricultural land by providing multiple functions. Grazing is used strategically to support soil health and biodiversity goals by managing aggressive species, keeping wet meadow from succession, and building soil organic matter. Rotational grazing can also be integrated into the orchard. This can help reduce inputs, as animal waste can fertilize the soil and increase productivity of fruit trees, and livestock consuming fallen fruit reduces the amount of additional feed needed.

Educational Center & Teddy's Garden

The newly constructed educational center provides a flexible space for CT RC&D programs, events, and work. This building is surrounded by gardens and an orchard. Teddy's educational garden demonstrates a variety of agricultural practices, and a path passing through the garden leads to the historic barn to the east.

Old Buildings, New Life

The iconic barn is restored and converted into a flexible storage and events space. A gravel parking lot and paths into and around the barn clarify flow of traffic, and landscaping on the southern side of the site provides a flexible outdoor space for gathering and work. The adjacent old farmhouse is repurposed and used for CT RC&D staff offices or for farmer housing. The 'chicken coop" continues to be used as storage and as a livestock barn.

Universal Access Trail:

A network of universally accessible pathways and additional footpaths wind through the property, allowing visitors and residents the opportunity to experience the diversity of landscapes at Randall Farm. Trails of varying lengths and accessibility provide opportunity for a variety of people to recreate, and serve as an additional attraction to the site and asset for the greater community. A portion is paved for ease of maintenance in winter months, providing year round connectivity between key areas including the educational center, historic barn, and farmhouse.

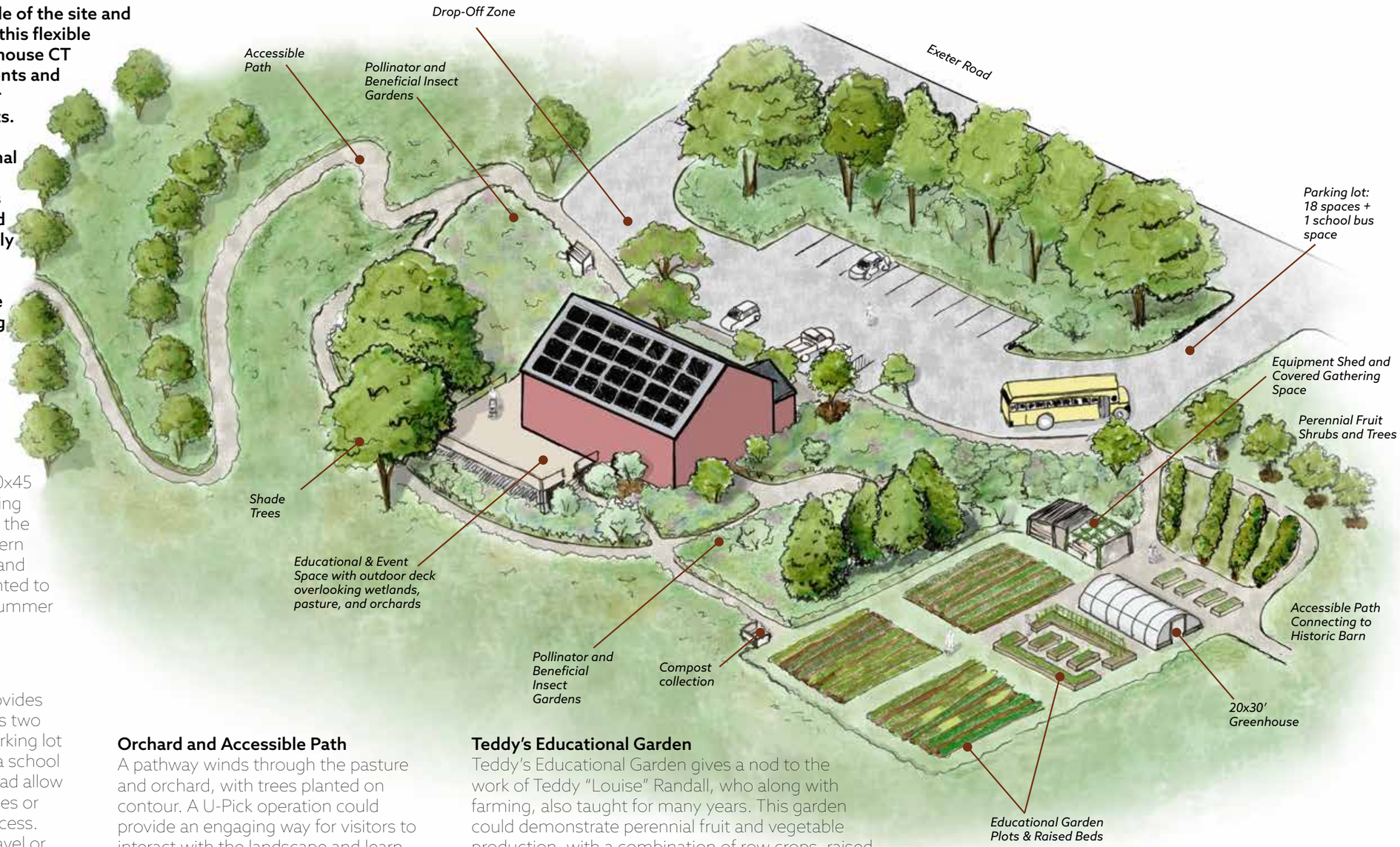
U-Pick Permaculture Orchard

A U-Pick permaculture orchard is sited to the south of the new agricultural education center. Much of this area is seasonally accessible via the universally accessible trail loop. Plant guilds and native understory plants diversify the landscape and support native pollinator populations. Educational signs along the trails makes the U-pick experience both educational and rewarding.

A resting spot/gathering space is located on a natural flat area in the center of the slope, affording trail goers with a nice view. This spot can also be used for outdoor classes/workshops. Materials found on site, such as extra rock that is currently discharged in the wetlands, is repurposed to border this area.

Education Center & Teddy's Gardens

Perched on a hill on the north side of the site and conveniently off of Exeter Road, this flexible building space could be used to house CT RC&D offices, host CT RC&D events and programs, house a farm store, or could be rented for private events. The nearby vegetable garden is converted into Teddy's Educational Garden, and demonstrates a diversity of agricultural practices with small plots, raised beds, and rows of perennial fruit. Universally accessible paths wind through these gardens and extend out into the property, inviting people to explore the landscape. Parking is provided for 18 vehicles and one school bus.



Flexible Educational and Event Space

The conceptual building is on a 60x45 foot footprint, with a deck extending to the southwest and elevated on the hill. A perched location and southern exposure allows for passive solar and PVs. Two deciduous trees are planted to the southwest to provide some summer afternoon shade.

Parking

The double-loaded parking lot provides space for 18 vehicles, and includes two accessible parking spaces. The parking lot also provides a parking space for a school bus. Two entryways off Exeter Road allow large vehicles, such as school buses or farm trailers, easy pull-through access. The parking lot could either be gravel or porous asphalt. Asphalt would allow for easy winter maintenance, and may be preferable if the space is regularly used throughout the year.

Orchard and Accessible Path

A pathway winds through the pasture and orchard, with trees planted on contour. A U-Pick operation could provide an engaging way for visitors to interact with the landscape and learn about growing practices.

Teddy's Educational Garden

Teddy's Educational Garden gives a nod to the work of Teddy "Louise" Randall, who along with farming, also taught for many years. This garden could demonstrate perennial fruit and vegetable production, with a combination of row crops, raised beds, and rows of fruiting shrubs and trees. Adjacent pollinator and beneficial insect gardens provide insect habitat and additional educational opportunities.

Design Spotlight: Flexible Barn Space

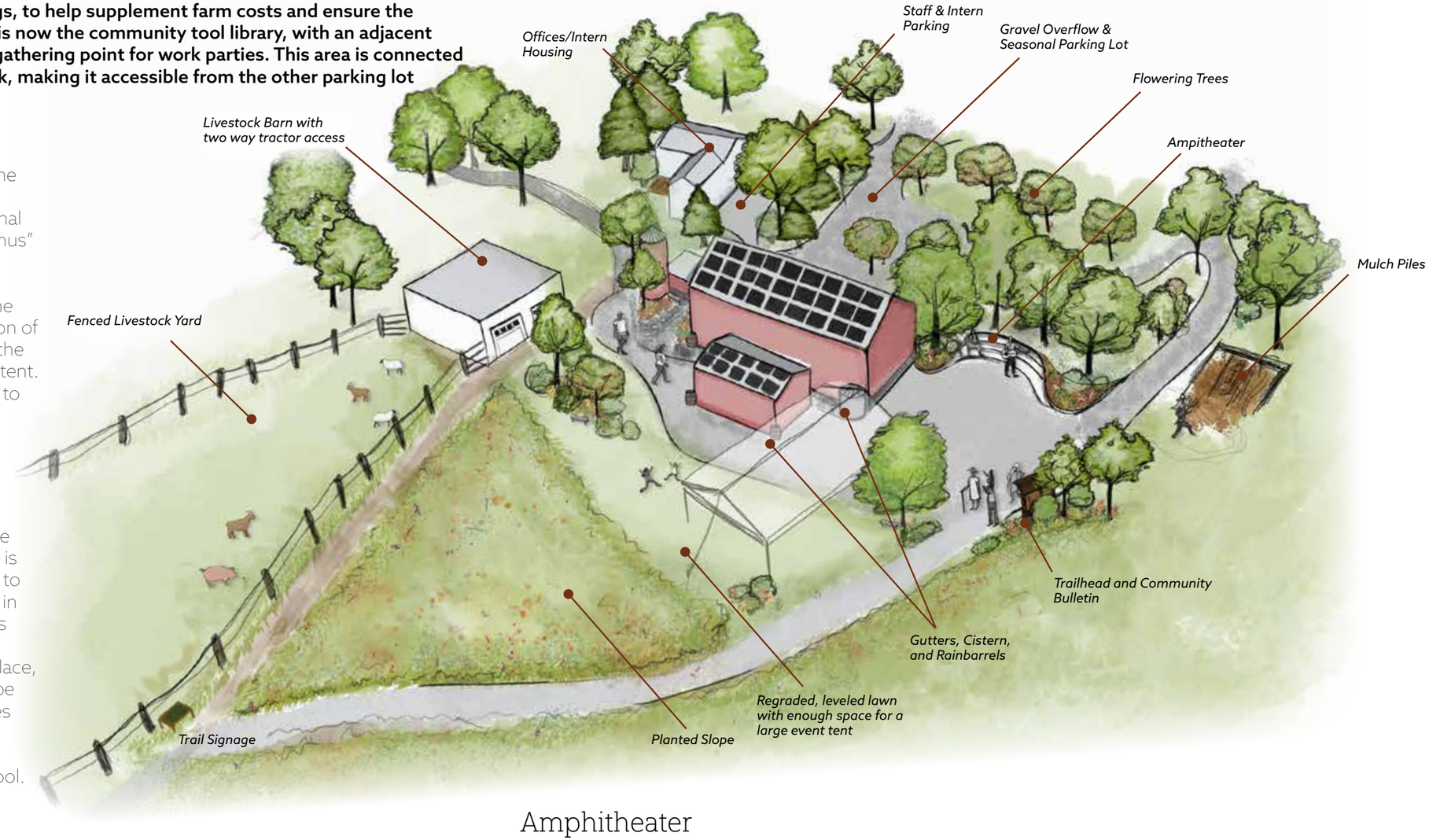
The historic barn is rehabilitated and used for farm storage and for hosting events. CT RC&D can rent this space out for larger events, such as weddings, to help supplement farm costs and ensure the farm stays affordable for the farmers. The shed is now the community tool library, with an adjacent community bulletin board, making this an ideal gathering point for work parties. This area is connected to the greater universally accessible trail network, making it accessible from the other parking lot without a need to drive between the two.

Accessible Gathering Area

A regraded area sweeps around the back side of the barn, providing great views of the landscape and ample space for community gatherings, educational workshops, and large events. Use of fine "1/4" minus" gravel ensures the space is universally accessible for guests, while still allowing flow of tractors and vehicles as needed to the shed and the sides of the barn. LED lighting allows visibility at night. A portion of the existing lawn is leveled to match the grade of the gravel area, with enough space for a large pop up tent. This area extends to a planted slope transitioning to meadow.

Gravel Parking

A gravel lot lies just north of the barn, allowing for flexibility in parking arrangements, and a more pervious alternative to pavement. This1/4" minus gravel lot is connected to the universally accessible trail system, allowing universal access. Vegetation is used to enhance the barn view from the road and to buffer privacy for the separate intern/staff parking in front of the old farmhouse. An area of turf remains along Exeter road, and can be used for roadside farmers market events. When larger events take place, the high school has a large parking lot that could be used. Using an already paved parking lot minimizes the ecological footprint and intrusion on prime agricultural soils.*
*this plan has not been approved by the high school.



Community Tool Library

The existing shed is used as a community tool library, providing an asset to share with the greater community. Farmers could freely check out equipment, while CT RC& D may rent out tools for a small fee to the general public. Tools can also be used by volunteers and staff for work parties.

Flexible Market Space

A portion of the lawn is kept as lawn just facing Exeter Road. This area can be used as a flexible market space and/or farm stand, where vendors are clearly visible from the road to attract passers by who would like to make a quick visit.

Amphitheater

On the eastern side of the barn, just below level grade, a natural curve in the land is turned into amphitheater. This indent takes advantage of existing topography, which naturally amplifies music and speakers. Vegetation frames the setting, making it ideal for photographs, and adding privacy from the parking lot.

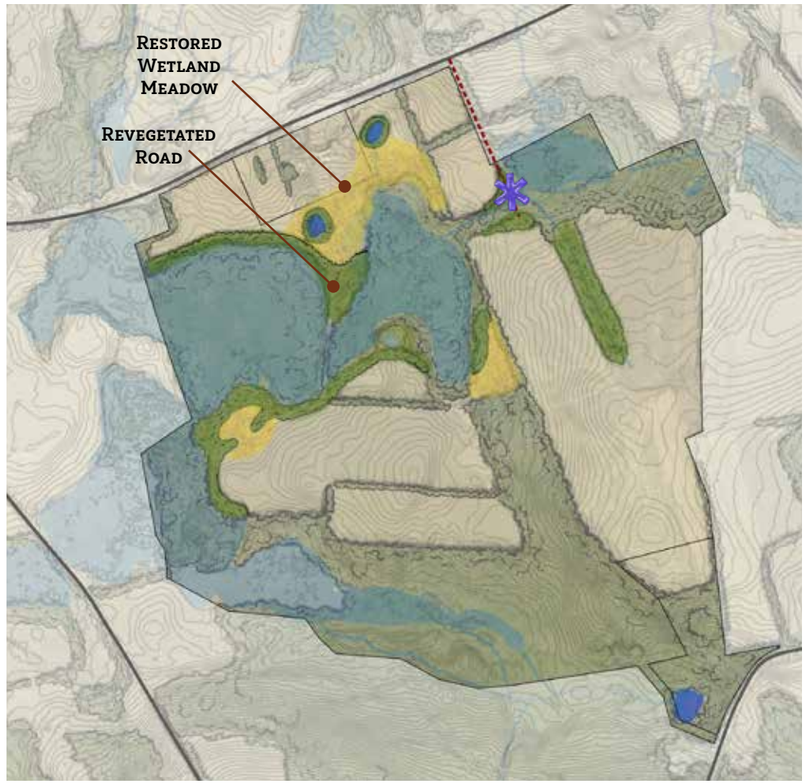
Stormwater Collection

The Barn and Tool Library are retrofitted with gutters, which pour stormwater into rainbarrels and cisterns. These demonstrate to visitors how to recycle and repurpose excess stormwater run-off for farm use.

Design Spotlight: Protecting Wetlands

Wetlands continue to provide important ecosystem functions, and agricultural practices can be integrated into the wetlands and wetland buffers in an ecologically sensitive way. Restoring the wetlands and educating the public about the critical roles they play could open up opportunities for CT RC&D to partner with local and regional organizations. Furthermore, this is an opportunity to educate the agricultural community about how to best protect wetlands and why it is important.

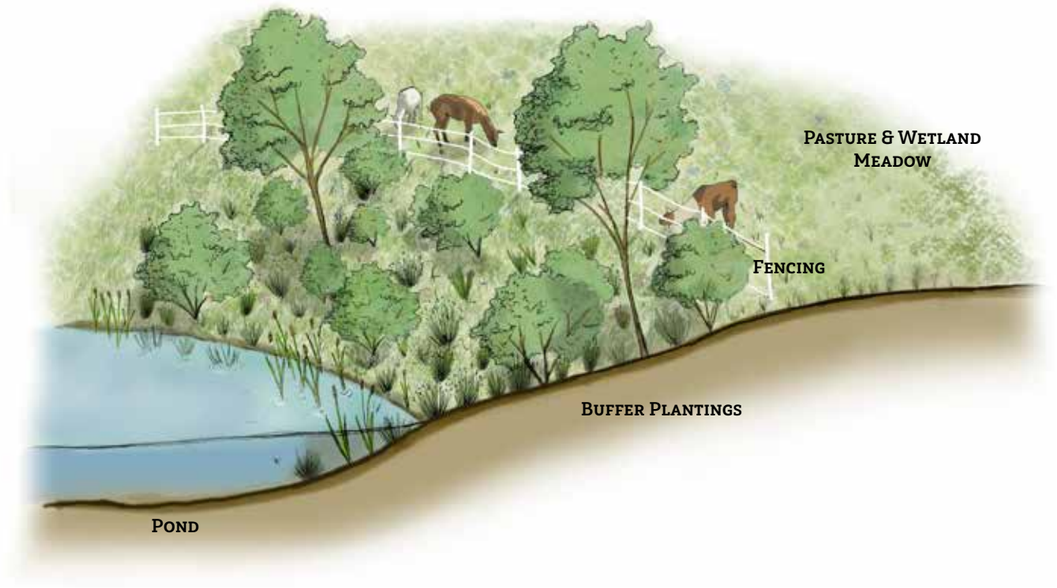
Restored Wetland Core



Limiting vehicle traffic to the eastern access road allows for the western road, which passes through a wide expanse of the central wetlands of the property, to be decommissioned, and the wetlands restored. These restored wetlands provide additional habitat for wildlife, help to mitigate flooding, and sequester carbon. Plants used in wetland restoration may have additional interest to farmers, such as marketable fruit or flowers which support pollinators.

25' Vegetated Wetland Bufferzones

Wet meadow is restored, boosting biodiversity and important habitat value. Rotational grazing in wet meadows can deter forest succession and spread of aggressive species such as multiflora rose and tartarian honeysuckle, both of which are abundant on Randall Farm. Rotational grazing in wet meadows is an opportunity for education, and farmers to generate an income while also preserving and managing wet meadow habitats. Grazing in wetland meadows should be done during the late summer and fall, when water tables are typically at their lowest. This will help reduce chance of erosion by animals, and allows most plants the opportunity to flower and seed, providing important habitat for insects and birds, and allowing for future growth of meadow species.

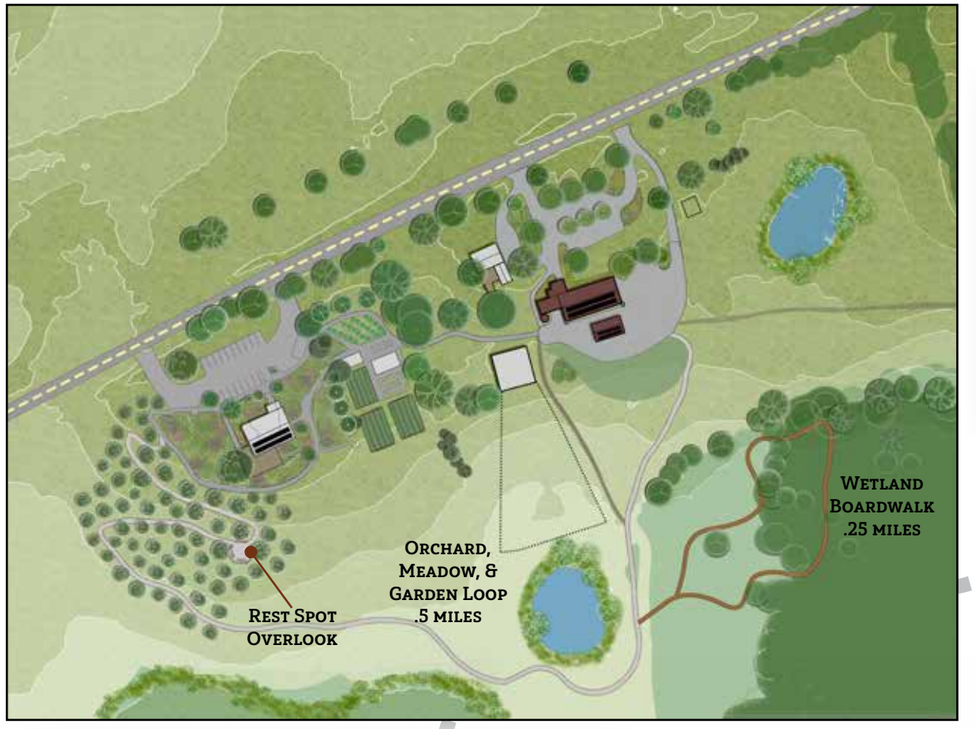


Wet Meadow Rotational Grazing Demonstration Area

Wet meadow is restored, boosting biodiversity and important habitat value. Rotational grazing in wet meadows can deter forest succession and spread of aggressive species such as multiflora rose and tartarian honeysuckle, both of which are abundant on Randall Farm. Rotational grazing in wet meadows is an opportunity for education, and farmers to generate an income while also preserving and managing wet meadow habitats. Grazing in wetland meadows should be done during the late summer and fall, when water tables are typically at their lowest. This will help reduce chance of erosion by animals, and allows most plants the opportunity to flower and seed, providing important habitat for insects and birds, and allowing for future growth of meadow species.

Design Spotlight: Accessible Educational Trails

A .75 mile long universally accessible trail winds through the northern portion of the property, providing access to several key features and educational areas from the main parking area.



Year-Round Connectivity Between Hubs

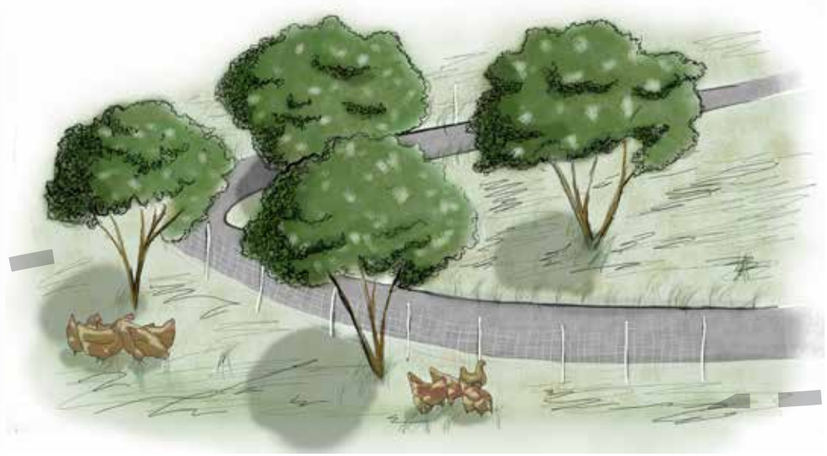
A portion of the trail network connecting the new education center to the historic barn can be maintained year-round, allowing for pedestrian connectivity between the two spaces. This path also connects the two parking lots, allowing for easy access between the two spaces when larger on-site events use both parking lots.

Rest Spot Overlook

A resting point mid-orchard provides a gathering space with a view, situated atop a natural resting spot that would not require regrading.

U-Pick Permaculture Orchard

The accessible trail winds through a permaculture orchard on the western side of the property, just to the south of the educational center. This orchard could be managed as a "U-Pick" operation, drawing people to the farm and into the landscape. Livestock and poultry are also be pastured in the orchard, providing fertilizer, grazing groundcover, eating fallen fruit, and managing pests. Animals such as chickens can be effective in eating fruit pest larvae located in the soils below fruit trees and in fallen fruit. By integrating accessible paths and numerous agricultural practices in the landscape CT RC&D can demonstrate a variety of agricultural practices to a wide audience through interactive experiences.



Wetland Educational Boardwalk

The accessible trail connects to the wetlands boardwalk, which is also accessible because of its flat slope and materials; wider stops on the boardwalk allows for two-way pedestrian traffic, and places to gather and rest.

The wetlands boardwalk takes trail-goers through a series of wetland habitats, from wet meadow, to cattail marsh, to forested swamp. This provides a variety of educational and recreational opportunities.

Universal Accessibility Guidelines

The ADA has specific requirements to ensure that paths meet accessibility guidelines. Some of the ADA guidelines are detailed below; see ada.gov for more specific guidance.

Width

A six-foot wide trail ensures enough room for a wheelchair with passing space. Wider rest stops and pull-offs along the way boost user friendliness for all abilities and comfort levels.

Slopes

Slopes should have no incline greater than 5% (i.e., twenty feet of trail per every one foot of elevation gain). Cross slope of the trail also needs to be considered in order to keep drainage flowing off of the trail; cross slope should be consistently at 2%, to ensure that water flows down slope while also providing safety for people using wheelchairs.

Suitable Surface & Materials

Surface materials need to accommodate for a variety uses including different types of wheelchairs and scooters, and should form a firm surface. Trap rock gravel, 1/4" minus gravel, or pavement can be suitable options.

Signage

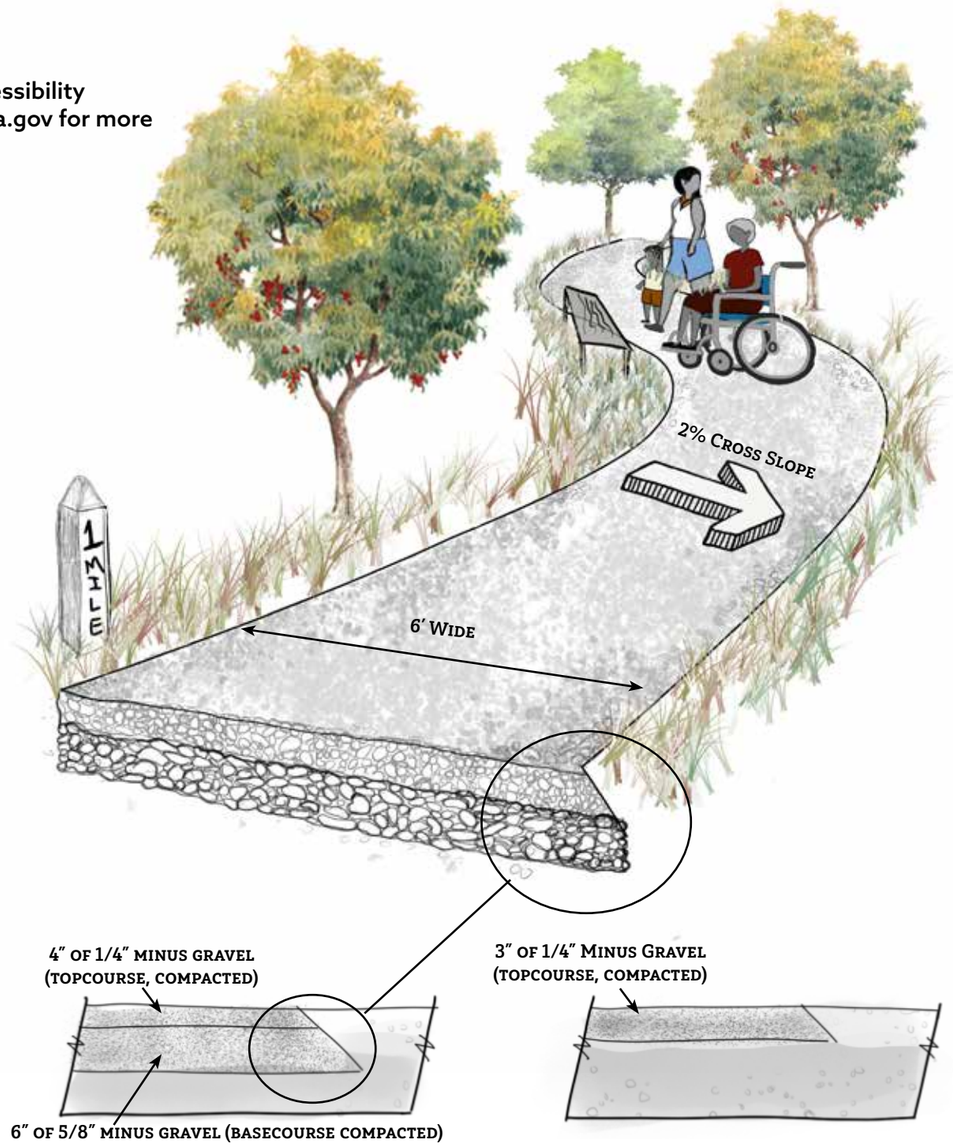
Trail markings and/or signs every 1/4 mile can ensure visitors know what to expect while on trail, and when to turn back. Clear signs indicate where a foot trail is or is not accessible. Ropes, rails, and other features can be used to accommodate people with visual impairments.

Traffic Crossings

Areas where vehicles will be using the same surface will require construction that accommodates vehicles. These areas should also have clear visibility and signs for safety.

Seasonal vs. Year Round Use

Crushed stone or firmly compacted gravel pathways offer a more affordable, alternative to asphalt and pavement. However, these trails may be more challenging to maintain in winter months. For trails and paths that see regular winter use, permeable asphalt may be easier to maintain as an accessible surface.



Path Construction Details

Accessible paths at Randall farm should be built using the appropriate materials for the amount of predicted use. The above diagram is based on Washington Rock Quarry's construction details of an accessible trail. The diagram shows the suggested ratios of gravel according to the amount of foot traffic (Washington Stone Quarries). The gravel layers should be compacted atop of compacted subgrade.

Accessible Boardwalk Trails

Boardwalks are also 6 feet wide to accommodate enough room for two-way wheelchair traffic.

Boards are spaced less than or equal to 1/2" inch apart to ensure that no wheels or canes get stuck.

Wetlands are important ecosystems, with specific soil conditions that call for careful construction to minimize habitat disturbance and ensure longevity of the boardwalk network. Built responsibly, this boardwalk network can serve as an educational asset to display the variety of wetland habitats at Randall Farm.

Construction in wetlands will require permitting from the Town of Lebanon, and will require further guidance from engineers.

Helical Piles Boardwalk Construction Detail

Boardwalks are installed carefully to ensure minimal disturbance on wetlands. Diamond Piers are a suitable alternative to Helical Piles to minimize wetlands disturbance during construction.

Road Improvements

The farm will likely continue to have multiple classes of roads, varying in frequency of use, types of vehicles using them, and seasonal maintenance needs. Frequently used roads on the property should be constructed or improved to accommodate traffic from farm vehicles, resident farmers, visitors, and staff. Proper construction of roads and wetland crossings can ensure access to key areas of the farm, such as barns, greenhouses, and farmer residences, minimize long-term maintenance costs, and minimize negative impacts from roads to surrounding ecosystems, especially wetlands.

Culvert failures and washout require regular maintenance and repair on the existing farm roads.

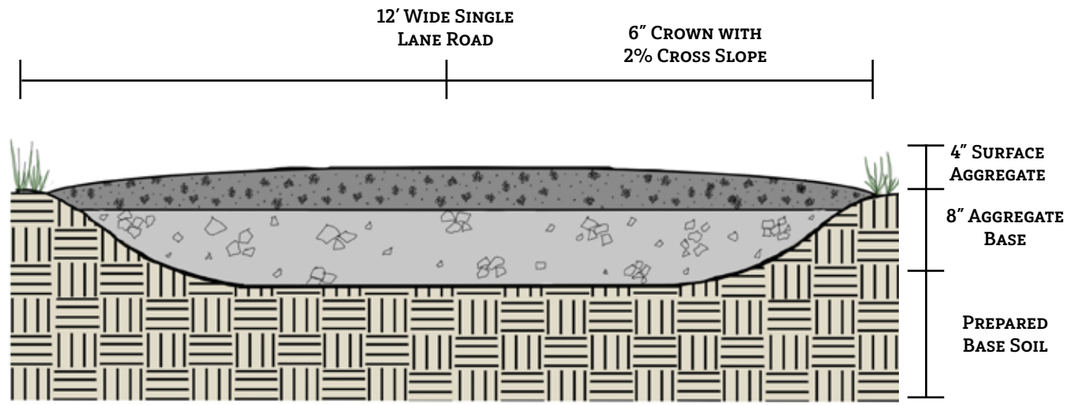
Gravel Roads

A gravel road should be installed to provide access to the most frequently used spaces on the farm, such as the farmer housing. Depending on where housing and other frequently used structures are sited, existing roads can be improved upon, or road segments may need to be constructed.

A gravel road with an 8″ layer aggregate base and 4″ surface layer crushed stone or gravels and support regular traffic from vehicles and farming equipment. In areas requiring a smoother surface for pedestrian accessibility, 1/4″ minus gravel can be used. For a 12′ wide road, a 6″ crown allows for drainage into adjacent swales. This drainage supports the longevity of the road and minimizes the frequency of significant road maintenance such as regrading.

Road improvements over existing farm roads will likely be cheaper to install than completely new construction, as the base soil is already compacted and will require less preparation. Since the conditions of the existing roads are variable throughout the farm, the potential savings of using the existing roads is not reflected in the construction cost estimates, as each road will have its own unique set of conditions.

12′ Wide Gravel Road



Road Cost Estimates

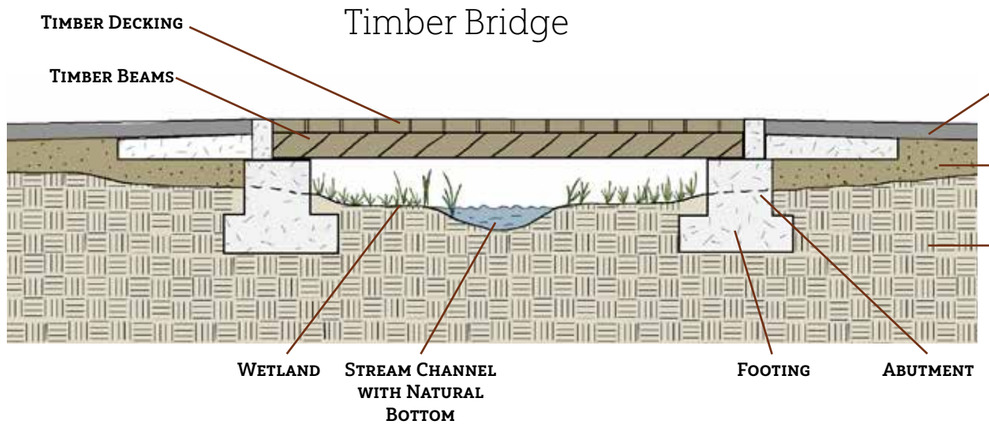
Approximate Cost of Gravel Road per Square foot: $4

100′ long x 12′ wide road= $4,800

Improved Wetland Crossing

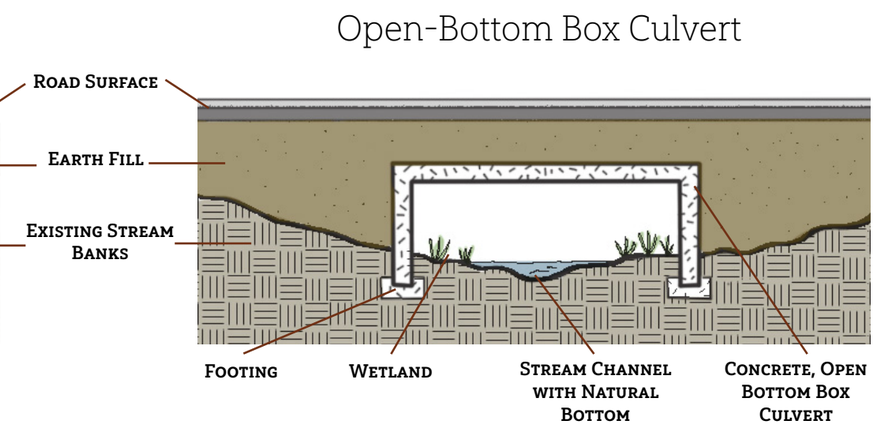
To accommodate regular access to the southern fields and to support wetland ecosystem health improved culverts or timber bridges should be installed where roads cross wetlands. Timber bridges or open-bottom box culverts are ideal, as they minimize disturbance in the streambed and accommodate movement of a variety of wetland species. To minimize impact to wetlands and cost of constructing and maintaining adequate roads through wetlands, the number of crossing points should be minimized, potentially to a single point.

Timber Bridge



Timber bridges afford wetlands the most protections, as they span a wider area over stream channels and adjacent wetlands. The additional space also accommodates fluctuating water levels and flooding

Open-Bottom Box Culvert



Open-bottom box culverts allow for a variety of wildlife to move through the stream channel and preserved stream banks.

Precedents

Educational Gardens

Shelburne Farms, Shelburne, Vermont

Shelburne Farms, an agricultural education non-profit organization in Shelburne, Vermont, features an educational garden close to the "Farm Barn", which is the hub of visitor activity on the farm. These gardens include annual and perennial vegetables, fruits, shrubs, trees, and flowers. The space is regularly used by summer camp groups, who partake in planting, cultivating, and harvesting produce. The gardens are also located along a walking path, and visitors passing through the gardens have the opportunity to chat with farmers as they explore the greater landscape.

Accessible Paths & Boardwalks

Drumlin Farm, Lincoln, Massachusetts

Drumlin Farm, located in Lincoln, Massachusetts, is a farm and wildlife sanctuary operated by Mass Audubon. The property includes a four mile trail network, a half-mile of which is universally accessible. These accessible trails pass through woodlands, wetlands, and agricultural landscapes.

Amity Trail, Needham, Massachusetts

The reservoir trail in Needham, Massachusetts was improved to create a universally accessible trail through forests and wetlands. The paths are six feet wide, and vary in surface material, from crushed stone, to concrete, to wooden boardwalks.

Silvopasture Orchard

Silvospasture in Massachusetts

Farmers throughout Massachusetts have been practicing silvospasture methods in recent years. The species they grow include Chinese chestnuts, apples, persimmons, walnuts, and pawpaws, among others. Mobile electric fencing is used to manage rotational grazing though the orchard, and may be used alongside caging to prevent pastured animals from grazing on young tree foliage and bark. Silvospasture can be an effective method for carbon sequestration, can help build soil organic matter, and integrate multiple farming practices into one landscape.

Flexible Event Barn

Holcomb Farm, West Granby, Connecticut

Holcomb Farm in West Granby, Connecticut is 312-acre historic farm that uses its landscape and facilities in a variety of ways. Numerous barns and gathering spaces on the farm host public events, educational programs, or can be rented for private events.

Riparian Buffers

Photo credit Lynne Bets, NRCS

Agriculturally Productive Buffers, Vermont

Riparian buffers can be designed and managed as part of a productive agricultural landscape while protecting wetland habitats and water quality. The University of Vermont publication "Grow Agriculturally Productive Buffers" provides information on how to structure riparian buffers into different zones, integrating food, fuel, and forage crops. Many of the plant suggestions provided in this publication are suitable for Connecticut.

Plant Palettes

Wetland Buffer

Open bodies of water will benefit from the addition of planted buffers, which can intercept and filter runoff from roads and agricultural fields. The following are plants well suited for wetland conditions in Connecticut. Some of these plants may have edible fruit that could serve as and additional revenue stream for farmers.

Botanical Name	Common Name	Type	Notes
Acer rubrum	Red Maple	Tree	Abundant on site and well-suited for wetlands.
Alnus spp.	Alder	Tree	Found on site in shrub swamp areas, nitrogen fixer.
Amelanchier canadensis	Shadblow Serviceberry	Tree	Naturally occurs in bogs and swamps.
Salix nigra	Black Willow	Tree	
Aronia Melanocarpa	Aronia, Black Chokeberry	Shrub	Edible/medicinal fruit, wet tolerant.
Cephalanthus occidentalis	Buttonbush	Shrub	
Clethra alnifolia	Sweet Pepperbush	Shrub	
Cornus amomum	Silky dogwood	Shrub	Fruit is attractive to birds.
Lindera benzoin	Spicebush	Shrub	Fruit is edible with flavor similar to allspice or cloves.
Rhododendron viscosum	Swamp Azalea	Shrub	
Rosa carolina	Carolina Rose	Shrub	Native rose with edible rosehips.
Salix discolor	Pussy Willow	Shrub	Can be used in floral arrangements.
Viburnum dentatum	Arrowwood	Shrub	Fruit is attractive to birds.
Vaccinium corymbosum	Highbush blueberry	Shrub	Edible fruit, wet tolerant. Suitable for more acidic soils.
Carex stricta	Tussock Sedge	Sedge	
Juncus effusus	Soft Rush	Rush	
Juncus canadensis	Canada Rush	Rush	

Permaculture Orchard

The U-Pick Orchard at Randall Farm could host a large diversity of fruit species, with some fruits that may not typically be commercially available. The following list is an example of fruit trees that are cultivated in Connecticut, as well as some complementary understory plants.

Botanical Name	Common Name	Type	Notes
Amelanchier spp.	Serviceberry	Tree	Wet tolerant, delicious berries, native!
Asimina triloba	Paw Paw	Fruit Tree	Low disease and pest pressure. Shade tolerant.
Diospyros virginiana	American Persimmon	Fruit Tree	Late season fruit harvested in September/October.
Malus domestica	Apples	Fruit Tree	Choose disease resistant root stock.
Morus rubra	Red Mulberry	Fruit Tree	Delicious berries. Can grow tall, so plant in areas where it will not block sunlight from other sun-loving plants.
Prunus maritima	Beach Plum	Fruit Tree	
Prunus persica	Peach	Fruit Tree	Seek species with resistance to ‘”Brown Rot”.
Sambucus canadensis	Elderberry	Fruit Tree	Medicinal, wet tolerant. Can also be planted in wetland bufferzones and rain gardens.
Achillea millefolium	Common Yarrow	Herbaceous perennial	Medicinal.
Amphicarpaea bracteata	American Ground Peanut	Groundcover	Nitrogen fixer.
Fragaria vesca	Wild strawberry	Groundcover	Edible ground cover.
Symphytum officinale	Comfrey	Herbaceous Perennial	Medicinal.
Trifolium spp.	Clover	Groundcover	Nitrogen fixer.


Salix discolor


Vaccinium corymbosum


Aronia melanocarpa


Salix nigra


Lindera benzoin


Juncus effusus


Carex stricta


Achillea millefolium


Morus rubra


Asimina triloba


Trifolium pratense

Plant Palettes

Climate Resilient Trees

As the forests on Randall Farm undergo changes due to the effects of climate change, CT RC&D and resident farmers should plant trees that are climate resilient and adapted to changes in the regional climate. These trees will also continue to provide ecosystems services such as carbon sequestration, which can help to mitigate the future effects of climate change.

Botanical Name	Common Name	Notes
Acer rubrum	Red Maple	Abundant on site, especially in wetlands.
Carya ovata	Shagbark Hickory	Abundant on site in upland forests.
Fagus grandifolia	American Beech	
Liriodendron tulipifera	Tulip Poplar	
Nyssa sylvatica	Black Gum	Well suited for wet areas.
Quercus alba	White Oak	

Landscaping Trees

These trees are of particular landscaping interest around buildings, as either an especially showy flowering tree, or for creating a privacy buffer.

Botanical Name	Common Name	Notes
Cercis canadensis	Eastern Redbud	Showy pink spring flowers.
Amelanchier spp.	Serviceberry	Early flowers important for pollinators.
Chamaecyparis thyoides	Atlantic white cedar	Privacy buffer.


Nyssa sylvatica


Liriodendron tulipifera


Carya ovata

Wetland Meadow

As wetland meadows are restored on the site some additional seeding and planting may be needed to supplement existing plant community. If these meadows are managed as part of a rotational grazing scheme, additional forage species may be needed.

Botanical Name	Common Name	Type	Notes
Asclepias incarnata	Swamp Milkweed	Herbaceous Perennial	Monarch butterfly food
Eupatorium maculatum	Joe Pye Weed	Herbaceous Perennial	
Verbena hastata	Blue Vervain	Herbaceous Perennial	
Viola papilionacea	Common Blue Violet	Herbaceous Perennial	
Poa palustris	Fowl Bluegrass	Grass	
Houstonia caerulea	Bluets	Groundcover	Very short and grow well among grasses.
Juncus effusus	Soft Rush	Rush	
Juncus canadensis	Canada Rush	Rush	
Carex vulpinoidea	Fox Sedge	Sedge	


Poa palustris


Acer rubrum


Carex vulpinoidea


Verbena hastata

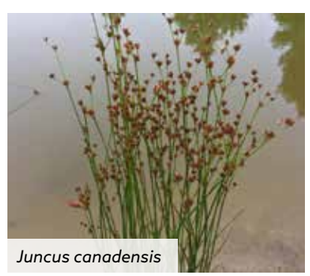

Asclepias incarnata


Eupatorium maculatum


Houstonia caerulea

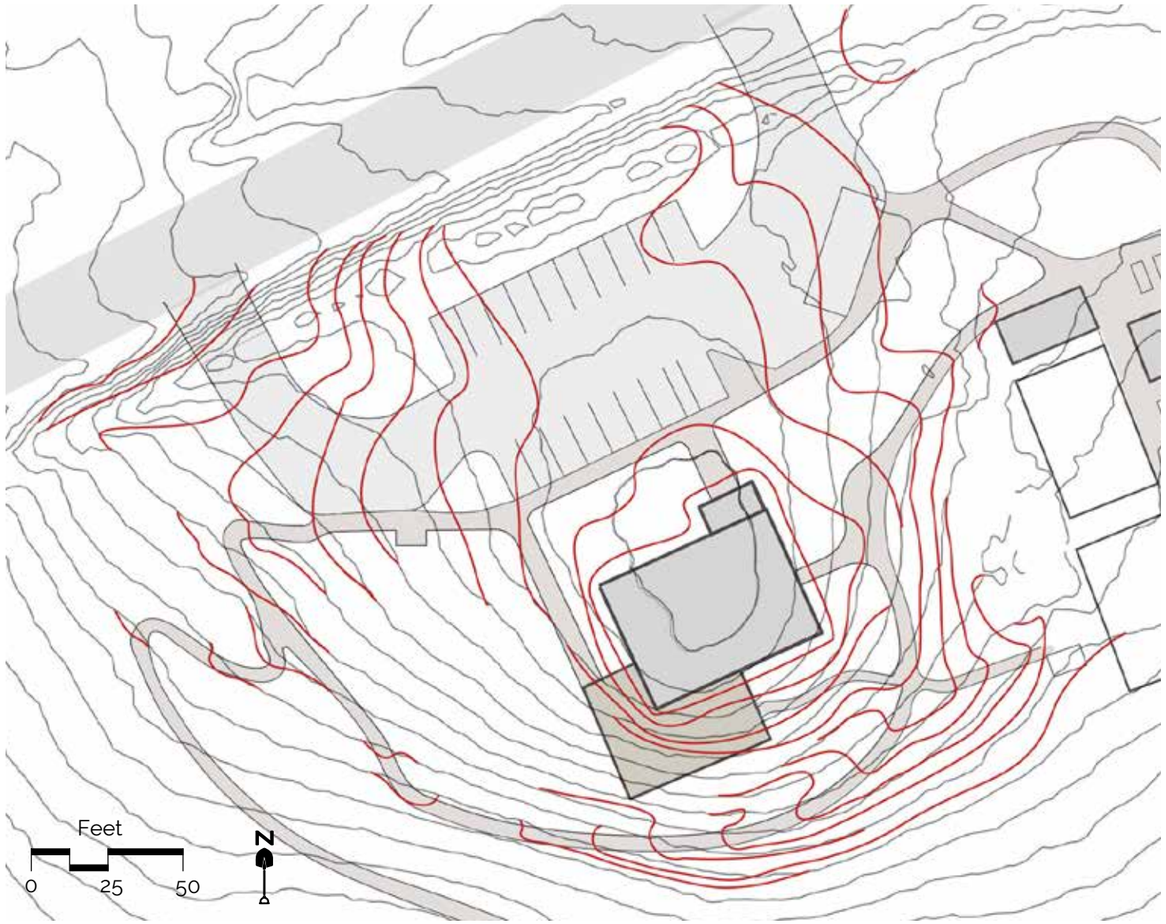

Cercis canadensis

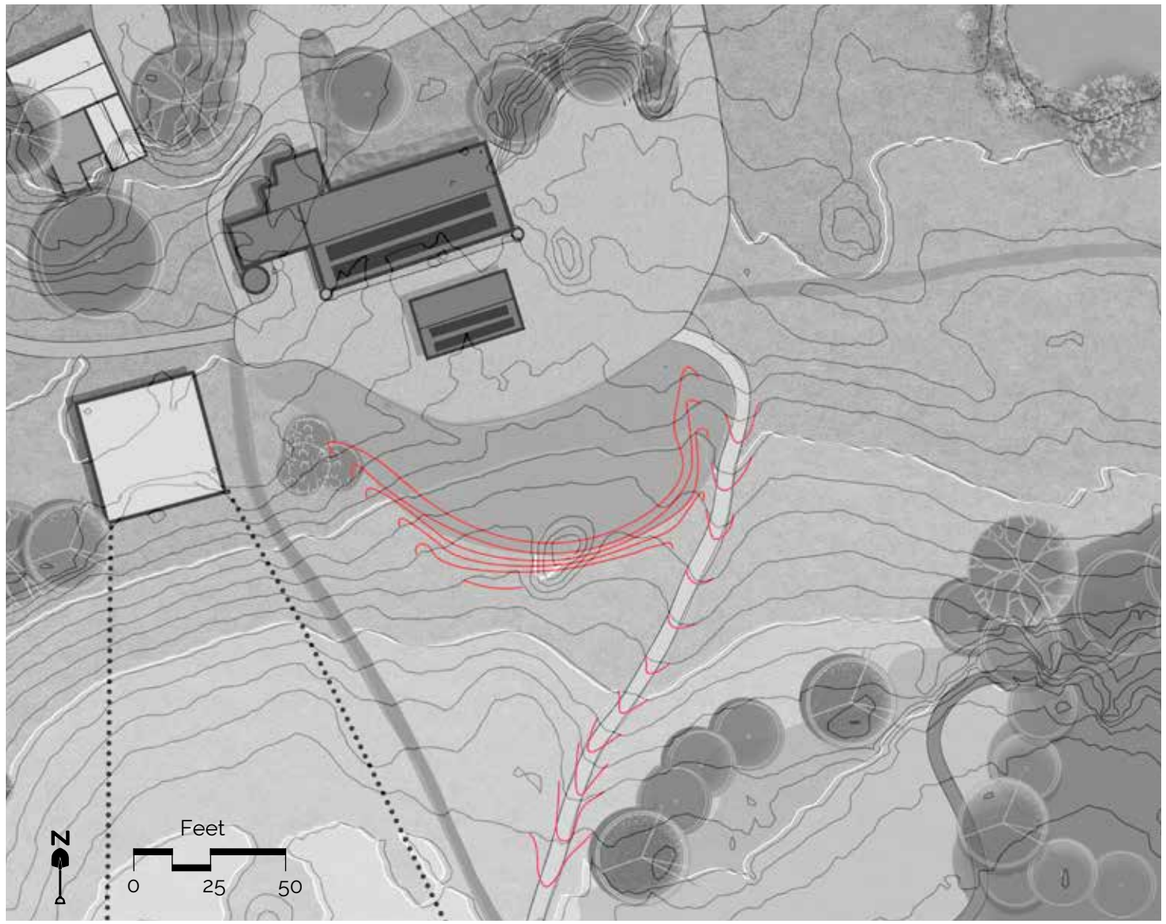

Amelanchier


Juncus canadensis


Viola papilionacea

Grading Plans





Creating the driveway, parking lot, educational center, and universally accessible paths will require some grading. Fill will be added to create a level area at the top of the hill with a footprint large enough to accommodate the 45x60 structure. A berm off Exeter Road will need to be leveled to create driveway entryways, and to create a gentle slope to allow for vehicle traffic while also allowing for drainage. While the path leading to the orchard to the south and historic barn to the east are positioned on gentle slopes, some grading will be necessary to achieve slopes equal to or less than 5%. This grading plan is an example of what may be needed to accommodate a plan. As building designs are drafted, a formalized grading plan will be needed to suite the proposed structure and surrounding landscape.

Existing Contours

Proposed Contours

Adding fill to the area to the south of the historic barn can create an open and even space for larger gatherings. Some grading along the universally accessible path will also be needed to achieve a slope of less than five percent.

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