Learning through Experience: an interpretive trail design for Nasami Farm

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designed by mark wamsley, m.l.a., m.a.a.
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Introduction

Winter view of Nasami Farm from the Roaring Brook bridge on North Street.

Almost fifty years ago Freeman Tilden suggested that outdoor places have an ability to speak for themselves (1957). They each impart their own set of unique experiences for visitors, fostering the senses of fascination, attachment and understanding. This alluring voice may, in part, explain why nature centers, botanical gardens and other informal learning sites with interpretive trails have grown in popularity. Such sites attract roughly 420 million visitors a year worldwide, making them prime locations for increasing public awareness and action toward broader environmental issues (Jones 2001,11). Yet, as interpretive trails become a ubiquitous part of the landscape, their effectiveness as a means of environmental education is facing scrutiny. In particular, criticisms have disparaged the common form of interpretive trails, which usually focuses on visitor circulation through a series of views, displays and specimens, or on objects with associated educational signage (Knapp and Barrie 1999; Kerry 1979; Cable et al. 1987; Poff 2001). While seeking to educate, these trails often fail to provide people with a full experience of the landscape, or with meaningful opportunities to connect with it.

Perhaps more than any discipline, landscape architecture strives to enhance the rich relationship between humans and their surroundings. Careful analysis and design can reveal landscapes that have been lost or damaged by our fast-paced societies, reawakening the full potential of human experiences they have to offer. This design project holds that very basic approaches within the discipline, such as using land forms and plant materials to vary experiences of space, light, topography, sight, and sound, can, in themselves enhance a person's innate understanding of their surroundings

The goal of the following design is to suggest how the landscape at the New England Wildflower Society's (NEWFS) Nasami Farm could be experienced by visitors through an ecologically sensitive and site appropriate network of interpretive trails. The trail system's design relies upon direct physical experiences and interactions with the landscape as core components of the site's broader environmental education program.

Design Program

The NEWFS is a regional and national leader in conservation, education and research related to native and endangered plants. In the Spring of 2004, the NEWFS relocated their primary native plant nursery operations to the site of the former Nasami Farm nursery and Christmas tree farm in Whately, MA. Beyond the areas intended for plant propagation and sales, the organization envisions developing the remainder of the site as an educational center and sanctuary for native plants and wildlife. The proposed interpretive trail will access the majority of Nasami Farm's 75 acre site, integrating and providing access from the retail sales area to the surrounding sanctuary lands in the north, south, and east.

The design program set out by the NEWFS for the interpretive trails envisions:

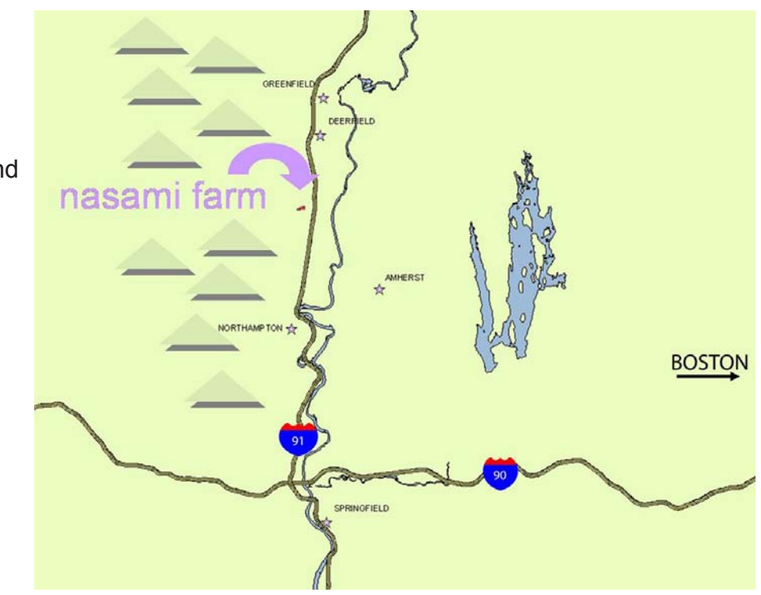
1. a 1.5 to 1.8 mile loop through six distinct habitats.

2. supports a wide range of visitors and provides free, non-motorized access;

3. while serving as an access point to the land and providing experiences that increase environmental and conservation awareness.

4. The trail design will also strive for environmental/aesthetic appropriateness and low-impacts in construction, use and maintenance.

5. Indentify and record information to support interpretive efforts at the site.



The parcel currently known as Nasami Farm is located in the Connecticut River Valley of western Massachusetts, between the Berkshire mountain foothills and the Quabbin Reservoir. It is nearby and easily accessed by several large urban centers. (Map data courtesy of MassGIS.)

Literature Review

From an evolutionary perspective, the phenomenon of walking in the landscape, and learning, represents one of the oldest and most profound processes of human understanding (Schusky and Culbert 1987; Campbell 1974). It is this fundamental inquisitiveness that designers of outdoor interpretive trails attempt to harness. Beyond a simple means of circulation, interpretive trails must convey concepts to visitors. Their goal is educating, at the least, and at the most, changing human attitudes and behaviors.

After a short history of existence, interpretive trail design now lingers in a period of overall stasis. As a form of environmental interpretation, trails are often the subject of criticism for not meeting educational goals, yet they are rarely the subject of innovations to their basic design. Several fields, including environmental interpretation and environmental psychology, offer rich literatures that could positively influence trail effectiveness. At the same time, landscape architects are beginning to use their own approaches to redefine the very concept of interpretation and experience of human surroundings. Both bodies of knowledge, taken together, ultimately could help restore the connection between people and their environment that facilitates environmental education.

The roots of interpretive trails may extend back to early botanical gardens, arboreta and zoos. Alexander defines a botanical garden as, "…a collection of labeled plants, the primary purpose of which is the advancement and diffusion of botanical knowledge [including taxonomy, anatomy, cytology and metabolism]" (Alexander 1993, 99.) The first such gardens can be traced back 4,000 years to ancient gardens in China, Greece, Egypt and Aztec Mexico, with the first European botanical garden developing in either Padua or Pisa (ibid). At their basis, all of these early examples were primarily outdoors, aspired to an educational purpose, involved a path system, and were open to some portion of the public.

The jump from botanic gardens and arboreta to formal interpretive trails was a much more recent and uniquely American occurrence. Knudson et al. (1995) detail how the late nineteenth century saw the birth of environmental interpretation, as increased interest in national parks brought new and inexperienced visitors to the American west. Private companies, such as the Wylie Camps at Yellowstone, responded to the lucrative market by offering professionally guided park tours. The Park Service itself did not offer formal interpretation at most sites, but instead, initially relied upon an increasingly knowledgeable staff of rangers and guards to answer visitor questions (Knudson et al. 1995).

The contemporary idea of "interpretation" arose from the 1950's writings of Freeman Tilden, a reporter and author who worked for the U.S. National Park Service. Tilden defined interpretation as, "An educational activity which aims to reveal meanings and relationships through the use of original objects, by firsthand experience, and by illustrative media, rather than simply to communicate factual information" (Freeman 1957, 3). Ham later narrowed the topic further, describing the act of environmental interpretation as, "…translating the technical language of a natural science or related field into terms and ideas that people who aren't scientists can understand. And it involves doing it in a way that's entertaining and interesting to these people" (Ham 1992, 3).

According to Machlis and Field (1992), the popularity and usefulness of formal interpretive services grew at National parks in the 1940s and 50s, eventually becoming institutionalized both by the Park Service as well as by museums across the country. Exactly how the relationship between interpretation and self-guided trails evolved is not explained in the published literature. Piersenne' (1999) states that nature trails eventually became such a ubiquitous novelty for interpretation in the 1960s, coinciding with rising public concern toward nature conservation, that they eventually came to be viewed as a cliché' for environmental interpretation in general.

The general parameters for interpretive trail layouts and the methods for information delivery have not changed dramatically since the 1960s. Design starts by evaluating the interpretive potential of the sites themselves (Ham 1992). Trails have interpretive potential when they, "…bring important features and environments into the view of people walking the trail. The features could relate to plants, animals, geologic formations or cultural history" (Ham 1992, 316). Given a site with ample possibilities for interpretation, Asbaugh and Kordish (1971) propose a choice between multiple levels of interpretive trails, including formal teaching trails with a main emphasis on interpretation, walking or hiking trails where interpretation is of secondary importance, and special-use trails that may have interpretive components.

Regarding form, design guides still recommend a closed loop trail, either circular or in a figure eight, and ranging from 1/8 of a mile to 1 mile (Ham 1992, Asbaugh and Kordish 1971). This configuration is short enough to maintain interest while reducing the chances of visitor fatigue. Once a route is

established, interpretive and guiding elements are then adapted to the trail in the form of signage, kiosks and exercises. In their most common form, these elements primarily are object or information-based, often stressing the uniqueness of the object while eliciting a “wow” response from the visitor (Russell 2001, 3). The recommended number of interpretive stops on a trail usually ranges from 10 to 20, with associated interpretive information coming from fixed signs or through brochures available at the trail head.

The recurring and most serious problem with common interpretive trail designs appears to be the failure to meet either educational or behavior change-related goals for trail visitors. In particular, interpretive trail and facility studies cast doubts on the value of passive, object-based viewing for interpretation (Knapp and Barrie 1999; Kerry 1979; Cable et al. 1987). In one recent study of fourth grade students visiting a U.S. Forest Service interpretive site, Knapp and Poff (2001) found that afterward, students did not demonstrate increased knowledge or any indication of behavioral changes toward the environment.

Braus and Ardoin place the blame for such failures on institutions for “…not going beyond labels and static exhibits….and continu[ing] to focus on one type of learner: those who like to read scientific labels and descriptions” (2001, 2). Pierssene’ (1999) and Kerry (1979) concur, stating that walking a nature trail has the potential of being a sterile, frustrating experience. Pierssene’ explains, “Apart from the pretext of going out into the countryside, and the convenience of having someone else to suggest a starting point and a route, a nature trail offers the hope of seeing wildlife, and of having animals or plants identified for us” (1999, 134). If these do not occur, and some other engaging activity is not offered, visitors have the opportunity to leave, or to stop paying attention. This problem lies at the heart of informal education—non-student visitors are not captive audiences, and there are no personal consequences for them if they do not become involved (Ham 1992, 7; Ham and Krumpe 1986, 12).

The criticisms of interpretive trails offer clues on how to break free from this old and failing paradigm. On the most basic level, for interpretation to be effective it must be enjoyable, it must be relevant, it must be organized, and it should have some identifiable theme (Ham 1992, 8; Medlin and Ham 1992, 1; Jacobson 1999, 188). Fittingly, many of the same studies that found fault with purely passive approaches to interpretation found positive effects when visitors were offered more active or multi-sensory experiences, such as educational programs or audio guides (Knapp and Poff 2001; Knapp and Barrie 1999; Cable et al. 1987; Kerry 1979). These findings echo a general trend in the field of interpretation, one that emphasizes the idea of visitor “experience” as holding the key for education efforts. Borun contends that the very context of informal learning creates “a complex web of experiences” that can be drawn upon to achieve specific goals (2001, 10). And while some authors direct this recognition toward more diverse, fine-tuned, media intensive experiences, others suggest that the visitor experience can be more profound in its simplicity.

Studies in environmental psychology detail how humans fundamentally are drawn towards, use, and connect with the outdoor environment. Kaplan, Kaplan and Ryan (1998) specifically assert that trails offer individuals a secure way to access natural areas, bringing them in direct contact with natural phenomena. Not only is this contact desirable to many people, it also presents opportunities for engaging activities such as observation and exploration, as well as the potential for psychological restoration (Kaplan et al. 1998, 89).

The work of Rachel and Stephen Kaplan, and Robert Ryan (1998) provides a succinct, research-based guideline for designing a range of recreational trails. Their findings demonstrate that users do prefer certain trail configurations more than others. Curving, narrowing paths that follow site topography and landmarks are more preferred than straight trails, as they draw users forward with a sense of mystery (Kaplan et al. 1998; Ham 1992). The narrowness also places them within easy reach, physically and psychologically, of their surroundings (Kaplan et al. 1998). This addresses a frustration that anthropologist Colin Turnbull voiced for tourists in too often being, “carefully kept at a distance from…the animals [and] the land…[and henceforth being] denied the opportunity that many of them sought” (1981, 26). Research also suggests that visitors prefer trails with a mix of open and wooded areas, which provide a feeling of shelter along with both macro and micro scale views (Kaplan et al. 1998; Axelsson-Lindgren & Sorte 1987; Hammitt & Cherem 1980). Trails that encounter the water’s edge, and those with relatively soft surfaces or boardwalks also rate highly with users (Kaplan et al. 1998). Equally important for trail use is a layout that assists visitors in way-finding. Access points should be visible, and landmarks and signage should clearly lead visitors (Kaplan et al. 1998; Keyes & Hammitt 1984). This is especially true on trail systems more complex than the common loop. Lastly, resting places should be strategically placed and configured for potential activities (Kaplan et al. 1998).

Swonke’s (2000) research takes the idea that humans form attachments and preferences for certain landscapes one step further by proposing that educators use these basic, positive emotions in creative combinations with interpretive messages. In this sense, human/landscape interactions that draw upon sensory and emotional reactions to environmental experiences can form the basis of human changes that are seemingly immune to interpretive messages alone. Here, design could conceivably play a pivotal role

in shaping those human/environment interactions. If that occurs, trails could become, as Hugo states, “not mere links between places,” but part of a holistic, integrated person-environment system” (1999, 138).

In many ways, landscape architecture has encountered similar pitfalls to interpretive trails, and has moved ahead. From an early history that focused on the creation of “picturesque” landscapes, the discipline now considers the experience of humans in the landscape as its core. Modernist architectural writings by Erno Goldfinger (1942) and James Rose (1938) speak about the qualities of “space” in the landscape, and how human feelings of enclosure, security, prospect and meaning can be affected by the manipulation of earth, plants and structures. As James Rose states, “The intrinsic beauty and meaning of a landscape design come from the organic relationship between the materials and the division of space in volume to express and satisfy the use for which it is intended” (1938, 69). Trails intended for human interpretation of the outdoor environment then seem a logical fit for landscape architecture. Lawrence Halprin once wrote that key considerations to his own designs were developing a choreographed movement through space and emphasizing the “results of the process of nature” (1995, 247). That approach, combined with a careful attention paid to the sensory and emotional experiences of visitors, could eventually push the concept of interpretive trails ahead.

Several landscape architects are already exploring the boundary of interpretive trails with their own innovative designs. Susan Child of Boston has two notable entries in the category. The Grande Isle Pathway on Lake Champlain offers a minimalist, yet highly aesthetic approach to an outdoor trail that is arguably more experiential than interpretive. On an 80 acre site, Child sparingly uses raised walks, stairs and viewing platforms to leave much of the area undisturbed while giving visitors ample chances to contemplate the landscape (Richardson 2000). At Cornell University, Child developed a master plan for integrating the Sapsucker Woods Bird Sanctuary trail system into the design for the new Imogene Powers Johnson Center for Birds and Biodiversity. In doing so, Child expanded the existing wetland with small islands, bio-filters and swales, effectively blurring the distinction between human and bird habitat (Hillier 2003).

Other multi-disciplinary firms such as Jones & Jones and the Portico Group focus specifically on design innovations for education and interpretation. The designs of Jones & Jones for the Cedar River Watershed Education Center, the Mercer Clough Environmental Education Center and for numerous zoo exhibits and trails set new examples for how to bring educational activities to the outdoors. Similarly, the Portico Group describes a forward thinking approach to outdoor education design, stating that the group approaches each site as a “sequence of learning experience—using the landscape as palette—to immerse visitors in ‘this place’” (Portico Group 2004). Other designers, such as Carol Franklin, Peter Latz and Julie Bargmann are looking at new ways to express the history and character of landscapes that takes liberties with the notion of “interpretation” by adding elements of commentary through design.

While the very idea of interpretive trails is facing a reconceptualiztion, most available literature focuses on innovation in interpretive offerings and programs rather than on progressive trail designs. This gap in the research likely reflects the abundance of older interpretive trails that still mark the landscape, and the possible attempts made at retrofitting them to increase their effectiveness. Evaluations of new design approaches would certainly fill a void in the knowledge base of several fields, as would an exploration of the intersection of program activities and trail designs. Lastly, discussing and evaluating unconventional forms of interpretation as interpretation, not simply as social and environmental commentary, could prove to be a valuable exercise for landscape architecture and a means of firmly establishing the discipline’s role in the future of interpretive trails.

Interpretive trails remain a long-standing and popular typology of outdoor recreation and informal education. As criticisms of their effectiveness mounts, they continue to be built nationwide and around the world. Recently, landscape architects have started to push the norms and expectations of interpretive trails through innovative designs and uses of materials. Building on these efforts, the discipline stands in a promising position to take a significant leadership role in the future development of interpretive trails, while remaining steadfast in its inclusion of other disciplines in the design process.

Site Analysis

The property at Nasami Farm offers substantial opportunities as well as design challenges for the proposed development of interpretive trails. Rich in history, the site also boasts a stunning setting and an abundance of ecological features. Given a trail design that acknowledges and respects these settings, visitors will have unique opportunities to experience their surroundings in an up-close and personal manner.

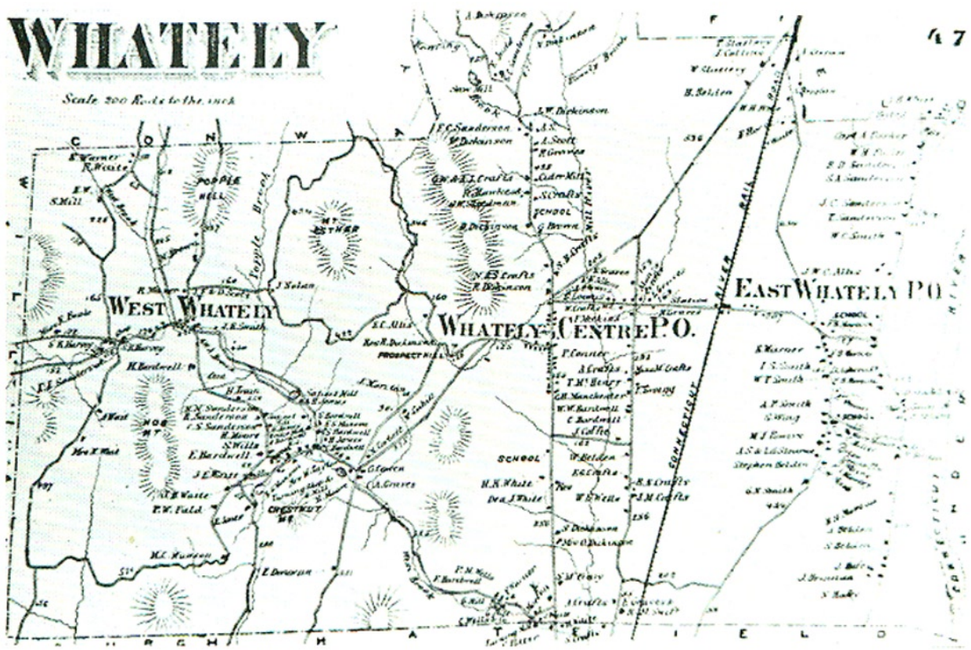
History

The Area and its Early Inhabitants

Human habitatition of the Whately area spans millennia, with successive generations each leaving their own imprint on the landscape. Native groups from the earlier Archaic and Woodland cultures likely gave rise to the Norwottock tribe,[1] present in the area at the time of European contact. The Norwottucks, who occupied the land of the current towns of Whately, Hatfield, Hadley, Northampton and Williamsburg, were a western outlier of the greater Nipmuc tribe of central Massachusetts.[2] Split into three communities, the Nipmucs in the Whately area were lead by the sachem Quonquont, whose fort was on the eastern side of the Connecticut River, north of the Mill River in Hadley.

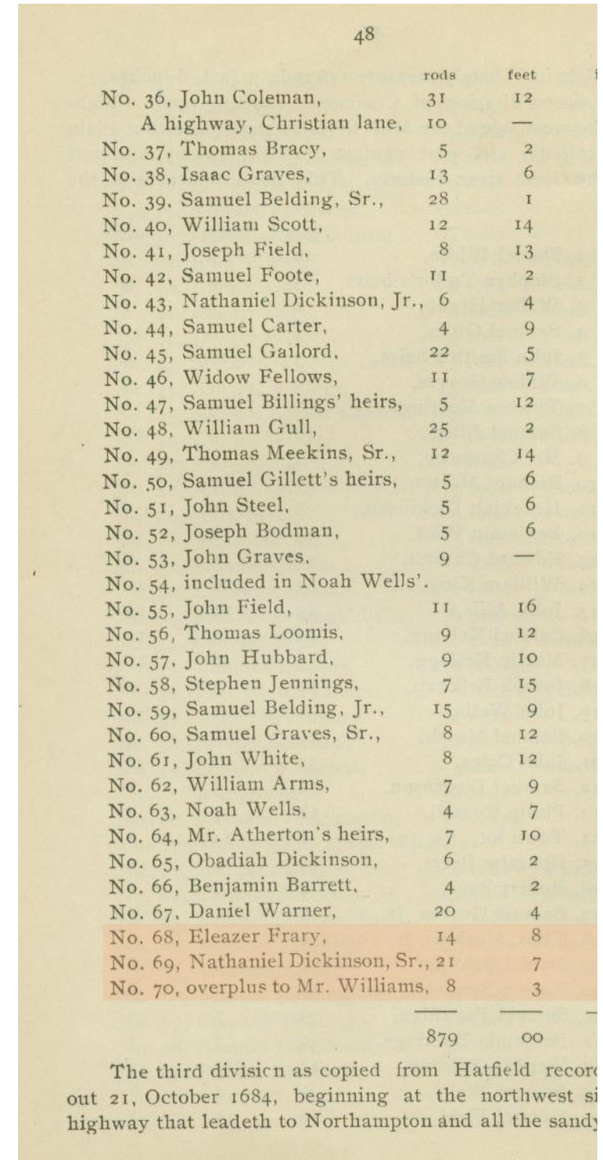
No recorded archaeological studies illuminate the land use of native people on Nasami Farm. According to James Crafts (1899), the area north of Hatfield, particularly the Whately Plains, Mill River Swamp and Hopewell areas, were favorite Nipmuc hunting grounds. Available game included deer, bear, turkeys, small game and fur-bearing animals, though deer and bear were only present until 1750 (ibid). Nipmucs were known to cultivate traditional crops of corn, beans, and squash, and local communities in the Connecticut River Valley had a history of burning over area meadows for agricultural purposes each November.

The original white settlers in the area, known as the Hadley planters, arrived from Wethersfield and Hartford in the Connecticut Colony. Most had come from England in 1632-34. Purchase of the land now known as Whately occurred on October 19, 1672. The Town of Hatfield bought the area from Quonquont's widow, Sarah Quanquan, her



Beer's 1871 map of Whately naming home owners, businesses and schools.

One of the earlier, accurate maps of greater Whately. (Crafts, 1899)



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	rods	feet
No. 36, John Coleman,	31	12
A highway, Christian lane,	10	—
No. 37, Thomas Bracy,	5	2
No. 38, Isaac Graves,	13	6
No. 39, Samuel Belding, Sr.,	28	1
No. 40, William Scott,	12	14
No. 41, Joseph Field,	8	13
No. 42, Samuel Foote,	11	2
No. 43, Nathaniel Dickinson, Jr.,	6	4
No. 44, Samuel Carter,	4	9
No. 45, Samuel Gailord,	22	5
No. 46, Widow Fellows,	11	7
No. 47, Samuel Billings' heirs,	5	12
No. 48, William Gull,	25	2
No. 49, Thomas Meekins, Sr.,	12	14
No. 50, Samuel Gillett's heirs,	5	6
No. 51, John Steel,	5	6
No. 52, Joseph Bodman,	5	6
No. 53, John Graves,	9	—
No. 54, included in Noah Wells'.		
No. 55, John Field,	11	16
No. 56, Thomas Loomis,	9	12
No. 57, John Hubbard,	9	10
No. 58, Stephen Jennings,	7	15
No. 59, Samuel Belding, Jr.,	15	9
No. 60, Samuel Graves, Sr.,	8	12
No. 61, John White,	8	12
No. 62, William Arms,	7	9
No. 63, Noah Wells,	4	7
No. 64, Mr. Atherton's heirs,	7	10
No. 65, Obadiah Dickinson,	6	2
No. 66, Benjamin Barrett,	4	2
No. 67, Daniel Warner,	20	4
No. 68, Eleazer Frary,	14	8
No. 69, Nathaniel Dickinson, Sr.,	21	7
No. 70, overplus to Mr. Williams,	8	3
	879	00

The third divisicn as copied from Hatfield recor
out 21, October 1684, beginning at the northwest si
highway that leadeth to Northampton and all the sandy

Fig. 1: Original 1684 parcel divisions in the Nasami Farm area. Properties are listed south to north from Christian Lane. Possible Nasami locations are highlighted. (Crafts 1899)

son Pocunohouse, daughter Majessit and two others. At the time, Quonquont's descendents and the remaining Nipmucs lived in a village on "Indian Hill," just west of present day Nasami Farm. The tribe maintained the right to hunt, fish, and gather walnuts and white ash for baskets. Crafts reported that White settlers were drawn to the area by the open Indian meadows, which did not requiring clearing to produce either agricultural or pasture land (ibid). He commented that this grass could grow up to a person's face, and that the initial tillage land of the settlers was devoted to corn, wheat, peas and flax. Most permanent Indian residents left this part of the Pioneer Valley in 1697, as regulations on Natives in the area became oppressive after a violent altercation (ibid).

Crafts notes that few people initially settled the area of Whately (known as the Bradstreet and Dennison Grants). In addition to frequent Indian raids and troublesome questions about title, individual lots were not sufficient for farming due to their small size. Hatfield voted to allow Whately to exist independently on May 23, 1770. Named after Sir Thomas Whately, British parliamentarian and expert horticulturalist, the town was chartered on April 26, 1771.

Nasami Farm History

Traces of Nasami Farm's history can be seen in the layout of its fields and in the patterns of plant growth. Apart from possible use by Native communities prior to European settlement, the site's spatial sequence of barn, to crops, to pasturage, to woodlot suggests that the Nasami property was farmed as early as colonial times using the "four field" system common to the period (See Fig. 2)

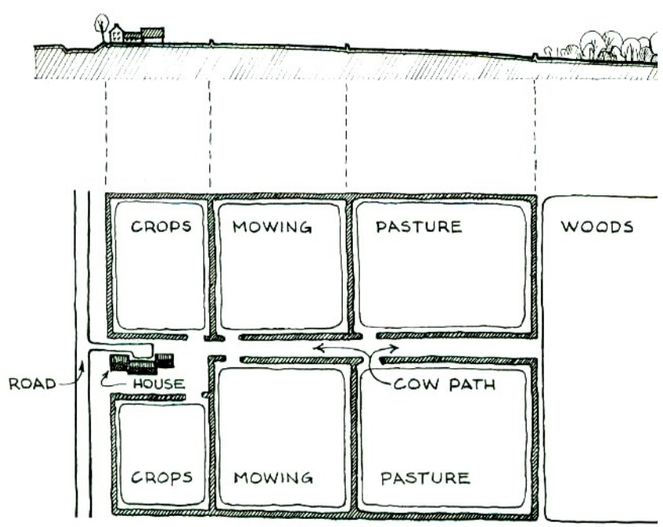


Fig. 2: From interviews and current vegetation patterns, it appears that the four field system reflects historical land use at Nasami Farm (Hubka, 1984).

Adding research from available literature and consulting oral histories supports and enriches this story, but still leaves certain gaps and questions.[3] Written accounts of Whately's development mention several locations that fit the position and characteristics of the Nasami area. Two likely candidates are "Old Fields" (Crafts, 1899) and "Mill Swamp" (Cane, 1972 & Crafts, 1899). In reference to the latter, Crafts states "It will be noticed that allusion is often made to the Mill swamp division. This was a meadow on both sides of Mill River, varying in width from 40 to about 55 rods. These lots were divided among Hatfield residents, only three or four of them lying in Whately." (Crafts, 1899) Crafts goes on to explain that "Up to 1683, all river meadows North of Bashan were lying common and used for general pasturage." (ibid) The river meadows were divided into long, narrow lots with and east/west alignment on October 21, 1684. Chestnut Plain Road (North St.) was originally a space left between two of the original parallel divisions of this common area.

The 1684 division of common land into agricultural lots set many of Whately's current property boundaries. The original owner and lot number assigned to the Nasami Farm parcel is unclear, though it was likely designated as one of Lots 68, 69, or 70. (See Fig. 1) Descriptions indicate that these lots comprise the general location of Nasami Farm, and became associated with either the Scott or Dickenson families very soon after their division.[4] An association between these same families and the Nasami Farm parcel has existed until relatively recently.

Photo 1: Mid-twentieth century view of the knoll and Eastern, upper fields at Nasami (in distance) from the Scott farm to the south. (Crane, 1973).

Discussions with family members and others familiar with the farm reveal stories from both the land's immediate and distant pasts. Henry Baldwin, who began working on the Nasami property in 1957, recalls seeing ten to twelve foot wide drainage ditches constructed in the eastern, upper fields that he proposed dated to the 1800's. According to Baldwin, the adjacent Great Swamp of Whately had already been substantially logged of large trees by the late 1800's, leaving a much more open forest dotted with large hemlock stumps. The mysterious stone cistern, just outside the farm's northeastern boundary in the swamp, may have been the remains of an old cabin or hunting camp. Whether a cabin or more substantial farmhouse ever existed on the property remains debatable. As for the large stones and boulders on the western edge of the farm, Baldwin explains they were washed down from the mountains by a massive flood in the late 1700's or early 1800's. Stacking those stones into a barrier was a later attempt by farmers to control the periodic flooding by Roaring Brook.

While many New England farms vanished in the 19th Century, the caretakers of the Nasami property never abandoned its agricultural past. Although detailed records of the farm's first two and one

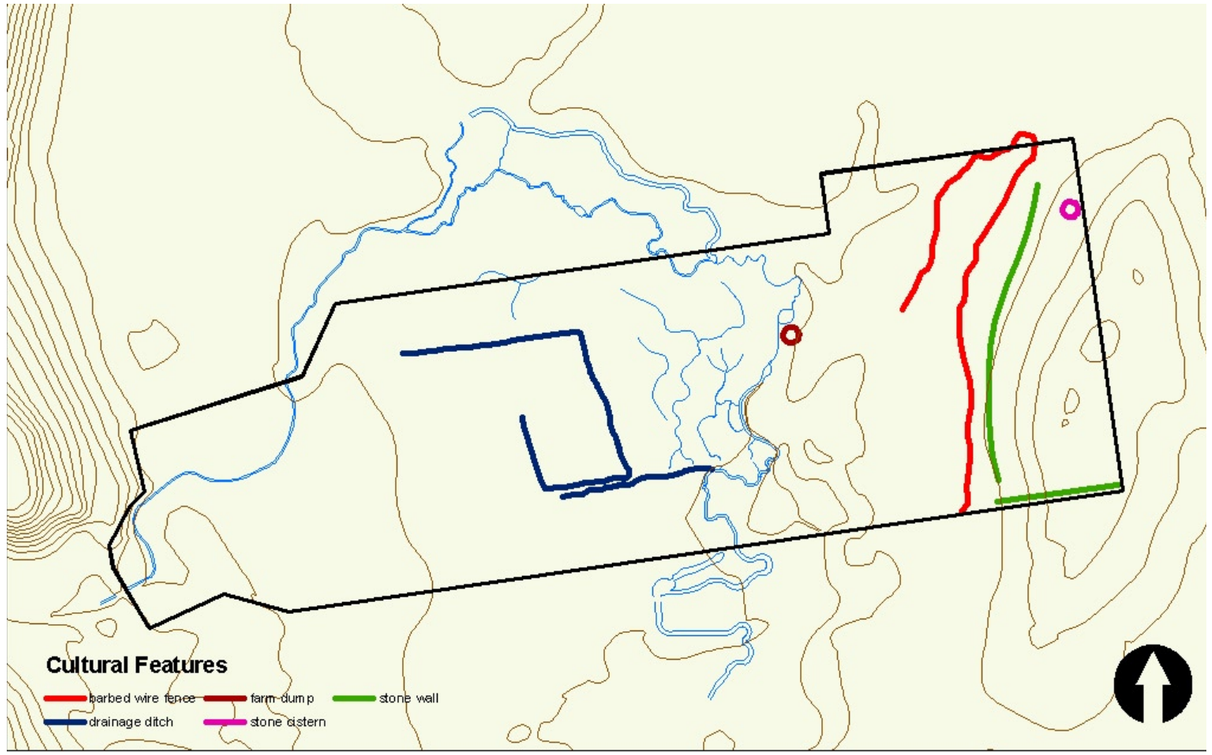


Fig. : In addition to the vegetational succession from the four field system, other cultural features on the site provide hints to Nasami's past. Stone walls, barbed wire, drainage ditches and even dump sites are physical reminders of multiple generations of farming. Other artifacts, like an old stone cistern, add an air of mystery about the site's past.

half centuries are scant, accounts from the 20th Century remain rich and varied. At different points from the late 1800's to 1960, members of the Johnson, Scott, Baldwin, and Dickenson families ran the farm from a house on the adjoining property to the south on Chestnut Plain Road. A second farm road ran from the house in the southwest, northeast to the tobacco barn, before continuing to Roaring Brook, giving the property both north/south and east/west orientations. A large cow barn ran north/south along Chestnut Plain Road, and was watered by local spring seeps that also supplied several nearby houses.[5] The existing tobacco barn sat on the property not far from its current location, while a second barn sat down the farm road to the east. Much of the land was cleared of brush right to the property boundaries, and remained so until the 1950's. (See Photo 2). The westernmost edge of the property, which holds the best soils, was reserved for vegetable crops. Potatoes grew from the road to the first tobacco barn. Carrots, onions and strawberries filled the remaining land to the north and south of the barn. Tobacco itself was grown in the wetter, heavier clay soils from the standing tobacco barn to the edge of the current alder swamp. The remaining land, eastward toward the Great Swamp of Whately, supported hayfields. Henry Baldwin recalls that the property's back knoll was seeded with timothy and natural clover. Usually, the "neck" area of the upper field was left undisturbed. In the 1950's, the forest around the upper field was cut back ten to twenty feet from where it is today.

Occupants' memories of the site were not limited to farming.[6] Sylvia Nye fondly recalled swimming near the muddy banks of the Mill River on the north side of the farm bridge.[7] Henry Baldwin contends that this has always been the site of the farm bridge, and that he himself laid the steel beams that currently span the river there. Sylvia Baldwin Johnson (Sylvia Nye's mother) was well-known for collecting, preserving and showing wildflowers from the property, such as adder's tongue, jimsonweed, mayflower, and forget-me-nots. Other plants of interest reportedly include wild cranberries that may still grow in a

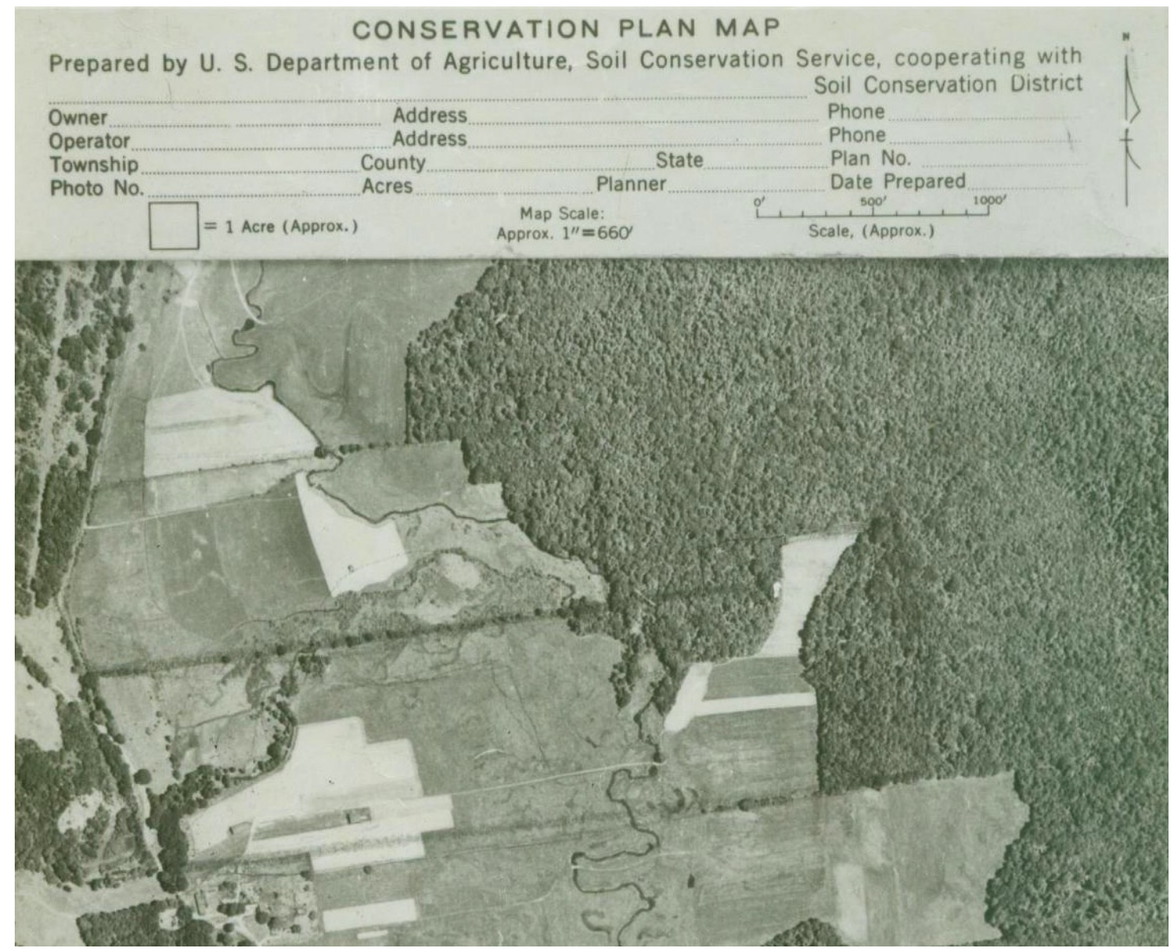


Photo 2: Aerial photgraph of Nasami Farm and surroundings from the 1950s. The site shows clear pastures to the Mill River. Old drainage ditches and farm roads are visible, as are the cow barn and eastern barn.

depression on the northwest edge of current alder swamp (at the corner of the westernmost drainage ditches). Wildlife was always a part of the farm as well. Henry Baldwin remembers beaver slots slicing through the fields, and tells of an established coyote population since the 1950's, with a significant den site in a hummock just past the northeast corner of the property. "Knobs" and hummocks throughout the Great Swamp also are reputed to be important feeding areas for deer. Sylvia and Walter Nye remember mink, otters and fishers frequenting the property, as well as bear, deer, and the occasional moose.

In 1960, Sylvia Baldwin Johnson sold the narrow Nasami Farm parcel north of her home to Samuel and George August of Boston, ending the property's long affiliation with its historical stewards. For the next twenty-two years, the August brothers used the farm for grazing cattle, further keeping the forces of vegetational succession on the land at bay. Important changes to the property also occurred during the August's tenure. The large cow barn was soon torn down in 1960, and the current drainage ditch system was installed between 1962 and 1964. The easternmost barn on the property, which had been severely damaged in a storm, was sold to, dismantled and carried away by residents of a new commune in the town of Montague. In 1982, the property was briefly sold to Dr. John Stocks of New Orleans, who intended to pass the land on to one of his children for "homesteading." Shortly after, the arrangement fell through and Dr. Stocks sold the property back to the August family in 1983.

The most recent chapter of the property's history saw the farm take on its current name. Nasami, a derivation of Nathaniel, Sara, and Michele, was the invention of Robert August, who used the land to develop a thriving local business as a Christmas tree farm and nursery. Christmas trees, including: white pine, white spruce, scotch pine, blue spruce, and Balsam and Frazier firs, were grown and sold on site during the Winter. Ornamental tree and shrubs were sold in the warmer months. Nasami soon developed a reputation for its selection and quality, and built strong name recognition throughout the area. Robert August closed his business and sold Nasami Farm to the New England Wildflower Society in 2003.

Topography and Soils

Nasami Farm unfolds on in the rich bottomland of the Connecticut River Valley, with the Berkshire foothills rising dramtically to the west. For such a stunning site, the land at Nasami is surprisingly flat, with a slight concave shape toward the Mill River floodplain in the center (See Fig. 4). A forested knoll in the Great Swamp of Whately on the eastern portion of the site respresent the property's high point, roughly 70 feet, while the low point is only about 53 feet, below at the Mill River. The relatively flat topography dictates that certain sections of any proposed trail will need to be raised above existing wet areas, while other sections will require construction that ensures positive drainage from the trail itself.

Soils on the site are consistent with the area's glacial history, and in particular, the presence of

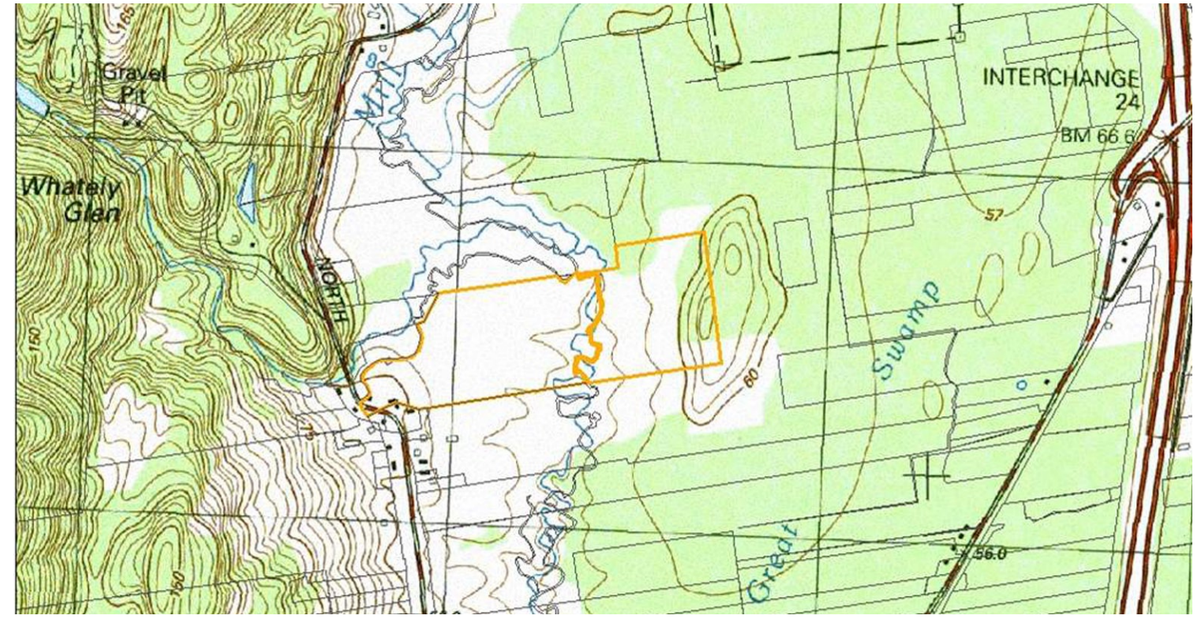
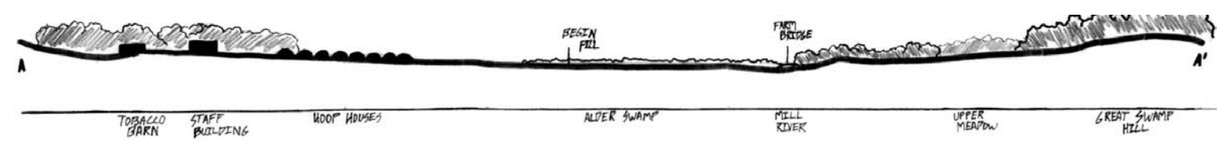


Fig. 3: Nasami Farm lies at the outlet of Roaring Brook from Whately Glen in the Berkshire foothills. The foothills to the west and knoll to the East provide a dramatic relief from the flat river valley. The public has easy access to the farm via Rts. 5 and 10 and Rt. 91. (Data courtesy of USGS and MassGIS)

Fig. 4: Section A- A1- A View of Nasami Farm from West to East



glacial Lake Hitchcock in the Connecticut River Valley. Soil maps of Franklin County show fine sandy loams suitable for agriculture on only the westernmost third of the parcel. These areas have a gentle grade of only zero to three percent and are roughly six to ten feet deep. Further eastward, soils become heavier and wetter, with various silt loams to the parcel's western border. Grades on the western knoll are the steepest on the site, ranging from three to fifteen percent.

Hydrology

Of all the forces at work on Nasami Farm, water trumps all others in shaping the landscape. The parcel is split roughly in half by the slow moving Mill River, which runs North to South down the milddle of the farm. Roaring Brook, once a source of power for local industry, and now part of the South Deerfield Water District, enters from the west and eventually meets the Mill River. Both the Mill River and Roaring Brook have extensive beaver activity, with multiple dams, lodges, and numerous beaver slots. Dams have forced Roaring Brook to split into multiple channels, with many frequently overflowing their banks and flooding the adjacent alder swamp. While flooding poses technical challehnges for trail construction, the flows also support and maintain much of the early successional wetland vegetation on the site.

A beaver-induced washout of the old farm road.

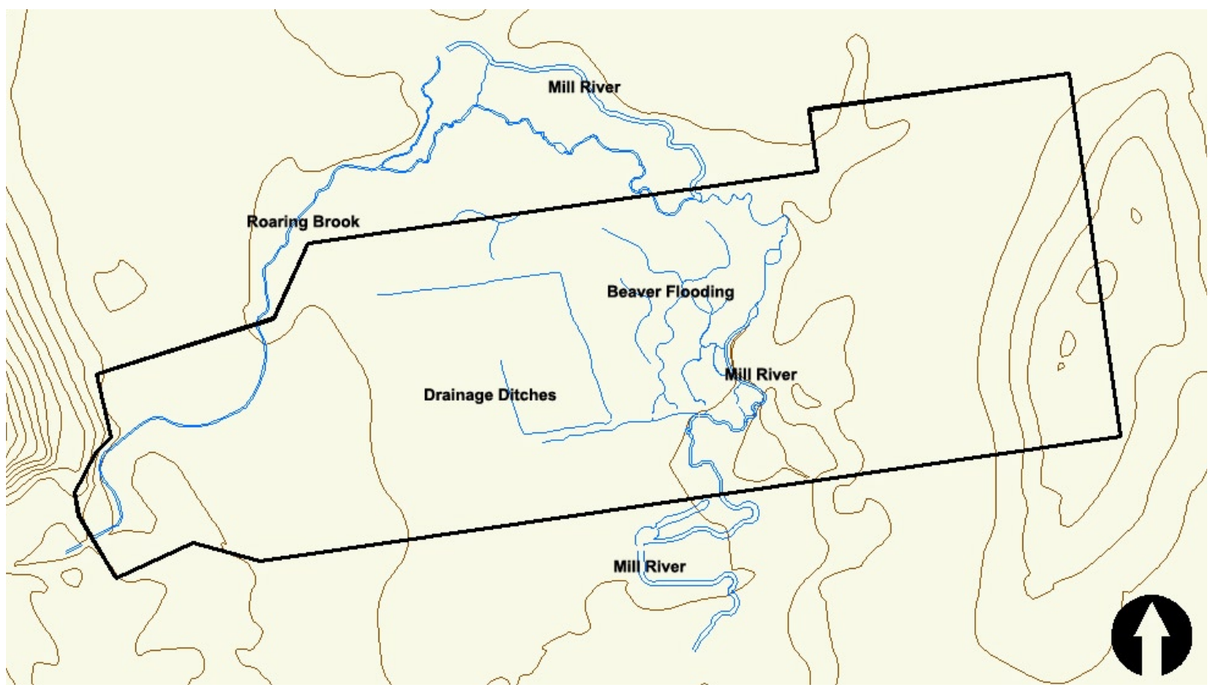


Fig. 5: The web of blue shows the influence of beaver below the intersection of Roaring Brook and the Mill river. Angular lines represent old drainage ditches. (Data courtesy of MassGIS)

This dynamic, deranged drainage pattern is responsible for frequent wash outs of the old farm road, and constant water flow in Nasami's drainage ditches causing significant erosion. A beaver dam on the Mill River destroyed the existing farm bridge at Nasami, the only route on the property connecting its eastern and western halves. Sections of Roaring Brook and the Mill River are also erroding their banks where the existing topography forces them to radically change course.

Blooming Milkweed framed by sensitive ferns in the Mill River floodplain.

Vegetation

Flora within the borders of Nasami Farm forms a patchwork, represeting the myriad of current, past, cultural, and natural processes occurring on the site. At least six distinct ecological zones are evident: riparian corridors, upland forest, wet meadows, dry meadows, willow/alder swamp, and a rare perched swamp of black gum/swamp white oak/pin oak in the Great Swamp of Whately. These areas each support diverse communities of plants and wildlife, and therefore nearly boundless opportunities for interpretation.

Askins (2001) recently noted that open grassland and shrublands, particulalrly in the northeastern U.S., have been largely neglected in land preservations efforts. The neglect stems from a lack of understanding of these landscapes as crucial habitat for many bird and mammal species, as well as the public's low preference for visiting densely vegetated, often monotonous landscape types where wildlife can be reclusive (Gobster, 2001). As a result, the total acreage of early successional landscapes has declined to only 16% of total timberland in the region. The reduction threatens many habitat-dependant species, particulalry birds such as bobolinks, woodcock and grouse. Nasami's abundance of meadows and alder/willow swamp are not only resources for preservation, but also teaching tools that will allow the public access to a little understood and rarely experienced landscape.

Categorizing ecological areas is subjective, and boundaries between areas often are blurred. Furthermore, without active management, many of Nasami's landscapes eventually will succumb to

succession. Management plans that include mowing meadows, thinning forest edges, and allowing some beaver flooding, will be crucial for habitat sustainability on the site.

Legal Context

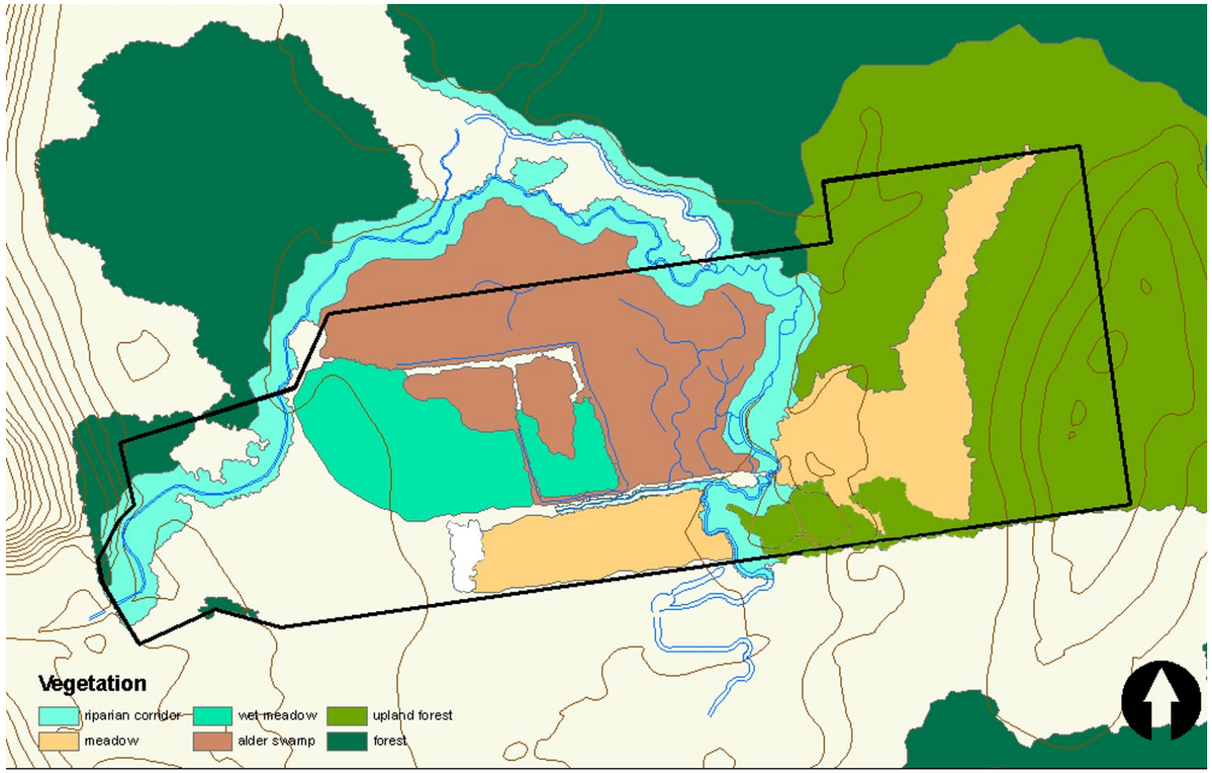


Fig. 6: Although the Eastern portion of the site contains part of the Great Swamp of Whately, it is the highest point in the swamp and therefore contains mostly upland forest species. Most wetland vegetation spans from the Mill River westward. Ecological areas were identified using orthophotos and site visits. The dark green on the map represents unclassified forest. (Data courtesy of MassGIS)

A variety of legal restrictions aimed at protecting natural resources apply to the land comprising and adjacent to Nasami Farm. These include, but are not limited to the Massachusetts Endangered Species Act (M.G.L. c.131A), the Wetlands Protection Act (M.G.L. c.131,s.40), the Federal Endangered Species Act, and the Rivers Protection Act. Regulations have complementary goals with the proposed interpretive trail at Nasami, and serve as a reminder that the property's resources must been taken into account during the planning, design and construction of the trail.

Massachusetts' Wetlands Protection Act establishes building restrictions in delineated wetland areas and protective buffer zones surrounding those areas. Fig. 7 illustrates that any interpretive trail that accesses the site's diverse ecological zones will necessarily cross protected wetland areas. Use of existing agricultural roads as part of the trail network will reduce some permitting issues. In other portions of the site special care needs to be taken in trail layout, use of materials, and construction, in order to minimze disturbances to the area while ensuring permit approval for the trail's construction. Careful design is an even greater imperative given that most of the site has been identified as either core habitat or priority supporting natural habitat for rare species by the Massachusetts Natural Heritage and Endangered Species Program (NHESP) (Fig. 8). The rare species include the dwarf wedgemussel (*Alasmidonta heterodon*), the elderberry long-horned beetle (*Desmocerus palliatus*), the eastern pondmussel (*Ligumia nasuta*) and the squawfoot (*Strophitus undulatus*). With the exception of the elderberry long-horned beetle, it is unlikely that the other endangered or rare species exist on the site due to their specific habitat preferences.

The Roaring Brook riparian corridor is protected under the Massachusetts Wetlands Protection Act.

Building restrictions also exist at Nasami through easments intended to protect the site as farmland in perpetuity. As of 2003, Nasami Farm's owners voluntarily relinquished significant development rights to the property through an Agricultural Preservation Restriction (APR). Specific limits to impermeable coverage now exist for the western half of the property, but were undergoing revision at the time of this design project. Portions of the property's eastern side also may be classified as forest under Chapter 61 regulations. Fortunately, much of the land surrounding Nasami is also under in the APR program, or has been sold to the Massachusetts Department of Fisheries and Wildlife, ensuring that the surrounding context of the farm will remain agricultural, and that its magnificent views will be protected.

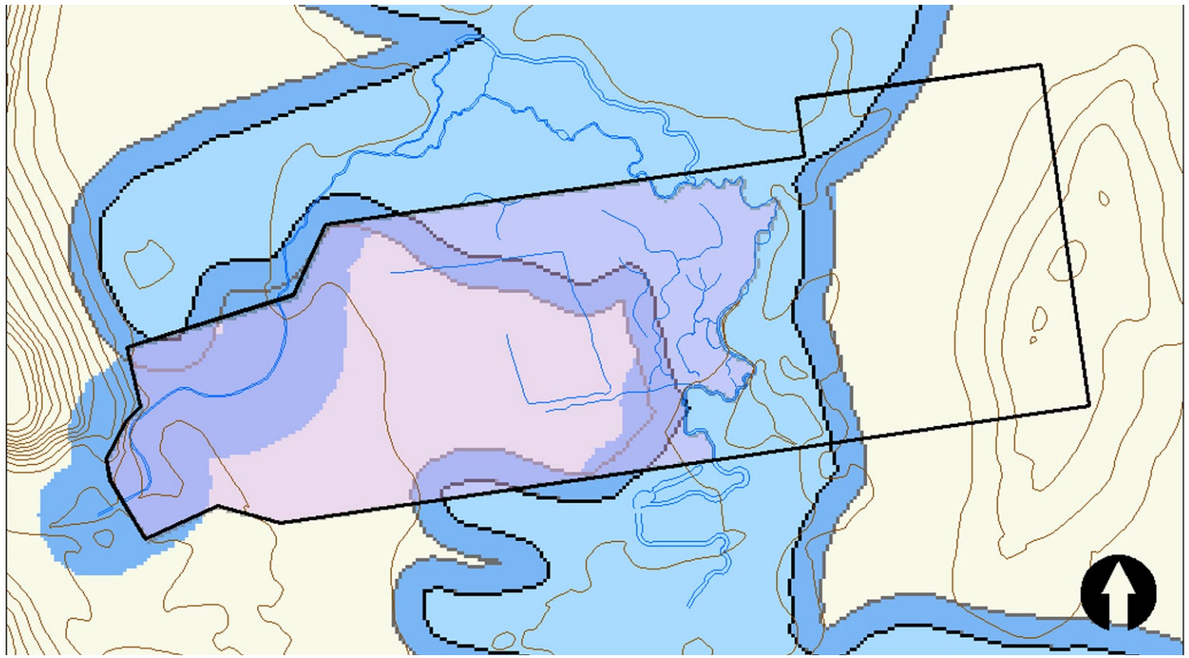


Fig. 7: Wetlands and regulatory buffer zones cover the majority of Nasami Farm. Aqua areas represent core wetland resource areas while darker blue demarcates buffers. Lavender indicates protected floodplains. (Map data courtesy of MassGIS.)

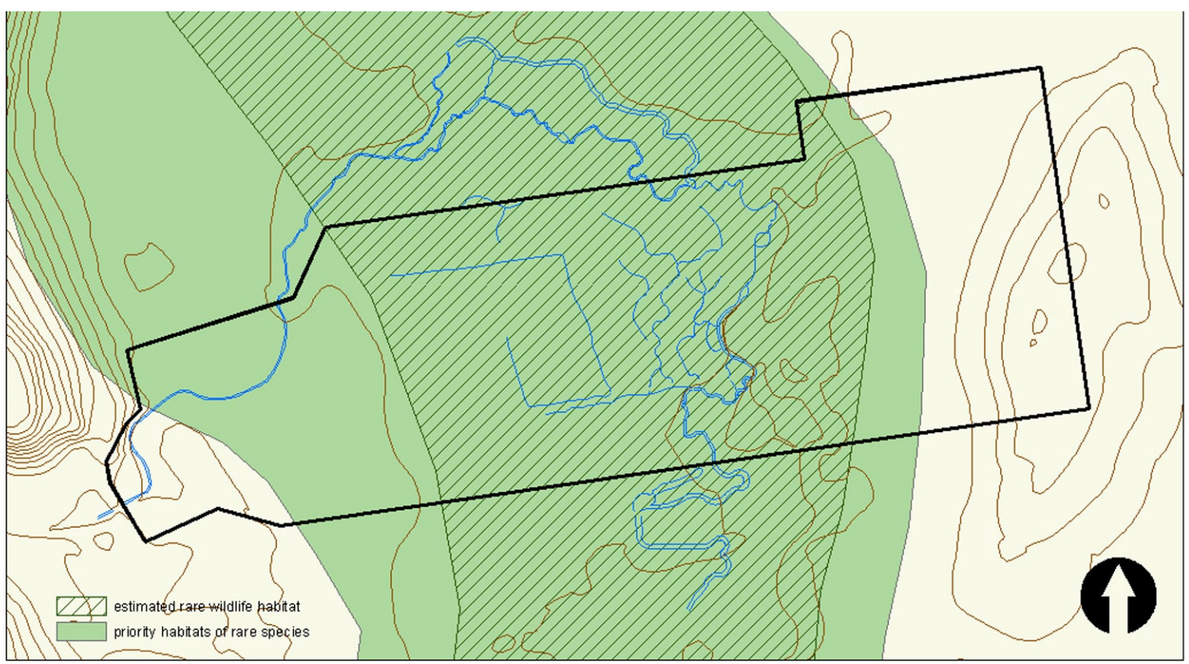


Fig. 8: Core and priority habitats on the site, as identified by the Massachusetts NHESP, correlate primarily with Nasami's wetland areas. (Map data courtesy of MassGIS.)

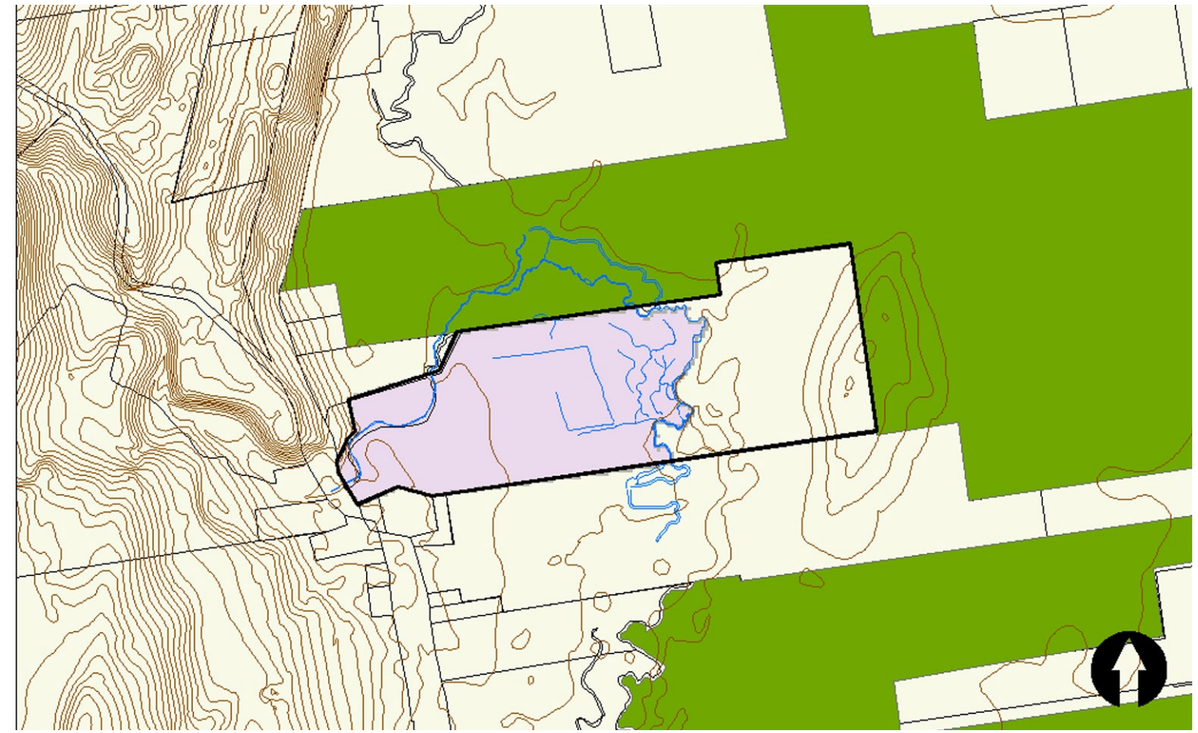


Fig. 9: The Nasami Farm property, itself partially under Agricultural Preservation Restrictions, is surrounded by parcels either owned by, or under easement to the Massachusetts Division of Fisheries and Wildlife, ensuring that the views and lands contiguous to the sanctuary will remain protected. (Map data courtesy of MassGIS.)

Views

Whether gazing at rolling farmland or taking in the spectacular Fall foliage of the Berkshire foothills, an interpretive trail at Nasami Farm will reveal breathtaking views to visitors. Some of the best perspectives exist near the center of the property, where views south look out over the Scott farm, and the view west captures the foothills (Fig. 10). The alder/willow swamp impedes ground-level views to the north, but sightlines from a raised platform could access some rarely seen wetland landscapes of swamp and grassland. More vantage points open from the high knoll on the eastern half of the site, where breaks in the forest reveal secluded, rolling meadows, and vast panoramas of the surrounding contryside.

View of the Scott farm to the south.

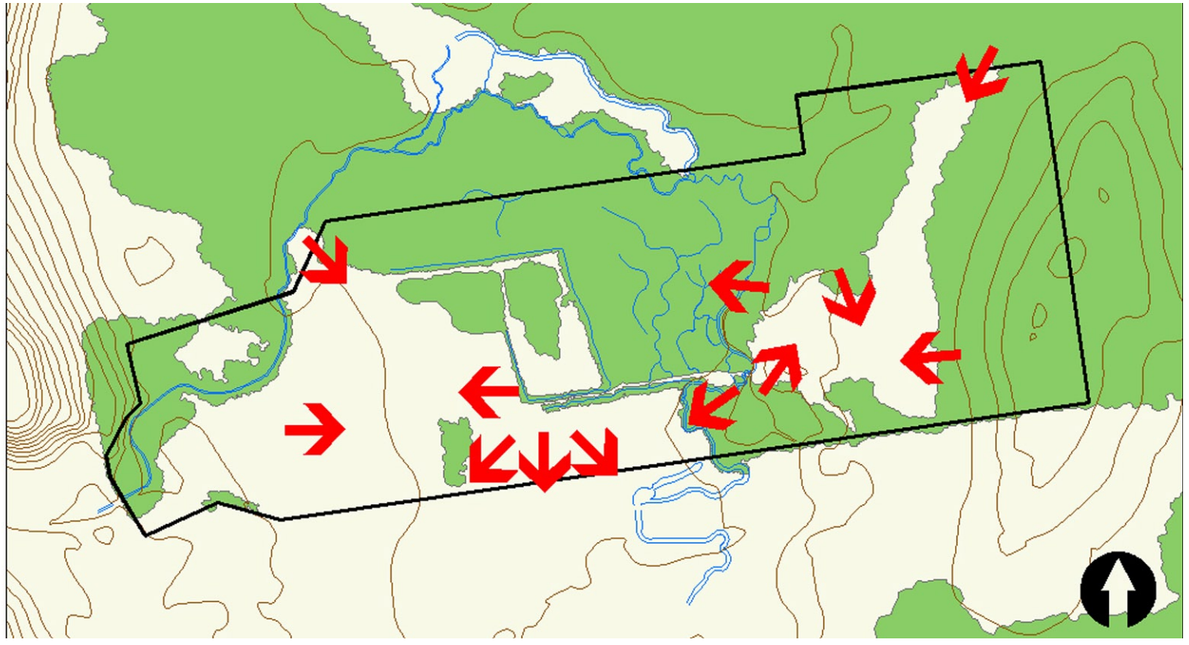


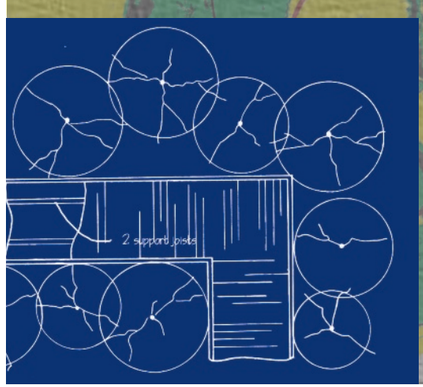
Fig. 10: For such a flat site, views abound at Nasami Farm. Many of the best vantage points offer glances of the surrounding landscapes, though views into the site's interior wetlands offer great promise. (Map data courtesy of MassGIS.)

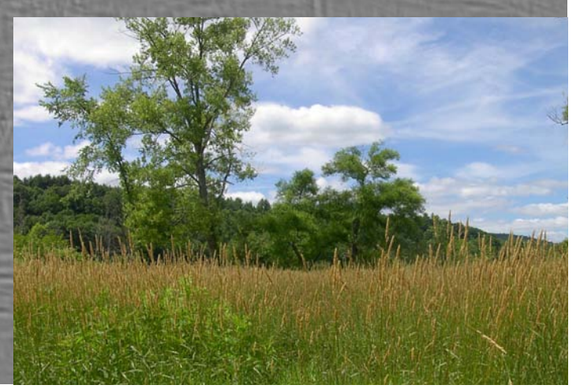
trail design concepts

- 2.2 miles of trail consisting of two loops connected by a central spine

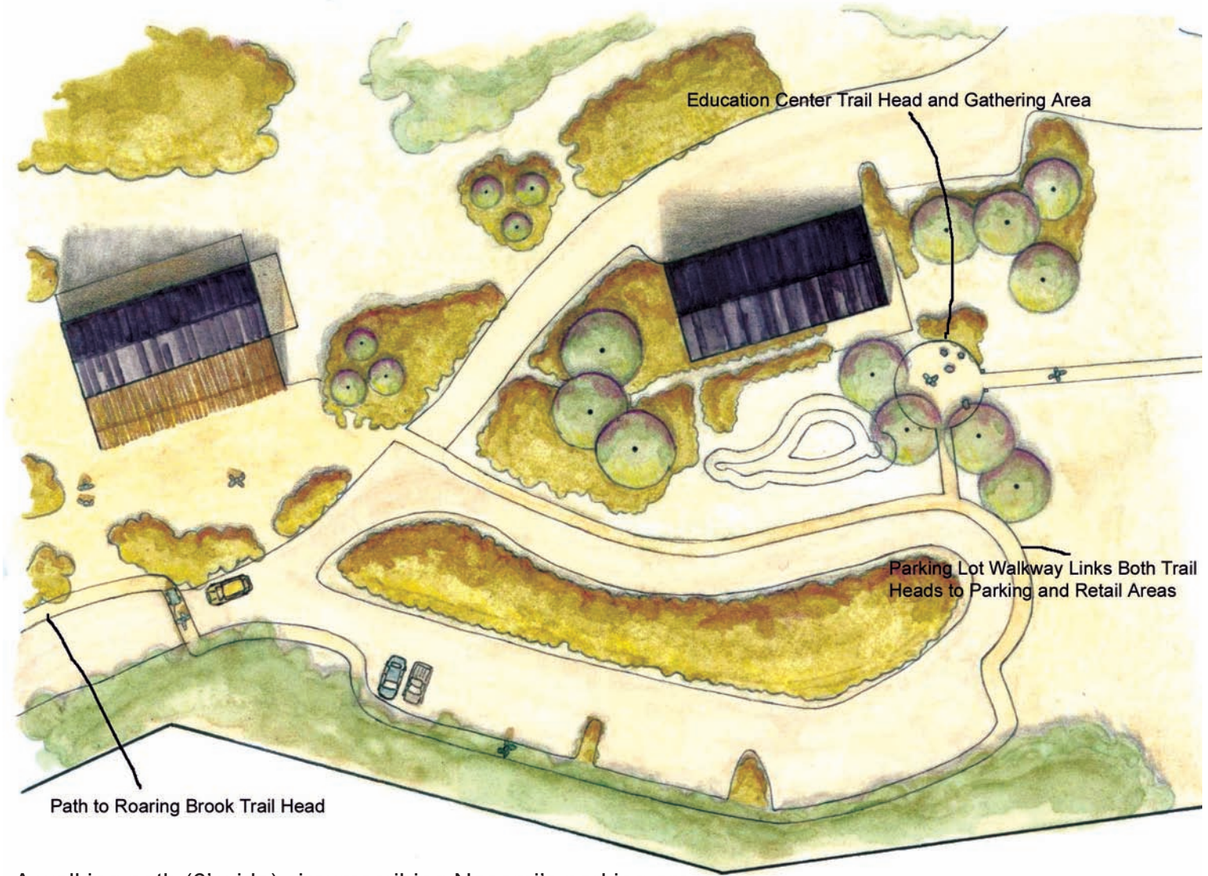
- primary loop provides easy access to the majority of ecological zones via two connected trailheads, while side trails provide additional excursions for visitors who wish to explore the sanctuary further

- trail layout, construction, and observation features allow visitors to experience their surroundings on multiple sensory levels and from various perspectives





Trailheads



A walking path (6' wide) circumscribing Nasami's parking area leads visitors to both the education center trailhead/meeting area, as well as to the retail area. The path provides circulation that completes the primary trail loop while effectively separating visitors from the working production areas of the farm.

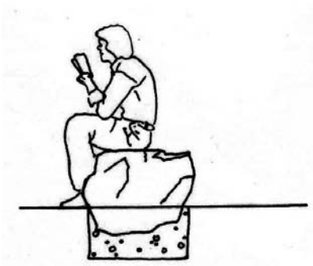
Vehicular activity at the existing tobacco barn and retail area.

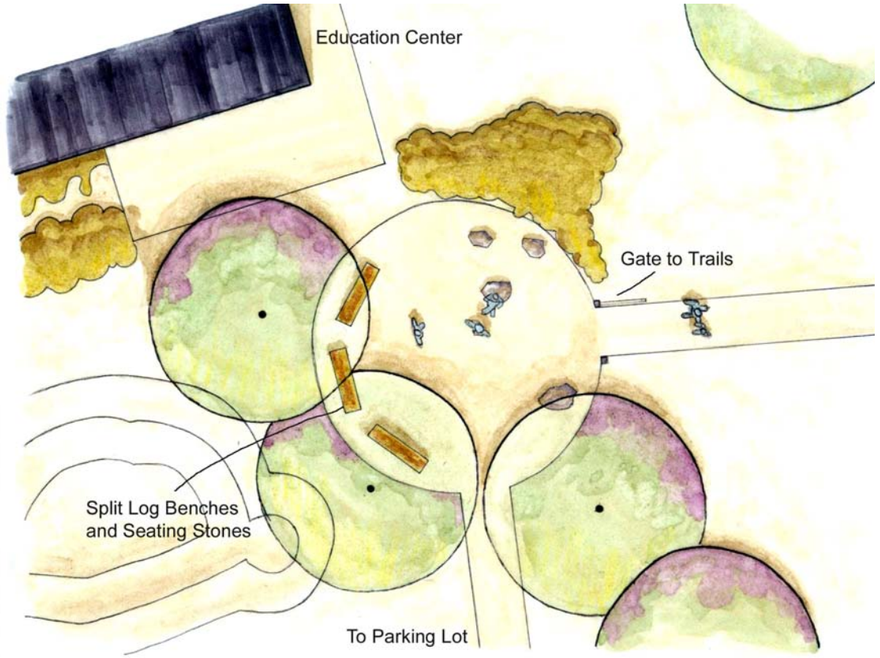
View of pasture at Scott's farm from vicinity of proposed meeting area.

Trailheads

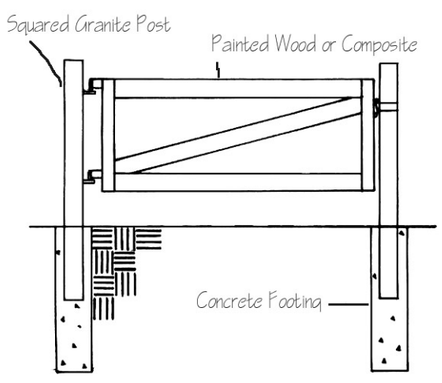
Education Center/ Meeting Area Trailhead

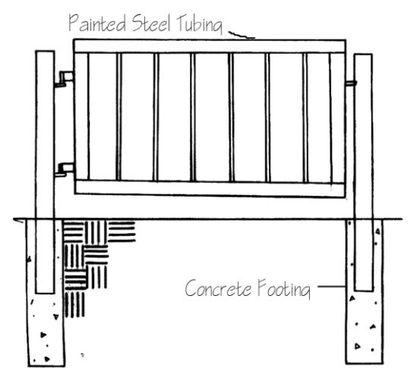
Seating stones and split log benches offer simple, unobtrusive, and durable resting places for visitors.



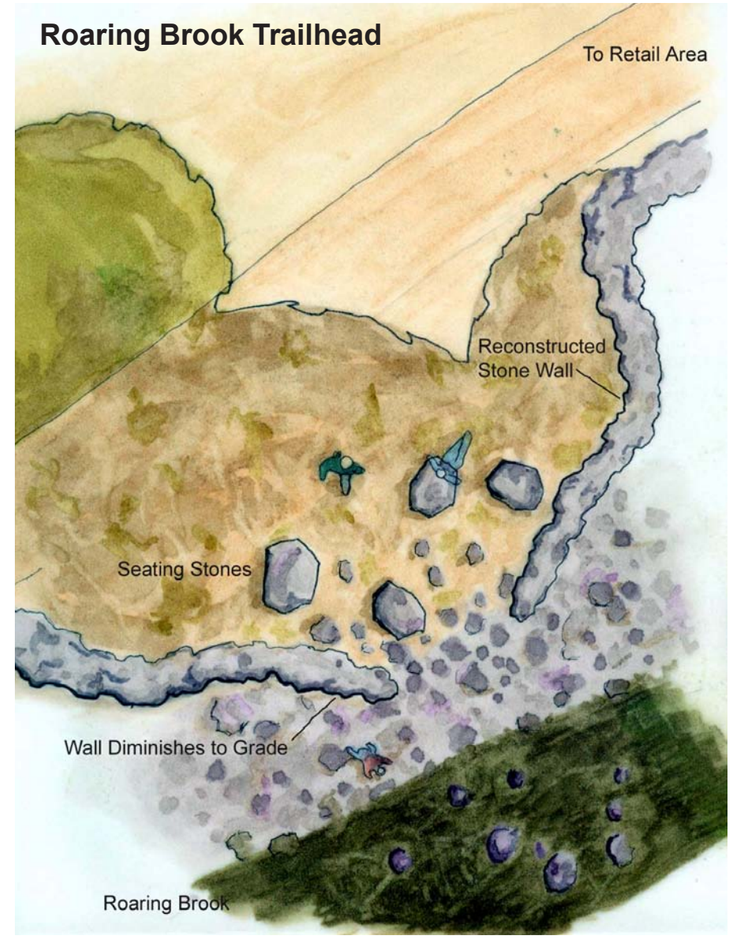


This trailhead also serves as a gathering place for groups about to walk the interpretive trails or visit the education center.





Gates at trailheads act as a barriers that signal when trails are closed, yet still allow access to the trailhead gathering spaces. Gate designs can serve as small reminders of the farm's history (above left), or as contemporary, utilitarian structures that blend in with the landscape (above right).



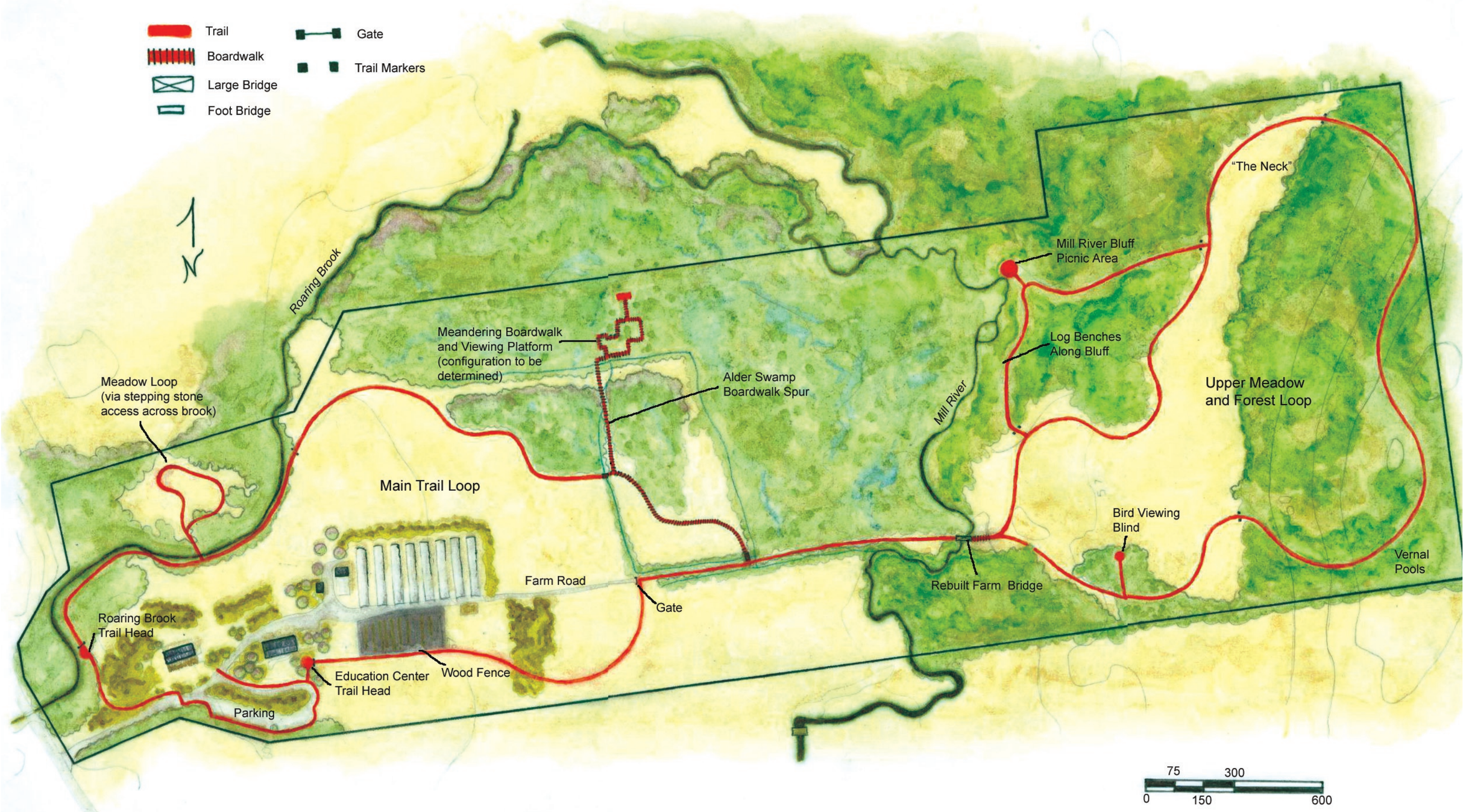
Roaring Brook trailhead is accessed from the retail sales area, and begins a walk through riparian woodlands.

Existing piled stones are reconstructed into a wall that borders the path, separating the path from the brook. The wall then bows away from the path, creating a gathering space, before dropping to grade and ending, providing a point of access to Roaring Brook.

Seating stones blend in with the rocky landscape, and signage provides information about the trail ahead. Again, a gate can be used to restrict visitors from proceeding further down the trail when conditions are hazardous.

Master Plan

NOTE: Main Loop Trail and farm road trail connector will be ADA accessible. Trails east of the Mill River may be hardened at a later date.



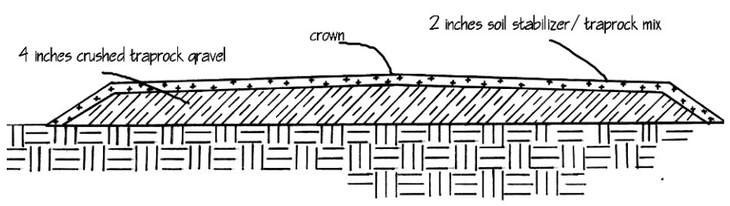
Dry Meadows and Riparian Corridors

Meadow walks can gloriously unite earth and sky. They can also be hot, tedious, and muddy.

Nasami's meadows are probably the most dynamic and surprising landscape on the property. Grasses can form trail edges from ankle to chest high, and each season revels different, new blooms.

With mowing regimes that respect resident bird species, meadow areas should continue to offer visitors a variety of trail experiences.

The meadow trail designs focus equally on borrowing surrounding vistas, as well as curving paths to maintain interest and draw visitors eyes down to ground level.



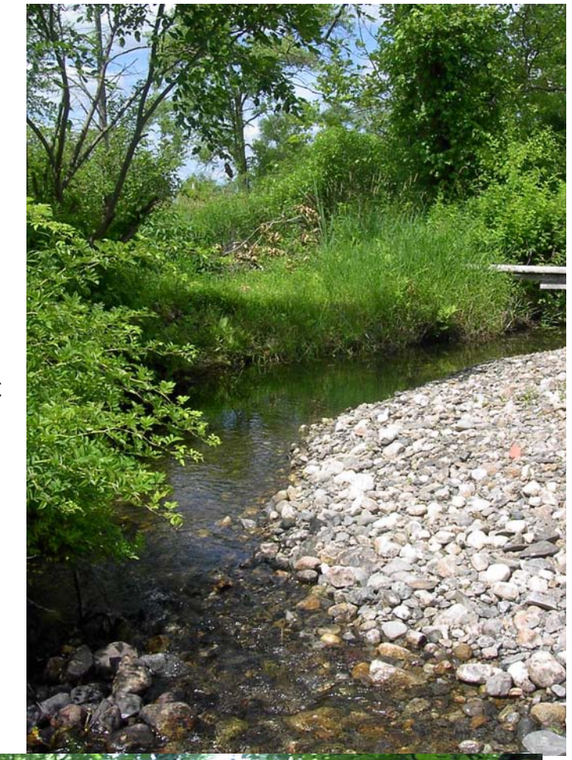
Trail surfaces should be hardened, where possible, and use a raised "turnpike" construction to encourage positive drainage off the trail in very flat areas.

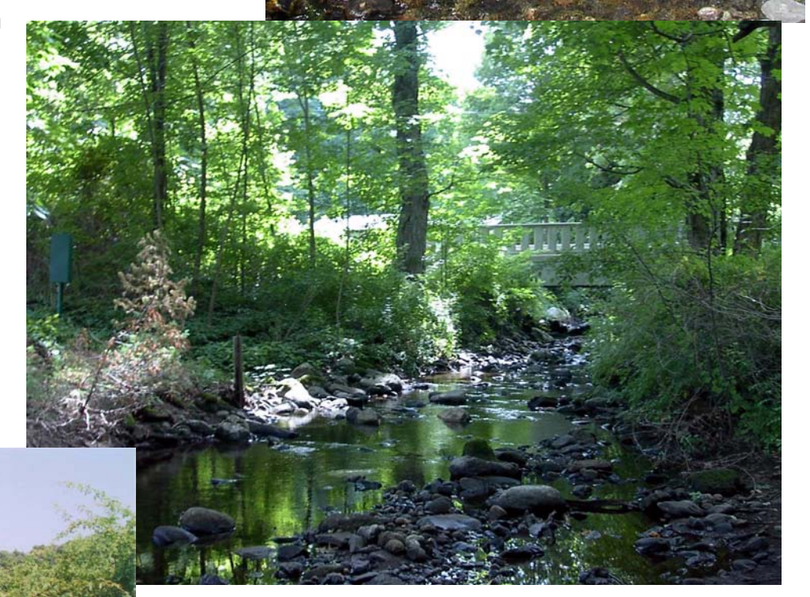
Although Roaring Brook feeds into the Mill River, the two waterways could not be more different. For some distance, as Roaring Brook tumbles out of the Berkshire foothills, its clear water races over cobbles and through shady riparian forests.

The Mill River is deep, murky, and impeded by beaver dams so it flows slowly through hot farm fields and deep, swampy woods.

Proposed riparian trails mostly parallel Roaring Brook, beginning from its namesake trailhead in the northwest corner of the property. At one juncture, a side trail will cross the brook via a series of stepping stones to access an adjacent meadow. Trails in this area will keep a reasonable distance from the brook itself, and make every effort to avoid siltation from the trail. A non-toxic hardened trail surface would be preferable.

The main farm road trail will cross the Mill River at the old farm bridge, once it is rebuilt. A proposed canoe launch sits on the north side of the new bridge. A side trail will also take advantage of the substantial bluff on the east side of the river to obtain river views and a prospect over part of the alder swamp. Most of the Mill River's other banks are unsuitable for trails.





Above: Roaring Brook reveals a rocky beach, and a picturesque scene where the waterway enters farm property.

Below: A view from the farm bridge, over the Mill River to the upper meadow.

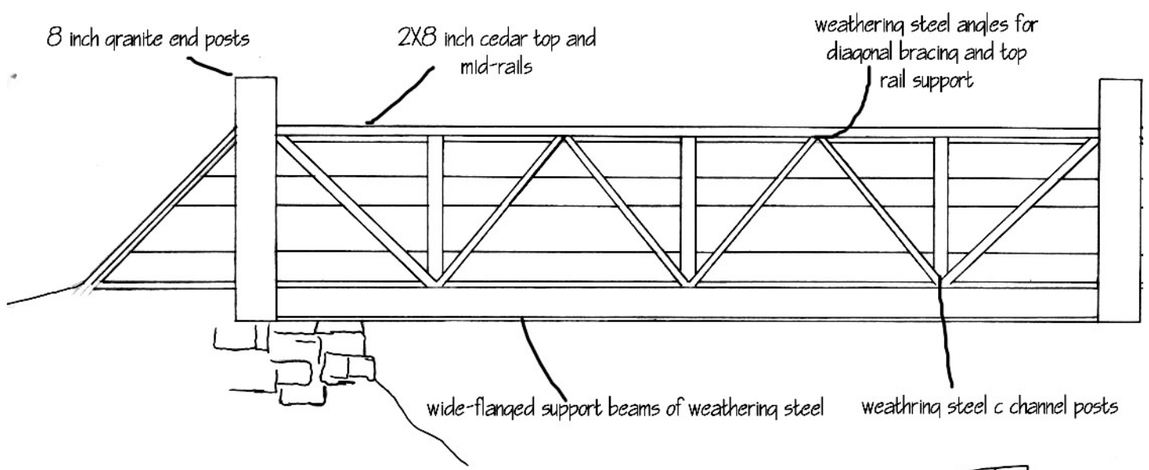
Providing safe crossing for pedestrians and farm equipment across the Mill River requires a substantial structure. This structure could become a signature feature of the Nasami Trail system if it successfully combines function, site appropriateness and distinct design.

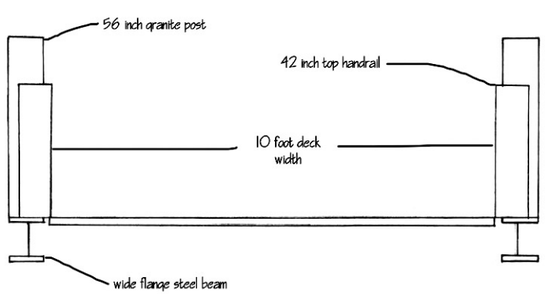
The following drawings suggest two possible styles for the farm bridge, both in form and materials. In addition to custom structures, a number of prefabricated bridges could also suit the site. *Any bridge plans should be produced under consultation with an engineer or qualified contractor.*

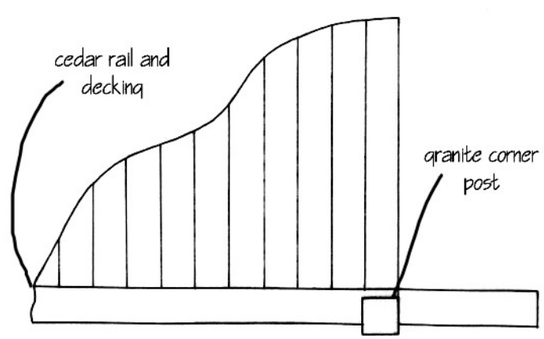
The remains of the old farm bridge after falling victim to beaver activity. The beams were the work of Henry Baldwin in the 1950s or 60s, though the abutments may be much older.

Design 1

This design evokes historic farm structures through its forms and details.

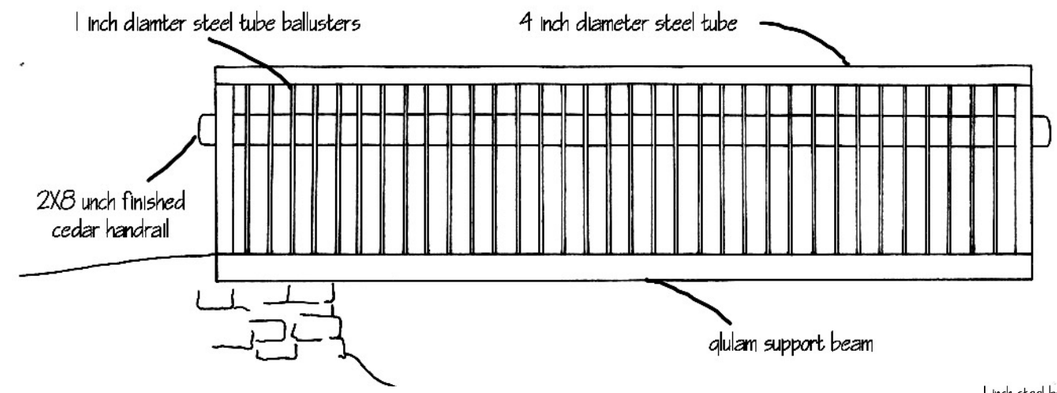


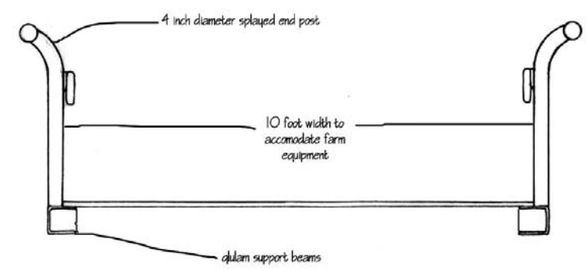


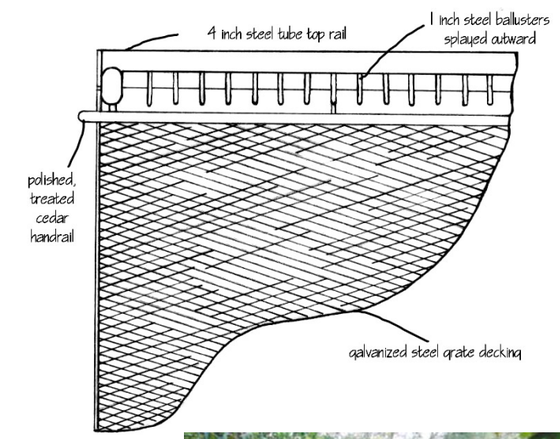


Design 2

This design seeks to complement and blend with its outdoor surroundings by using vertical features and flowing forms painted a dark green.







Early rendition of Farm Bridge Design 2.

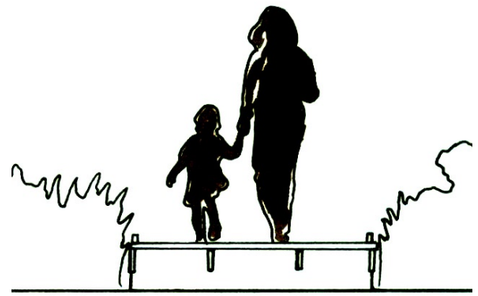
Beaver lodge on the Mill River.

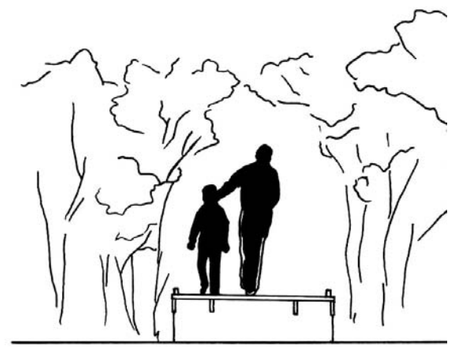
Wet Meadows and Alder Swamps

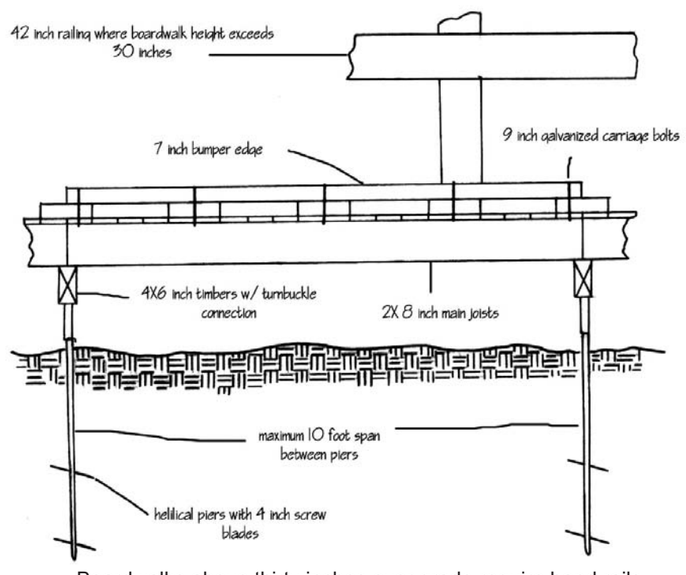
Alders lining a farm drainage ditch, now full year-round due to beaver flooding in Roaring Brook.

A limited number of trail sections at Nasami Farm must cross areas of standing water or seasonally saturated soils. While other site locations may also fall under the legal rubric of “wetlands,” these areas require more specialized trail construction, both to limit environmental degradation and to allow pedestrian access. Although costly to construct, boardwalks and viewing platforms can reveal landscapes seldom experienced by the average visitor.

Wet meadows and alder/willow swamps cut a large swath through the center of Nasami. While the rebuilt farm road will traverse most of this area, linking the two halves of the property, a section of the primary trail loop and a significant spur trail into the alder/willow swamp allow more initmate glimpses of the surroundings. These areas will require turnpiked trail, boardwalk, and several footbridges for crossing old drainage ditches.



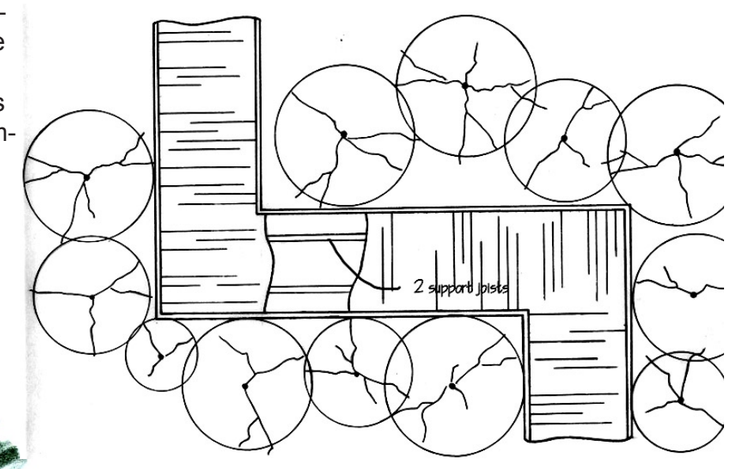


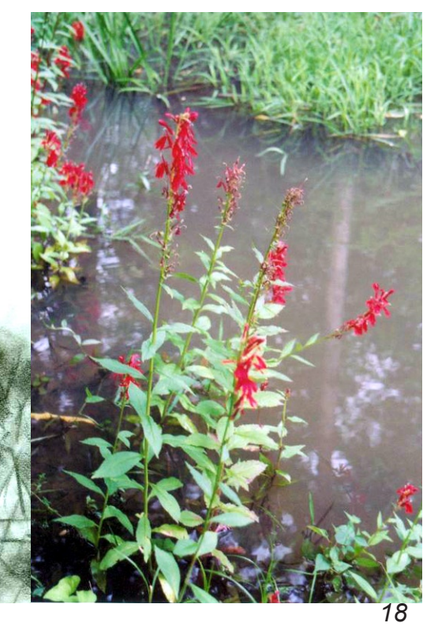


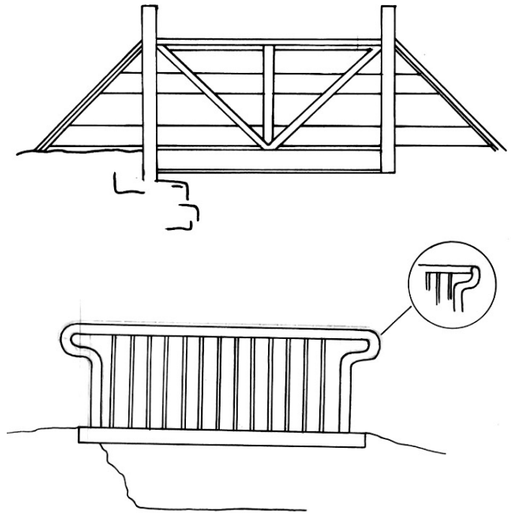
Boardwalks above thirty inches over grade require hand rails.

The proposed trail design for wetlands offers visitors an unusual experience in an unusual landscape. Boardwalks elevate visitors off of the saturated ground, while adjacent wet meadow vegatation rises close to form a short wall along the path. Soon, alders reach higher, forming their characteristic thicket, a green wall arching into a translucent ceiling allowing dappled sunlight to reach the ground.

Alder swamps are nearly impenetrable, making them prime cover for animals seeking shelter, who dart about in unpredictable patterns through the growth. Similarly, the proposed layout for the boardwalk employs a series of short segments, turning at seemingly random ninety degree angles. This emphasizes the almost maze-like experience of creatures entering this habitat, hopefully raising visitor’s undertanding of the area’s functions and characteristics.





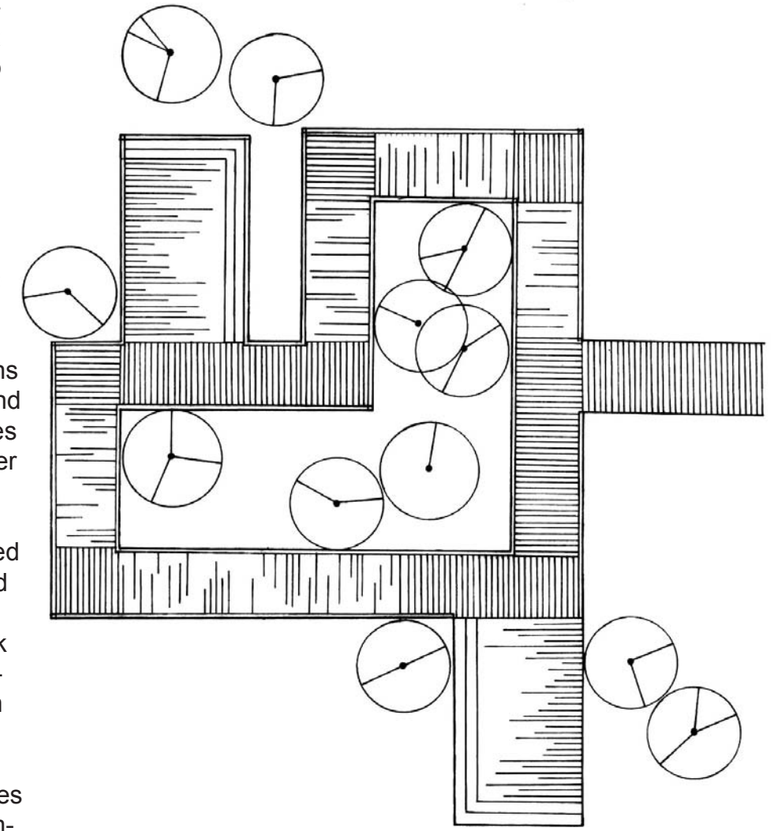


Two possible small footbridge designs, the top using traditional forms, the bottom a contemporary structure built of painted steel.

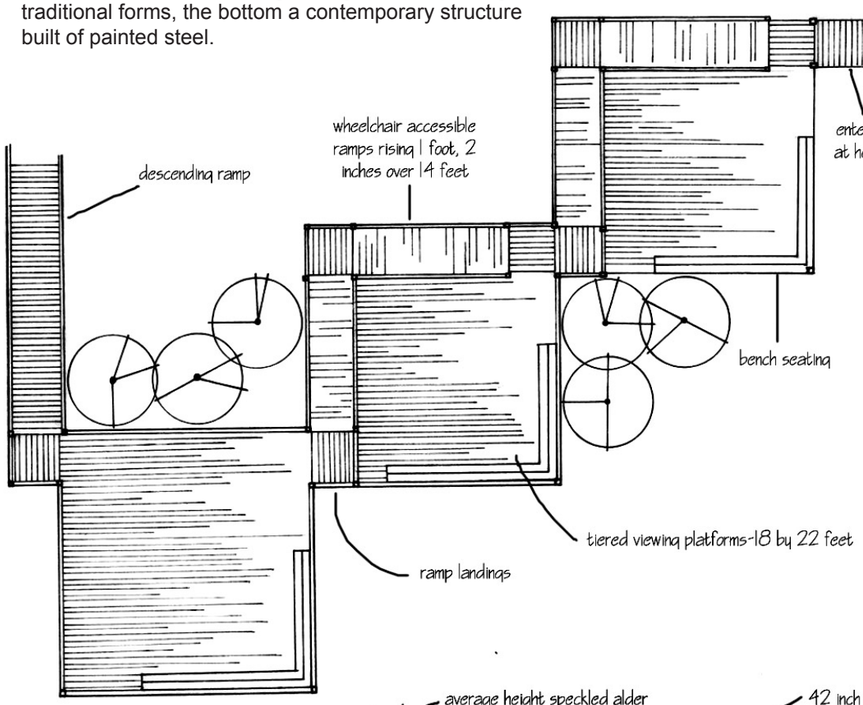
Viewing platforms give visitors the opportunity to understand the patchwork of clearings and thickets that make up an alder/willow swamp, as well as to view life in the swamp's canopy.

The viewing platform would be best located at some point along the meandering boardwalk route--seperated from the rest of the trail to avoid noise disturbances from other walkers. Primary views should be directed to the north, were the swamp gradually opens to grasslands around the Mill River, and to the east, where the swamp becomes particularly thick and marked by beaver activity.

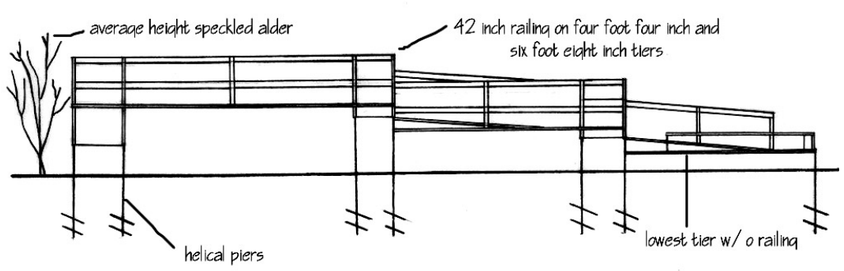
The viewing platform designs illustrated offer examples of simple (at right), and more substantial (bottom left) structures that fit with the overall boardwalk trail design for the site. Each is wheelchair accessible, permits viewing from multiple levels, and can accomodate individuals or large groups with equal comfort. Each would function as spaces for wildlife viewing, or for quiet contemplation.



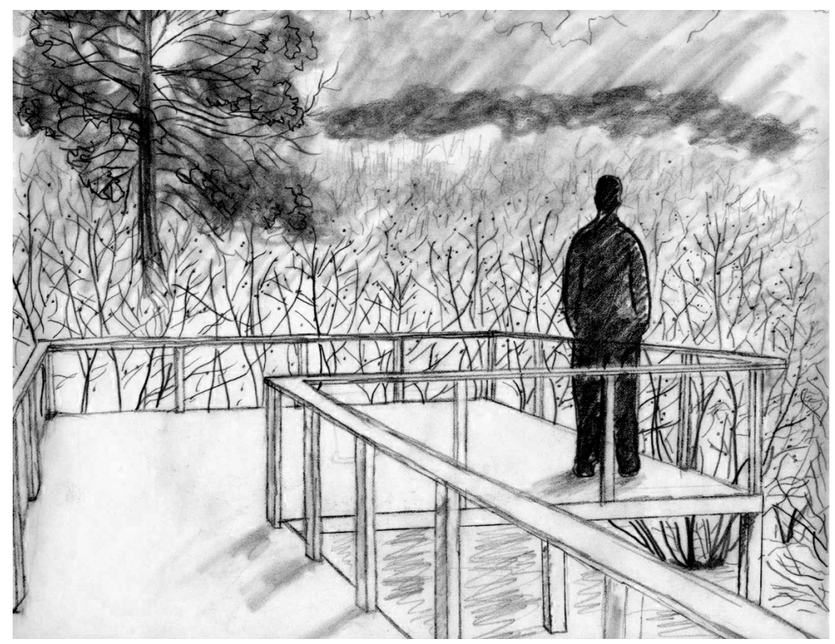
The above design includes two viewing platforms, one at ground level and one that is substantially higher. On each design, the lowest level employs only benches and the surrounding vegetation to provide and edge to the space. The above design incorporates the overall meandering wetland boardwalk pattern into the viewing platform structure.



Mowed corridor at alder swamp edge, near proposed entrance to meandering boardwalk.



This wetland viewing platform design consists of three, tiered decks, rising from just above ground level to nearly six feet off the ground. The structure has bench seating and is fully wheelchair accessible.

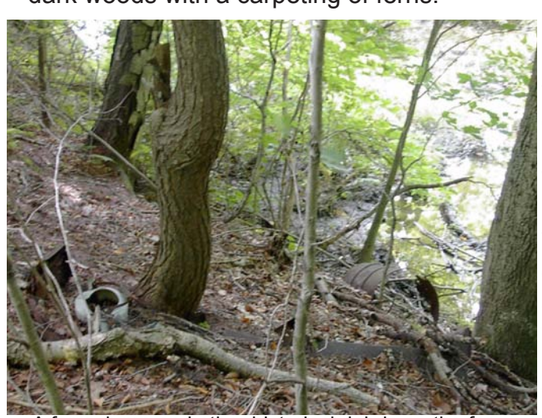


Upland Forest and Forest Edge

Looking east from Nasami's tobacco barn, a tall, forested knoll rises from the Mill River floodplain. This high land was once woodlot and pasturage, and now supports a regenerating upland forest and a sun-drenched meadow.

Lore abounds regarding this portion of the property, as it the gateway to the Great Swamp of Whately. The narrow portion of the meadow has long been called "The Neck," and noted for its abundance of wildflowers.

Visitors to the eastern loop of the Nasami trail network would experience dark woods with a carpeting of ferns.



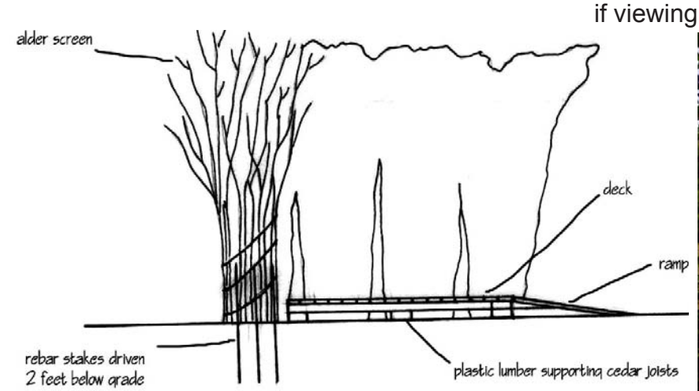
A farm dump and other historical debris on the forest edge require removal to ensure visitor safety.

Several vernal pools rest on the southern wooded edge of the knoll, while the woods themselves abruptly transition to edge forest and then bright meadow.

Trails in the forest can be relatively primitive, as a simple bench-cut into gentle grades will allow lateral drainage. Trail layouts through the open, shaded woodland avoid direct, vertical paths on steeper grades to minimize drainage problems and ease pedestrian access. Realignment for indivual trees and large roots should be expected during construction. Meadow trails may require turnpiking in flat sections, but also offer wonderful opportunities to teach about the dynamics and character of the forest edge.

A forested promontory overlooking the Mill River and alder swamp will support a space for resting and picnics. Ringed by split log benches, the simple site is designed not to distract from the tall trees and the quiet of the nearby water's edge. The area is located on a spur from a side trail, increasing the chances of protecting the location's solitude. As the banks of the promontory are eroding significantly, site preparation will require bank stabilization.

Another, more primitive spur from the upland meadow loop leads to a proposed birding/wildlife observation blind. A stand of trees dividing the trail from the upper meadow serves as an opportune location. The structure itself could use sustainable materials from the site that are easily transportable if viewing conditions change.



A simple birding blind design using Alder branches cut during trail construction.

View onto the upper meadow towards the neck, from the proposed birding blind site.

	wet meadow	dry meadow	alder swamp	riparian	upland forest	forest edge
trail surface	boardwalk/raised turnpike	west of Mill River: stone dust or soil stabilizer east of Mill River: stone dust, raised turnpike or natural	boardwalk	stone dust or soil stabilizer	stone dust or natural (with appropriate grading and drainage controls)	stone dust, soil stabilizer or natural (with appropriate grading and drainage controls)
edge	low walls, grasses and shrubs close to trail edge	low walls, grasses and shrubs close to trail edge, on slopes one edge may be higher than opposite edge	high walls, shrubs close to trail edge	varied depending on vegetation	porous, very low groundcover	low wall on meadow side, high wall of successional trees on opposite
ceiling	open air, occasional tree canopy	open air	alder leaf canopy	varied depending on vegetation	high leaf canopy	partial canopy overhang
layout	straight and curving paths	straight and curving paths working with topography	maze-like, 90 degree turns and short, straight sections of varying lengths	meandering along water courses	straight and curving paths working with topography	meandering along tree line
enclosure	partial enclosure, corridor or “sunken” path through vegetation	partial enclosure, corridor or “sunken” path through vegetation	full enclosure, tunnel-like	varied depending on vegetation	full but spacious enclosure	partial enclosure, one-sided
views	sky, close and mid-distance vegetation	sky, close vegetation on ground to distant vistas at eye-level	limited to close vegetation and portal openings	sky, close vegetation on ground to distant vistas at eye-level, particularly on one side	close vegetation on ground and mid-distance vegetation	sky, close vegetation on ground to distant vistas at eye-level, particularly on one side
light	full light to partial shade	full light	deep shade to dappled sunlight	partial shade to full sun	deep shade to dappled sunlight	partial shade to full sun

Endnotes

[1] Cane (1972) defines the word "Norwottuck" as meaning "in the midst of the river" in the group's native Algonkian language.

[2] Coincidentally, the Nipmucs ranged from present-day Framingham in the east to Whately in the west.

[3] Research could reveal more about the crops grown on the property from colonial times through the 19th Century. The Whately Historical Society holds some records of crops sent to market by individual farmers in the area. Documents at either the Greenfield Register of Deeds or the National archives in Pittsfield or Boston must be consulted, to establish a link between these individuals and Nasami.

[4] Crafts indicates that Lot 68 was originally owned by Eleazer Frary, but was later occupied by David "Master" Scott who built a house on the land in 1812, and whose descendents continued to occupy the property. This lot is possibly the location of the current Scott's farm. Whether this lot included the current Nasami property within its northern boundary is unclear. More likely, the Nasami parcel was associated with Lot 69, originally owned by Gideon Dickinson, who built a house "exactly at the north end of Chestnut Plain St" (Crafts, 1899), or on Lot 70. Lot 70 was listed in the 1684 roster as "overplus to Mr. Williams," though the land eventually passed to J.W. Dickinson, who, it is suspected, constructed a barn there (ibid).

[5] Sylvia Nye tells that her grandmother, Alice Scott Johnson, installed much of the local pipework herself, and that some can still be seen on the adjoining properties.

[6] In addition to the private recreational opportunities on the Nasami Farm property, the nearby Roaring Brook and Whately Glen picnic grounds were popular Summer destinations for residents of Springfield, Holyoke and Chicopee throughout the first half of the 20th Century.

[7] Sylvia and Walter Nye maintain an extensive collection of black and white photographs of Nasami Farm from the early to mid-20th Century.

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Appendix I: Trail Materials + Structure Design

The following materials recommendations and design concepts are NOT intended to serve as construction documents or detail specifications. While some simple trail construction may not require outside expertise, licensed professionals should be consulted for projects concerning structures, water management, or grading. The following represent possibilities which may be appropriate for the site and complementary to the overall trail design concept.

Trail Surfaces and Farm Road

Trail treadways must be graded with an adequate slope to allow water to drain properly from the trail surface. This can be achieved either through a cross-slope of 2 to 5% achieved via a half or full bench cut, or through a running slope of over 2% with appropriate drainage diversions. Certain portions of the eastern half of the site exhibit topographic conditions that support these design approaches. Here, trails may be prepared with natural surfacing, or given a gravel surface for increased durability.

Trail segments through flat areas should be constructed as “turnpike” to allow positive drainage. Turnpike consists of cleared and compacted earth covered with geotextile fabric, filled with compactable gravel, such as traprock, and then surfaced with the material of choice.

For high traffic areas on the western portion of the site, a soil stabilizer should be applied to the top two inches of gravel for durability, reduced maintenance, and handicapped accessibility (although some spray-on stabilizers may require significantly less depth for their applications.) Currently, stabilizers fall into three categories: ionic stabilizers, enzyme stabilizers, and polymer stabilizers. The effectiveness and application technique of each stabilizer type varies with local soil and climatic conditions, so it may prove worthwhile to test small amounts of several stabilizers on different trail sections.

Choosing environmentally safe products will help narrow the available options. Products that claim environmental sensitivity include: Klingstone 400 (http://www.klingstone.com/), Polypavement (http://www.polypavement.com/), various Enviroseal products (http://www.enviroseal.com/), and Road Oyl (http://www.sspco.org/roadoyl.html).

Reconstructing the old farm road is a major, yet essential endeavor to the overall trail project. The road will need widening to at least eight or ten feet, which will significantly alter one of the two drainage ditches immediately adjacent to its sides. In addition, a long segment of the road will likely need to be filled to avoid washouts and to meet the entrance to the new farm bridge at grade. Fill material can be sorted, compactable trap rock gravel. To address flooding issues, the top layer of gravel may be wrapped in geotextile fabric, creating “drainage cells,” that allow water to flow through upon reaching a certain height. Given the amount of water from beaver activity and seasonal precipitation, culverts may also be required at several locations along the road. Increased runoff into one or more of the old farm drainage ditches could feasibly exacerbate preexisting erosion and siltation problems in the ditches, necessitating management solutions such as stone check dams. For exact road designs and water management strategies NEWFS should contact a licensed landscape architect or engineer.

Boardwalk

Given the importance of wetlands at Nasami Farm, the boardwalk trail sections have the potential to become a signature feature of the property. The wetlands also present one of the greater design problems, given the ecological sensitivity of the area and the highly variable water levels caused by beaver flooding.

The proposed boardwalk layout consists of a six foot treadway, laid out in a maze-like pattern of varying-length segments joined at right angles. The design intends to simulate animal movement through the speckled alder swamp, using the dense vegetation lining the boardwalk as a wall-like structural element—and in some areas, as an overhanging ceiling.

The boardwalk will be supported by helical piers, spaced at a maximum distance of ten feet per pair. Helical piers are a low impact option for sites that are frequently or permanently submerged in water. The helical piers are joined to timber beams, which in turn support four joists below the boardwalk decking. Short wooden bumpers delineate the boardwalk edge and provide a protective barrier for wheelchair users. Forty-two inch high railings will be used for boardwalk sections over 30 inches above grade. Please note that railing depicted in this paper may not meet local codes. Several companies such as Superdeck (http://www.superdecksystems.com/) also offer pre-designed, modular boardwalk options which should also be considered as a cost-effective alternative to custom designs.

Available boardwalk materials range from traditional wood, to plastic and composite lumber, to non-traditional materials such as metal grating. Considerations in choosing materials include cost, durability, aesthetics, ease of construction and environmental impacts. Given the client’s expressed desire to avoid using pressure-treated wood, only wood alternatives and untreated woods were considered. Table 1 compares the characteristics of several commonly available woods and wood alternatives. If the initial cost

is not prohibitive, it appears that a wood composite decking placed over a naturally decay resistant wood structure would prove the most economical and sustainable over the boardwalk's life cycle.

Table 1: Boardwalk Material Comparison

Material	Relative Cost	Rot Resistance	Advantages	Disadvantages
Douglas Fir	Similar to pressure-treated	10-15 years	Cheap, easy to work with	Not naturally rot resistant
Western Red Cedar	25% more than pressure-treated	15-25 years	Rustic look, less likely to split or warp	Scratches and dents easily, nails can pop
Port Orford White Cedar	25% more than pressure-treated	15-25 years	Harder, cleaner and stronger than red cedar	Nails can pop, may be harder to work with
Ipe	60% more than pressure-treated	25 plus years	Very hard and strong, need less wood for spans, dense so little water absorption	Price, tropical source, requires pre-drilled holes
Wood Composites	40-60% more than pressure-treated	Warranties' vary 25 plus years expected	Durable, little to no maintenance, made from recycled materials	Price, can be slippery, requires wood for structural support

Construction in wetland areas will require special permitting and a great deal of ecological sensitivity. Vegetation clearing for the boardwalk should be as limited as possible. Installation of the helical pier supports is a relatively benign process using a hand-held hydraulic drill. Construction processes that produce waste, such as sawing, should be performed on dry land. Temporary working platforms on the helical piers should be constructed quickly to avoid unnecessary foot traffic in sensitive areas.

Wetland Viewing Platform

Speckled alder swamps provide a home to a tremendous diversity of wildlife, many of which are rarely seen due the nearly impenetrable thickets of vegetation in which they take shelter. While experiencing the swamp from the ground level is its own unique experience, gaining prospect over the tree line can reveal a completely different landscape.

The trail program calls for a viewing platform in the alder swamp as part of the boardwalk layout. The proposed design concept 1 for the platform consists of a series of three, tiered, interlocking platforms, connected by four wheelchair accessible ramps. The lowest tier would be completely enclosed by the surrounding swamp vegetation, providing a secluded, lush room for visitors to rest in the cool shade. The middle tier is also surrounded be vegetation, but begins to open to the sun and sky. The highest tier gives visitors a clear prospect over the mid-height swamp vegetation, revealing life in the swamp's canopy.

Materials and construction procedures for the viewing platform would match those chosen for the boardwalk system. Similarly, the structure itself would be mounted on helical piers. Floor joists would be placed every two to three feet, depending on the materials chosen. The lowest tier would rest at two feet above grade, the same height as the boardwalk at entry. Subsequent tiers rise 2 feet, four inches, gaining a maximum height of six feet eight inches. The entire structure spans seventy feet.

Design concept 2 comprises two separate viewing decks, one at two feet above waterline and one at five feet above waterline. The decks abut a short loop of boardwalk ramps at the end of a boardwalk spur.

Farm Bridge

All that exists of the prior farm bridge at Nasami are stone abutments and two rusting wide-flanged steel beams. The bridge, which crossed the Mill River, was last built in the 1950s, and was later destroyed by beaver flooding sometime within the past 3 years. It is a crucial juncture for the trail system, as it connects the two halves of the property, allowing access to the higher elevation fields and forest on the site.

Options for reconstructing the farm bridge are varied. A custom bridge could be constructed for the site, using a range of different materials. Or, a pre-fabricated structure could be purchased and sited, dependent upon repairs to the farm road for transport of the structure. The following are two designs for custom-built structures that take into account the overall context of the farm, as well as the specific needs of the site. Structurally, the bridge needs to accommodate both pedestrian trail traffic and the farm's tractor.

The traditional farm bridge concept echoes the site's heritage, employing materials such as stone, wood, and weathering steel in a style reminiscent of historical forms. The bridge is supported by a substructure of stone masonry abutments and a superstructure of two, wide-flanged steel beams. The high yield strength of steel will enable the relatively simple superstructure to easily withstand pedestrian traffic and light farm equipment. The decking is comprised of 2" by 8" planks of highly wear resistant white cedar. Engineers should be consulted as to whether additional lateral decking support is needed to distribute potential loads. This additional support would likely involve diagonal steel angles.

Visitors are greeted by roughly-hewn granite endposts at each side of the bridge. Attached are horizonatl cedar top rails, and mid rails, attached vertically. Rail support posts along the span are mild steel c channels of weathering steel, chosen for maintenance and aesthetic purposes. Angles of similar materials

provide cross-bracing and support for the top rail. Rail components will be attached via carbon steel bolts, while additional steel beam bracing could use either welds (for a more flush surface) or high strength bolts.

The second farm bridge concept uses more contemporary forms and materials to create a graceful structure that blends with the curves and colors of the landscape. The substructure again relies on rebuilding the existing stone abutments, but the superstructure combines glulam wood, with painted, tubular steel, and steel grating.

The superstructure's support comes from two treated glulam beams located at the outside edges of the bridge. Glulam has become increasingly popular in bridge construction due to its high yield strength, its ability to cross large spans, and wood's natural high chemical resistance. For decking, the bridge design incorporates galvanized, toothed, carbon steel grating. This will diminish potential damage to the bridge caused by the force of floodwaters, which destroyed the previous structure, while providing adequate traction and allowing sunlight to penetrate to river below. Continuing upward in the design, four inch diameter, tubular steel end posts rise and splay outward, supporting a similar size, horizontally-placed top rail tube running the length of the bridge. One inch tubular ballusters are spaced at six inch intervals. All steel components, except for the deck, will be painted with a dark green rust inhibiting paint. A 2X8 inch cedar wood handrail, polished, treated, and with rounded edges projects outward from the bridge ends to guide pedestrians across the structure.

Many components of this bridge will require off-site manufacturing—specifically the glulam beams, the welded tubular rail structures, and the deck grating. These units will then be bolted together in place. Overall, this concept has the potential to become and attractive, long-lived, and low maintenance landmark in the Nasami trail system.

Birding Blind

Birding blinds offer an opportunity to experiment. The limited criteria that blinds offer basic shelter, portability, and disguise, enables them to utilize simple materials in unique ways, harkening back to the first human structures. The proposed bird blind concept unites both raw, organic materials from the site with contemporary innovations. For screening, the blind is enveloped by bundles of alder trunks removed when constructing and maintaining the trail boardwalk. These trunks are to be trimmed of branches to two thirds of their height, and bound together with synthetic rope in roughly two foot diameter bundles. Each bundle will then be placed upon three steel rebar stakes, driven to a depth of two feet below grade. Gaps will be left between bundles to allow viewing from the inside of the shelter.

For birder comfort, the blind's interior will consist of a raised platform of cedar planks, accessed via a similarly constructed ramp. The platform decking will sit on joists, which will be joined to three members of 4 by 6 inch plastic lumber. The plastic lumber will prevent direct wood contact with the ground, and thus inhibit the potential for decomposition. These plastic "runners" will not be permanently fixed to the ground. This way, the entire structure, from the platform to the bundles, can be easily and quickly transported to respond to wildlife patterns on the site. The structure's environmental impact will also be negligible.

Appendix 2: Project Cost Estimates

Table 2: Preliminary Cost Estimates

Trail Type	Linear feet	Estimated Unit Cost	Estimated Total Cost
Hardened Trail (trail clearing, crushed stone w/ organic stabilizers)	2,830' (6' wide)	$15-$22 (crushed stone) + $14.40/linear foot (stabilizer)	$77,089 -$103,012
Natural Surface Trail (trail clearing, crushed stone)	5,330' (4' and 6' wide)	$15-$22 (crushed stone)	$50,000-$70,662
Boardwalk (wood or composite timber, 2 helical pier footings per 10'; or modular units)	Main concept: 1,136' (6' wide) Shorter option: 458' (6' wide)	$130-$200 $130-$200 $54-$144 (modular-lg) $54-$144 (modular-st)	$147,680-$227,200 $59,540-91,600 $61,344-$163,584 $24,732-$65,952
Retail Area Walkways (crushed stone w/ organic stabilizers)	1,000' (6' wide)	$15-$22 (crushed stone) + $14.40/linear foot (stabilizer)	$17,400-$24,400
Farm Road Reconstruction**	1,104' (8' wide)	$15-$22 (crushed stone) ??? structural fill, grading, culverts, drainage lenses	$16,560-$24,288
Farm Bridge* Replacement**			$7,000-$20,000
Totals****	11,400'/ 2.2 miles		
		w/ Main Boardwalk Concept	$315,720-$469,562
		w/Shorter Boardwalk Option	$227,589-$333,962
		w/ Main Boardwalk Concept (modular)	$229,393-$405,946
		w/Shorter Boardwalk Option (modular)	$192,781-$308,314
Total Cost Range			**$192,781-$469,562**

* The cost estimates presented are intended to be guidelines for a concept-level design. While trail dimensions are roughly accurate, available price estimates for the same material vary greatly, and may or may not include installation costs.

Costs were estimated through conversations with informed professionals, through comparison with other trail projects, and from the following websites:

National Center on Accessibility: http://www.ncaonline.org/products/index.php4?cat=Surfaces

Unit/Item Costs from "Trails For The 21st Century," published by Rails-To-Trails Conservancy, 2001: http://www.nysphysicalactivity.org/site_beactiveenv/nybc/source_files/6_resources/costdata/states_costest.rtf

Recreation Management Magazine:
http://www.recmanagement.com/features.php?fid=200305FE02&ch=4

** Estimates for the reconstruction of the farm road only include the road surface. Regrading the road and the drainage ditches, and citing the culverts and drainage lenses, will require an accurate survey of the site and possibly the assistance of an engineer or other professional.

*** The farm bridge estimate does not include the potential and likely cost of rebuilding the bridge foundations. This, along with the choice of bridge materials, and the options to build a customized structure or site a prefabricated model, will ultimately determine the bridge cost.

**** Total estimates are provided for trail concepts that allow for options in 1.) total boardwalk length, and 2.) choice of a customized or modular boardwalk. Not included in the overall estimate are costs for site features such as: signage, benches, smaller stream bridges, stepping stones, gates and wildlife viewing platforms.