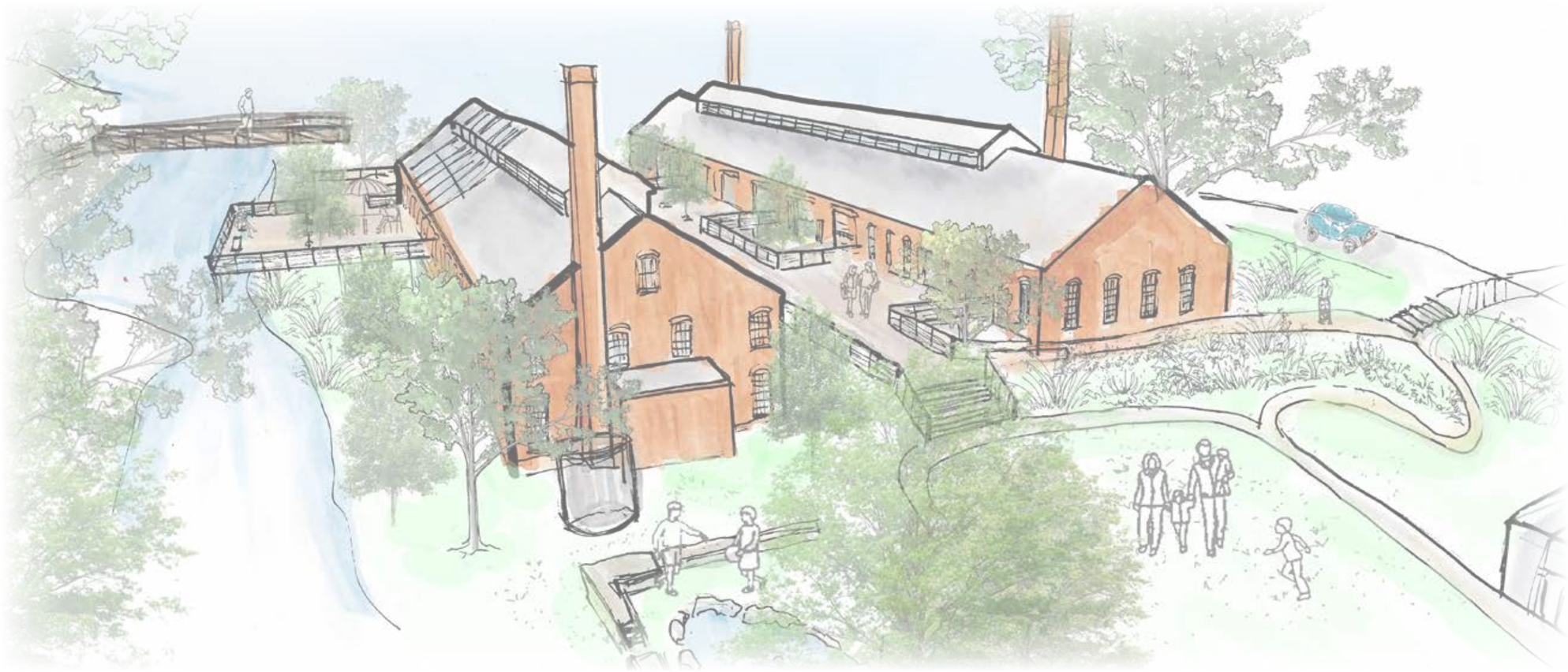
SCOVIL MILL CENTER
Fostering the Local Economy

Higganum, CT



Prepared for Connecticut Resource Conservation and Development Area

Designers: Dan DeLago & Renee Ruhl | The Conway School | Spring 2018

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A LANDSCAPE DESIGN FOR THE
SCOVIL MILL CENTER
11 CANDLEWOOD HILL ROAD, HIGGANUM, CT

DESIGNED BY: DAN DELAGO & RENEE RUHL
SPRING 2018

the ConwaySchool
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PROJECT OVERVIEW + SITE HISTORY

PROJECT OVERVIEW

The Connecticut Resource Conservation and Development (CTRC&D), a non-profit organization, cultivates innovative partnerships and programs to promote agriculture, conservation, rural economic growth, and healthy food systems. CTRC&D identified the Scovil Hoe Mill site, located in Higganum, Connecticut, a village within the Town of Haddam, as a possible home for its offices and an opportunity to support and host rural, land-based enterprises.

It is seeking to reuse existing mill buildings on site for:

- A regional market and cafe
- Maker space
- Office space
- Education center
- Event space

The Town of Haddam is working toward innovative solutions for rural economic development in Higganum Center and throughout the town. While a final site location has not been determined by CTRC&D for its offices and other mission-aligned enterprises, it hopes to evaluate the potential of the historic Scovil Hoe Factory site (currently owned by Connecticut Department of Transportation CTDOT) to serve as a multi-use hub for rural commerce.

PROJECT GOALS

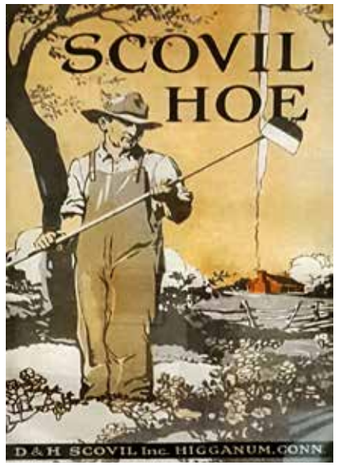
In order to meet CTRC&D's programming needs, the project goals are to:

- Develop a site design connecting interior space and proposed programming with the exterior landscape.
- Design the exterior landscape to as a destination that draws local entrepreneurs and visitors.
- Recommend climate preparedness solutions and phases of site development.
- Connect the site to the surrounding natural resources and village amenities.
- Site a greenhouse (up to 5,000 sf) and storage barn (300 sf).

SITE HISTORY

The D & H Scovil Hoe Company was founded in 1844 by brothers Daniel and Hezekiah Scovil Jr. who designed a self-sharpening planter's hoe and produced it in the mills at 11 Candlewood Hill Road for over 60 years. The State of Connecticut purchased the site in 1941, converted the buildings for use as a CTDOT repair garage and storage facility, and actively used the buildings until 2014. Currently, the two mill buildings are vacant.

The site soils contain pollutants and currently the Town of Haddam has contracted a team of engineers on an environmental site assessment. It is assumed for the scope of this design that the site has been remediated; however, some design recommendations incorporate educational components demonstrating phytotechnology's potential utility in remediating polluted landscapes.



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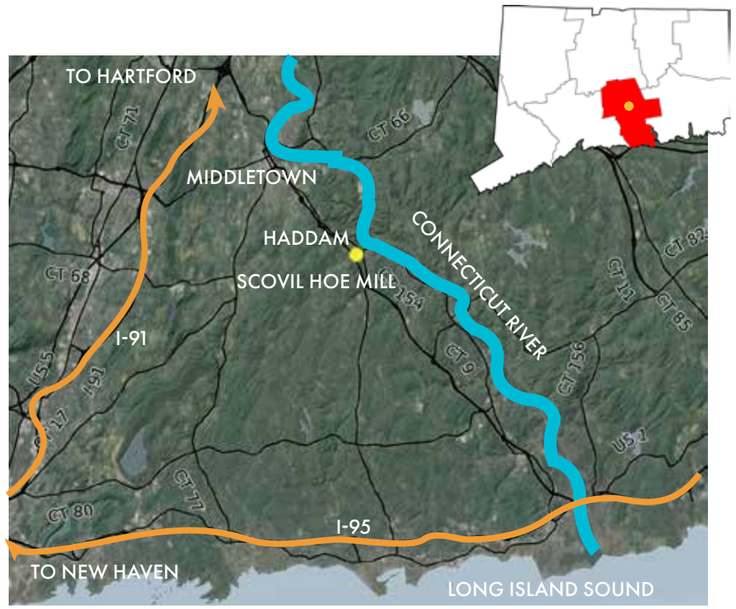
SITE CONTEXT

The Scovil Hoe Mill is located in Higganum, Connecticut, a small village within the town of Haddam. Residential development abuts the site to the north and south, and the site is within approximately 800' of Higganum Village. The Village Green is located directly north of the site across busy Candlewood Hill Road. Candlewood Hill Brook, a tributary of the Connecticut River, flows along the southern edge of the property. Arterial roads create easy access to this site from interstate highways I-91 to the west and I-95 to the south.

The site is located in a rural portion of the Connecticut River Valley and is approximately twenty to thirty miles from the urban centers of Hartford and New Haven and six miles from Middletown, home of Wesleyan University. Natural resources surrounding the site include several state parks, and the Higganum Reservoir could support land-based businesses such as fishing, kayaking, and eco-tourism.

CTRC&D envisions the site as a commercial site that could draw residents of southern New England. It seems that the Scovil site has potential to draw tourists to the area, provide a memorable experience for visitors, and support rural business development.



With farmland to the west and urban centers to the north, the Scovil Hoe Mill site has the potential to promote economic exchange between rural businesses and urban populations of Middlesex County.

The site is within walking distance of the commercial center to the east. Unfortunately, pedestrian flow is restricted with no sidewalks connecting the mill site with the village center.

The village green sits across Candlewood Hill Road from the eastern portion of the site. The mill could explore the possibility of collaborating with the town on hosting events in this space, providing stronger connections of town amenities.

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SITE CONTEXT
A LANDSCAPE DESIGN FOR THE SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

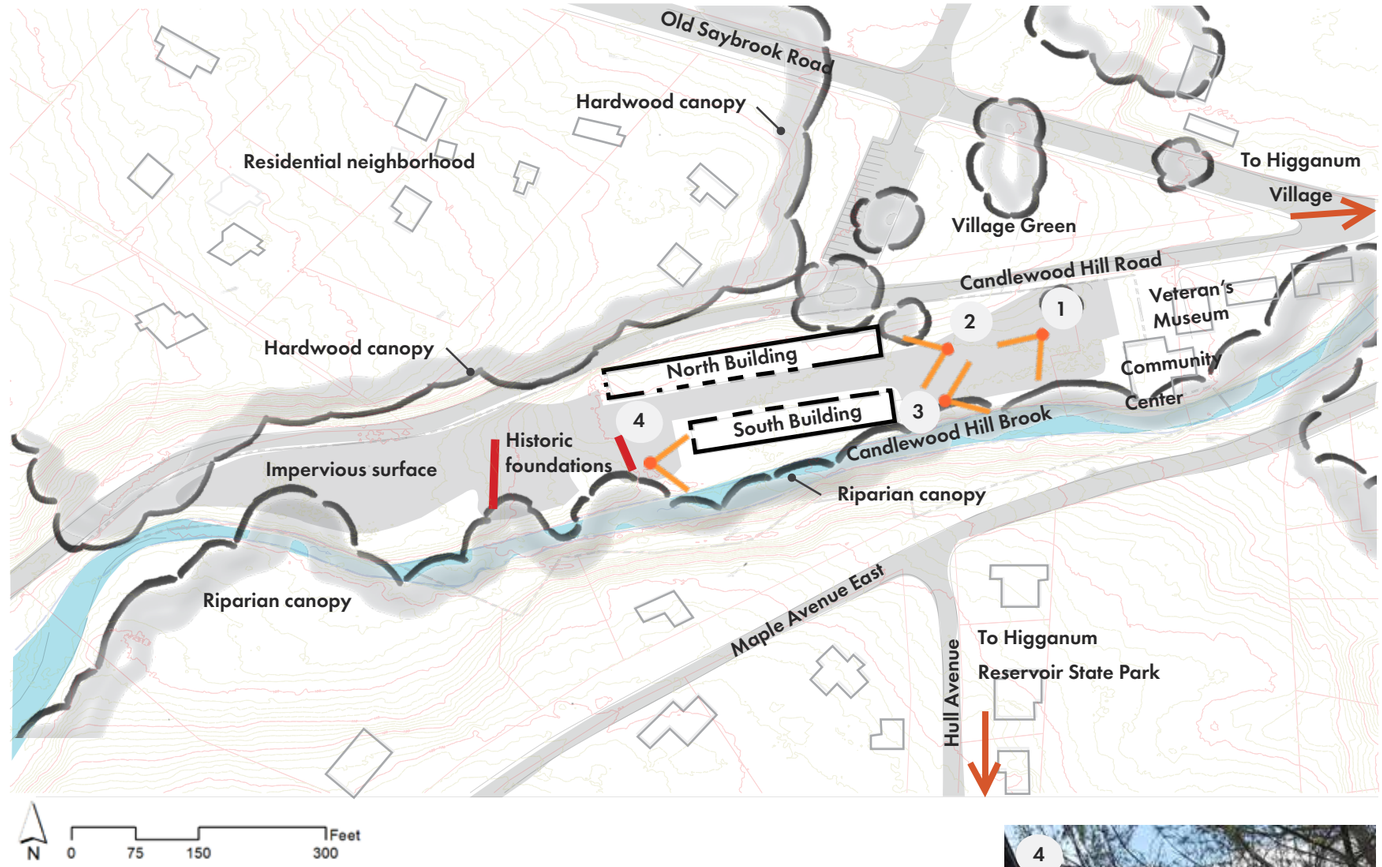
EXISTING CONDITIONS

The Scovil Mill's legacy as an industrial manufacturing site is evident upon first inspection. Most of the 4-acre site is paved in asphalt and the buildings were sited for maximizing production and energy generation via hydro power.

Remains of the industrial legacy include a historic dam wall in the western portion of the property and buried hydroelectric pipes and storage tanks in the eastern portion of the property. Large areas of polluted fill are present in the western portion of the property, and storage tanks and hydrocarbon leaks in the central and eastern portions of the property will require removal and remediation (Church et al., 2018).

The landscape comprises three zones: a gradually sloping, mostly paved western area, a flat central corridor between the two mill buildings, and a flat eastern area adjacent to a community center. All of these zones are bordered by Candlewood Hill Brook to the south and the accompanying riparian ecosystem. Much of the opportunistic vegetation occupying the space between the asphalt and the riparian community is listed as invasive and will require eradication and/or management.

The site is well connected to major roads, natural resources and trail systems. Two entrances, one on the east and another on the west, with parking on both sides creates easy vehicle access to and within the site. Pedestrian access is limited by lack of sidewalks and the steepness of slopes north of the site. Within one quarter mile are state parks, including Higganum Reservoir State Park trail system to the south along Hull Avenue.



The southern canopy along the Candlewood Hill Brook provides shade.

The site contains two historic buildings with a wide, open space in between.

Candlewood Hill Brook and the accompanying riparian ecology are an excellent resource for conservation education.

The southern building sits within the floodplain and is at risk of inundation.

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EXISTING CONDITIONS
A LANDSCAPE DESIGN FOR THE SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

NATURAL DIVERSITY

The Scovil Mill site is located one half mile from the Connecticut River. The riparian communities associated with the river and its numerous tributaries, one of which runs along the site's southern boundary, can potentially support CTRC&D's goals of conservation education, and recreation/ tourism business development.

The site is within a significant natural diversity area, as defined by the Connecticut Department of Energy and Environmental Protection, which is home to state listed animal species (either endangered, threatened, or of special concern) and significant natural plant communities. From an education standpoint the site has the potential to serve as a living classroom educating visitors about the diversity of organisms found in riparian areas and their associated local ecologies. The Seven Falls State Park, Higganum Reservoir State Forest, and Cockaponset State Forest to the north, south, and southeast of the site, respectively, expand the living classroom by providing examples of healthy forest ecosystems for observation.

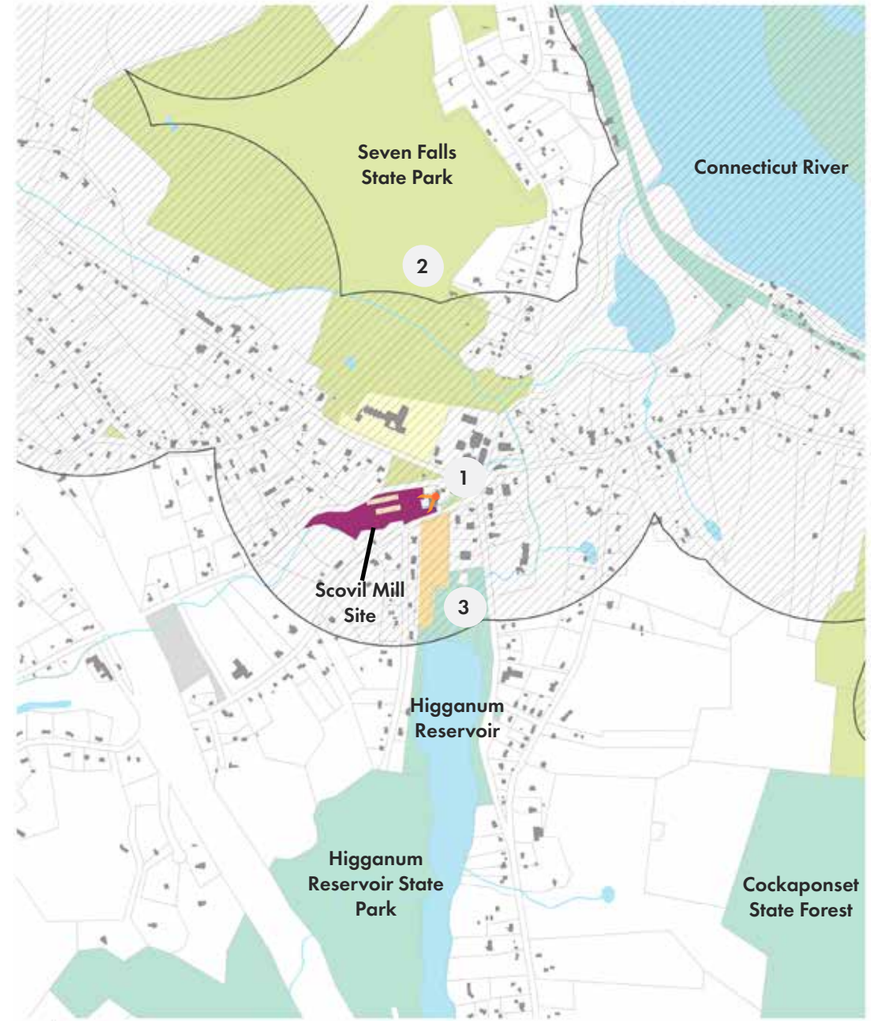
The Connecticut River and Higganum Reservoir offer excellent recreational opportunities and a rural business incubator could potentially support recreation-based businesses.

Candlewood Hill Brook along the southern boundary of the site.

Candlewood Hill Brook is lined with diverse vegetation, but many plants are invasive which could negatively impact the sensitive ecosystem in this area.

Higganum Reservoir is only a short walk from the site. CTRC&D could help to raise visitors' awareness of this natural resource.

Cockaponset State Forest to the southeast offers an excellent example of a healthy forest ecosystem and can provide a living classroom for conservation education.



N 0 500 1,000 2,000 Feet

- Natural Diversity Area
- State Forest
- Municipal
- School
- Scovil Mill Site
- Water bodies
- Residential, Commercial, Other
- Cemetery

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NATURAL DIVERSITY
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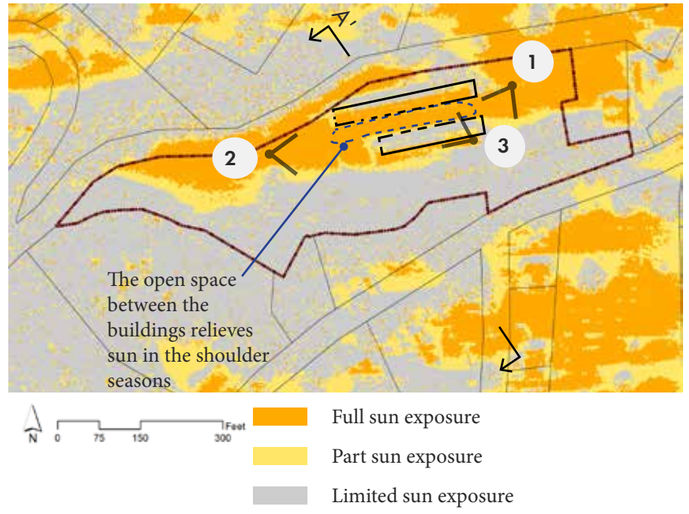
SUN & SHADE

Sun exposure influences the type and density of vegetation on the landscape, and is also critical to the atmosphere of the site. CTRC&D is seeking a landscape aesthetic which is both inviting and comfortable for visitors in all seasons.

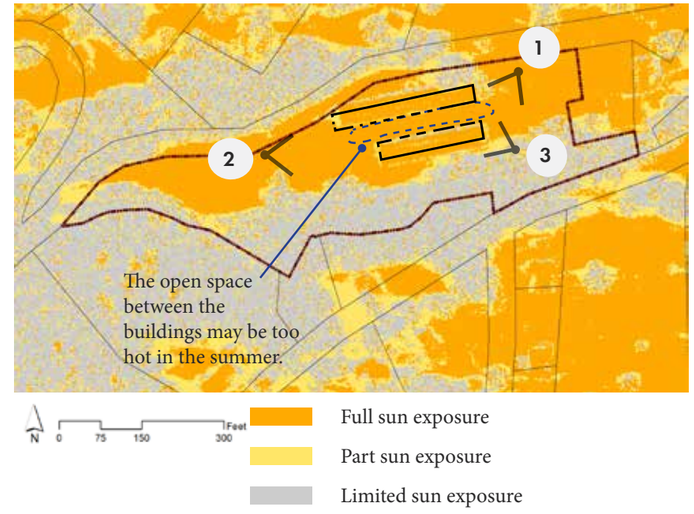
The riparian tree canopy which has developed on the slope adjacent to the brook shades the southern portion of the site from spring through autumn. The lack of vegetation on the remainder of the site results in full sun conditions year round, with the exception of shade cast to the north of buildings. The gradient of sun exposure will allow for a diversity of vegetation adapted to varied light conditions.

The site is exposed to the sun in the cooler shoulder seasons and shaded at least partially during hot summer months, particularly in the central open area between the two mill buildings.

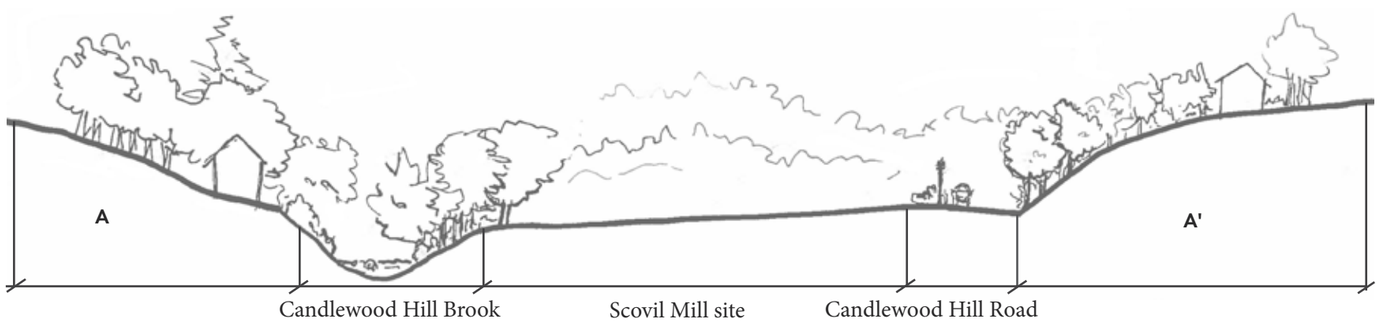
Aside from the obvious considerations of visual appeal and comfort, CTRC&D also seeks to incorporate a greenhouse for the exhibition of sustainable indoor production strategies. This will require full sun exposure throughout the growing season. A sun/shade model (right) indicates that the northern half of the site receives the most sun exposure.



The map above illustrates sun exposure in spring and autumn.



The map above illustrates sun exposure in summer.



The canopy trees along the southern boundary of the site provide ample shade across the southern half of the site throughout the growing season while allowing the central core of the site to receive full sun.

The canopy to the north and south of the site provides an inviting feeling of enclosure but does not shade the site's center.

The center of the site remains in full sun year round with the exception of an area directly along the southern building's northern edge.

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SUN & SHADE
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SLOPES & DRAINAGE

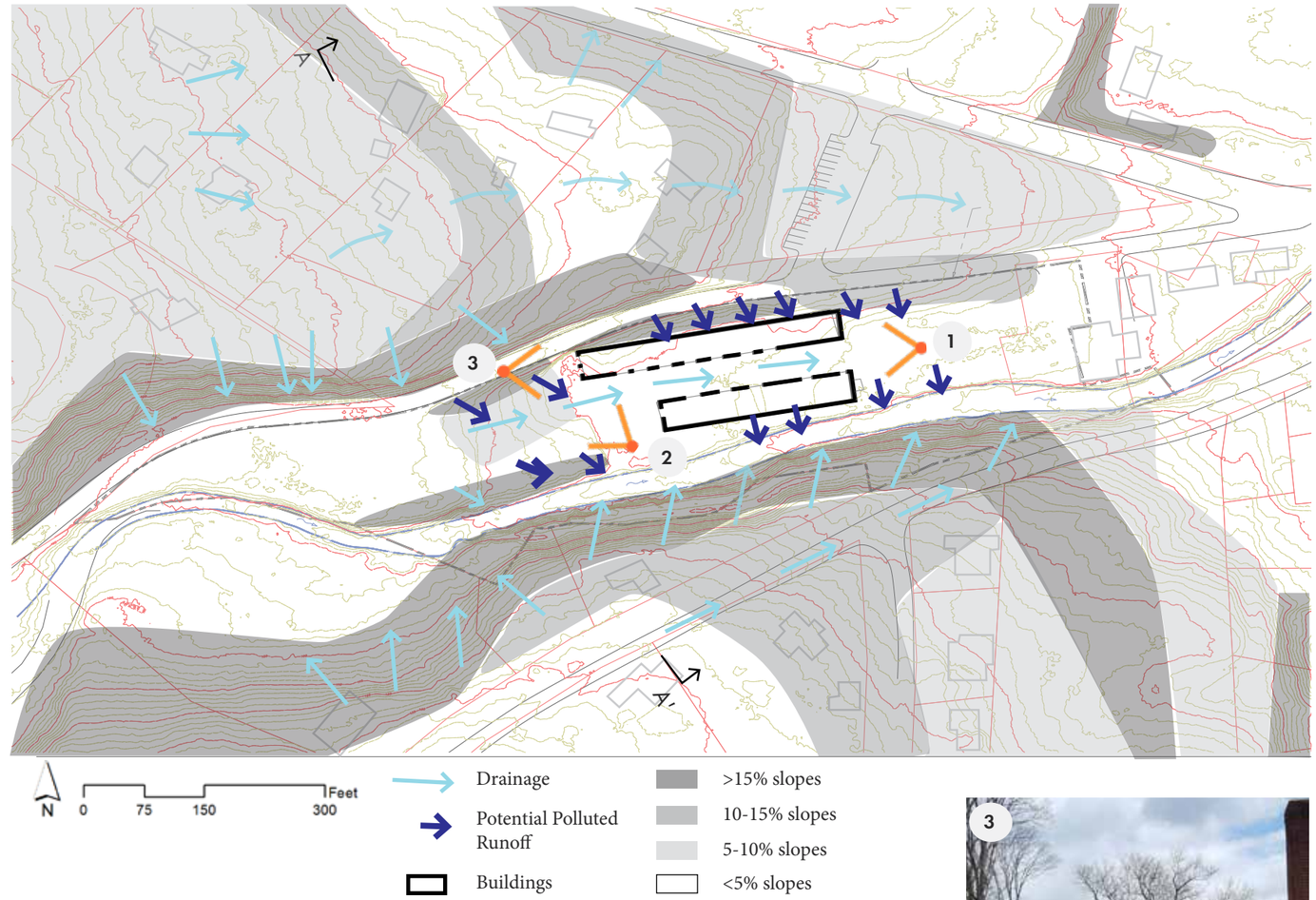
Steep slopes directly north of the northern building and across the brook to the south create a feeling of enclosure on the site.

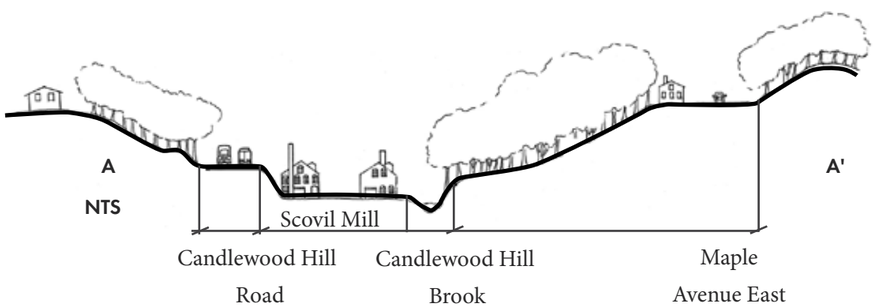
Most of the site slopes gradually toward the village center to the east. This eastern aspect and close proximity to the village makes the site feel as though it is connected to the community's activity.

Because most of the site is polluted from industrial use and paved in impervious asphalt, polluted runoff enters the brook after significant rain events (Church et al., 2018).

Fortunately most of the site has a gradual west to east drainage pattern which slows the momentum of runoff toward the brook. However, the eastern and southwestern portions of the property do slope toward the brook. Preventing stream bank erosion in these areas would help protect the brook.

Areas of steep slopes north and west of the northern building present complications for grading as trucks would be required to traverse this area when approaching the buildings from the west.





Beyond the flat area between the buildings, land slopes up to the western property boundary.

With slopes exceeding 10%, the northwest portion of the site is exposed to polluted runoff from Candlewood Hill Road.

Land slopes down steeply between Candlewood Hill Road and the buildings.

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SLOPES & DRAINAGE
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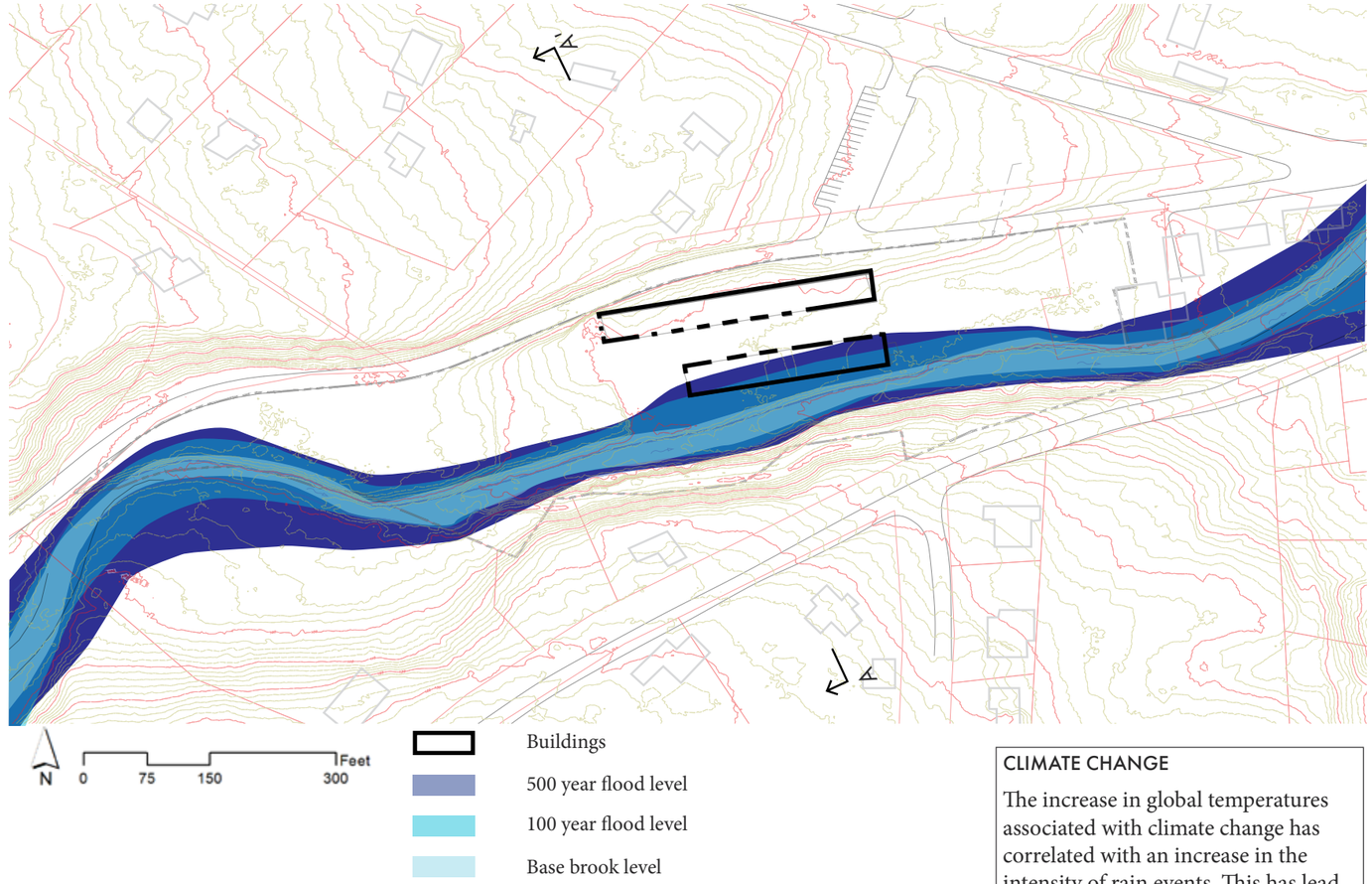
FLOODING

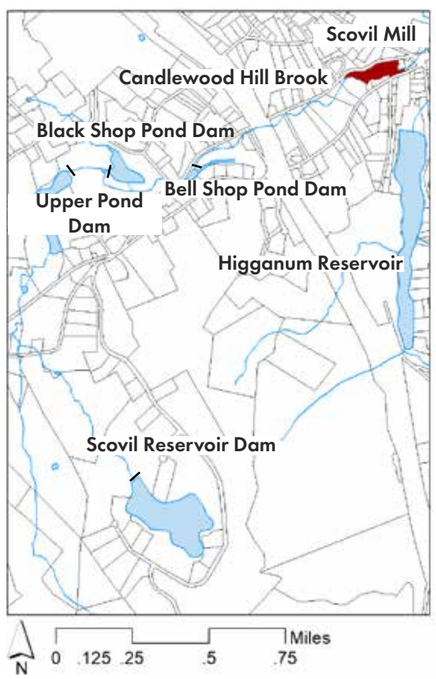
Like many industrial mills of New England, the Scovil Mill depended on a natural resource which provided cheap hydropower energy for manufacturing. Because this form of power generation depends on harnessing the high volume of water flowing through Candlewood Hill Brook, the mill buildings were located as close as possible to the brook. For this reason, the infrastructure was intentionally constructed in the brook's floodplain.

This location in the floodplain leaves the site vulnerable to flooding events. As shown in the map and cross section, 100-year and 500-year storm events lead to floodwaters abutting and inundating the southern building respectively. Because this hazard has implications for the safety of the CTRC&D staff and the site's infrastructure over the long term, it will be a major consideration throughout the design process.



DAM HISTORY

While these flood levels take into consideration the volume of water flowing through the site during the extreme events mentioned, flood levels associated with dam breaks are unpredictable and extremely variable. Several community members reported that two notable floods associated with the failing of upstream dams in 1934 and 1982 inundated both buildings. The flood of 1982 involved the failing of the Upper Pond dam due to several small dam breaches upstream. Ten dams along Candlewood Hill brook are upstream of the Scovil Mill site. While the majority are of low hazard, four dams have higher level of hazard including the Upper Pond Dam (moderate hazard), the Black Shop and Bell Shop Pond Dams (significant hazard), and the Scovil Reservoir Dam (high hazard) (Midstate Regional Planning Agency and the Lower Connecticut River Valley Council of Governments, 2013).

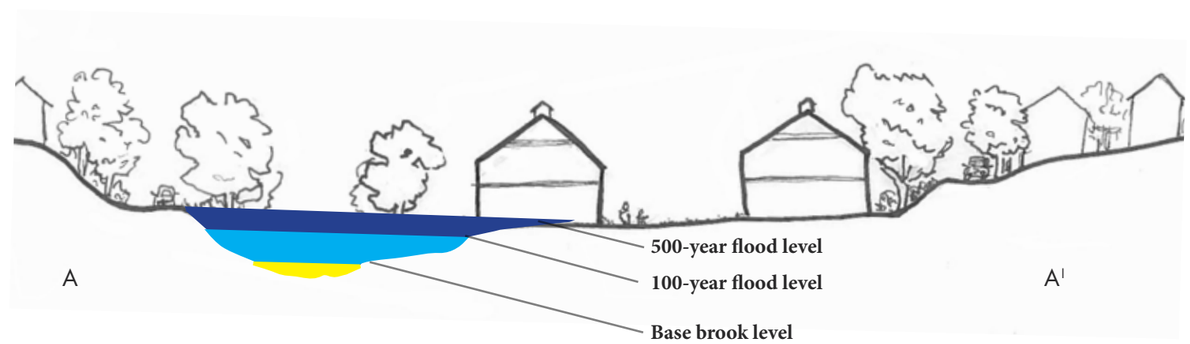


The map above shows the significant dams which drain into Candlewood Hill Brook upstream of the site.

The Scovil Reservoir Dam's high hazard classification means that failure of the dam would result in "probable loss of life, major damage to habitable structures and highways, and major economic loss" downstream (Midstate Regional Planning Agency and the Lower Connecticut River Valley Council of Governments, 2013). Detailed information about the current condition of this dam is unknown, however a report published by the Army Corps of Engineers in 1984 listed this dam as being in 'poor' condition. Because this dam is upstream of the Scovil Mill site and is of high hazard classification, an assessment of this dam should be performed, prior to the acquisition of the mill site by CTRC&D.

CLIMATE CHANGE

The increase in global temperatures associated with climate change has correlated with an increase in the intensity of rain events. This has lead to more abundant and destructive flooding events (Kundzewicz and Schellnhuber, 2004). Being in the floodplain of Candlewood Hill Brook, the historic mill site could undergo damage future extreme flooding events.



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FLOODING
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SUMMARY ANALYSIS

Over the two centuries in which this site has served as an industrial mill and Department of Transportation facility, little has been done to improve of the landscape in terms of its natural resources. In proposed reuse of the historic industrial site, creates opportunities to improve the site for commercial use while mitigating harmful impacts on the stream. The site has been vacant for four years. Historic buildings remain intact and have the potential to house CTRC&D's proposed programming, thereby expanding the commercial activity of the village and the Town of Haddam. Major design considerations include the following:

1. The historical architecture of the mill buildings and their position nestled between steep slopes to the north and south creates a unique atmosphere for the programming needs of the client.

2. The site's proximity to the village center, town green, and nearby state parks may help draw visitors, but pedestrian access to the site from the village and state parks is limited.

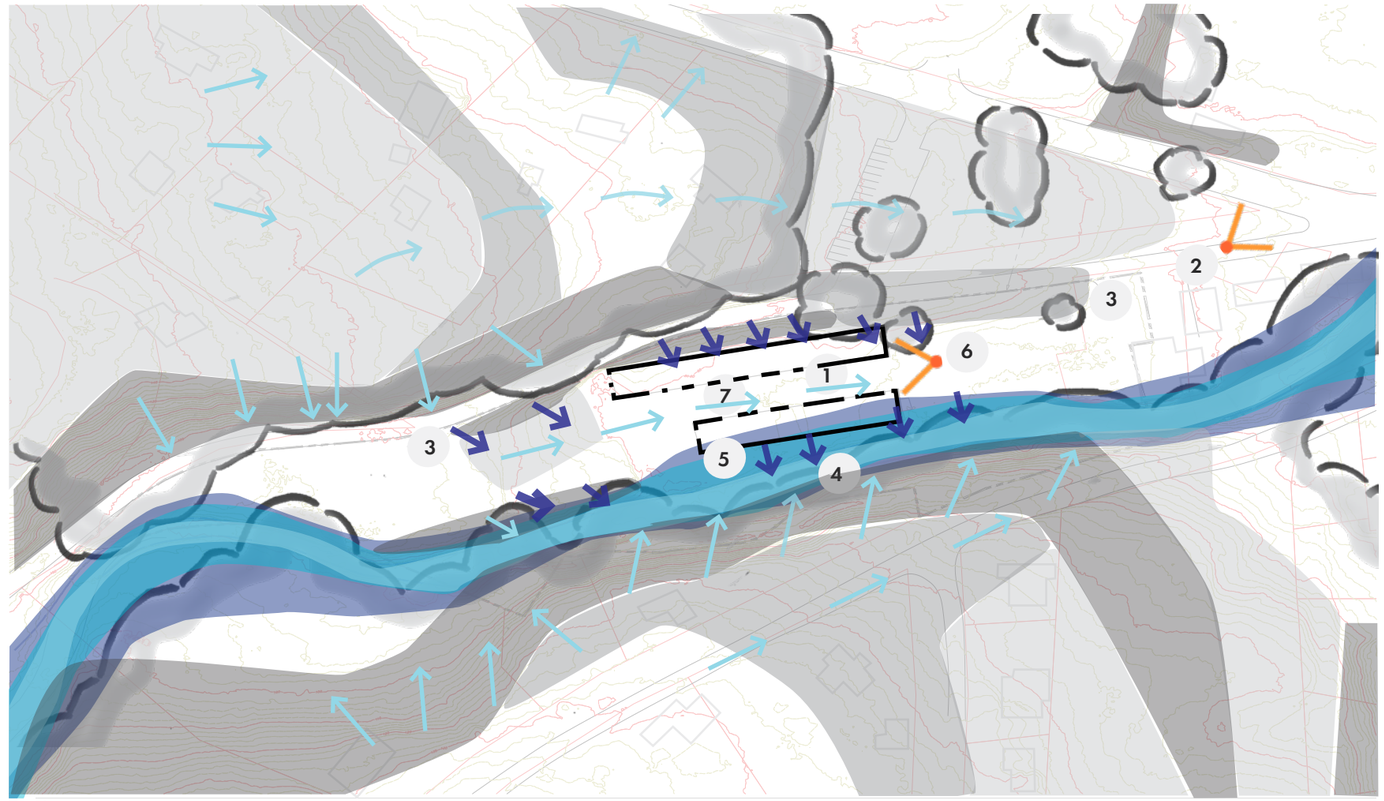
3. Two entrances off of Candlebrook Hill Road connect to large flat areas suitable for parking. The landforms will help to delineate the parking and pedestrian zones.

4. A novel ecology has formed in the wake of the site's abandonment. Although it is located in a larger region of significant natural plant communities, its prior land uses have encouraged the growth of invasive vegetation that may require management.

5. The site is within a floodplain where 100-year and 500-year flood would inundate at least one of the buildings requiring the landscape to work with the floodwater or fortify against it.

6. Impervious surfaces and pollutants in the site's soils may inhibit the ecological function of the site and the brook. This may also have implications for the health of the Connecticut River less than half a mile downstream.

7. A large, flat, and sunny area between the mill buildings presents opportunities for indoor/outdoor programming but some seasonal protection from the sun may be needed.



N 0 75 150 300 Feet

500-year flood level
100-year flood level
Base brook level
>15% slopes
10-15% slopes
5-10% slopes
<5% slopes
Drainage
Potential Polluted Runoff
Buildings

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SUMMARY ANALYSIS
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DESIGN ALTERNATIVES 1

These 3 design concepts were based on client and community feedback. Each focuses on different ways to respond to the increase in future flood events.

- "Inner Forest" design restores the riparian ecology.
- "Above the Water" flood proofs the infrastructure.
- "Protect from the Flood" diverts the water from the infrastructure.

ADVANTAGES

Existing sensitive riparian ecology is augmented.

Restoration efforts provide an opportunity for education in support of the organization's goals.

Vehicle access is limited, encouraging pedestrian flow.

Indoor garden in south building provides opportunity for a unique event space experience.

Site allows flood water to rise without putting people at risk.

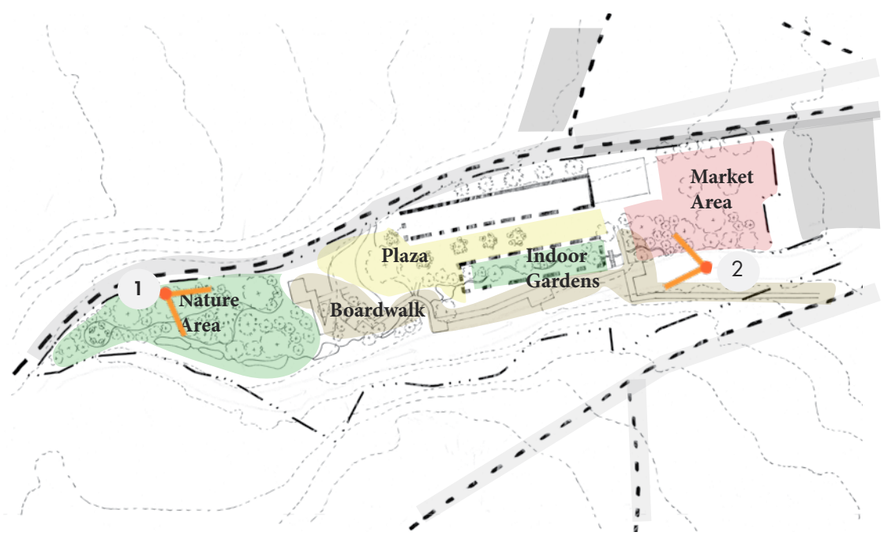
DISADVANTAGES

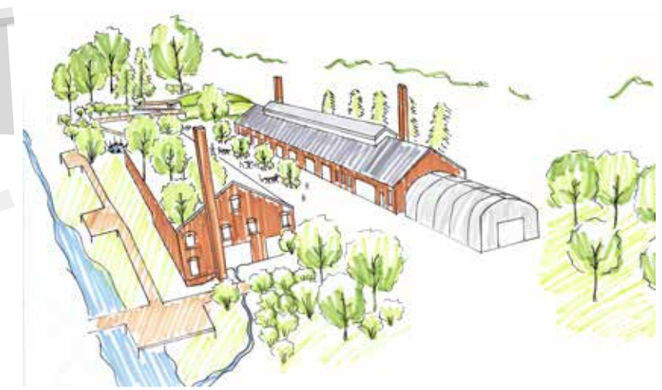
Programming is reduced in southern buildings.

Seasonally limited usage of southern building.

INNER FOREST

A natural riparian ecosystem is regenerated, filling the floodplain. The roof of the southern building is removed and the historic shell is filled with interior gardens that extend into the landscape. Vegetation is restored on the west and east for demonstration gardens that serve as a buffer to the brook. A center plaza supports market and cafe visitor use and a boardwalk brings visitors from this space to the brook. A bridge over the brook connects with a pathway to the Higganum Reservoir State Park. Shared offsite parking on adjacent properties further supports the site's restoration and Candlewood Hill Road is closed at the village green access road for safe pedestrian flow. A bioswale along the southern portion of the property slows and treats runoff.





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DESIGN ALTERNATIVES
A LANDSCAPE DESIGN FOR THE SCOVIL MILL CENTER
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DESIGN ALTERNATIVES 2

ABOVE THE WATER

In response to base flood elevations (BFE) the building floor is elevated to the design floor elevation (DFE). A platform at the same DFE between the buildings acts as a connector to the north and south buildings, and extends out over the lawn area at the west and Candlewood Brook to the south. This central core acts as one functional space interacting with the buildings and the brook. A catwalk extends from Candlewood Hill Road south of the village green above the two mill buildings, and across the brook to Maple Avenue East establishing connections to the site from the Village Green, Hull Avenue, and Higganum Reservoir State Park.

ADVANTAGES

Mitigates the effects of potential floodwaters by allowing water to flow below elevated floor and platform heights.

Unified connections of the buildings are realized through the outdoor platform, catwalk, and boardwalk.

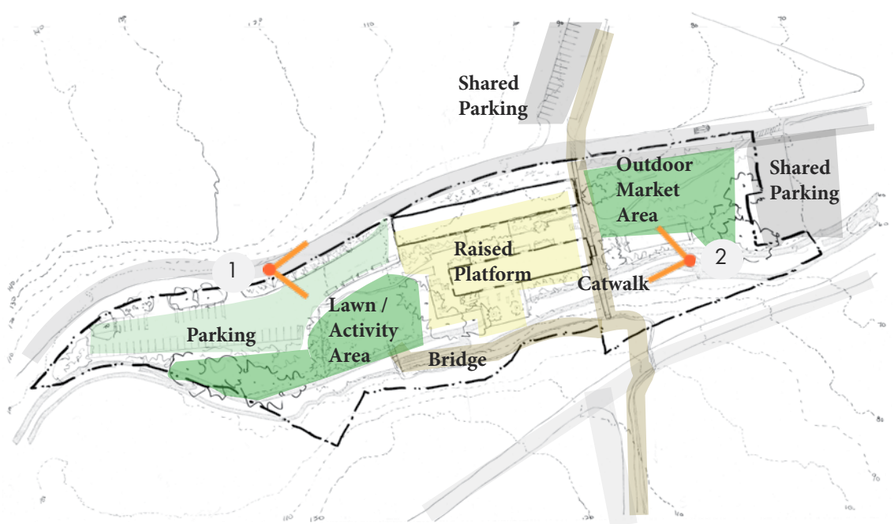
Limits parking on site to 48 spots and shares with adjacent parking lots.

DISADVANTAGES

Significant grading will be required for truck off loading at the western end of the northern building.

Parking off site will require town planning approval.

Significant changes to building infrastructure will be required.



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DESIGN ALTERNAITVES
A LANDSCAPE DESIGN FOR THE
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DESIGN ALTERNATIVES 3

PROTECT FROM THE FLOOD

A berm to the southwest of the buildings protects them from potential flood inundation. It hugs an outdoor patio extension off the southern building. A center plaza between the north and south buildings supports an indoor/outdoor market and cafe. Recreational and garden space located on the western portion of the property furthers the outdoor experience on site. A mobile market and event space located on the eastern side of the site connects to both the mill buildings and the village center.

ADVANTAGES

Protection against flooding limits damage to infrastructure and potential soil erosion.

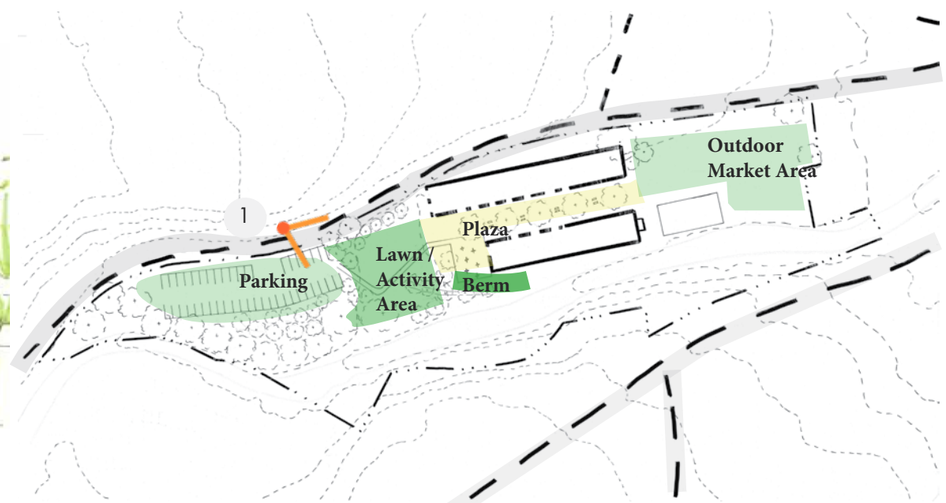
Building programming is supported with parking with 80 combined spots on the western and eastern portions of the property.

The center plaza is an interactive space for community gathering.

DISADVANTAGES

Commercial vehicle access to the buildings is limited.

A levee to armor the site doesn't guarantee flood proofing of infrastructure and may require annual maintenance



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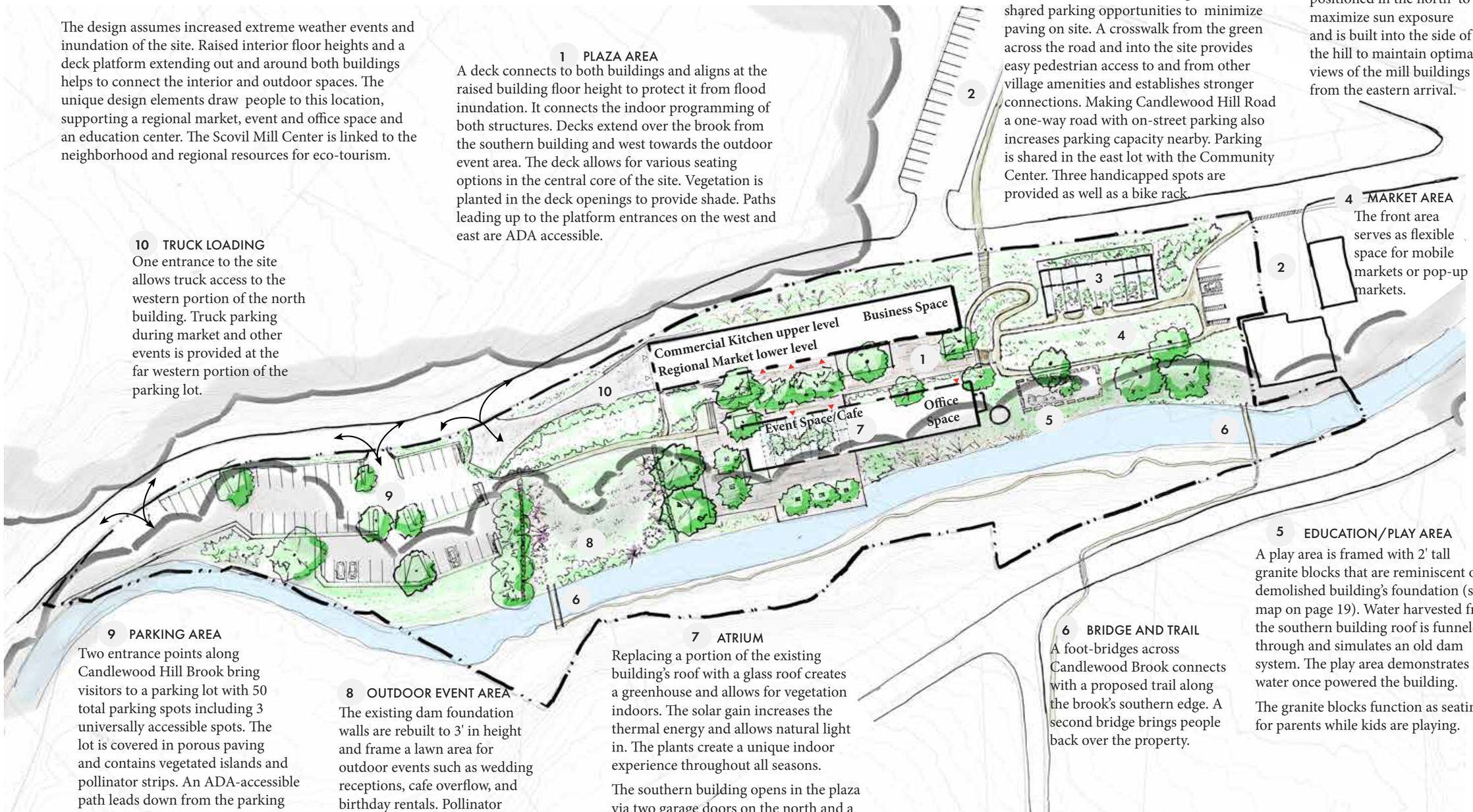
FINAL DESIGN

The design assumes increased extreme weather events and inundation of the site. Raised interior floor heights and a deck platform extending out and around both buildings helps to connect the interior and outdoor spaces. The unique design elements draw people to this location, supporting a regional market, event and office space and an education center. The Scovil Mill Center is linked to the neighborhood and regional resources for eco-tourism.



1 PLAZA AREA
A deck connects to both buildings and aligns at the raised building floor height to protect it from flood inundation. It connects the indoor programming of both structures. Decks extend over the brook from the southern building and west towards the outdoor event area. The deck allows for various seating options in the central core of the site. Vegetation is planted in the deck openings to provide shade. Paths leading up to the platform entrances on the west and east are ADA accessible.

2 SHARED PARKING
The Village Green parking lot across Candlewood Hill Road could provide shared parking opportunities to minimize paving on site. A crosswalk from the green across the road and into the site provides easy pedestrian access to and from other village amenities and establishes stronger connections. Making Candlewood Hill Road a one-way road with on-street parking also increases parking capacity nearby. Parking is shared in the east lot with the Community Center. Three handicapped spots are provided as well as a bike rack.

3 GREENHOUSE
A 4,000 sf greenhouse is positioned in the north to maximize sun exposure and is built into the side of the hill to maintain optimal views of the mill buildings from the eastern arrival.

4 MARKET AREA
The front area serves as flexible space for mobile markets or pop-up markets.

5 EDUCATION/PLAY AREA
A play area is framed with 2' tall granite blocks that are reminiscent of a demolished building's foundation (see map on page 19). Water harvested from the southern building roof is funneled through and simulates an old dam system. The play area demonstrates how water once powered the building.

The granite blocks function as seating for parents while kids are playing.

6 BRIDGE AND TRAIL
A foot-bridges across Candlewood Brook connects with a proposed trail along the brook's southern edge. A second bridge brings people back over the property.

7 ATRIUM
Replacing a portion of the existing building's roof with a glass roof creates a greenhouse and allows for vegetation indoors. The solar gain increases the thermal energy and allows natural light in. The plants create a unique indoor experience throughout all seasons.

The southern building opens in the plaza via two garage doors on the north and a third on the western side.

8 OUTDOOR EVENT AREA
The existing dam foundation walls are rebuilt to 3' in height and frame a lawn area for outdoor events such as wedding receptions, cafe overflow, and birthday rentals. Pollinator gardens border the stone walls.

9 PARKING AREA
Two entrance points along Candlewood Hill Brook bring visitors to a parking lot with 50 total parking spots including 3 universally accessible spots. The lot is covered in porous paving and contains vegetated islands and pollinator strips. An ADA-accessible path leads down from the parking area to the platform that connects the north and south buildings.

10 TRUCK LOADING
One entrance to the site allows truck access to the western portion of the north building. Truck parking during market and other events is provided at the far western portion of the parking lot.

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Designed By: Dan DeLago & Renee Ruhl
Spring 2018

FINAL DESIGN
A Landscape Design for the Scovil Mill Center
11 Candlewood Hill Road, Higganum, CT

DESIGN SKETCHES

Visitors can flow through the landscape to and from the buildings to experience the landscape on the deck and down into the lawn area framed by the foundations of the old dam. A footbridge over Candlewood Hill Brook connects to a trail that leads further south to a local state park.

The deck connects the two buildings and extends out into the landscape where visitors can enjoy sitting outside and overlooking Candlewood Hill Brook on the southern end of the property.

Inside the buildings are a regional market in the northern building and an atrium in the southern building which serves as a unique venue for events and a cafe.

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DESIGN SKETCHES
A LANDSCAPE DESIGN FOR THE SCOVIL MILL CENTER
11 CANDLEWOOD HILL ROAD, HIGGANUM, CT

DESIGNED BY: DAN DELAGO & RENEE RUHL
SPRING 2018

DESIGN SKETCHES

The site connects to the village green to the north via pathways flowing from the site's center. A 4,000 sf greenhouse provides opportunity for food production and education. A rainwater cistern feeds into a simulated dam system for education purposes in an interactive play area.

An interactive play area demonstrates how hydroelectric power is generated and highlights the implications of dammed river systems for infrastructure downstream. Educational signs describe how the trees species shading the area help to remediation pollution below ground.

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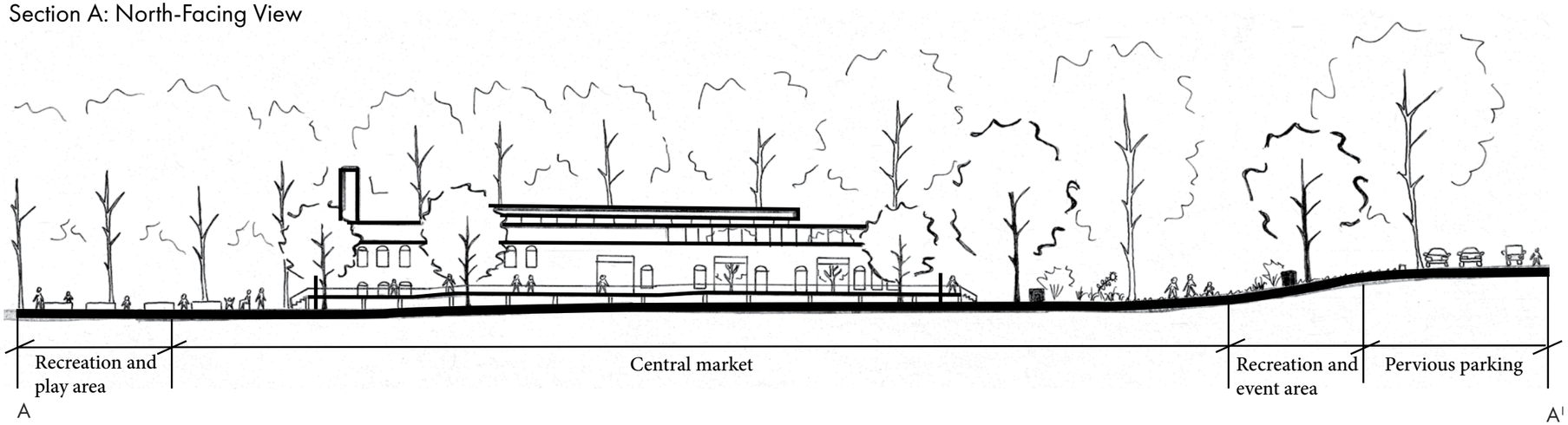
11 CANDLEWOOD HILL ROAD, HIGGANUM, CT

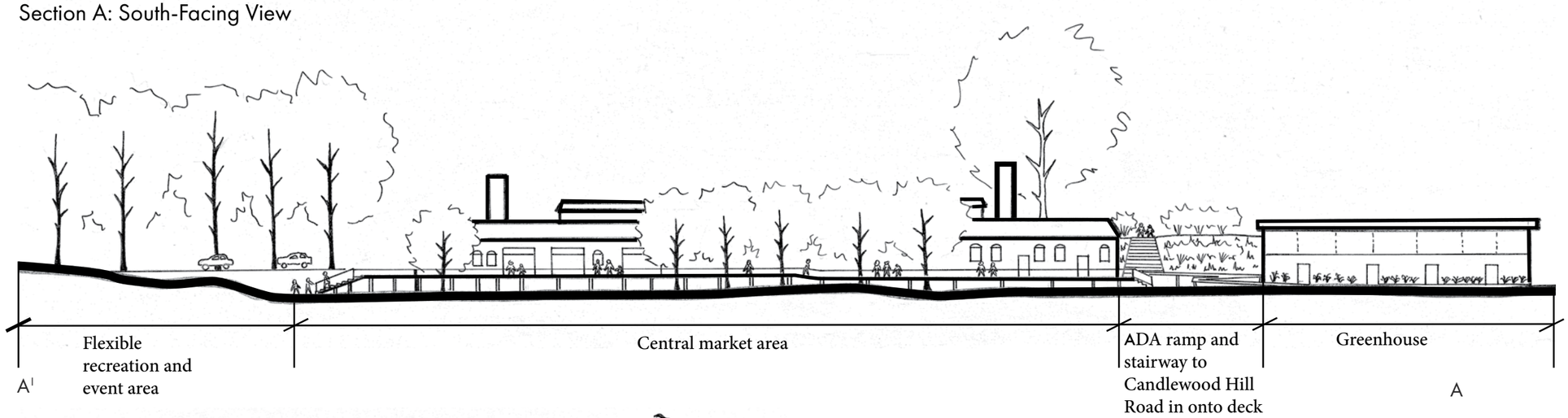
DESIGNED BY: DAN DELAGO & RENEE RUHL
SPRING 2018

DESIGN SECTIONS

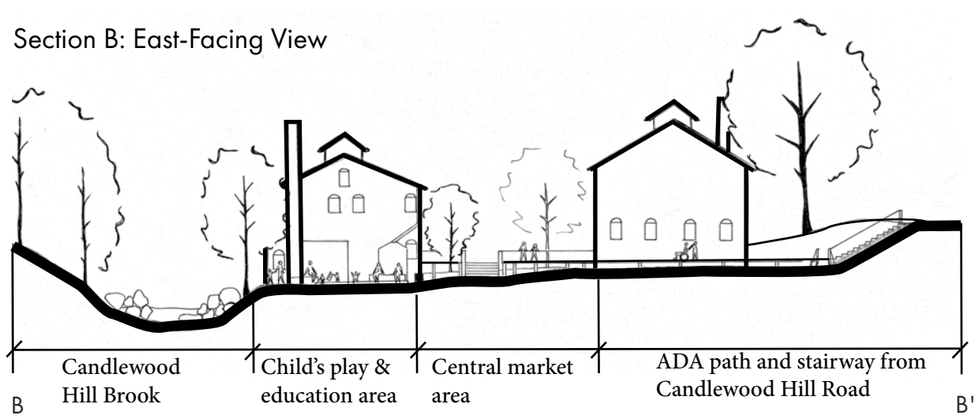
Section A: North-Facing View

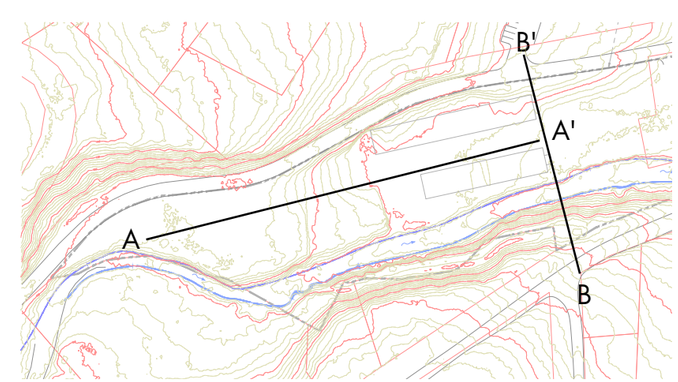


Section A: South-Facing View



Section B: East-Facing View





Not for construction. Part of a student project and not based on a legal survey.

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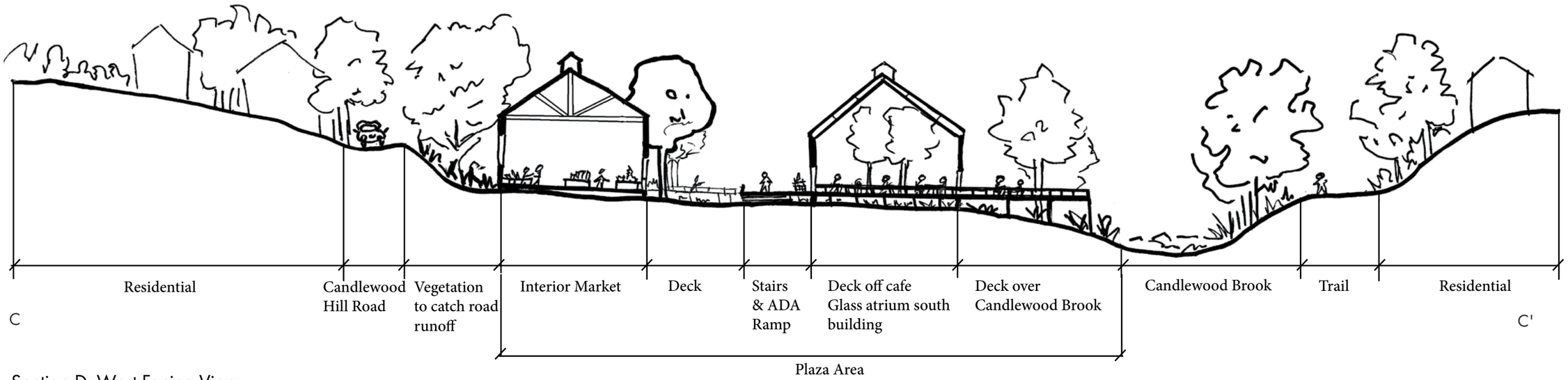
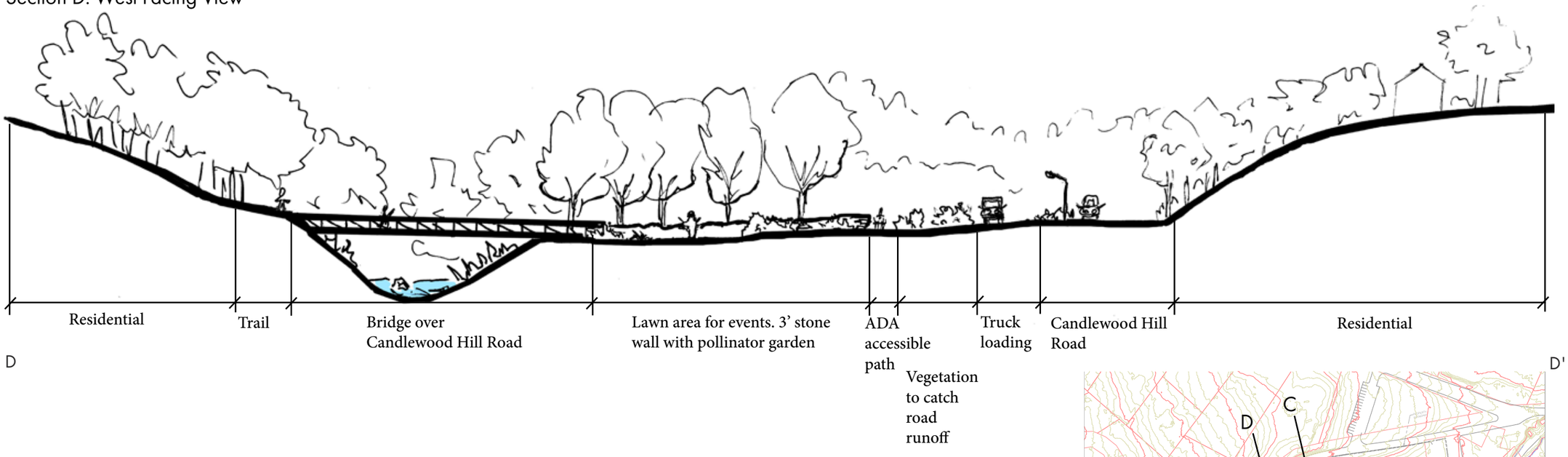
DESIGN SECTIONS
A LANDSCAPE DESIGN FOR THE
SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

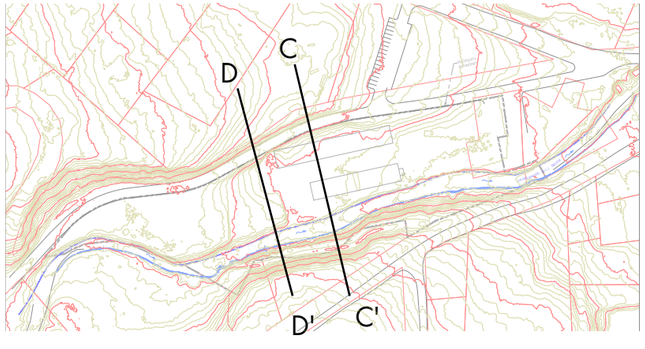
DESIGN SECTIONS

Section C: East Facing View



Section D: West Facing View





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DESIGN SECTIONS
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SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

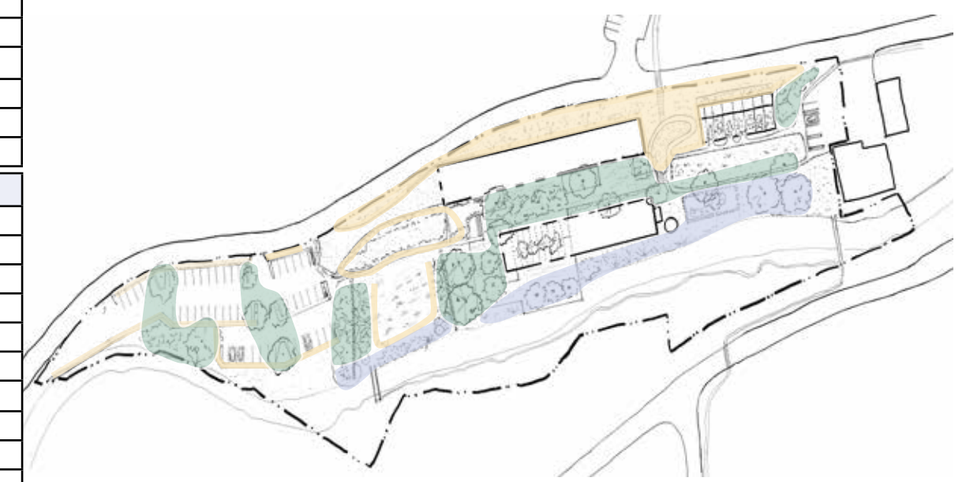
PLANT LIST

BOTANICAL NAME	COMMON NAME	FLOWER COLOR	HT	SEASON	SUN	SOIL
Pollinator habitat						
Aquilegia canadensis	wild columbine	red & yellow	12-15”	May-Jun	part shade, shade	sandy, well drained
Asclepias spp.	milkweed, butterfly weed	yellow to orange	1-3’	May-Aug	sun to part shade	dry to moist
Baptisia australis	false blue indigo	blue- purple	3-6’	May-Jun	sun to part shade	dry to moist
Echinacea purpurea	purple coneflower	rose-purple	2-4’	Jun-Aug	full sun to part shade	med wet, well drained
Echinops spp.	globe thistle	blue-purple	2-4’	Jun-Aug	full sun	dry to moist
Eupatorium spp.	Joe-Pye weed, boneset	pink, purple, white	1-10’	Jul-Oct	sun to part shade	medium wet to wet
Geranium spp.	cranesbills	purple or pink	1-2’	Apr-Jul	full sun to part shade	med wet, well drained
Helianthus spp.	sunflower	yellow	1-6’	Jul-Oct	full sun to part shade	dry, well drained
Liatris spp.	blazing star	rose, purple	1-6’	Jul-Oct	full sun to part shade	med wet, well drained
Lobelia spp.	cardinal flower	red or blue violet	1-5’	Jul-Oct	full sun to part shade	moist
Monarda spp.	bee-balm, wild bergamot	red	1-3’	Jul-Oct	sun to part shade	acidic, rich moist
Phlox spp.	phlox, wild sweet William	rose, purple, blue, white	1/2-6’	Apr-Oct	sun to part shade	med wet, well drained
Rudbeckia spp.	black-eyed Susan, coneflower	yellow	1-2’	Jul-Oct	full sun to part shade	dry to wet, well drained
Solidago spp.	goldenrod	yellow	1-6’	Jun-Oct	full sun to part shade	dry to wet, well drained
Symphyotrichum spp.	aster	white, blue, violet	1-6’	Jul-Oct	full sun to part shade	dry to wet, well drained
Viola pedata	bird’s foot violet	purple	3-8”	Apr-Jun	full sun or filtered shade	dry to med wet
Grasses						
Andropogon gerardii	big blue stem	purple-red	4-6’	Sept-Dec	full sun	dry to moist
Muhlenbergia capillaris	pink muhlygrass	pink-red	2-3’	Aug-Dec	full sun	dry to moist
Schizachyrium scoparium	little bluestem	purple	2-4’	Aug-Dec	full sun	dry to moist
Riparian zone trees and shrubs						
Acer rubrum	red maple	red	40-70’	Mar-Apr	sun to part shade	moist, well drained
Amelanchier spp.	serviceberry	white	6-25’	Mar-Apr	sun to part shade	moist, well drained
Carpinus caroliniana	hophornbeam	white, yellow	20-35’	Feb-Mar	sun to part shade	moist well drained
Cornus sericea	redosier dogwood	white	6-12’	May-Jun	sun to part shade	med wet to wet
Fraxinus americana	white ash	lavender	60-90’	May-Jun	sun to part shade	med wet to wet
Hamamelis virginiana	witchhazel	yellow	15-20’	Oct-Nov	sun part shade	moist
Kalmia latifolia	mountain laurel	pink-lavender	12-20’	May-Jun	part shade	moist, well drained
Liriodendron tulipifera	tuliptree	orange	60-90’	May-Jun	sun to part shade	moist, well drained
Oxydendrum arboreum	sourwood	white	25-30’	Jun-Jul	sun to part shade	moist, well drained
Platanus occidentalis	sycamore	yellow/red	70-100’	Apr-May	sun to part shade	med wet to wet
Populus spp.	poplar, cottonwood, aspen	green/red	50-80’	April-May	sun to part shade	dry to moist
Rhododendron viscosum	swamp azalea	pink	3-5’	May-July	part shade	moist to wet
Rhus copallinum	dwarf sumac	yellow green	3-6’	Jul-Sep	sun to part shade	dry to med wet, average
Salix spp.	black willow, silky willow	yellow green	12-50’	Mar-Jul	sun to shade	moist
Sassafras albidum	sassafras	yellow	30-60’	Apr-May	sun to part shade	moist, well drained
Upland trees and shrubs						
Ceanothus americanus	New Jersey tea	white	3-4’	May- Sep	sun to part shade	dry well drained
Cercis canadensis	Eastern redbud	pink-lavender	20-30’	Apr-May	sun to part shade	moist well drained
Gleditsia triacanthos	honey locust	white	30-50’	May-Jun	full sun	moist, drought tolerant
Juniperus virginiana	Eastern red cedar	non-flowering	30-50’	n/a	sun part shade	dry well drained
Physocarpus opulifolius	common ninebark	pink	5-8’	May-June	sun to part shade	dry to med wet
Quercus bicolor	swamp white oak	yellow	50-70’	Apr-May	sun to part shade	moist, drought tolerant
Rhus copallinum	dwarf sumac	yellow green	3-6’	Jul-Sep	sun to part shade	dry to med wet, average
Viburnum dentatum	southern arrowwood	white	6-10’	May-Jun	sun to shade	sandy, well drained

Eupatorium spp.

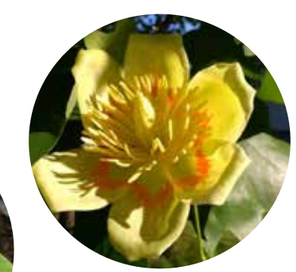
Monarda spp.

Asclepias spp.



Cercis canadensis

Populus spp.



Liriodendron tulipifera

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PLANT LIST
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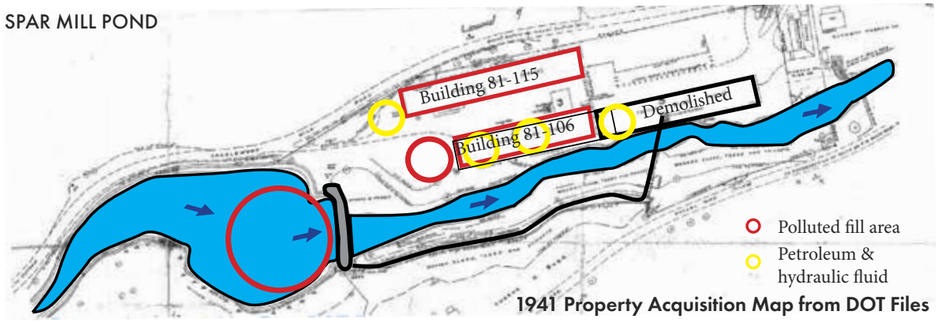
PHYTOTECHNOLOGY

SPAR MILL POND



1941 Property Acquisition Map from DOT Files

*Polluted areas contain levels of constituents above baseline remediation standard regulations criteria for the state of Connecticut. Information derived from Fuss & O'Neill Phase II/Limited III Environmental Site Assessment Draft submitted March 2018

SCOVIL MILL'S LEGACY

Evidence of the Scovil Mill's industrial legacy is obvious in its landscape and architecture. Like many historic industrial sites, a large amount of waste material and degrading infrastructure lies unseen below the surface. This material has contaminated the site with heavy metals and hydrocarbons (Church et al., 2018). Some hydrocarbons such as benzene and pyrene are known carcinogens (Mueller et al., 1996).

The Spar mill pond was created in 1881 by damming Candlewood Hill Brook for hydroelectric power and was later filled in 1941 with polluted soil and construction materials. Asphalt and coal fragments used to fill the pond contain PAHs (Polycyclic Aromatic Hydrocarbons), ETPH (Extractable Total Petroleum Hydrocarbons), and heavy metals (arsenic, lead). These contaminants are also spread throughout the property as a result of petroleum and hydraulic fluid spills (Church et al., 2018). Petroleum hydrocarbons are the most common contaminant of sediments and soils globally (Stroud et al., 2007).

Full remediation of the site using chemical and mechanical solutions is planned. However, in considering the educational goals of CTRC&D, there is great potential to highlight the rapidly developing field of phytotechnology and its utility as an agent of remediation. Numerous biological agents for remediation of some of the aforementioned contaminants on site are known(April and Sims 1990, Balcom and Crowley 2009, Barac et al., 1999, Cook and Hesterberg 2013, Euliss et al., 2009, Ferro et al., 1999, Spriggs et al., 2005). The tables at the right include only vegetation that is native to North America and suitable for Connecticut's climate zone.

PERSISTENT POLLUTION

While organic contaminants like hydrocarbons can be degraded into less toxic parts, heavy metals are problematic because they cannot be degraded or destroyed through biological processes (Chaney et al., 2010). However, using phytoextraction, metal accumulating plants like Indian mustard can be grown and harvested in polluted areas to remediate sites (Anjum et al., 2012). Some metals like arsenic have high bioavailability and can be readily assimilated into plant bodies (Van der Ent et al., 2013). Others, like lead, require chelating agents to become bioavailable for absorption by roots (Zia et al., 2011).

Research regarding biological agents beyond plants is being done to address persistent inorganic contaminants. The proteobacteria *Geobacter metallireducens* has been shown to oxidize hydrocarbons in anoxic environments (Holliger et al., 1996). Additionally, the mushroom genera *Agaricus, Armillaria, Boletus, Polyporus, Pleurotus, Russula,* and *Termitomyces* have been proven to uptake heavy metals within their mycelial networks between soil particles (Raj et al., 2011).

HYDROCARBON REMEDIATION AGENTS

BOTANICAL NAME	COMMON NAME	HEIGHT	SUN	SOIL
Trees				
Cercis canadensis	Eastern red bud	20-30'	sun to part shade	moist, well drained
Fraxinus pennsylvanica	green ash	50-70'	sun to part shade	moist, well drained
Gleditsia triacanthos	honey locust	30-50'	full sun	moist, drought tolerant
Juniperus virginiana	Eastern red cedar	30-50'	full sun	dry
Morus rubra	red mulberry	35-50'	sun to part shade	moist, well drained
Populus spp.	cottonwood, poplar, aspen	50-80'	sun to part shade	moist, flood tolerant
Quercus macrocarpa	bur oak	60-80'	sun to part shade	moist, drought tolerant
Quercus phellos	willow oak	50-70'	sun to part shade	moist
Salix spp.	willow	10-50'	sun to part shade	moist, flood tolerant
Herbaceous plants				
Andropogon gerardii	big bluestem	4-6'	full sun	dry to moist
Bouteloua gracilis	blue grama grass	1-2'	full sun	dry , drought tolerant
Carex cephalophora	ovalhead sedge	1-2'	full sun	moist, flood tolerant
Elymus canadensis	Canada wild rye	2-5'	full sun	dry, drought tolerant
Helianthus annuus	sunflower	5-10'	full sun	dry, drought tolerant
Panicum virgatum	switchgrass	3-6'	sun to part shade	moist, drought tolerant
Sagittaria latifolia	arrowhead	1-4'	sun to part shade	wet, flood tolerant
Schizachyrium scoparium	little bluestem	2-4'	full sun	dry, drought tolerant
Sorghastrum nutans	Indian grass	3-5'	full sun	dry, drought tolerant

The table above includes vegetation native to the Northeastern U.S. which have proven effective at hydrocarbon pollution remediation.

Pleurotus spp.

Sagittaria latifolium

Salix spp.

Pinus spp.

PHYTOTECH ALL STARS

Deep rooted trees have the potential to tap into groundwater and facilitate remediation through evapotranspiration. This process either degrades the contaminants within the plant, or volatilizes the organic contaminants as gas into the atmosphere (Hong et al., 2001).

Willow (*Salix spp.*), poplar (*Populus spp.*) and loblolly pine (*Pinus taeda*) have proven highly effective in phytodegradation and phytovolatilization of hydrocarbon compounds from groundwater sources due to their high evapotranspiration capacity. So much so that within two to five years of contaminants proved to be non-existent in previously polluted groundwater sources (Barac et al., 1999 & Cook et al., 2010).

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PHYTOTECHNOLOGY
A LANDSCAPE DESIGN FOR THE SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

COST ESTIMATE

The following costs are approximate. Site analysis, planning, and design will be required to evaluate the full cost of developing the former Scovil Mill.

ITEM	UNIT	UNIT COST	QUANTITY PHASE 1	QUANTITY PHASE 2	QUANTITY PHASE 3	COST PHASE 1	COST PHASE 2	COST PHASE 3	TOTAL COST
DEMOLITION									
Fill removal	cubic yard	TBD							$0
Clearing and grubbing	acre	$8,000	1.25		0.75	$10,000	$0	$6,000	$16,000
Asphalt removal (assume part of remediation)	square yard		10,000			$0		$0	$0
Subtotal						**$10,000**	**$0**	**$6,000**	**$16,000**
Landscaping									
Erosion & sediment control	lf	$5	500		300	$2,500	$0	$1,500	$4,000
Grading	sf	$0	53000	9000	28000	$7,950	$1,350	$4,200	$13,500
Imported topsoil	cy	$55	960	160	510	$52,800	$8,800	$28,050	$89,650
Bark mulch	cy	$50	480	80	260	$24,000	$4,000	$13,000	$41,000
Trees (2" caliper)	each	$400	25	8	15	$10,000	$3,200	$6,000	$19,200
Shrubs (average 3' center)	1 gallon	$25	440		260	$11,000	$0	$6,500	$17,500
Meadow seed mix for pollinators	ac	$4,000	0.3		0.1	$1,200	$0	$400	$1,600
Turf lawn	ac	$3,000	0.2		0.1	$600	$0	$300	$900
Reinforced turf	sf	$12			5000	$0	$0	$60,000	$60,000
Subtotal						**$110,050**	**$17,350**	**$119,950**	**$247,350**
SITE IMPROVEMENTS									
Porous Asphalt	sf	$16	22150			$354,400	$0	$0	$354,400
Concrete Curb & Gutter with Drain: Medium Duty	lf	$12	420		100	$5,040	$0	$1,200	$6,240
5' wide concrete pathway	sf	$6	1800		2,600	$10,800	$0	$15,600	$26,400
5' gravel pedestrian path	sf	$4	3000			$12,000	$0	$0	$12,000
5' wide wood bridges	sf	$90	200		250	$18,000	$0	$22,500	$40,500
Retaining Wall - Rebuild (lawn area)	sff	$25	330		270	$8,250	$0	$6,750	$15,000
Decking	sf	$28	6600		7,400	$184,800	$0	$207,200	$392,000
Wood steps	sf	$10	140		140	$1,400	$0	$1,400	$2,800
Deck railing & steel cable	ft	$74	300		350	$22,050	$0	$25,725	$47,775
Glass Roof for atrium	ls	$50,000	1			$50,000	$0	$0	$50,000
Subtotal						**$906,840**	**$34,700**	**$532,275**	**$947,115**
AMENITIES									
5500 gallon rain cistern system	ls	$20,000			1	$0	$0	$20,000	$20,000
Garden Pool	ls	$12,000			1	$0	$0	$12,000	$12,000
Flag stones for play area	sf	$20			600	$0	$0	$12,000	$12,000
Reclaimed granite block for Play area (2'x2'x8')	each	$500			10	$0	$0	$5,000	$5,000
Hand pump	each	$350			1	$0	$0	$350	$350
Wooden benches free standing	each	$500	8		4	$4,000	$0	$2,000	$6,000
Wooden benches embedded	each	$800	4	4		$3,200	$3,200	$0	$6,400

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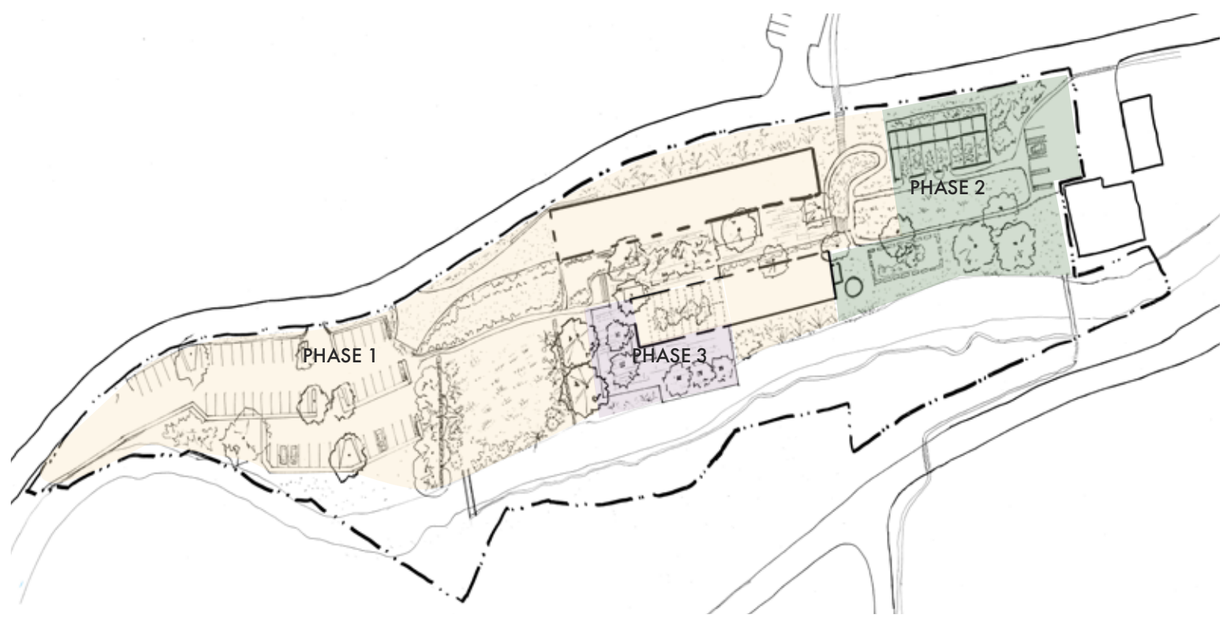
Spring 2018

COST ESTIMATE
A LANDSCAPE DESIGN FOR THE SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

COST ESTIMATE

ITEM	UNIT	UNIT COST	QUANTITY PHASE 1	QUANTITY PHASE 2	QUANTITY PHASE 3	COST PHASE 1	COST PHASE 2	COST PHASE 3	TOTAL COST
Logs for play	each	$250			3	$0	$0	$750	$750
Tables and chairs (1 table & 4 chairs)	each	$250	8	12		$2,000	$3,000	$0	$5,000
Greenhouse	ls	$20,000			1	$0	$0	$20,000	$20,000
Bike Rack	each	$800			1	$0	$0	$800	$800
Trash receptacles	each	$800	10			$8,000	$0		$8,000
Event and path lighting	ls	$300	1			$300	$0	$0	$300
Subtotal						$17,500	$6,200	$72,900	$96,600
Total						$1,044,390	$58,250	$731,125	$1,833,765
Mobilization 2%						$20,888	$1,165	$14,623	$36,675
Administration fee 10%						$104,439	$5,825	$73,113	$183,377
Contingency fee 15%						$156,659	$8,738	$109,669	$275,065
Grand Total						$1,326,375	$73,978	$928,529	$2,328,882



The map above shows the proposed phases of development on the site.

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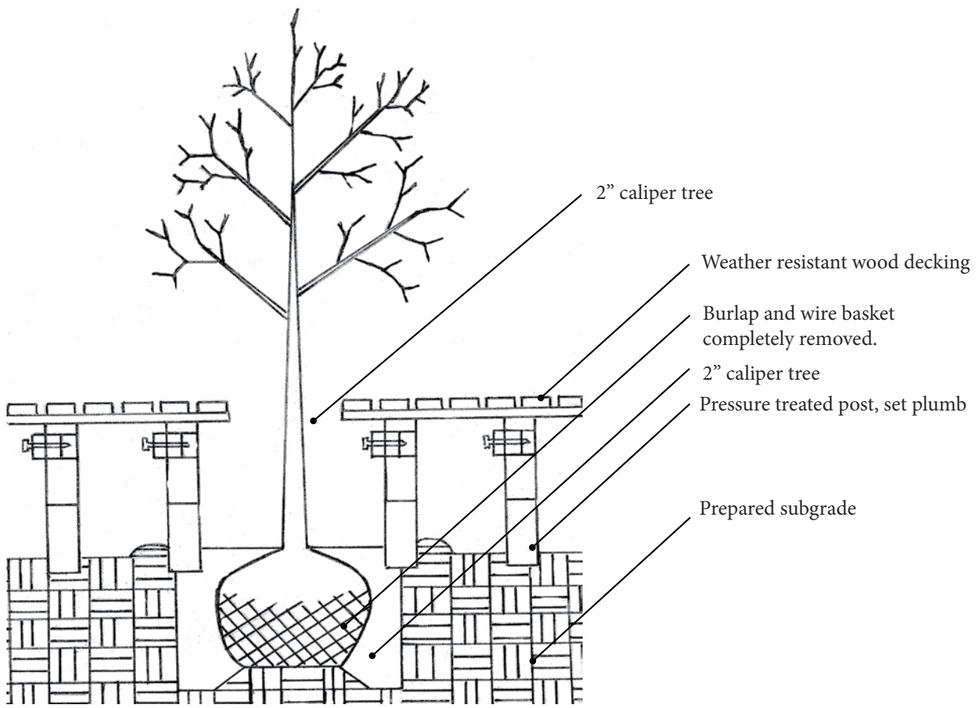
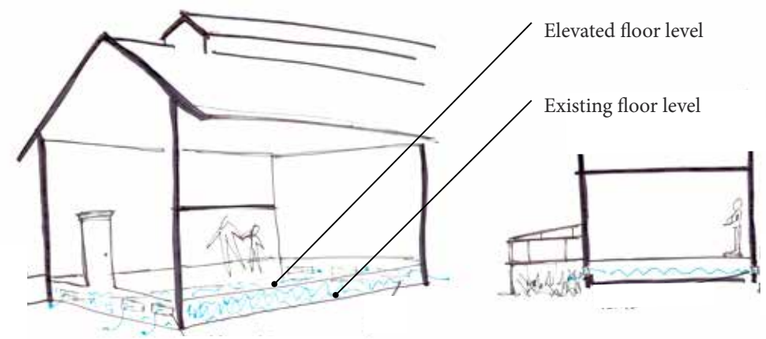
Spring 2018

COST ESTIMATE
A LANDSCAPE DESIGN FOR THE
SCOVIL MILL CENTER
11 Candlewood Hill Road, Higganum, CT

CONCEPTUAL CONSTRUCTION DETAILS

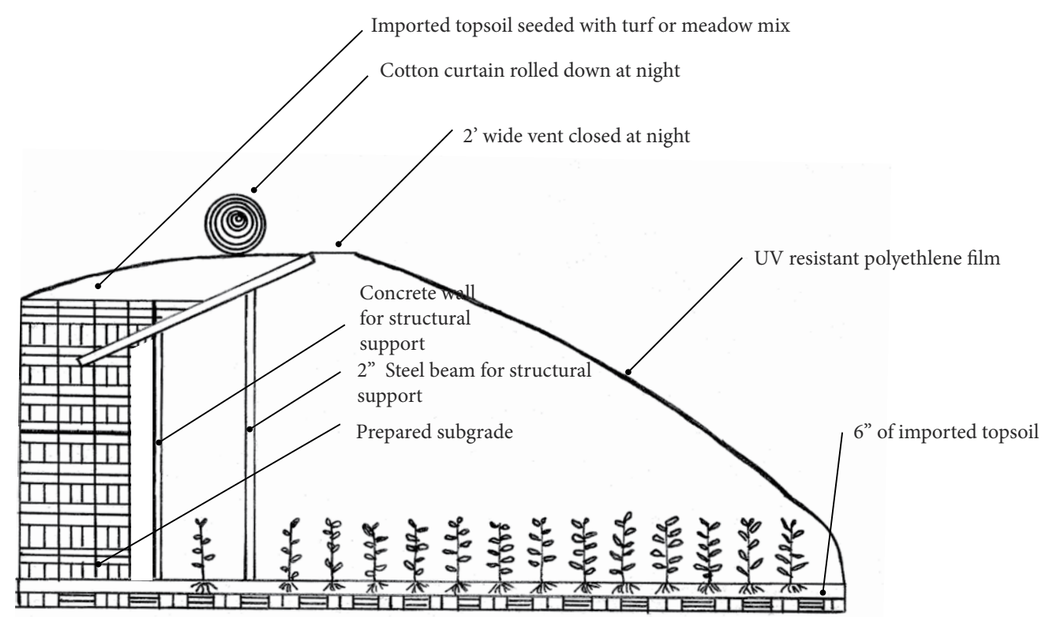


CONCEPTUAL DETAIL OF TREE IN DECK AREA



CONCEPTUAL DETAIL OF RAISED FLOOR PLAN

NTS



CONCEPTUAL DETAIL OF PASSIVE SOLAR GREENHOUSE

Disclaimer: Final construction details to be designed by others.

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CONCEPTUAL DETAILS
A LANDSCAPE DESIGN FOR THE
SCOVIL MILL CENTER
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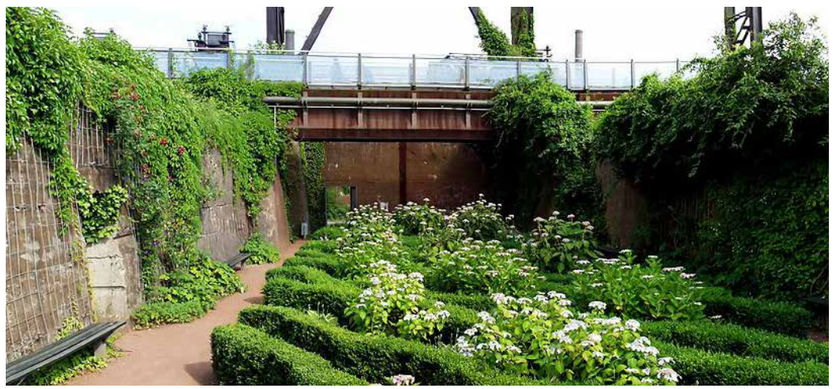
MATERIAL + PRECEDENTS

Open air cafe with seating along a river at the Book Mill in Montague, MA. Image courtesy of Renee Ruhl.

Ithaca Farmer's Market is in a floodplain with an open construction without walls to accommodate variable water levels. Image courtesy of Wikipedia.

Landscape character of sloping path and stairway leading from parking to elevated Pulaski Park. Image courtesy of Renee Ruhl.



Abandoned infrastructure at Duisborg-Nord frames gardens providing a unique outdoor experience. Image courtesy of WikiCommons.

Granite blocks repurposed in a public park. Image courtesy of Renee Ruhl.

A water feature at Smale Park in Cincinnati, OH, is an educational playscape for children. Image courtesy of Sasaki.

A wooden bridge provides pedestrian access over a brook. Image courtesy of WikiCommons.

Vegetation planted within an atrium. Ford Foundation Atrium. Image courtesy of WikiCommons.

Passive solar greenhouse in Ladakh, India. Image courtesy of Mother Earth News.

Not for construction. Part of a student project and not based on a legal survey.

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SPRING 2018

REFERENCES

Anjum, Naser A., et al. Phytotechnologies: remediation of environmental contaminants. CRC Press, 2012.

Aprill, Wayne, and Ronald C. Sims. "Evaluation of the use of prairie grasses for stimulating polycyclic aromatic hydrocarbon treatment in soil." Chemosphere 20.1-2 (1990): 253-265.

Balcom, Ian N., and David E. Crowley. "Pyrene effects on rhizoplane bacterial communities." International journal of phytoremediation 11.7 (2009): 609-622.

Barac, Tanja, et al. "Field note: hydraulic containment of a BTEX plume using poplar trees." International journal of phytoremediation 11.5 (2009): 416-424.

Chaney, Rufus L., C. Leigh Broadhurst, and Tiziana Centofanti. "Phytoremediation of soil trace elements." Trace elements in soils (2010): 311-352.

Church, Brianna S., Wierszchalek, Stefanie K., and Jahne, Daniel R. "Draft phase 1 and 2 environmental site assessment of former Scovil Hoe Mill." Prepared by Fuss and O'niell Civil and Environmental Engineering for the Town of Haddam, Connecticut. (2018): 1- 697.

Cook, Rachel L., et al. "Field note: successful establishment of a phytoremediation system at a petroleum hydrocarbon contaminated shallow aquifer: trends, trials, and tribulations." International journal of phytoremediation 12.7 (2010): 716-732.

Cook, Rachel L., and Dean Hesterberg. "Comparison of trees and grasses for rhizoremediation of petroleum hydrocarbons." International journal of phytoremediation 15.9 (2013): 844-860.

Euliss, Katy, et al. "Greenhouse and field assessment of phytoremediation for petroleum contaminants in a riparian zone." Bioresource technology 99.6 (2008): 1961-1971.

Ferro, Ari M., et al. "Phytoremediation of soils contaminated with wood preservatives: greenhouse and field evaluations." International Journal of Phytoremediation 1.3 (1999): 289-306.

Ferro, Ari M., et al. "Performance of deep-rooted phreatophytic trees at a site containing total petroleum hydrocarbons." International journal of phytoremediation 15.3 (2013): 232-244.

Holliger, Christof, and Alexander JB Zehnder. "Anaerobic biodegradation of hydrocarbons." Current opinion in Biotechnology 7.3 (1996): 326-330.

Hong, Marjorie S., et al. "Phytoremediation of MTBE from a groundwater plume." Environmental science & technology 35.6 (2001): 1231-1239.

Kundzewicz, Z. W., and H-J. Schellnhuber. "Floods in the IPCC TAR perspective." Natural Hazards 31.1 (2004): 111-128.

Midstate Regional Planning Agency and the Lower Connecticut River Valley Council of Governments. "Lower Connecticut River Council of Governments multi-jurisdictional natural hazard mitigation plan." (2013): 1-597.

Mueller, James G., Carl E. Cerniglia, and P. Hap Pritchard. "Bioremediation of environments contaminated by polycyclic aromatic hydrocarbons." Biotechnology Research Series 6 (1996): 125-194.

Raj DD, Mohan B, Vidya Shetty BM. Mushrooms in the remediation of heavy metals from soil. Int J Environ Pollute Control Manage. 2011; 3(1):89–101.

Stroud J.L, Paton G.I., Semple K.T. 2007. Microbealphatic hydrocarbon interactions in soil: implications for biodegredation and bioremediation. Journal Applied Microbiology 102, 1239-1253

Spriggs, Thomas, M. Katherine Banks, and Paul Schwab. "Phytoremediation of polycyclic aromatic hydrocarbons in manufactured gas plant–impacted soil." Journal of environmental quality 34.5 (2005): 1755-1762.

Van der Ent, Antony, et al. "Hyperaccumulators of metal and metalloid trace elements: facts and fiction." Plant and Soil 362.1-2 (2013): 319-334.

Zia, Munir Hussain, et al. "In vitro and in vivo approaches for the measurement of oral bioavailability of lead (Pb) in contaminated soils: a review." Environmental pollution 159.10 (2011): 2320-2327.

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