ES 300

Women Who Will Farm: a Proposal to Move a Farm onto Campus

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Table of Contents

Abridged Proposal

In the ES 300 course of Spring 2017, focusing on improving the food system at Wellesley College, we addressed the issue of moving a farm onto the college campus. The current farm is located in the North 40, a piece of land which the college sold to the Town of Wellesley in 2015. A portion of the North 40 is leased from the Town so the student organization, Regeneration, can continue to farm organically on it. (Research Process: Regeneration Organization)

However, several difficulties currently make it difficult for students to maintain the farm. The most prominent of these is the distance of the farm from campus, which limits accessibility as well as student involvement. Others include the lack of structures on the plot, which force students to carry tools to and from the plot; management complications, especially in the summer when no one is available to water the growing plants; and, recognition, since few people on campus know of the farm's existence, and even fewer participate in its maintenance.

To address these issues, we recommend that the farm be moved to campus. The ideal location for the plot would be in an open area between residence halls Bates and McAfee and the backyard of the SCoop house. Lying parallel to Washington Street, it can hold a 175 feet by 50 feet in-ground farming plot, which is twice as large as the current farm. This plot would have an on-site storage shed for gardening tools, and a border fence to keep deer and other pests out. (Proposals: Site Descriptions: Washington Street Plot) We conducted soil testing and ensured that the soil at this location had acceptable levels of lead and arsenic, which would have proved dangerous to student health in the long run. (Proposals: Soil Testing and Results)

To ensure that this option was a viable one, we then built a budget and management plan addressing pressing concerns. We found that the highest cost items would be the shed, a fence, and a wheelbarrow ($530). For total costs per year, the Washington Street plot is the cheaper option of the several we considered. Indeed, an in-ground plot near Washington Street would also have a high cost efficiency per square foot: $0.24 per square foot in the first year, and on the order of $0.07 per square foot in subsequent years, assuming that lower cost per square foot is roughly equivalent to cost per vegetable and cost per pound of produce. (Proposals: Budget)

For the management plan, we took several considerations into account. We first defined the roles of people on the farm, from farm manager to core volunteers and peripheral volunteers. Second, we included steps in the growing cycle in comparison to the academic calendar, which deliniates student involvement. Finally, we considered compensation for work on the farm. Combined, these criteria helped us pinpoint two pressing needs: first, a full-time staff farm manager who would take care of running the farm on the long term; second, some form of funding for crops to be watered in the summer, thus ensuring they will not die of thirst. (Proposals: Management Plan)

On the long run, the Washington Street plot, being such a large area of land, would give Regeneration space to try out crop rotation, as well as provide room for faculty and other interested parties to farm their own plots. In addition, the location, close to Residence Halls and SCoop, would make it easy to collaborate with residential life. It would also increase the farm's visibility and thus the number of people interested in working on it, including as a part of Regeneration. In fact, physical activity on the farm as well as being outdoors would provide important physical and mental health benefits for students. The concern of summer workers could be addressed, since summer students live in Bates and McAfee. (Goals)

Furthermore, moving the farm to this location would provide opportunities for academic integration. Located close to the Science Center, it would allow interested professors to take their students out to the plot or even conduct independent research at this location. Engineering classes could test out farming techniques and water use management, while biology classes might study crop rotation and pollination. Social sciences could also use the farm to learn about food systems' ties to societies. Ideally, a member of faculty would teach a few classes on agriculture and take on the responsibilities of managing the farm on the long term. (Proposals: Academic Integration)

The numerous benefits of moving the farm to the Washington Street plot on campus far outweigh the downsides. This action can only improve student experience at Wellesley while illustrating the college's commitment to sustainability.

I. Introduction

Environmental Studies 300, or Environmental Decision-Making, is the interdisciplinary capstone seminar for the Environmental Studies major at Wellesley College, which addresses an environmental issue within the Wellesley College community each year ("Course Browser"). This year, the course focused on improving the sustainability of the food system at Wellesley College. Our class defined a sustainable food system in general as, "a collaborative network that includes the growth, harvesting, distribution, consumption, and waste disposal in such a way that all people are well-nourished, wastes and by-products are recycled and integrated, is socially and economically feasible, has a minimal impact if not positive impact on resources, applies to all scales, is resilient and fair, and promotes social, environmental, and economic equity, longevity of the system, and resiliency in the face of change." We asked ourselves what a sustainable food system would look like at Wellesley, and specifically how the Regeneration Student Farm fits into a sustainable food system here.

This project builds on the work of a previous ES 300 class. In their 2011 report, "Sustainable Sustenance, Greening Wellesley College's Food System," the report contains a number of recommendations for improving the sustainability of the Wellesley College food system, particularly in the context of AVI Fresh and the dining hall system. The report cites the Regeneration Student Farm as an opportunity to get the campus involved with hyperlocal food, "a well-defined community-scale area in which products are both produced and consumed by residents of the area," and "a growing trend that goes a step beyond the local food movement" (ES 300, 2011).

Hyperlocal food often promotes sustainability. Indeed, small, local farms are generally less resource-intensive than large factory farms, using less outside inputs like fertilizer, pesticides and herbicides (ES 300, 2011). This can have a positive effect on the biodiversity of the local ecosystem, as well as on the quality of the food grown on the farm. In fact, hyperlocal food is allowed to ripen longer than non-local food, and thus boasts higher nutritional value. Cultivating multiple kinds of crops, including heirloom varieties, and multiple animal breeds also supports biodiversity. In addition, hyperlocal farms use less packaging on their products by selling fresh products locally. Furthermore, food from hyperlocal farms tends to be less energyintensive than food from factory farms. First, local farms in Massachusetts are generally small, so their practices don't require fossil fuel-intensive machinery. Second, greenhouse gas emissions decrease in the transportation process because hyperlocal food does not travel far between producer and consumer. Third, food from hyperlocal farms does not need as much refrigeration because it is purchased right after harvest. Thus, local seasonal food has a lower impact on climate change than food produced at factory farms.

In addition to these sustainable advantages, the report also explains that hyperlocal food added to the campus food system would benefit the college (ES 300, 2011). The food, being fresher, would have better nutritional value and a preferable taste. Hyperlocal farms would also create ties and interactions with the community, both on and off campus, offering educational opportunities and new business connections. Hyperlocal food might even save the college money. These findings make hyperlocal food from Regeneration Student Farm an appealing option to increase food system sustainability at Wellesley College.

II. Research Process

A. Regeneration Organization

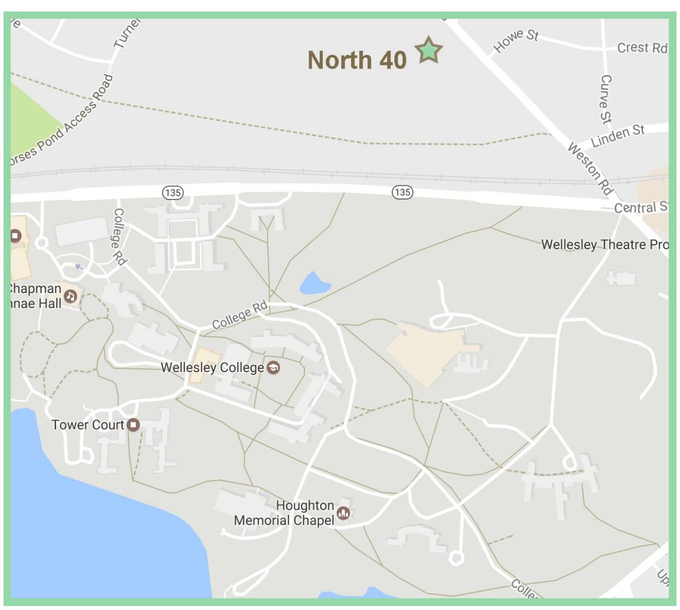

Figure 1. Map indicating the location of the current plot

The Regeneration Student Farm was established by Wellesley students in 2006, and continues to be run by students who "strive to farm organically, advocate food justice, and raise consciousness of sustainable agriculture in our communities," ("Environmental Studies: Student Organizations"). Regeneration, the student organization that runs the farm, is colloquially known as Regen.

The current farm plot measures 3,600 square feet, or approximately 1/11th of an acre. It is located on the North 40, a parcel of land located off campus that Wellesley College sold to the Town of Wellesley in 2015. After the college announced it would be selling the North 40, representatives from the organization met with the Vice President of Finance and Administration in the academic year 2013-2014 to discuss the future of the land (Al-Qadi, 2014). In the meeting, they talked about moving the farm to campus "in a location that is suitable for growing," so that Regeneration might continue farming.

However, by Spring 2017 when we began this project, there had been little progress made on this front. In a meeting with Regeneration's current President, we discussed the potential move to campus, the conditions on the current plot, and the workings of the organization ("Amy Isabelle: Regeneration President", 2017). While the administration of the college has expressed willingness to move the farm to campus, it is thinking on a longer time scale. Moving the plot on-campus is currently a lower priority because the college can pay to lease the current plot on the North 40 from the Town of Wellesley. Regeneration and the college administration have also had trouble finding a space on campus for the farm. This issue is complicated by the presence of toxic materials like lead and arsenic in some of the soil on campus, as well as by upcoming campus renewal plans that may change the landscape and layout of campus over the next few years.

The President expressed that she thought it would be good for their organization to move the farm to campus ("Amy Isabelle: Regeneration President",2017). Access for members would be facilitated because they would not have to walk all the way to the North 40 (Figure 1). In fact, there are only about 10 members of Regeneration in the Spring 2017 semester, which is less than ideal for successfully farming the plot. The difficulty of accessing the plot may be a contributing factor to the low participation rate. Furthermore, Town of Wellesley's community garden rules state that Regeneration cannot have structures on the site. This means they cannot have a toolshed or picnic table, two important features for Regeneration's work and community.

Regeneration's president also gave us vital information on the current workings of the organization ("Amy Isabelle: Regeneration President",2017). To start, the output of produce from the farm is low and highly variable, making it difficult to estimate how many pounds per week of produce they get in the months where they harvest. This is partially due to the low membership and distance from campus, and other structural issues with how the farm is run and maintained. In addition, the greatest output of the farm is in the summer, when few people are on campus due to the academic schedule. Regeneration lost much of their crop to the drought this past summer, especially because the plot was not being watered frequently.

At another Regeneration meeting, we discussed problems that the organization faces further in order to identify potential solutions (“Regeneration Meeting”, 2017). Under their current system, no one works on the plot during the few weeks between the end of finals and beginning of summer session, and the few weeks between the end of summer session and when classes begin in the fall. During summer session, interns from the Botanic Gardens have the option to help maintain the plot in addition to their other duties, but there are no student workers whose job explicitly focuses on maintaining the plot. Regeneration explained that the current lease cycle on the land from the Town of Wellesley only lasts for three years at a time, which is also a challenge for long-term growing and organizational plans. Transportation challenges are also important. Regeneration members need to carry supplies, including tools, seeds, and produce back and forth between the plot and campus, since they have no built structure on the plot in which to store things. They also have no vehicle that is exclusively theirs to transport their tools. Furthermore, the plot itself is not ideal for growing. In particular, a failed attempt at mulching with cardboard left plastic tape in the soil. Trash also finds its way to the plot from the nearby road. Finally, the members agreed that their output is currently neither large enough nor consistent enough year to year to engage with the college’s dining halls. Their highest priorities were engagement with El Table, SCoop, collaborations with other student organizations, and a potential farm stand.

In our third meeting with Regeneration, we asked what their ideal outcome of this project would look like (“Regeneration Class Meeting”, 2017). The organization explained that while their current mission is to take care of the plot they have and produce as much as they can, they used to be bigger and more plot-focused, with regular farm stands, an ideal to which they would like to return. A perfect outcome for them would be a farm on campus, easier to access for members and more visible to the community. That plot would exist as one centralized space, rather than multiple smaller decentralized plots, to make it easier to manage. Regeneration would also like a greenhouse structure for seedlings and a shed on the plot to store tools. In addition, having a picnic table would make it easier for them to hold social events around the plot and build their community. In terms of activity, their ideal organization would include more members and more random involvement from students, like on open days or signing up for watering times. It would also involve members of the Wellesley College faculty. Ideally, an intern or summer fellow would have a specific position to water the plot in the summers, rather than just working on the plot in addition to his/her main duties. Finally, Regeneration imagines a set system to distribute produce to people who want it.

B. History of Farming at Wellesley

1. Wellesley Archives

In order to investigate if there were farming or gardening groups at Wellesley College in the past, we visited the Wellesley College archives. Indeed, Wellesley students have long been connected to their local food systems in the past. During World War I, Wellesley College offered special wartime emergency electives to prepare students with knowledge and skills that would empower them to better serve their communities. One of these electives, called Food Production, Conservation, and Gardening, aimed to teach students how to grow and preserve their own food in the likely event that food would be scarce due to rationing. It was expected that students in this elective would share these skills with other students and local Wellesley citizens to help sustain the community and its food system (Wellesley College Archives, 1917).

There is also a precedent for student gardens on Wellesley's main campus. Starting in 1933, Wellesley's Botany 101 made use of an open area next to the Observatory, in what is now the arboretum, to create 41 student gardening plots (Figure 2). Intended to enhance academic learning through real-life gardening experience, the plots helped students to better understand the life cycles and pollination patterns of crops. Each student was given their own five foot by five foot plot, and full control over what they planted and where they planted it within their individual plot. While most students primarily planted flowers, a few also grew vegetables and other crops. Students cared for them throughout the entire year, doing plantings both in the fall and spring (Boston Globe, 1933).

Figure 2. Plan of Botany 101 student garden plots by the Observatory via Wellesley College Archives

Figure 3. Image from a 1942 newspaper article shows Wellesley College students managing their Victory Gardens.

These farmed plots remained for several years. By 1942, they transitioned to Victory Gardens for World War II. During yet another time of war, Wellesley students wanted to utilize the resources they had on campus -- in this case fertile soil and gardening expertise -- and use it to help feed their community and support the war effort (Wellesley News, 1947). A Wellesley News article shows students still active in the gardens as late as 1947 (Figure 3). That same year, the Botany Department, in order to promote Wellesley College's strong gardening expertise and legacy, started an annual tradition in May known as Garden Day. Off campus guests and members of garden clubs in the north-east attended, and the Botany Department hosted lectures, gave tours of the campus' greenhouses and gardens, and screened gardening films. This tradition lasted until 1959 (Wellesley College Archives, 1957).

2. 1998 Landscape Master Plan

The 1998 Landscape Master Plan, written by Michael Van Valkenburgh and Associates, was an important resource in understanding the relationship between Wellesley students and their campus. Through this investigation, we came to the following conclusions.

First, the campus landscape has changed dramatically since the land was bought in the 1860s. The Landscape Master Plan documents this change from a pastoral landscape typology to one in which the campus has been subsumed into the suburbanizing MetroWest region of Boston: "Wellesley College's campus ... began a gradual process of homogenization and standardization. As diversity and difference were eliminated ... the landscape evolved into a stripped-down version of the pastoral, a type of collegiate suburbanization" (Meyer, 1998, p. 17). It is important to note that much of this change to the landscape over the years has not been the result of natural processes, but rather the landscape has been significantly altered to fit the vision of the Durants and to meet the needs of the College: "the campus was cultivated, not wild. Its landscape was the result of human activity on the land" (Meyer, 1998, p. 14).

We found evidence of a strong tradition at Wellesley of using the landscape both as an educational device and as a way to promote mental and physical health: "... the campus landscape was conceived to educate students about ... horticulture and botany, to support recreational activities necessary for physical health, and to elevate the spirits as well as the minds of students, staff, and faculty" (Meyer, 1998, p. 3). In addition to being an essential part of student wellbeing and the curriculum, the campus has fostered a sense of place for the Wellesley

College community: “immersion in, and frequent contact with, the landscape bonded [the students and faculty] to their place, to this place” (Meyer, 1998, p. 6).

These findings support the establishment of a student farm on campus. A student farm would be a return to Wellesley’s rural past, and instead of marring a “pristine” landscape, be a more obvious intrusion into an already heavily designed landscape. It would also bolster student wellbeing as well as supplement the Wendy Paulson initiative, which seeks to identify ways in which the campus landscape can develop special meaning for students.

C. Benchmarking

To consider how the current Wellesley farm compares with other college farms, we researched other colleges with a similar student body size and a New England climate. Most college farms we examined were much larger than the current Regeneration plot, and had institutional support in the form of consistent and substantial funding and paid staff, varying based on plot size (Table 1). The lack of farms comparable in size and operations to the current Regeneration farm is possibly due to the fact that any existing would be too small to establish a web presence, and were therefore not visible to us. Given Regeneration’s current and projected volume of output, we determined that dining hall integration is not feasible at this time. This research provided us with some ideas with respect to expansion and future goals. Having a staff farm manager and considering the potential for full academic integration were some of these ideas.

	On Campus?	Paid Staff?	Dining Hall Integration?	Academic Integration?	# of Students	Size of Farm (Acres)
Whitman	✗	✓	✗	✓	1,400	21,000
Penn State	✗	✓	✗	✗	3,500	600
Warren Wilson	✓	✓	✓	✓	900	275
Oberlin	✗	✓	✗	✗	2,900	70
Amherst	✓	✓	✓	✓	1,700	50
Hampshire	✓	✓	✓	✓	1,410	20
Evergreen	✗	✓	✓	✓	4,400	25
Dartmouth	✗	✓	✓	✓	6,300	2
Reed	✓	✓	✗	✗	1,400	.25
Mt Holyoke	✓	✓	✗	✓	2,300	
Wellesley	✗	✗	✗	✗	2,350	.08

Table 1. Comparison of researched college farms by size. Wellesley is currently the smallest one. No results were found for the size of Mt. Holyoke.

D. Stakeholder Analysis

1. **Alumnae/Administration**

Throughout the course of the semester, we met with several stakeholders, including Professor Kristina Jones, the faculty advisor of Regeneration, Director of Design and Construction Jon Alvarez, Assistant Director of Campus Planning Michelle Maheu, Sustainability Director Patrick Willoughby, and John Olmsted, Manager of Landscape Operations. Not least of all we met with the members of Regeneration themselves. These meetings gave us a better idea of what would be feasible for our proposal of a student farm on campus.

We also took into account the interests of Residential Life staff, Sustainability Cooperative members and other student cooperatives on campus, and alumnae (Appendix I). We believe that many of these groups would be positively impacted by the decision to move a farm on campus and that close collaboration with these groups moving forward will be very important in making this proposal successful.

Our stakeholder analysis made it clear that a successful proposal would need to be consistent with the principles laid out in the 1998 Landscape Master Plan (see Section II, Part B(2) for more information). Our proposal could also not conflict with future campus renewal plans as specified in the Wellesley 2025 Plan, and needed to include relevant information such as soil tests.

2. **Public Opinion**

The last step in our information-gathering phase was to gauge public opinion on the various aspects of the proposals we were considering at the time (late March). The surveys we conducted demonstrate that Wellesley College students and faculty are largely in favor of having a farm on campus. Over 92% of the students and nearly 90% of the faculty and staff who responded replied "yes" when asked if they would like to see a garden on campus (Figure 4). These results guided the further development of our proposals (Appendix II).

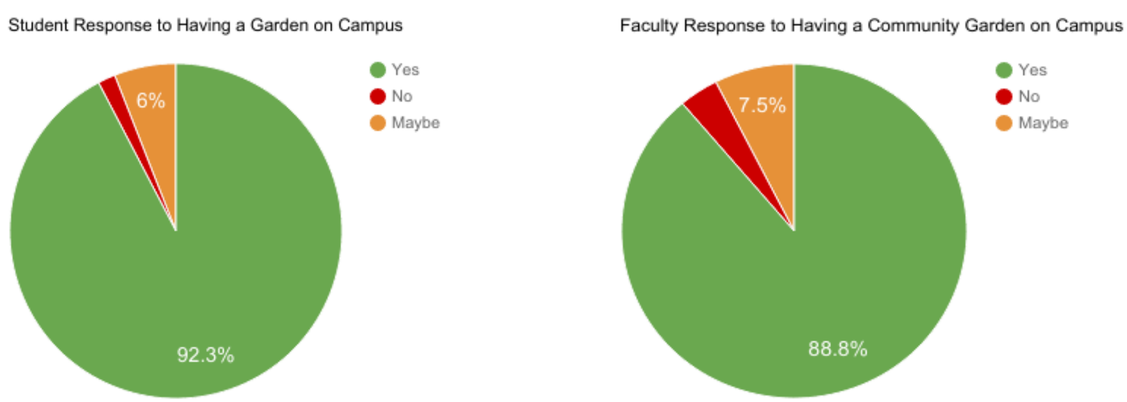

Figure 4. Results of the surveys for a. Students and b. Faculty showing the responses to having a garden on campus.

Through the surveys we also determined general preferences of the faculty and students about how they would like to be involved in a farm on campus, whether they would be interested in participating in a CSA (community supported agriculture) system or a different purchasing model for produce, whether they preferred smaller, decentralized gardens or a large, centralized farm, what kind of produce they would like to see grown in an on-campus farm, and where an on-campus farm should be sited (Appendix II).

We recognize that those who responded are only a fraction of the students and faculty who would be affected by the decision to move a farm on campus. These respondents may be self-selecting. However, we have had conversations with many enthusiastic students and faculty members who declared they would like to volunteer on a campus farm.

III. Goals

This proposal aims to prioritize the quality of life of all community members. We thus chose five goals based on our definition of a sustainable food system. Our proposal should maximize environmental sustainability, student health, accessibility and equity, academic integration, and the economic viability of Wellesley College's food system. For each goal, we evaluated the general benefits of moving the farm to campus, as well as how moving the farm to campus would affect progress toward each goal.

A. Sustainability

We propose to move the garden, currently located on the North 40, onto campus in order to increase the college's sustainability. Indeed, the garden will produce food with sustainable credentials, namely through a shortened supply chain without environmentally harmful chemicals or transportation emissions. This will partially offset the negative effects of food with less sustainable sources consumed on this campus. Our definition of a sustainable food system also requires a minimal impact on resources, and recycled and integrated wastes and byproducts. A campus farm meets these requirements. More importantly, the presence of a garden on campus will serve as a symbol of Wellesley's commitment to sustainability and raise awareness through increased visibility. This will motivate students to cultivate more sustainable lifestyles. Teaching students how to grow their own food will also give them the skills necessary to lead more sustainable lives after graduating from Wellesley. By raising awareness about sustainability and helping students identify themselves as people who care about sustainable farming and the broader environment, the garden will inspire further environmentally responsible actions from the community.

B. Student Health

Another key aspect of our proposal is for the garden to improve student health and wellbeing. Having locally-grown, organic produce available at student cooperatives like El Table or at student organizations' events can impact student health by improving students' diets. In addition, taking care of the garden through watering, weeding, and planting will increase students' activity levels. Getting students outside, either to do gardening work or to just appreciate the garden, will improve their mental health and stress management. A study published in the Journal of Health Psychology found that gardening significantly reduces stress as measured through salivary cortisol levels in addition to self-reported mood (Van Den Berg and Custers, 2010). The study compared it to reading indoors, and found that while both reading and gardening did have positive effects, gardening reduced cortisol levels much more significantly. The stress reduction and mood improvement also lasted far longer than those gained by reading. Finally, an on-campus garden will foster community by encouraging interactions among students, both through working the plot together and through events and gatherings. Structures are banned on the North 40, so Regen can no longer easily have gatherings there. The garden on campus could have picnic tables and foster these interactions, rather than suppressing them. The plot will also encourage community through cooking food and sharing meals together at the various co-ops: food made by students from farm to table.

C. Ease of Access and Equity

One of the largest benefits of moving the plot to campus is the resulting increase in accessibility. Currently, interested students need the time and ability to walk all the way to the North 40 plot (and cross multiple major roadways) while carrying all tools and necessary materials to participate in gardening. Bringing the plot on-campus, either in raised beds or in the ground, will facilitate access both for Regeneration and for the community at large. It will also be easier to take steps ensuring that the plot is physically accessible to the entire Wellesley community. Furthermore, we suggest the creation of a paid internship position to care for the plants during the summer. This will make the plot more accessible by enabling students from all economic backgrounds to participate. Thus, students who may not have otherwise had access to the plot will have a chance to engage in gardening.

D. Academic Integration

Finally, the garden can be used in several academic contexts. An on-campus garden can serve as a faculty resource, not only within the Environmental Studies and Biological Sciences departments, but to any department whose coursework addresses themes like agriculture or sense of place. A schedule for interested faculty would enable them to bring out their classes at various moments of the season in each semester while preserving independent student activities. Additionally, if the plot had a staff manager, this staff member could potentially teach a course specifically designed around the garden. Outside of formal academia, the garden will also provide students with opportunities to learn about gardening and sustainability tenets.

E. Economic Viability

While the scale of this garden is too small to affect the full economic viability of the college's food system, at least within the foreseeable future of the plot, it addresses essential aspects of student life and learning.

IV. Proposals

A. Site Descriptions

In our search for an on-campus location for the farm, we first mapped out and analyzed all spaces across campus. We looked for open spaces that were mostly unused throughout the year, in close proximity to student residential communities, and had no plans for construction in the immediate future. The locations that met these conditions were the paved courtyard in front of Bates Hall and an open green area behind McAfee Hall near Washington Street. We had also considered the open area to the left of the President's House, which we determined was too far from residential communities on campus, and the bare hillside lining the road along Munger Meadow. We feared that the close proximity to the road for the latter would risk contamination from road treatments to prevent ice and particulates from car exhaust.

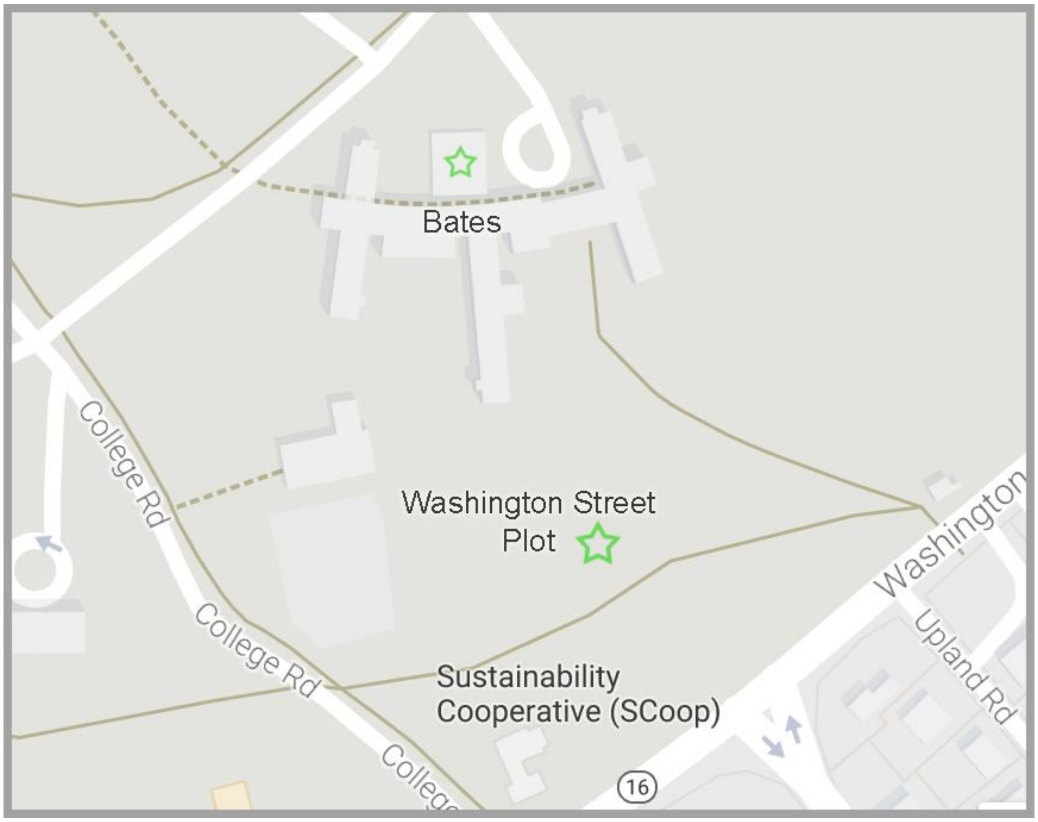

Figure 5. Location of the two best plots (green stars) relative to other buildings on campus.

1. Bates Proposal

The Bates plot is a paved courtyard situated next to the cul de sac in front of Bates and McAfee Residence Halls on the east side of campus. The courtyard is built on the roof that covers the Bates Dining Hall kitchen. The courtyard currently has a basketball hoop, picnic tables, and chairs. Students use the courtyard for residential life traditions and Bates and McAfee students and staff who smoke use it as a smoking area. Unless the weather is nice, the courtyard otherwise goes largely unused.

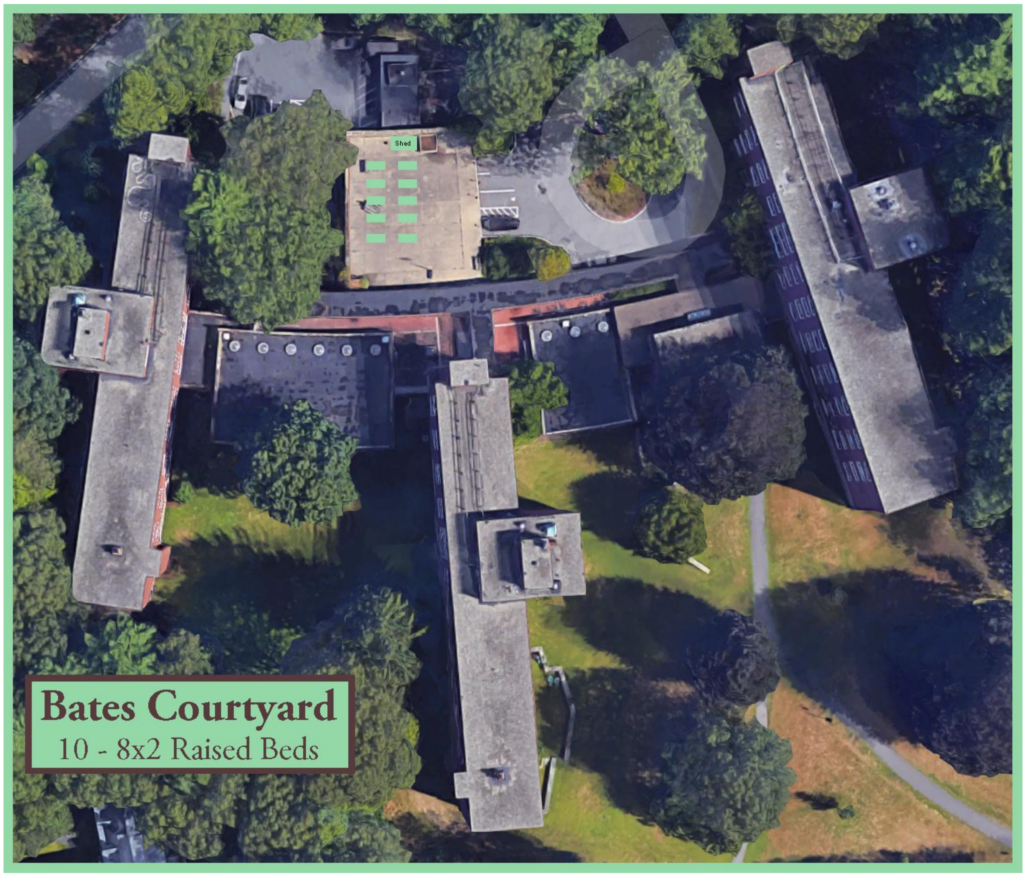

Figure 6. Aerial view of Bates Courtyard plot relative to the Residential Hall. Possible raised beds and shed indicated in green.

Figure 7. Aerial view of Bates Courtyard. First option of raised beds and shed indicated in green.

We propose that the Bates plot be comprised of ten eight feet by two feet raised beds, for a total growing area of 160 square feet. The soil would be two feet deep. We also propose the construction of a small shed on site to store tools and materials that Regeneration needs to access, rather than having them store their tools in the Greenhouses off site. The beds would be laid out with accessible walkways compliant with Americans with Disabilities Act (ADA) regulations in between them. Next to the raised beds, there would be an open space where the community could continue to use lawn chairs and picnic tables and enjoy the space recreationally.

Not only is the Bates courtyard located right next two three main east side residential halls, but Bates, McAfee, and Freeman are also the summer housing dorms. The Bates courtyard plot would have access to potential volunteers all year round, especially in the summer when a lot of the growing takes place. In addition, its close proximity to a paved road is ideal for transporting produce, tools, and potentially people to and from the site. The fact that the courtyard is on a paved surface will also facilitate the use of wheelbarrows and be accessible to students who may need to use wheelchairs on the site.

Unfortunately, it is unclear how much weight can be safely placed and maintained on the Bates Dining Hall roof. In the past, the courtyard was used as a paved parking lot where cars and trucks would stop temporarily. However, the weight of parked cars is a dynamic load that changes over time, whereas raised beds would be a static, permanent load that could cause structural damage to the Bates Dining Hall facility, located directly below the courtyard. A structural engineer needs to be consulted to determine just how much weight—and how many raised beds—the courtyard can hold before any plan can be implemented to reutilize the space. Bringing a structural engineer into this project would both increase costs and would delay the timeline of implementation.

Michelle Maheu, Assistant Director of Campus Planning, has confirmed that at the very least, the weight of two eight feet by two feet raised beds with an area of 64 square feet is within the weight limit. We acknowledge that if two raised beds is the maximum amount of beds that can be housed in the courtyard, they would not provide sufficient space for Regeneration to grow crops. Representatives from Regeneration have said that if only two beds are allowed on the site, they would prefer to remain on their off-campus site than confine their operation to a 64 square foot area.

Figure 8. Aerial view of Bates Courtyard. Second option of raised beds and shed indicated in green.

The courtyard design is also limited by the fact that it requires raised beds. There is no possibility to do any in-ground farming on this paved plot, unlike the in-ground plot that Regeneration currently manages.

2. Washington Street Proposal

The Washington Street plot is located in an open green area behind Bates and McAfee. It is near the backyard of the SCoop house and lies parallel to and within visual distance of Washington Street. There are currently no structures on the area, but Facilities maintains its lawn. The plot lies near pedestrian pathways, which bring the only foot traffic and activity that the plot ever sees throughout the year, as it currently is unused by the student body. It is lined by a row of trees and the surrounding area is fairly quiet.

We propose that this area hold a 175 feet by 50 feet in-ground farming plot. At a total of 8,750 square feet, the plot would be more than twice as large as Regeneration's plot on the North 40. Just like the Bates plot, the Washington Street plot would have an on-site storage shed for gardening tools and materials. It would also require a border fence to keep deer and other pests from consuming or damaging the plot's plants.

Figure 9. Aerial view of Washington Street plot relative to the road. The plot and shed are in green, and the sizes and distance from the pedestrian path are indicated in white.

Although Regeneration would not immediately need such a large area to farm, the size of the plot would allow them flexibility to grow as an organization. They would have space to practice crop rotation, and have an on-site area for social and community programs. There is also the potential for other interested parties, like professors or student cultural organizations, to farm their own small plots if extra space is available.

As an in-ground plot, Washington Street would not need soil replacement like the raised beds. Regeneration could plant crops requiring a soil depth greater than the two foot limit that raised beds would have. Located near Bates, McAfee, Freeman, Dower, and SCoop, this plot would have access to volunteers during the academic year and summer months, as well as the potential for collaboration with Residential Life and SCoop residents. The Washington Street plot, being further away from a main road than the current plot is from Weston Road, would experience less noise and air pollution from cars in addition to less roadside litter than the plot on the North 40.

There are a few downsides to the Washington Street plot location. Because it is further east than the Bates plot, it is slightly further away from the highly populated dorms of Bates, Freeman, and McAfee. It is also further away from the Greenhouse where Regeneration plants seedlings and accesses gardening tools. In addition, although there are paved walkways leading up to the plot, wheelbarrows and wheelchairs would be more difficult to maneuver on the plot itself.

B. Soil Testing and Results

Envisioning students working with the soil and consuming the crops grown in the raised beds at the Bates plot or in the ground at the Washington Street plot, it is important to know if the soil is contains unsafe concentrations of toxic elements or materials. We considered lead and arsenic to be elements of concern. Indeed, Wellesley College has a historical legacy of lead due to the paint shop that used to exist near Lake Waban, while arsenic may have been an ingredient in the pesticides sprayed on the orchard that used to exist in the area where the Washington Street plot is situated.

If raised beds are installed at the Bates plot, we recommend that the soil be tested for lead and arsenic before the beds become operational. To minimize the risk of toxic materials in the soil, we recommend that certified organic soils be used in the raised beds.

Meanwhile, we tested the soil at the Washington plot. The site's soil testing was a two-part process. The first round of soil testing was done with a portable NITON instrument, which uses a method called X-ray fluorescence to analyze elements in geological materials like soil. Shooting X-Rays at the soil, the NITON calculates the concentration of elements in the sample based on the level of energy that atoms give off.

Four areas of the Washington Street plot were tested, and a map was created to record the locations that the samples were collected from (Figure 10). Once a location was chosen, surface-level grass and debris were swept away, digging into the soil a couple of centimeters. The NITON analyzed the soil for 90-second periods.

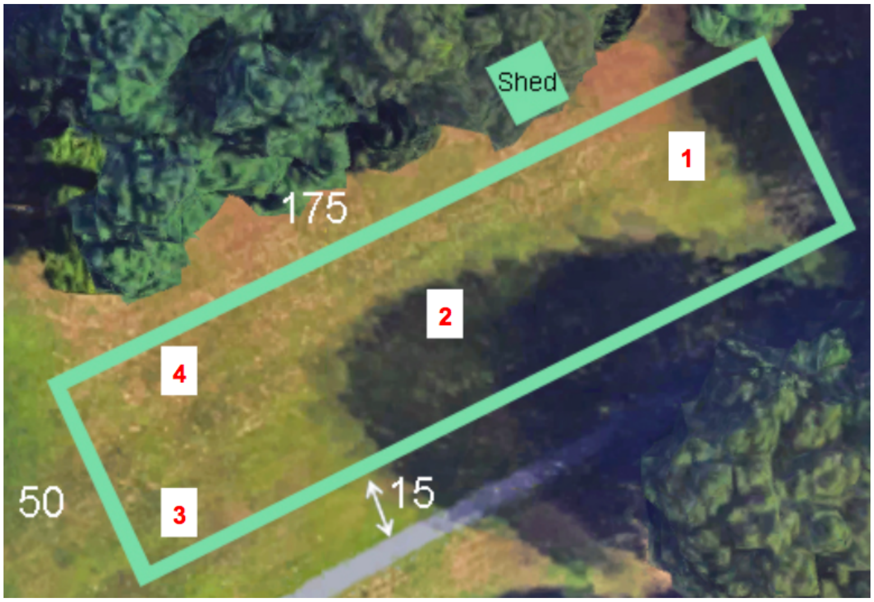

Figure 10. Map identifying the four areas where soil was tested at the Washington Street plot.

Figure 11. Images of ES 300 students and DJB lab members doing in-situ soil testing at the Washington Street plot using the NITON instrument.

After using the NITON, we dug several inches deep into the soil and collected 4 oz of soil material to analyze in the XEPOS X-Ray fluorescence spectrometer machine in Dan Brabander's lab. The XEPOS uses the same analytic method as the NITON, but has a longer analysis period that gives its results greater accuracy. To prepare the samples for the XEPOS, we placed them in a dehydrator oven to remove water content and homogenize their mass. Once dehydrated, the remaining material was ground with a mortar and pestle to homogenize the grain size of the sample. The samples were then placed in small, film-lined plastic cups and run through the XEPOS.

Results

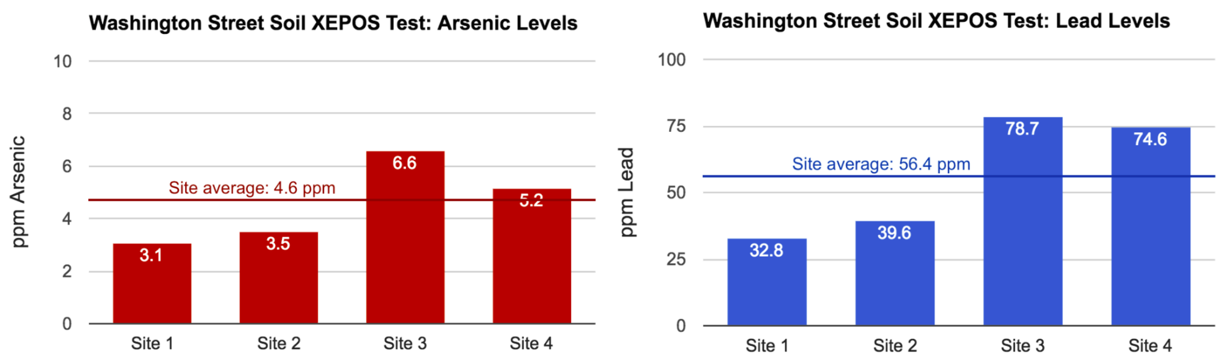

Figure 12. Washington Street plot XEPOS test results for a. Arsenic, and b. Lead. These graphs include the Sample 4 values from the second round of XEPOS testing.

The NITON data showed relatively low concentrations of lead, between 35-60 parts per million (ppm). Arsenic levels were so low that they were below the machine's level of detection. XEPOS results were similar to NITON results with levels of lead between 30-80 ppm and arsenic between 3-7 ppm. There was, however, one sample that the XEPOS identified as having significantly higher levels of lead and arsenic compared to the NITON. The concentrations in Sample 4 jumped from 35 ppm lead and 8 ppm arsenic with the NITON to 390 ppm lead and 26 ppm arsenic with the XEPOS.

We retested the soil gathered from the fourth site, grinding it more finely with a mortar and pestle to ensure that the sample was sufficiently homogenized. Two samples of this soil were run through the XEPOS again, and resulting in 74.3 ppm and 74.8 ppm lead and 5.9 and 4.4 ppm arsenic readings, respectively. These results were in line with what we expected based on the site's NITON results and the XEPOS results of the other three sampling sites. After consulting with students in Dan Brabander's lab, we believe that the XEPOS, which aims X-rays at and analyzes one single, narrow point in the sample, hit a spot in the soil which was either not fully homogenized or contained a grain or paint chip that caused the machine to read such a high lead concentration. We conclude that the first XEPOS of the soil from arsenic were likely outliers, and that the concentrations from the second round of XEPOS testing are more representative of the soil as a homogenous entity.

Discussion

We believe that the soil at the Washington Street plot is safe for farming. The concentrations of lead and arsenic that we found are likely close to geological background levels, and the lead concentrations are within or just above the 50 ppm concentration that the Academy of American Pediatrics considers to be the upper limit of completely uncontaminated soils (AAP Committee on Environmental Health, 1993). Furthermore, the site's lead concentrations are well within the 400 ppm lead safety guideline that the Environmental Protection Agency (EPA) set in areas where people, and especially children, are highly likely to interact with bare soil (ATSDR, 2010), as well as the more stringent 80 ppm lead limit that the State of California has adopted (Young, 2013).

We also used the NITON to test the soil on the current Regeneration plot on the North 40. The concentrations of lead and arsenic were similar to that of the Washington Street plot values (Appendix III). The concentrations of arsenic were below the level of detection and lead concentrations were below 70 ppm.

If Regeneration decides to move their farm to the Washington Street plot, we recommend that another, more thorough round of soil testing is done to map out the gradients of lead concentrations throughout the plot. In addition, crops could be tested for any bioaccumulation of arsenic or lead into the plant tissues, although the risk is likely fairly low if the low lead and arsenic concentrations that we found are wholly representative of the plot.

No level of lead exposure is considered safe for children under the age of five because lead's neurotoxicity can affect their development (ATSDR "What are the physiologic effects of lead exposure?" 2010). Therefore, we suggest that young children avoid interacting with the soil on the plot. Because adults are less susceptible to the effects of low-level lead exposure and because soil lead levels are within safety parameters set by the EPA and the State of California, this plot should be a safe environment for students to work in; however, precautions should still be taken to minimize student's risk of lead exposure through soil ingestion. The greatest risk of lead exposure on this site would be during the summer months when the soil is driest and farm workers may inhale leaded dust in the air. Risk of exposure could be minimized by keeping the soil moist or by covering soil with a layer of mulch to avoid the suspension of soil particles in the air.

C. Management Plan

After ensuring that the soil of the Washington Street plot was mostly lead and arsenic-free, we addressed the need for a management plan applicable to both proposals. In general, a yearly management plan outlines the activities required for farm maintenance and planning in any given year. While a more detailed plan could involve a year-to-year buildup of output and long-term plans of soil health, we focused on building a basic plan for the smooth management of the farm.

Drawing from New England farming practices (New England Vegetable Management Guide, 2017), Regeneration's institutional memory and the Wellesley College Academic Calendar (Wellesley College Calendar, 2017), we identified five important considerations to take into account. We first needed to define the roles of people working on the farm. Second, the key steps in the growing cycle were necessary to determine the planting and harvesting timeline. The plan also needed to adapt to fluctuations in student involvement over the academic year, and include advance planning for the summer to determine who would be available to work on campus. These criteria are both necessary for a college farm, where the potential workforce is often absent during the growing season (summer). Finally, we considered compensation for work on the farm as a criterion. By combining these criteria into a single timeline, the management plan allowed us to identify potential issues across the year and address them.

We drew a distinction between three roles for farm workers. The first one is that of "farm manager," one or a few people who devote the most time to the farm. Ideally,the farm manager possesses in-depth knowledge of agriculture and farming, and takes care of long-term planning. The ReGeneration E-board currently fills this position; however, having a full-time manager would ensure long-term, institutionally-supported stability. Specifically, the full-time manager would be a member of faculty or staff taking on this role while simultaneously teaching a course focused on agriculture, which would facilitate planning and conservation of farming knowledge. Second come the "core volunteers." This category includes students, faculty, staff, or community members who have developed some knowledge about the farm and who volunteer more frequently. Third are the "peripheral volunteers." These are volunteers who stop by casually to work on the farm from time to time. We hope that peripheral volunteers would move across the fluid definitions of ‘peripheral’ to ‘core’ as they gain knowledge and stay involved.

Our final yearly management plan includes three sections, the first of which presents management over the Spring Semester (Figure 13).

Spring Semester

Month	Actors	Actions	Special Considerations
January	· Volunteers	· Events	· Limited students on campus (Wintersession) · Inclement Weather
February	· Farm Managers · Core Volunteers	· Selecting Seed Varieties · Ordering Seeds · Events	· Inclement Weather · Spring budget application due (SOFC)
March	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Plant BLF · Manage BLF · Start seedlings ALF · Find staff for summer	· Inclement weather · Spring Break · Midterms
April	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Manage BLF · Manage ALF seedlings · Harvest BLF (depending on varieties) · Events to encourage volunteering	· Ruhlman; theses, MarMon · Spring Open Campus · Interim budget application due (SOFC) · ES Opportunity Fund application due

BLF: Before Last Frost
ALF: After Last Frost

Figure 13. Management Plan for the Spring Semester.

The key point to note during the spring is that growing season starts late because of New England’s long, inclement winter. It also unfortunately coincides with academic midterms, making it more difficult to find volunteers at that time of year. Other important tasks include planting Before Last Frost (BLF) crops, starting to grow seedlings for After Last Frost (ALF) crops, and planning to find volunteer workers for the summertime.

Summer Semester

Month	Actors	Actions	Special Considerations
May	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Plant ALF seedlings and others · Manage all · Harvest BLF	· Finals (include planting in "Take a Break" calendar) · Everyone leaves (except seniors)
June	· Farm Managers · Summer Farm Managers · Volunteers and/or Interns	· Manage ALF	· Reunion (ask Reunion volunteers to help?) · Summer Research/Classes I/ Fellowships Start
July	· Farm Managers · Summer Farm Managers · Volunteers and/or Interns	· Harvest ALF (depending on varieties)	· Summer Classes II
August	· Farm Managers · Summer Farm Managers · Volunteers and/or Interns	· Harvest ALF (regularly) · Plant more · Manage	· Classes Begin

BLF: Before Last Frost
ALF: After Last Frost

Figure 14. Management Plan for the Summer Semester.

For the Summer section of our management plan (Figure 14), the greatest issue is the lack of workers. Indeed, few students remain on campus over summer vacation; yet, it is the height of growing season. Crops need constant care and watering during the hot summer months. Two stretches of time are particularly notable: the weeks between the end of spring semester classes and the beginning of Summer Session and the weeks between the end of Summer Session and the beginning of the fall semester. During these two periods of time, the campus is virtually deserted. ReGeneration remarked that in past years, most of their crops dried out and died during these two time gaps, causing significant losses in produce. It would thus be essential to fund some form of remuneration for one or two students or faculty willing to remain on campus during these times and take care of the growing crops.

In addition, no structure currently exists for students to take care of the farm over Summer Session. As of now, Botany Fellows occasionally help out of their own free will, but the farm is by no means part of their obligations. The best way to address this issue would be to create a funded opportunity for students to specifically take care of the farm in the summer, whether through a stipended fellowship or a paid summer job. This would provide incentive for students to water and weed around the farm. Furthermore, a full-time farm manager would also be able to watch over the crops consistently over the summer. This Summer section thus indicates the need for summer management to ensure crops survive until students return on campus in the fall.

Fall Semester

Month	Actors	Actions	Special Considerations
September	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Harvest ALF (regularly) · Manage	· Org Fair · Fall Budget application due (SOFC)
October	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Harvest ALF (regularly) · Manage · Event (Fall Harvest?)	· Fall Break · Family/Friends weekend
November	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Manage root vegetables · Events · Find staff for winter	· Midterms · Thanksgiving · ES Opportunity fund due Nov. 15
December	· Farm Managers · Core Volunteers · Peripheral Volunteers	· Events · Cleanup	· Finals · Everyone leaves

BLF: Before Last Frost
ALF: After Last Frost

Figure 15. Management Plan for the Fall Semester.

In the third section of our management plan, we identify the important events marking Fall Semester (Figure 15). The first action to consider in the fall is harvest, which requires both time and many volunteers. Thankfully, the start of classes brings an influx of potential workers. Another important task is thus to begin recruiting volunteers, both through Regeneration organization events and advertising through classes or departments. Advance planning can also be important to organize the academic winter break and plan what other tasks may be necessary at that time, including ordering seeds for the next growing season and pickling or sharing harvested produce.

The yearly management plan represents an essential part of this project, as it organizes the tasks and considerations of each season in a linear fashion. Its broad approach makes it applicable to both proposals, while details can be added for each site. The Bates plot, for instance, would require a more careful watering schedule, as the soil would be unable to retain the water for long. Installing hoop houses or covers to extend the seasons at either site could also be included in the management plan.

D. Budgets

In order to compare the costs of our proposals and have a more complete picture of what operations would look like, we developed a budget for our two proposed scenarios. The full budget spreadsheets and detailed notes on the assumptions made and methods used can be found in Appendix IV.

Our budget spreadsheets estimate costs for both the setup year, including one-time initial costs for structures and tools, and for a subsequent year with typical operating costs, excluding major repairs or upgrades. We compare the two proposals, assuming that the raised beds on the Bates roof would have a total of 160 square feet of growing surface (ten 8-by-2 foot beds) and that the in-ground plot by Washington Street would have a total growing surface of 8,750 square feet (175 by 50 feet).

To make accurate budget estimates, we met with Regeneration, researched other campus farms, and researched New England gardening practices. We asked Regen about their current needs, plus what they would like to farm if they had more space or raised beds. For each budget item, we found prices online for all-new items. However, prices would be lower if some items were bought secondhand or donated.

The highest cost items included a shed for storing tools, a wheelbarrow, and other supplies, which Regen identified as a primary need ($530), and fertilizer, whose cost could vary dramatically based on the specific methods and fertilizer types used. Regen does not currently use any fertilizer on their plot. Raised beds involve high setup costs as well as recurring fertilizer costs. For the first year, building raised beds and filling them with fertile soil would probably cost more than $1000. Lumber and lining material to construct the beds would cost $500. Soil and fertilizer would be a substantial recurring cost of approximately $500 per year (again, varying significantly based on choices of fertilizer types), since it is difficult to reuse the complete volume of soil in raised beds ("Garden Tips", 2014).

Lowest Costs: Washington Street

For total costs per year, it is clear that the Washington Street plot has a lower total price tag. According to our estimates, setting up the Washington Street plot and running it for one year would cost $2,068, compared to $3,138 for raised beds on the Bates roof. An in-ground plot near Washington Street would also have a far higher cost efficiency per square foot: $0.24 per square foot in the first year, and on the order of $0.07 per square foot in subsequent years, compared to costs per square foot of $19.61 for the first year and $7.56 for following years for raised beds. We assume that at least in relative terms, lower cost per square foot is roughly equivalent to cost per vegetable and cost per pound of produce.

Paid Advisors

One potential cost that we did not include in our initial budgets is the cost of paying faculty and staff members for the time they spend advising farm volunteers on specific farming knowledge. In studying other campus farms, we identified paid staff as one key that helps other campus farms succeed over time. Having staff helps avoid rapid turnover, ensure continuity of knowledge, and keep a long view of organization both within years and across multiple growing cycles. The Duke Campus Farm is one such farm with a large staff. For schools of our size, these paid staff are either student farm managers, community members, or, ideally, faculty and staff who are paid to use some of their time to help students run the farm, like at Middlebury and Yale. Currently, some Wellesley faculty and staff members like Kristina Jones generously advise Regen pro bono, based on their own limited availability. If an on-campus farm were to grow larger over time, it might be ideal to find a way to have a member of faculty or staff be paid for advising, to make sure they had enough time free (and were fairly compensated) for helping volunteers learn and plan ahead.

E. Water

Growing vegetables in this part of New England, whether in the ground or in raised beds, requires substantial quantities of water for both initial planting and subsequent watering. Water sourcing is an important engineering consideration that would have to be finalized in collaboration with Landscape and Buildings. An in-ground plot near Washington Street could use a hose stretching from the SCoop house or from McAfee Hall; the raised beds on the Bates roof could use a hose connected to Bates.

It would be ideal to have a standpipe directly at the Washington Street plot. This option would provide greater convenience for those working on the farm, eliminate inconvenience to nearby buildings, and simplify issues of billing for water use. Building a standpipe would be a significant infrastructural investment; it would be possible to operate the farm for a couple of growing cycles using water sourced from nearby buildings (with permission) in order to demonstrate the viability of the farm before investing in an on-site standpipe.

A reliable water source, even a somewhat inconvenient one from a nearby building, and even with a relatively low flow, for an on-campus farm would mark an improvement from the water system at the current Regen plot on the North 40: the water spigots for the community plots are only turned on all at once at a certain point in the year, limiting options for the gardeners of certain plots who would like to plant earlier and need water to do so. On a trip to the North 40 plot on April 18, 2017, Regen members brought seedlings to plant but were unable to plant them because the water had not been turned on for the year. Reliable water for an on-campus plot would eliminate this restriction on planting dates.

F. Academic Integration

The flexibility and proximity of an on-campus farming plot would offer rich and diverse opportunities for integration with academic classes. Classes in biological sciences, geology, engineering, and even the humanities could cultivate their own plots (especially in the years when involvement in the farm was still growing) or use farm class sessions, in a variety of ways, as a living lab.

A farm, in contrast to a smaller garden or greenhouse space, offers unique learning opportunities. The large scale and particular modes of operation of a farm (centered on producing feasible profit margins in both the short and long term) would challenge and empower students in ways that other academic gardens cannot. A successful farm requires both biological know-how and careful business and engineering decisions.

Engineering classes could test out solutions at scales that would be uniquely large in space (plot size) and time (management over multiple growing cycles). Business plans, farming techniques, water use management, and other food system solutions could each be the focus of an academic class based on the farm. Imagine one class building their own overnight dew catchment devices out of bamboo, cloth, and other light and cheap materials and then setting the devices in the farm to test how they could work as irrigation tools. Imagine another class building on computer science skills to draft a business plan for the farm that includes a trial model for a farm share subscription service, complete with a user-friendly app.

Experiential learning in the social sciences is another type of experience uniquely suited to a farm, rather than a garden. Functioning food systems are inextricable from societies; visiting and volunteering on the farm could be a unique and powerful form of engagement with social issues surrounding farming. This effect could perhaps be amplified if students went on to volunteer with other Boston area farming organizations such as the Food Project after using the skills they learned on the on-campus farm ("The Food Project"). In addition to enriching the classroom experience, service learning itself seems to boost other measures of success in college. One study of 770 students in 17 higher education institutions in northern New England examined the effect of classroom-integrated service learning on civic engagement and other measures of student success. They found that higher-intensity service learning as a component of a college class (compared to a middle- or lower-intensity service learning component) corresponded to greater retention, academic engagement, interpersonal engagement, and community engagement (Cress et al., 2010). An on-campus farm could thus be both a living lab for service learning and a springboard to future civic engagement.

Humanities and arts classes could also use the farm to enrich learning experiences – if a professor wished to have a single field trip or a repeated series of field trip with their class to witness or participate in the growing of certain vegetables, they could coordinate with student volunteers to request that those vegetables be grown. Students could have firsthand experience with foods that are more common to different times and places.

Lastly, we discussed the possibility of a "Farming Gym Option." Since farming can provide rigorous exercise, it could be possible to organize a way for students to log time spent working on the farm (on the honor system, or coordinated with farm organizers) to count towards the gym requirement.

V. Recommendations and Next Steps

	Bates (large)	Washington Street	All
Sustainability	• Close to greenhouses/SCI	• Close to SCoop	•Sustainable food production •Symbol of college commitment •Inspire sustainable actions
Health		• Set in nature	•Improve diet of students •Physical activity •De-stressing breaks
Accessibility	• Closest to students • Most accessible for students with disabilities		•Closer to students •Improved access •Paid internships
Academic Integration		• Larger plot = more room for experimentation	•Used in classes •Independent learning about farming and sustainability
Economic Viability	First year: \$19.61/ft² Second year: \$7.56/ft²	First year: \$0.24/ft² Second year: \$0.07/ft² • Most cost-effective option	
Size	160 ft²	8750 ft²	
Actionability	• Requires review by structural engineer	• Requires plowing and construction of a shed	
Fits Regen's Vision?	Potentially	Yes	

Table 2. Comparison of the two best plots, including the advantages both share.

We recommend the Washington Street plot as the new location for the student farm Regeneration (Table 2). We believe that this new plot will increase the farm's visibility and proximity, illustrate the College's commitment to sustainability, and increase health benefits for students. Additionally, this plot will be more cost-effective than other locations on campus and will allow for academic integration because of its size, since there will be more room for experimentation, and proximity to academic buildings such as the Science Center.

In late April, we made this recommendation to the Regeneration organization and they endorsed it wholeheartedly, in agreement that it would give them more opportunities to try out different types of crops or types of farming and that it would be easier to increase membership of the student organization.

Now that we have Regeneration's endorsement, the next step will to bring a proposal before the Design Review Committee. The Design Review Committee will communicate their evaluation to the Executive Committee, who may then bring it before the Landscape and Buildings Committee and potentially the Finance Committee.

In the meantime, Regeneration will continue to solicit support from stakeholders as well as volunteers, continuing their operations as normal and planning ahead for the transition. In this endeavor, the ES 300 members that are class of 2018 will be available and willing to provide any support needed. Another important step will be to find funding for a part-time staff member to advise Regeneration and oversee the campus farm (see Section IV, Part D for more information).

VI. Acknowledgements

We would like to thank our advisor, Professor Higgins, for her constant help and support throughout the semester. We would also like to thank members of ReGeneration for sharing their knowledge and institutional memory, in particular Amy, Julia, Johanna, Lauren, Isabelle, and alumnae. Thank you to Kristina Jones, Dan Brabander, Jon Alvarez, Michelle Maheu, Dave Chakraborty, Patrick Willoughby, John Olmsted, Hannah Oettgen and Ciaran Gallagher for sharing their insights and participating in key steps of our projects. Finally, we would like to thank Beth DeSombre and previous ES 300 classes for their investigation into food systems and sustainability at Wellesley.

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VIII. Appendices

Appendix I. Stakeholder Analysis

Stakeholder Name (in no particular order)	Stakeholder's interests	How can we address their interests in the proposal?
Regeneration	Access for Regen and community, also having garden done well	Propose large plot on campus, some way for plot to be taken care of when Regen members aren't always readily available
Jon Alvarez & Michelle Maheu	1998 Master Plan, Wellesley 2025, Facilities Recommendations	Incorporate practical elements into proposal (soil testing/structural calculations) as well as consult Wellesley 2025 to ensure no conflicts arise
Patrick Willoughby & John Olmstead	Do it *right* from day one. Make it fit with ADA accessibility guidelines.	Address ADA concerns.
Kristina Jones & Botany Fellows	Having garden done well, not making more work for advisor and Botany fellows,have garden closer and more organized	Have garden on campus with organized plan, adequate work force so botany fellows don't have to do too much
Trustees (Landscape Committee)	1998 Master Plan, Budget Considerations, Aesthetics, College Mission, Student Quality of Life	Allow flexibility/multiple options, address history of farming in proposal as well as 1998 Master Plan principles, locate farm in low-visibility areas, connect back to Wellesley's mission
Sarah & Stacie Allen (Res Life)	Want community spaces for residents to gather and for programs; pretty residential landscape; social life of dorms; quiet noise level around building; would not want to be responsible for maintaining garden cleanliness	Give consideration to farm care/maintenance plan; mention that we considered how residential life and programs could be involved
SCoop	Space *literally* in their backyard to farm; fits with sustainability mission.	I think their interests will naturally be addressed by the proposal, particularly for the Washington Street plot.
Paula Johnson	Health and well-being of students; good image of college; improve education and results; safety	Address well-being, health, mental health of students in proposal; satisfy other stakeholders (especially alums); aknowledge our respect of landscape management plans for appearance of college; insert section about education (part of the Wellesley effect campaign?)

Dave Chakraborty & Office of Sustainability	Oversee college sustainability; programming to spread sustainability awareness; maintain landscape; implement measures to reduce energy use, etc; provide administrative support to sustainable orgs and initiatives	Explain what support farm/Regen might need from office
Students	Probably don't want garden to interfere with anything on campus, but would like having garden and fresh produce/special events available	Have garden in accessible yet unobtrusive location, have events and activities that contribute to broader campus community
Alumnae	Preserving college as they knew it; preserving landscape	Acknowledge landscape management plan and show how this particular proposal fits within it; show it as a new opportunity for current students
Stone Center	Student well-being; the availability of different options for stress management.	Research mental health benefits of gardening. Frame the garden as a resource for de-stressing.
MHEs	Variety of options for conversations and activities to do with mental health.	Mention farm/garden as a site for events / conversations by MHEs, plus a de-stressing resource they can recommend
El Table & Hoop	Buy/obtain fresh hyper-local produce to use in food sold on campus.	Their interests will naturally be addressed by the proposal. We can include a mention of selling the produce to on campus orgs. Or maybe they could have their own raised bed/plot.
Professors	Applicability to Curriculum (Farm-in-a-Box/botancial experiments, etc.), Accessability (proximity to classrooms), Student Enthusiasm	Faculty Survey, locating farm on-campus, making the resource known to relevant departments (ES, BISC, Art, Anthropology, etc.)
Wendy Paulson Director	Budget Considerations, Wendy Paulson Initiaitve Goals (sense of place)	Consult new Wendy Paulson Director.
Town of Wellesley	Conform to Wellesley town landscape and food code	Research Welllesley Town's law codes concerning land development and food growth

College Government	- Protection of student rights; concern for student well-being	Address benefits to students that garden will provide and inclusion of different orgs on campus; promote the health/well-being component
EcoReps	Dorm sustainability; want to expand dorm compost systems; increase dorm recycling; decrease energy and water use; increase sustainability culture within dorms; members of House Council	Use farm as a way to connect students to a more sustainable culture; potential for farm-dorm programming
Botanistas	Grow plants on campus outside of the greenhouse; chance to increase org's reach & visibility.	Their interests will naturally be addressed by the proposal. Maybe they could have their own raised bed or section in the plot.
Career Education (Civic Engagement)	Student engagement; job training?; leadership development? (productively) adding to resumes	Emphasize how students will develop skills - both specific farm skills and "soft skills" of teamwork and long-term planning
PE program	Meeting standards for PE classes (what are these standards?). Would like to have diverse and popular options available to students	We could propose a gardening PE program. Maybe a system with an hours-logging sheet where a student farm coordinator confirms a student's participation? Or a self-reported system. Begin with "farm training for PE students" session? Training including info on gardening/farming without hurting your body; lifting from legs not back, optimal ways to weed and harvest, etc.
Student orgs who might cultivate plots...	May be interested in: (1) cultivating a plot of vegetables that would be of use or of interest. and/or (2) using the site for events Examples (besides Regen): Shakespeare / literary / historical clubs? Al-Muslimat? Mezcla?	(1) develop a system of small sub-plots (2) make a plan for holding events --> reach out to different groups?

Appendix II. Survey Results for Public Opinion Analysis

A. Student Survey Results

1) Would you like to see a garden on campus?
   - Yes: 92.3%
   - No: 1.7%
   - Maybe: 6%

2) If yes, where?
   - Bates Courtyard: 108/227 (47.6%)
   - As a terrace on the hillside at Munger Meadow: 151/227 (66.5%)
   - In the Washington Street area behind McAfee: 58/227 (25.6%)
   - Other: 13 (5.7%)
     - "Anywhere healthy for it to be!"
     - "Literally anywhere."
     - "In the meadow between Stone-Davis and Bates."
     - "The roof of the art studios by Pendleton West."
     - "Somewhere out of sight."
     - "Courtyard behind Tower."

3) Would you like to see a garden off campus?
   - Yes: 9.9%
   - No: 36.8%
   - Maybe: 53.4%

4) If yes, where?
   - "Everywhere! Gardens everywhere!"
   - "We already have one."
   - "Personally I believe that I and many others wouldn't make the effort to find it off campus."
   - "In Linden Square or somewhere along Washington Street."
   - "Cedar Lodge."
   - "In the area near the entrance to the Ville that is on Central Street."
   - "If it were off campus, we wouldn't see it, and that'd be sad."
   - "On the pathway along to the Ville."
   - "I am indifferent. I don't think I would make enough time (nor other students)."
   - "In the Vil."
   - "Nearby."
   - "North 40 WHERE A WELLESLEY STUDENT COMMUNITY GARDEN HAS EXISTED FOR YEARS!"
   - "Anywhere."
   - "Wherever is available."

5) If Wellesley installed raised beds around your dorm, would you …
   - Help take care of them?: 172/210 (81.9%)
   - Pick vegetables from them?: 180/210 (85.7%)
   - Other: 18/210 (8.6%)
     - "Wonder if I could plant own plants there?"
     - "I will plant, tend, and harvest! Love this idea!"
     - "Love them."

- "Organize events around [them]."
- "Grow medicinal herbs."
- "Study there, walk there, get my toes in some dirt. :)"
- "This would be really cool! There could be floor programs around taking care of the plants together."
- "Test the soil."
- "Plant flowers."
- "Take photos in it and show it to friends."

6) What would you like to be grown there (types of crops i.e. herbs, vegetables, flowers instead of specific crops i.e. parsley, potatoes, daffodils)?

- Vegetables: 104/145 (71.7%)
- Herbs: 58/145 (40%)
- Flowers: 38/145 (26.2%)
- Fruit and/or Berries: 34/145 (23.5%)
- Other:
    - "I'd like the garden to produce something the community could use, especially if it helped us become a bit more sustainable, or gave us more interaction with nature."
    - "Native plants would be particularly cool!"
    - "Things that don't require lots of attention."
    - "Native plant species that are useful to wildlife and require little maintenance."
    - "It would be wonderful to have chickens to get eggs year round!"
    - "Plants that attract bees and butterflies. :)"

7) Where would you like the produce to go from raised beds?

- Sold to SCoop, Hoop and/or El Table: 55/225 (24.4%)
- Into the dining hall system: 138/225 (61.3%)
- Directly to students and faculty: 163/225 (72.4%)
- Other: 93/225 (41.3%)
    - "I would be happy paying a reasonable price for the produce raised."
    - "The students who pick it."
    - "It's not fair to give the produce that specific students work to procure to el table (a paid company) or Scoop, which already has more dietary freedoms and opportunities than the rest of the student body. The produce should go to those who work for it.“
    - "Extra food should be donated."
    - "Given to the Wellesley community."
    - "Local homeless shelters/individuals in need."

8) If Wellesley installed a community garden …

- Would you volunteer to take care of it?: 132/229 (57.6%)
- Would you enjoy taking walks in it?: 220/229 (96.1%)
- Would you do paid work to take care of it?: 183/229 (79.9%)
- Would be interested in distributing the produce in a CSA program?: 97/229 (42.4%)
- Other: 5/229 (2.2%)

9) Where would you like the produce to go from a community garden?

- Sold to SCoop, Hoop and/or El Table: 154/222 (69.4%)
- Into the dining hall system: 142/222 (64%)
- Directly to students and faculty: 152/221(68.5%)

- Other: 5/222 (2.3%)

10) If Wellesley installs a CSA program should priority be given to …
- Students?: 85.5%
- Faculty?: 6.4%
- The Wellesley Ville Community?: 0.5%
- Other: 7.7%

B. Faculty Survey Results

1) Would you be interested in seeing a community farm on campus?
- Yes: 89.9%
- No: 3.7%
- Maybe: 7.4%

2) Would you be interested in tending a small area in a community farm on campus?
- Yes: 26.3%
- No: 38.8%
- Maybe: 35%

3) Would you be willing to help water a small plot on campus during weeks when students are not available in the summer?
- Yes: 44.4%
- No: 23.5%
- Maybe: 32.1%

4) Would you be interested in purchasing locally grown produce from a student plot on campus?
- Yes: 81.5%
- No: 2.5%
- Maybe: 16%

5) If so, which purchasing model(s) would you prefer?
- CSA shares (weekly or biweekly packages of produce), on-campus pickup: 29/79 (36.7%)
- Online ordering forms, on-campus pickup: 36/79 (45.6%)
- Email updates when produce is available, on-campus pickup: 40/79 (50.6%)
- Farmer's market days on campus: 64/79 (81%)
- Take-what-you-want in exchange for volunteer work on the farm: 19/79 (24.1%)
- Other: 4/79 (5.1%)

Appendix III. Soil Testing Results

2017 Washington St. Plot Lead and Arsenic Data (NITON)

Name	Pb (ppm)	Pb Error (ppm)	As (ppm)	As Error (ppm)
Sample 1	52	13	<LOD	n/a
Sample 2	57	14	5	11
Sample 3	47	10	1	8
Sample 4	35	11	8	9

2017 Washington St. Plot Lead and Arsenic Data (XEPOS)

Name	Pb (ppm)	Pb Error (ppm)	As (ppm)	As Error (ppm)	Cup Mass (mg)
Sample 1	32.8	1.1	3.1	0.7	4.02
Sample 2	39.6	1.1	3.5	0.7	4.11
Sample 3	78.7	1.5	6.6	1	4.04
Sample 4	390.8	3.3	26	2.2	4.12
Sample 4b	74.8	1.5	5.9	1	2.91
Sample 4c	74.3	1.5	4.4	0.9	2.87

2017 North 40 Plot Lead and Arsenic Data (NITON)

Name	Pb (ppm)	Pb Error (ppm)	As ppm (ppm)	As Error (ppm)
Sample 1	40.51	13.16	<LOD	15.87
Sample 2	45.67	12.74	<LOD	15.89
Sample 3	57.48	12.13	<LOD	15.81
Sample 4	33.27	11.11	<LOD	13.97
Sample 5	61.06	13.46	<LOD	17.28
Sample 6	39.75	12.65	<LOD	16.92
Sample 7	47.24	11.74	<LOD	14.28
Sample 8	66.45	13.6	<LOD	16.78

2011 North 40 Plot Lead and Arsenic Data (XEPOS)

Name	Pb (ppm)	Pb Error (ppm)	As (ppm)	As Error (ppm)
Compost1	54.6	1.1	8.2	0.8

Compost2	56.1	1	8.3	0.7
Compost3	55.9	1.1	8.1	0.7
Compost4	60.3	1.1	6.4	0.7
Inside1	47.6	1.1	8.5	0.8
Inside2	56.1	1.1	9.1	0.8
Inside3	51.7	1.1	10.2	0.8
Outside1	70.5	1.3	15.7	0.9
Outside2	66.4	1.3	16.3	0.9
Outside3	66.4	1.3	16.4	0.9

Appendix IV. Budget Analysis

A. Budget Summary

Raised Beds on Bates Roof

FIRST YEAR BUDGET	**TOTAL:**	**$3,138**
SETUP, FIRST YEAR:		
Tools	$593	
Structures	$1,335	
RECURRING COSTS, FIRST YEAR:		
Soil and Fertilizer	$970	
Seeds	$240	

Raised Beds on Bates Roof - Year 1

Number of raised beds:	10
Length of each raised bed:	8
Width of each raised bed:	2
Total area of soil, in square feet:	160
Cost per square foot:	$19.61

SECOND YEAR BUDGET	**TOTAL:**	**$1,210**
OPERATING COSTS, SECOND YEAR		
SOIL AND FERTILIZER	$970	
SEEDS	$240	

Raised Beds on Bates Roof - Year 2

Total area of soil, in square feet:	160
Cost per square foot:	$7.56

Washington Street In-Ground Plot

FIRST YEAR BUDGET	**TOTAL:**	**$2,068**
SETUP, FIRST YEAR		
Tools	$593	
Structures	$835	
RECURRING COSTS, FIRST YEAR		
SOIL AND FERTILIZER	$400	
SEEDS	$240	

Washington Street In-Ground Plot - Year 1

Area of in-ground plot: 50 ft x 175 ft	
Area of soil, in square feet:	8750
Cost per square foot:	$0.24

SECOND YEAR BUDGET	**TOTAL:**	**$640**

Washington Street In-Ground Plot - Year 2

Area of soil, in square feet:	8750

OPERATING COSTS, SECOND YEAR		Cost per square foot:	$0.07
Soil and Fertilizer	$400		
Seeds	$240		

B. Details (supplementary to the Budget section of the main report):

We assume the area of an in-ground plot to be 8750 square feet in total (50 feet by 175 feet), and the combined area of raised beds on the Bates roof to be 160 square feet in total (either ten 8 feet by 2 feet beds or five 8 feet by 4 feet beds, with soil going 2 feet deep). The area of pavement on the Bates roof is approximately 55 feet by 75 feet. This Bates roof budget is meant to err on the side of the heaviest possible load of raised beds – hence, it presents the most cost-effective possible scenario, in terms of cost per square foot. The fact that the Bates roof could not hold this much weight without an evaluation by a structural engineer widens the gap in cost efficiency between the Bates roof and Washington Street scenarios.

The sources for specific items (represented by links) represent our best judgment of a balance between cost, functionality, and durability. Costs would be lower if items could be obtained secondhand or donated.

C. Full Budget - Raised Beds on Bates Roof

Number of raised beds: 10 - Length per bed: 8 feet - Width per bed: 2 feet - Depth: 2 feet
Soil total surface area: 160 square feet
Soil total volume: 320 cubic feet
Cost per area, year 1: $19.61 per square foot

FIRST YEAR BUDGET TOTAL: **$3,138**

SETUP, FIRST YEAR				
	Quantity	Price per unit	Total price	Information on price:
TOOLS				
Hoses	2	$20	$40	http://www.homedepot.com/p/Miracle-Gro-SoakerPRO-3-8-in-Dia-x-125-ft-Soaker-Hose-CMGSP38125FM/206551431?cm_mmc=Shopping%7cTHD%7cG%7c0%7cG-BASE-PLA-D28I-InsideGardenOther%7c&gclid=CLPslZeFidMCFdWIswodUjYPRA&gclsrc=aw.ds
Wheelbarrow	1	$90	$90	http://www.acehardware.com/product/index.jsp?productId=17

				157116&KPID=14578294&cid=CAPLA:G:Shopping_-_Wheelbarrows/Yard_Carts&pla=pla_14578294&k_clickid=cc3d42eb-9fe2-4faf-a74c-dbd3cf177268
Watering cans	5	$17	$85	https://www.amazon.com/dp/B00GGGLW9A/ref=asc_df_B00GGGLW9A4922496/?tag=hyprod-20&creative=394997&creativeASIN=B00GGGLW9A&linkCode=df0&hvadid=167123712426&hvpos=1o2&hvnetw=g&hvrand=17164102017767592813&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9002078&hvtargid=pla-338384888157
Buckets	10	$3	$30	http://www.homedepot.com/p/The-Home-Depot-5-gal-Homer-Bucket-05GLHD2/100087613
Shovels	5	$22	$110	http://www.homedepot.com/p/Razor-Back-48-in-Wood-Handle-Round-Point-Shovel-2593600/204476051
Hand tools (trowels, weeders, transplanters	9	$6	$54	http://www.truevalue.com//catalog/product.jsp?productId=26752&parentCategoryId=2239&categoryId=2251&subCategoryId=2262&type=product&cid=gooshop&source=google_pla&9gtype=%7Bifsearch:search%7D%7Bifcontent:content%7D&9gkw=%7Bkeyword%7D&9gad=%7Bcreative%7D.1&9gpla=%7Bplacement%7D&ctcampaign=4680&ctkwd=%7Bproduct_id%7D&ctmatch=&ctcreative=%7BCreative%7D&ctplacement=132111-44622122499
Hoes	2	$10	$20	http://www.hayneedle.com/product/midwest-rake-llc-42441-garden-hoe-with-54-in-hardwood-handle.cfm?source=pla&kwid=GardeningAccessories%20newskus&tid=JEN4688-1&adtype=pla&kw=&lsft=adtype:pla&gclid=CO2xosmKidMCFUSBswodoRsErA
Rake (for soil)	1	$7	$7	https://www.officesupply.com/cleaning-breakroom/safety/tools/rakes-shovels-hoes-scoops/jackson-eagle-style-garden-rake/p551898.html?ref=pla&cid=ad-pla-non-brand&product_id=551898&adpos=1o2&creative=82620378513&device=c&matchtype=&network=g&gclid=CJK8qqOHidMCFcaEswodtYEI2g
Rake (for leaves)	1	$10	$10	http://www.homedepot.com/p/Emsco-Cavex-Series-22-5-in-Black-Poly-Leaf-Rake-2857/203601974?cm_mmc=Shopping|THD|google|&mid=sKJX9PKmk|dc_mtid_890338a25189_pcrid_139625601344_pkw__pmt__product_203601974_slid_&gclid=CKGAvaaHidMCFcaEswodtYEI2g
Shears (large)	1	$16	$16	http://www.target.com/p/hedge-shear-green-melnor/-/A-50249516?ref=tgt_adv_XS000000&AFID=google_pla_df&CPNG=PLA_Patio+Garden+Shopping&adgroup=SC_Patio+Garden&LID=700000001170770pgs&network=g&device=c&location=9002078&gclid=CInkrdiKidMCFYaIswodiPwFAQ&gclsrc=aw.ds
Shears (pruning)	3	$15	$45	http://www.globalindustrial.com/p/outdoor-grounds-maintenance/garden-tools/pruning-cleanup/ames-true-temper-2343130-pruning-solutions-forged-bypass-pruner?infoParam.campaignId=T9F&gclid=CIeojtuKidMCFcKEswodDuUEyA
Gloves	10	$5	$50	http://www.homedepot.com/p/Firm-Grip-Latex-Coated-Cotton-Large-Work-Gloves-5083-48/100123073
Baskets	36	$1	$36	https://www.dollartree.com/Large-Rectangular-Slotted-

				Plastic-Storage-Basket/p305671/index.pro
	Subtotal:	**$593**		
STRUCTURES				
Shed	1	$530	$530	https://www.amazon.com/dp/B006GCP3MG/ref=asc_df_B006GCP3MG4924009/?tag=hyprod-20&creative=394997&creativeASIN=B006GCP3MG&linkCode=df0&hvadid=167133380292&hvpos=1o4&hvnetw=g&hvrand=8158052645955191816&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9002078&hvtargid=pla-275379737708
Fencing, anti-deer, per 100 feet	3	$75	$225	https://www.harrisseeds.com/products/40341-Deer-X-Fencing-7-x-100-Heavy-Duty?gclid=CI6huISfi9MCFUiHswodPbEDNw
Raised beds, 8x2 - frame	**10**	**$35**	**$350**	**http://queenbeecoupons.com/and-so-we-grow-building-raised-beds-for-the-first-time-about-35-each/**
Raised bed bottoms - plywood sheets, 8x2	**10**	**$15**	**$150**	**https://www.google.com/shopping/product/10832595344309895793?lsf=seller:8740,store:3963407762955875167&prds=oid:14361486488512596160&q=plywood+sheets&hl=en&ei=OeLjWOH9AYaxmQHR0oeADw&lsft=cm_mmc%3DShopping-_-LIAs-_-D21-_-202677224&lsft=gclid:CNm10dezi9MCFdCNswodbjMC6Q**
Cold weather protection	4	$20	$80	https://www.the-cover-store.com/4-pack-of-10-foot-frost-blankets-row-covers-pc2-covermates/?color=Green&gclid=CKGC1aahi9MCFduEswodq3sGyA
	Subtotal:	**$1,335**		
RECURRING COSTS, FIRST YEAR				
SOIL AND FERTILIZER				
Raised beds - soil, per cubic foot	**320**	**$2**	**$570**	**http://www.homedepot.com/p/6-cu-yd-Bulk-Topsoil-SLTS6/205459977**
Fertilizer, 70 lbs	4	$100	$400	https://jet.com/product/detail/9c7307ff067c4adf895e2ff1169158dc?jcmp=pla:ggl:NJ_dur_Gen_Patio__Garden_a1:Patio__Garden_Landscaping__Lawn_Care_Fertilizers__Soils_a1:na:PLA_784744545_40568398546_pla-293265449745:na:na:na:2&code=PLA15
	Subtotal:	**$970**		

SEEDS				
Corn (200 seeds)	4	$5	$20	http://www.burpee.com/vegetables/corn/corn-peaches-and-cream-hybrid-prod000672.html?gclid=CIDrpYiii9MCFZ2PswodGTICzw&cid=PPC
Tomato seed packets	20	$1	$20	http://www.americanmeadows.com/flower-seed-packets/business-promotion-seed-packets/grow-with-us-tomato-seed-packet?utm_source=google&utm_medium=cpc&scid=scplp2863&sc_intid=2863&gclid=CIXy4a-ii9MCFciLswodZ5oEnA
ESTIMATED OTHER TOTAL	1	$200	$200	
	Subtotal:	$2**40**		
	TOTAL:	**$3,138**		

SECOND YEAR BUDGET TOTAL: **$1,210**

Cost per area, year 2: $7.56 per square foot

RECURRING COSTS, SECOND YEAR				
	Quantity	Price per unit	Total price	Information on price:
SOIL AND FERTILIZER				
Raised beds- soil, per cubic foot	**320**	**$2**	**$570**	http://www.homedepot.com/p/6-cu-yd-Bulk-Topsoil-SLTS6/205459977
Fertilizer, 70 lbs	4	$100	$400	https://jet.com/product/detail/9c7307ff067c4adf895e2ff1169158dc?jcmp=pla:ggl:NJ_dur_Gen_Patio__Garden_a1:Patio__Garden_Landscaping__Lawn_Care_Fertilizers__Soils_a1:na:PLA_784744545_40568398546_pla-293265449745:na:na:na:2&code=PLA15
	Subtotal:	**$970**		
SEEDS				
Corn (200 seeds)	4	$5	$20	http://www.burpee.com/vegetables/corn/corn-peaches-and-cream-hybrid-prod000672.html?gclid=CIDrpYiii9MCFZ2PswodGTICzw&cid=PPC
Tomato seed	20	$1	$20	http://www.americanmeadows.com/flower-seed-packets/business-promotion-seed-packets/grow-with-us-

packets				tomato-seed-packet?utm_source=google&utm_medium=cpc&scid=scplp2863&sc_intid=2863&gclid=CIXy4a-ii9MCFciLswodZ5oEnA
ESTIMATED OTHER TOTAL	1	$200	$200	
	Subtotal:	$240		
	TOTAL:	**$1,210**		

C. Full Budget - In-Ground Plot Near Washington Street

Bold item = raised beds plan only; grayed out = in-ground plot only.

Plot dimensions: 50 feet × 175 feet

Soil total surface area: 8,750 square feet

Cost per area, year 1: $0.24 per square foot

FIRST YEAR BUDGET TOTAL: **$2,068**

FIRST YEAR BUDGET		TOTAL:	**$2,068**	
SETUP, FIRST YEAR				
	Quantity	Price per unit	Total price	Information on price:
TOOLS				
Hoses	2	$20	$40	http://www.homedepot.com/p/Miracle-Gro-SoakerPRO-3-8-in-Dia-x-125-ft-Soaker-Hose-CMGSP38125FM/206551431?cm_mmc=Shopping%7cTHD%7cG%7c0%7cG-BASE-PLA-D28I-InsideGardenOther%7c&gclid=CLPslZeFidMCFdWIswodUjYPRA&gclsrc=aw.ds
Wheelbarrow	1	$90	$90	http://www.acehardware.com/product/index.jsp?productId=17157116&KPID=14578294&cid=CAPLA:G:Shopping_-_Wheelbarrows/Yard_Carts&pla=pla_14578294&k_clickid=cc3d42eb-9fe2-4faf-a74c-dbd3cf177268
Watering cans	5	$17	$85	https://www.amazon.com/dp/B00GGGLW9A/ref=asc_df_B00GGGLW9A4922496/?tag=hyprod-20&creative=394997&creativeASIN=B00GGGLW9A&linkCode=df0&hvadid=167123712426&hvpos=1o2&hvnetw=g&hvrand=17164102017767592813&hvpone=&hvptwo=&hvqmt=&hvdev=

				c&hvdvcmdl=&hvlocint=&hvlocphy=9002078&hvtargid=pla-338384888157
Buckets	10	$3	$30	http://www.homedepot.com/p/The-Home-Depot-5-gal-Homer-Bucket-05GLHD2/100087613
Shovels	5	$22	$110	http://www.homedepot.com/p/Razor-Back-48-in-Wood-Handle-Round-Point-Shovel-2593600/204476051
Hand tools (trowels, weeders, transplanters	9	$6	$54	http://www.truevalue.com//catalog/product.jsp?productId=26752&parentCategoryId=2239&categoryId=2251&subCategoryId=2262&type=product&cid=gooshop&source=google_pla&9gtype=%7Bifsearch:search%7D%7Bifcontent:content%7D&9gkw=%7Bkeyword%7D&9gad=%7Bcreative%7D.1&9gpla=%7Bplacement%7D&ctcampaign=4680&ctkwd=%7Bproduct_id%7D&ctmatch=&ctcreative=%7BCreative%7D&ctplacement=132111-44622122499
Hoes	2	$10	$20	http://www.hayneedle.com/product/midwest-rake-llc-42441-garden-hoe-with-54-in-hardwood-handle.cfm?source=pla&kwid=GardeningAccessories%20newskus&tid=JEN4688-1&adtype=pla&kw=&lsft=adtype:pla&gclid=CO2xosmKidMCFUSBswodoRsErA
Rake (for soil)	1	$7	$7	https://www.officesupply.com/cleaning-breakroom/safety/tools/rakes-shovels-hoes-scoops/jackson-eagle-style-garden-rake/p551898.html?ref=pla&cid=ad-pla-non-brand&product_id=551898&adpos=1o2&creative=82620378513&device=c&matchtype=&network=g&gclid=CJK8qqOHidMCFcaEswodtYEI2g
Rake (for leaves)	1	$10	$10	http://www.homedepot.com/p/Emsco-Cavex-Series-22-5-in-Black-Poly-Leaf-Rake-2857/203601974?cm_mmc=Shopping|THD|google|&mid=sKJX9PKmk|dc_mtid_890338a25189_pcrid_139625601344_pkw__pmt__product_203601974_slid_&gclid=CKGAvaaHidMCFcaEswodtYEI2g
Shears (large)	1	$16	$16	http://www.target.com/p/hedge-shear-green-melnor/-/A-50249516?ref=tgt_adv_XS000000&AFID=google_pla_df&CPNG=PLA_Patio+Garden+Shopping&adgroup=SC_Patio+Garden&LID=700000001170770pgs&network=g&device=c&location=9002078&gclid=CInkrdiKidMCFYaIswodiPwFAQ&gclsrc=aw.ds
Shears (pruning)	3	$15	$45	http://www.globalindustrial.com/p/outdoor-grounds-maintenance/garden-tools/pruning-cleanup/ames-true-temper-2343130-pruning-solutions-forged-bypass-pruner?infoParam.campaignId=T9F&gclid=CIeojtuKidMCFcKEswodDuUEyA
Gloves	10	$5	$50	http://www.homedepot.com/p/Firm-Grip-Latex-Coated-Cotton-Large-Work-Gloves-5083-48/100123073
Baskets	36	$1	$36	https://www.dollartree.com/Large-Rectangular-Slotted-Plastic-Storage-Basket/p305671/index.pro
	Subtotal:	**$593**		
STRUCTURES				
Shed	1	$530	$530	https://www.amazon.com/dp/B006GCP3MG/ref=asc_df_B006GCP3MG4924009/?tag=hyprod-20&creative=394997&creativeASIN=B006GCP3MG&linkCode=df0&hvadid=167133380292&hvpos=1o4&hvnetw=g&hvrand=81

				58052645955191816&hvpone=&hvptwo=&hvqmt=&hvdev=c&hvdvcmdl=&hvlocint=&hvlocphy=9002078&hvtargid=pla-275379737708
Fencing, anti-deer, per 100 feet	3	$75	$225	https://www.harrisseeds.com/products/40341-Deer-X-Fencing-7-x-100-Heavy-Duty?gclid=CI6huISfi9MCFUiHswodPbEDNw
Cold weather protection	4	$20	$80	https://www.the-cover-store.com/4-pack-of-10-foot-frost-blankets-row-covers-pc2-covermates/?color=Green&gclid=CKGC1aahi9MCFduEswodq3sGyA
	Subtotal:	**$835**		
RECURRING COSTS, FIRST YEAR				
SOIL AND FERTILIZER				
Fertilizer, 70 lbs	4	$100	$400	https://jet.com/product/detail/9c7307ff067c4adf895e2ff1169158dc?jcmp=pla:ggl:NJ_dur_Gen_Patio__Garden_a1:Patio__Garden_Landscaping__Lawn_Care_Fertilizers__Soils_a1:na:PLA_784744545_40568398546_pla-293265449745:na:na:na:2&code=PLA15
	Subtotal:	**$400**		
SEEDS				
Corn (200 seeds)	4	$5	$20	http://www.burpee.com/vegetables/corn/corn-peaches-and-cream-hybrid-prod000672.html?gclid=CIDrpYiii9MCFZ2PswodGTICzw&cid=PPC
Tomato seed packets	20	$1	$20	http://www.americanmeadows.com/flower-seed-packets/business-promotion-seed-packets/grow-with-us-tomato-seed-packet?utm_source=google&utm_medium=cpc&scid=scplp2863&sc_intid=2863&gclid=CIXy4a-ii9MCFciLswodZ5oEnA
ESTIMATED OTHER TOTAL	1	$200	$200	
	Subtotal:	$240		
	TOTAL:	**$2,068**		

SECOND YEAR BUDGET TOTAL: **$640**

Cost per area, year 2: $0.07 per square foot

	Quantity	Price per unit	Total price	Information on price:
SOIL AND FERTILIZER				
Fertilizer, 70 lbs	4	$100	$400	https://jet.com/product/detail/9c7307ff067c4adf895e2ff1169158dc?jcmp=pla:ggl:NJ_dur_Gen_Patio___Garden_a1:Patio___Garden_Landscaping___Lawn_Care_Fertilizers___Soils_a1:na:PLA_784744545_40568398546_pla-293265449745:na:na:na:2&code=PLA15
	Subtotal:	**$400**		
SEEDS				
Corn (200 seeds)	4	$5	$20	http://www.burpee.com/vegetables/corn/corn-peaches-and-cream-hybrid-prod000672.html?gclid=CIDrpYiii9MCFZ2PswodGTICzw&cid=PPC
Tomato seed packets	20	$1	$20	http://www.americanmeadows.com/flower-seed-packets/business-promotion-seed-packets/grow-with-us-tomato-seed-packet?utm_source=google&utm_medium=cpc&scid=scplp2863&sc_intid=2863&gclid=CIXy4a-ii9MCFciLswodZ5oEnA
ESTIMATED OTHER TOTAL	1	$200	$200	
	Subtotal:	$240		
	TOTAL:	**$640**		