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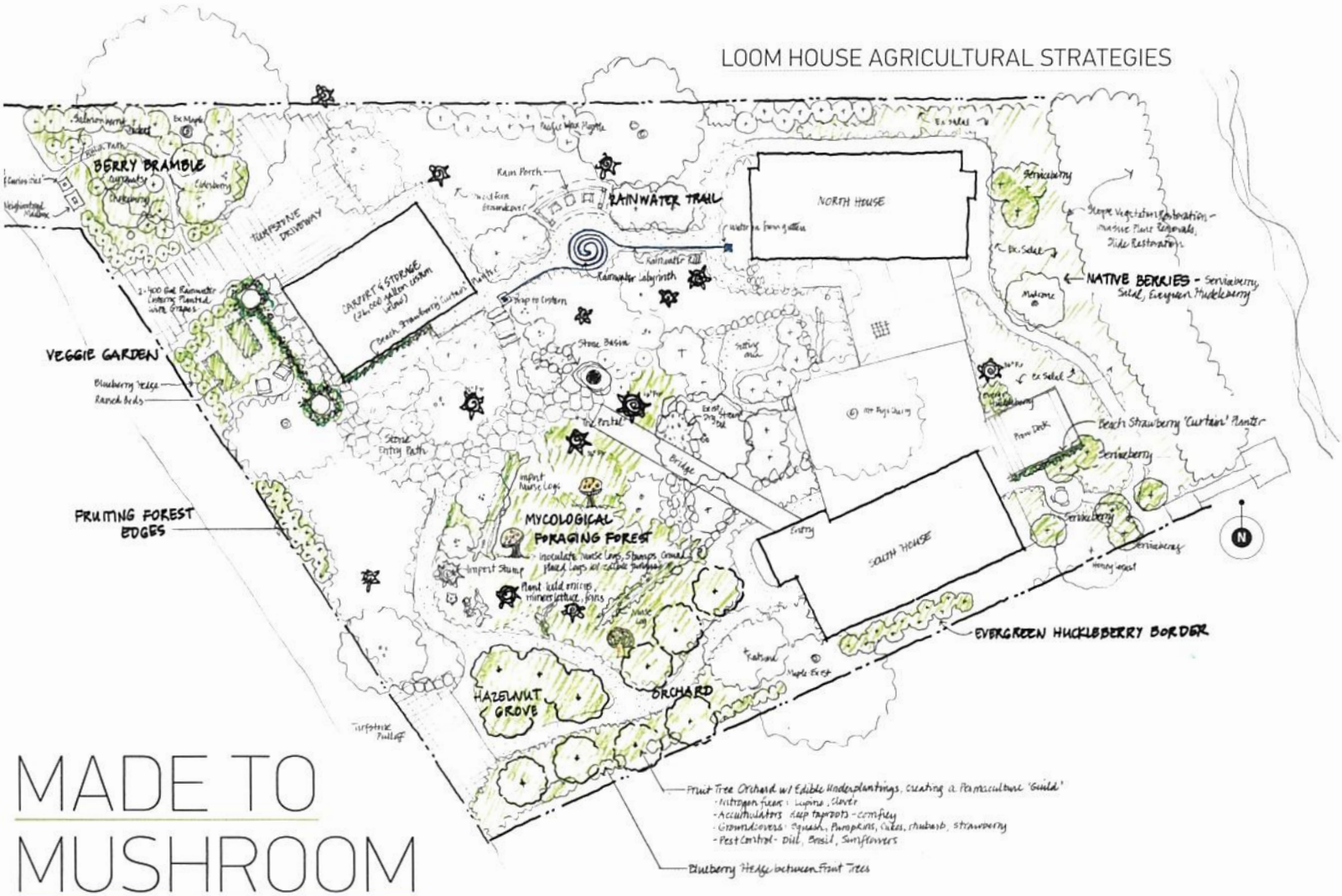


MADE TO MUSHROOM

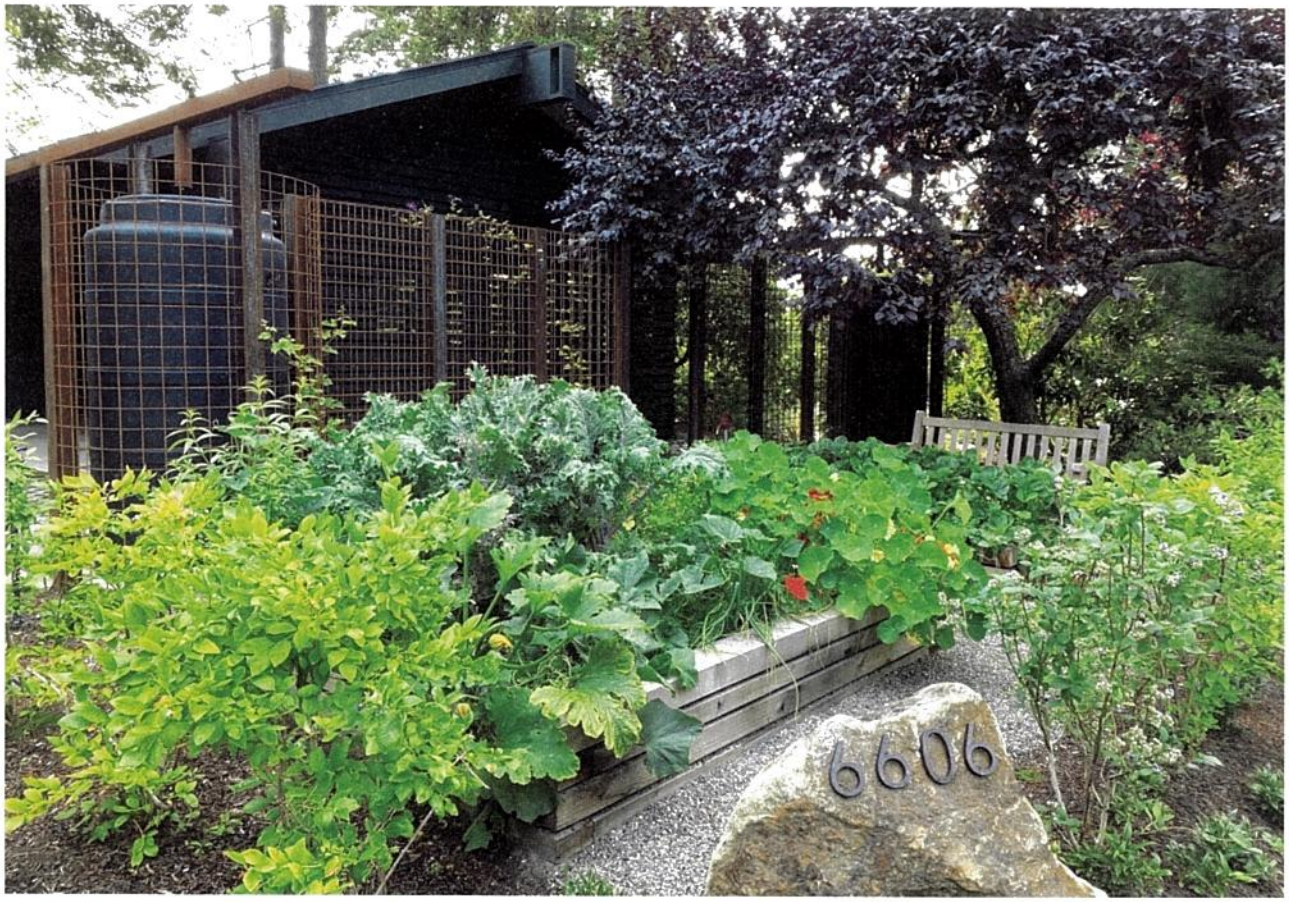
A CREATIVE CROP HELPED ANNE JAMES LANDSCAPE ARCHITECTURE HIT A TRICKY SUSTAINABILITY TARGET.

BY TIMOTHY A. SCHULER

BOVE
he Living Building hallenge's food roduction requirement elped inspire the roject's adventurous lant palette.

Anne James, ASLA, pored over the site plan one more time. In front of her were concept sketches she had made for a roughly half-acre residential property on Bainbridge Island across Puget Sound from Seattle. The wedge-shaped site, in James's reimagining, was already brimming with food-producing plants—wild berries, hazelnuts, raised beds for vegetables—but it wasn't enough.

The project, known as Loom House, was a collaboration with the Miller Hull Partnership, Biohabitats, and other specialized consultants, and the team was working to meet the lofty standards of the Living Building Challenge, one of the most stringent building sustainability standards currently in practice. The existing house, composed of two structures perched on the edge of a bluff and joined by a wooden deck, had been built in 1968, and designed by the noted Pacific Northwest modernist Hal Moldstad. In 2016, Karen Hust and Todd Vogel



ABOVE
Raised beds for herbs and vegetables were possible only where there was enough sunlight.

purchased the house, attracted to the property by its proximity to Vogel's sister and her family, who live just down the street, as well as the rugged beauty of Bainbridge Island.

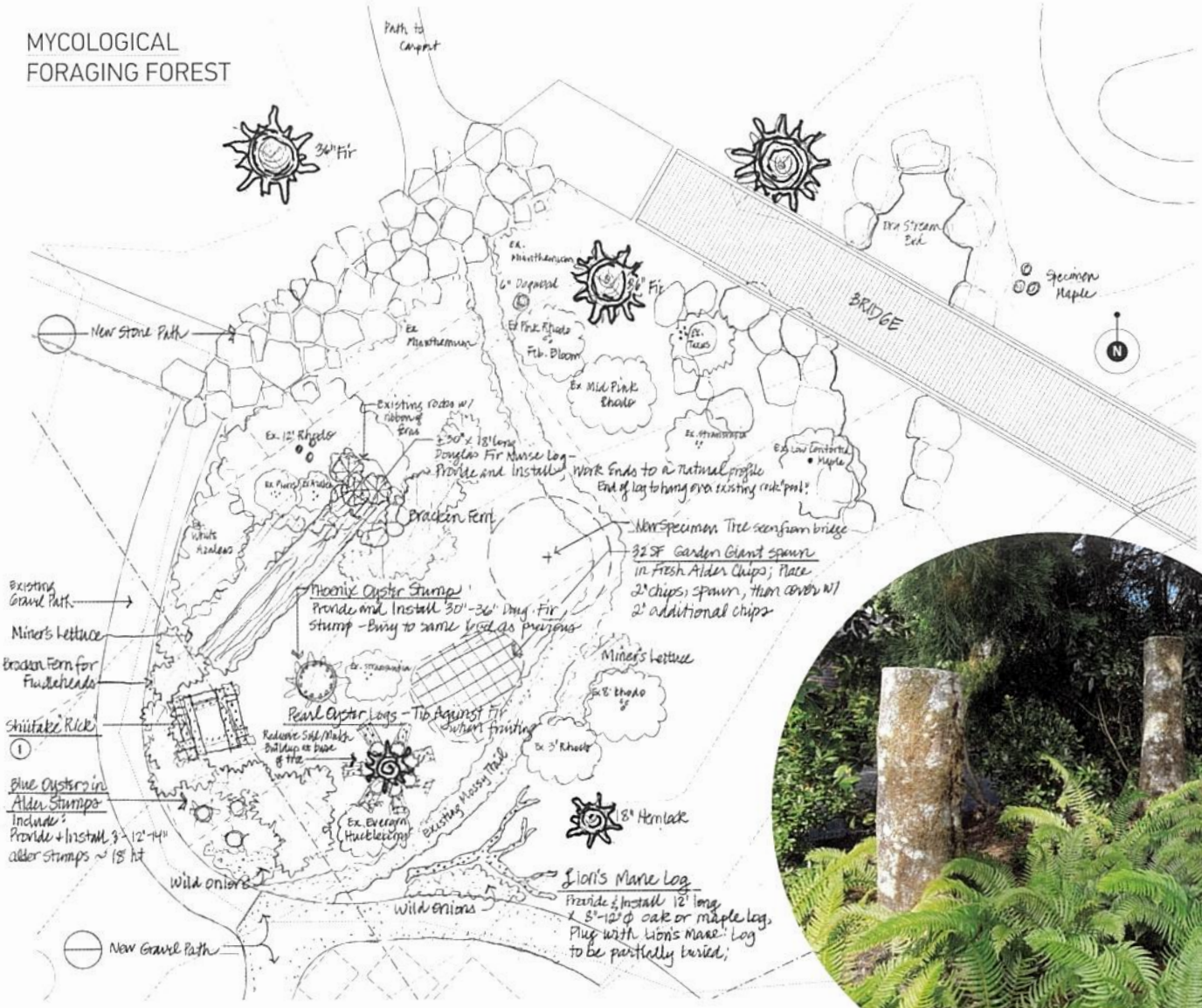
Hust and Vogel decided to pursue Living Building certification after a meeting with the design team at which Miller Hull presented every sustainability rating system on the books. "We didn't know much about the Living Building Challenge, but when we learned about it, we just felt very inspired," Hust recalls. "We wanted to do the hard thing."

To be certified under the Living Building Challenge, a project must, among many other imperatives, supply all of its own water, produce all of its own energy, and avoid materials containing any one of nearly 20 harmful chemical classes cataloged on the program's Red List. One of the more unusual requirements of the challenge is that projects must enhance access to healthy, locally grown food by devoting a part of the total project area to agricultural production. In the case of the Loom House, the project's floor-to-area ratio of 0.15 meant that the design team needed to include more than 7,000 square feet of food production on-site.

The house's densely forested site didn't leave the design team many options. But after several days of contemplation, an idea struck James—the possibility of introducing a type of edible organism she'd never designed with before: mushrooms.

"That was a great stroke of brilliance from Anne," says Chris Hellstern, an architect at Miller Hull and the firm's Living Building Challenge services director.

James—who, prior to opening her office, Anne James Landscape Architecture, spent a decade working alongside the acclaimed landscape architect Richard Haag—proposed creating a mycological foraging forest of fungi native to the Pacific Northwest. The idea emerged organically, she says, from memories of hiking in and around western



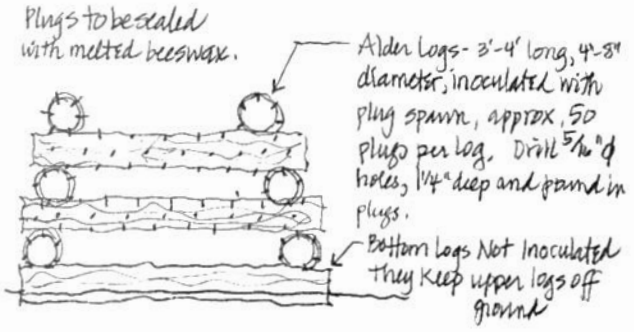
ABOVE
Inoculated stumps and other fungi-growing media are arranged as part of a foraging forest.

INSET
Upturned logs will eventually be colonized by shiitake and blue oyster mushrooms, as stumps might be in an unmanaged forest.

Washington. "I've worked a lot with this plant pathologist named Dr. Olaf Ribeiro, and walking through the forest with him on projects, I learned a lot about mushrooms," she says. "So it was just by observation, really, and internalizing that observation [that the idea was born]."

Combined with the other planned agricultural components, including a berry bramble that would be open and accessible to neighbors, the mycological foraging forest was the last piece in satisfying the Living Building Challenge's urban agricultural requirement. Fortunately, it was also an idea embraced by the clients. "It was really exciting," Hust says. "I mean, who wouldn't love to be able to grow mushrooms and harvest them from their own backyard?"

For landscape architecture, the Living Building Challenge is as much about what a team doesn't do—greenfield development is ineligible, for example, as is the use of many fertilizers and pesticides—as what it does, and James describes her approach at Loom House as one of careful editing, preserving a series of mature fir trees and charismatic rhododendrons while enhancing the garden's ecological value by replacing a majority of ornamental species with native plants. As with the mycological garden, James drew inspiration from the island's ecology. "The thing to think about is,



ABOVE
The incorporation of mushrooms required specialized drawings and planting schedules.

RIGHT
After inoculation, some logs were assembled into loosely stacked structures called ricks.

what is the landscape around you?" she says. "What can grow without supplemental water in the conditions that you have?"

Besides the agricultural requirement, the toughest target to hit, James says, was the water-use-reduction requirement. The Living Building Challenge prohibits the use of any potable water for irrigation and requires that 100 percent of stormwater be treated onsite. Existing buildings must also reduce indoor water use by 30 percent. Although the Cascadia region is a famously wet place, the particular pattern in which precipitation falls in Seattle and the surrounding area created challenges for landscape maintenance, James says. "People don't understand that in Seattle we have a lot of rain, but we don't have hardly any rain from, like, the first of July through the end of September. We're talking about a Mediterranean climate: dry, dry, dry," she says. What that typically means is that cisterns are oversized to make it through the dry season. But on residential projects, storing enough water for the irrigation demand often isn't feasible. "What you have to do is just reduce your use as much as you can," she says.

Replacing the property's lawn and ornamental plants—including a large and enigmatic wisteria vine that was transformed into a chandelier for the dining room—propelled the team a good part of the way to the water use target. But even with new native plantings and a 10,000-gallon cistern under the former driveway, the cost of meeting the requirement was out of reach. "We could have provided the water for the project, including the irrigation, but the cost of the system that we would have needed to build was perceived as nonsustainable because it was so expensive,"

ABOVE
King stropharia was among the first mushroom varieties to appear following the project's completion.

"WHO WOULDN'T LOVE TO BE ABLE TO GROW MUSHROOMS AND HARVEST THEM FROM THEIR OWN BACKYARD?"

—KAREN HUST

James says. "We were trying to be a model for small houses, renovated houses, and it just seemed like a disconnect." The project ultimately received an exemption in the water category, based on an annual reduction in water use of approximately 60,000 gallons, or more than 50 percent compared to baseline.

If large-scale water storage can be cost prohibitive for the average homeowner, the creation of a mycological garden is quite the opposite. "It's pretty cheap," James says. "It's not something a normal person couldn't do."

After some initial research and consultation with staff at Fungi Perfecti —an Olympia, Washington-based mycological supply company founded by the mushroom evangelist Paul Stamets (whose book *Mycelium Running: How Mushrooms Can Help Save the World* was also a helpful resource)—James assembled a list of six "regionally appropriate" edible mushroom varieties: shiitake, lion's mane, king stropharia, blue oyster, pearl oyster, and phoenix oyster. These were chosen because they aligned with Bainbridge Island's climate and also matched up with the hardwood species available. Different tree species are better suited to certain fungi, James explains, and the varieties selected reflected the types of wood she could acquire "fresh" from local arborists: alder and big-leaf maple. "You have to have fresh logs so that they're not contaminated with other mycelium," James notes. "Types of wood available would vary in different areas of the country, and fungal selections would likely reflect that."

James's unusual take on a food forest —which, in addition to mushrooms, included wild onions and edible ferns—did come with a steep learning curve, however, as well as a hefty amount of unconventional landscape material: dozens of fresh alder logs (for inoculation), hundreds of packets of mushroom plug spawn (the inoculant), and several pounds of beeswax (for sealing the plugs). As part of her drawing set, James developed a mycological inoculation schedule, which detailed the names, quantities, inoculation types, and timing of the various mushroom varieties. Some fungi could be cultivated year-round; others only in the spring or fall.

To build the garden, workers from Ohashi Landscape Services stacked the alder logs into a series of three-foot-high, Jenga-like towers called "ricks," then inoculated them with mushroom spawn. They drilled holes 5/16 of an inch in diameter up and down the length of the logs, into which they inserted the plug spawn (small, myceliated wooden dowels). After the plugs were inserted, the workers melted the beeswax over a small camp stove and used the wax to seal the holes. For the same reason "fresh" logs are necessary, the

RIGHT
When it was completed, the Loom House became the first residential renovation to achieve Living Building certification.

BELOW
Other strategies to meet the requirements included reusing site materials such as concrete.

ricks' base logs are not inoculated, forming a barrier that prevents the rest of the structure from being infected by other soil-based mycelium. In addition to the ricks, myceliated alder chips—nested between two uninoculated layers—were spread over a 32-square-foot area of the forest floor, and several more alder stumps were inoculated and stood upright in the garden. "The thought was that it would look like old trees that got cut down, when in fact they were brought in and inoculated with mushroom mycorrhizae," James says.

Building the mushroom garden was a novel experience for the entire design team. "These landscape guys, they had never done this either, so I was trying to give them all the information that I could," she says. She made a point to be on-site during the inoculation process, partially to ensure it went smoothly but also to observe the process firsthand. "It was new to all of us," she says.

Completed in 2019, the house underwent the requisite performance monitoring for one year. In 2021, the Loom House received certification under version 4.0 of the Living Building Challenge—only the fourth house, and the first renovation, to do so. Hust, one of the owners, compares the house to a living organism that exists in symbiosis with the elements at play on the site—"the water and the sun and the wind and things that grow naturally here. It feels like our house is helping to root us into this place in a really honest way, and Anne has been really instrumental in helping weave the house into the landscape." Hust and Vogel have even had the pleasure of seeing the first few mushrooms emerge from the forest floor, though it will be a while yet before the ricks produce enough fungi for a harvest. (It can take anywhere from six months to five years for the fungi to fruit, depending on the growing medium and the local conditions.) "We definitely have seen a few," Hust says, "but they're just getting going." ●

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