The Sustainability of the Smith Landscape

The Smith College landscape serves as much more than just the backdrop of the college. As a nationally renowned and historically significant landscape design, an educational resource, a draw for prospective students, a sacred space for alumnae, and a home to the approximately 2,700 diverse Smith College students, this landscape serves many functions and serves many people. Due to this multitude of landscape services, and to the many people invested in them, making changes to the landscape, such as implementing sustainability initiatives, can be difficult.

Despite these obstacles, the Smith College Grounds Department, a branch of Facilities Management, has taken considerable steps towards more sustainable landscape operations by using the safest fertilizers known and conditionally appropriate grasses, in addition to avoiding harmful de-icers and incorporating pest management techniques that cause the least harm to the local environment. As sustainability is an asymptotic concept, however, there is still more that Smith College can do to make its landscape more ecologically sound while also being mindful of the landscape’s history, functions, and stakeholders. Large projects include updating the irrigation system to include the use of water from Paradise Pond and replacing gas-powered machinery with electric-powered machinery that could be charged with solar power, but these projects will require considerable cooperation of stakeholders and consideration of the landscape’s design and function to be implemented. Smaller projects, such as increasing visibility of the sustainable practices that are already in use by establishing an internet presence for Grounds and installing more educational signs when appropriate, are more feasible projects for the near future.

The Smith College campus is valued not only by the immediate Smith community, but by the nation as it is one of Frederick Law Olmsted’s renowned landscapes. Olmsted, who is also known for designing Central Park, designed the Smith landscape in 1893. Olmsted intended for the Smith landscape to look as if it were natural and informal by designing irregular pathways that are informed by the topography and character of the landscape. He created picturesque views, crafted both expansive lawns and more private small spaces, and incorporated the Botanic Garden into his plan (Figure 1). The landscape design of Smith has changed considerably over time as more buildings have been built, expanding the acreage of the campus by about one hundred acres and reducing the amount of open space that was originally included in the Olmsted plan (Towers and Oberlander Part One, 10). However, now that the historical significance and importance of this landscape design has been realized, Smith has made it a priority to preserve the areas that were part of the original Olmsted design and to keep his design principles in mind when expanding or changing the landscape (Michael Marcotrigiano, personal communication, 23 April 2012).

In addition to being valued for its aesthetics, the Smith College landscape is also a valued educational resource. When Olmsted was designing the Smith landscape, President Laurenus Clark Seelye charged that Olmsted “lay out the grounds so that they shall not only be most serviceable for our ordinary use, but also provide an ornamental botanic garden, the plants and trees being selected and grouped according to scientific and aesthetic demands” (qtd. in Towers and Oberlander Part One, 10). The entire campus is an arboretum that has encompasses 125 acres with each tree labeled with its common and Latin names for the curious student or visitor (Trees, pamphlet). The Botanic Garden of Smith College, which was established at the time that the Olmsted plan was implemented, also labels the many shrubs and herbaceous plantings on campus, and has a Systematics Garden in front of the Lyman Conservatory to teach students about plant systematics and classification.

As part of a landscape on which people work and live, the social value of the landscape is significant. This campus is home to about 2,500 students during the school year, in addition to being the
workplace of many faculty and staff members and a destination for many members of the surrounding Northampton community. As such, the landscape serves many cultural and recreational functions as well, and these functions change as the people who inhabit and use the landscape change. Mary Maples Dunn, the president of Smith College in 1995, wrote in the Landscape Mission Statement for the 1995 Landscape Master Plan Part One, “[the landscape] changes in response to the requirements of the people who inhabit it” (9). She explains in the mission statement that while Olmsted’s historic vision of the Smith campus should be considered when making changes to the landscape, a consideration that was not always made in the past, it is also important to consider the needs of the people who use the landscape today and makes changes appropriately, as a landscape is not a static entity, but rather a dynamic system that changes over time.

The Smith College community has been historically, and still is today, acutely mindful of the role that the landscape plays in the college community and beyond. Throughout the past century, the Smith College community has changed its perception of its landscape, and has even come together to discuss their perceptions. The detailed analysis accomplished by each of these efforts is beyond the scope of this paper, but the events themselves are enlightening when considering the evolution of the Smith landscape into what it is today. After the Olmsted Plan was implemented in 1893, further changes were made to the campus landscape design by the landscape architect John Nolan in 1914 as Smith prepared to expand along Elm Street and Green Street. Nolan was hired as a result of Smith president Marion LeRoy Burton’s attempts to make Smith College more of a “modern University” (Towers and Oberlander Part Two, 75). Nolan’s design strayed from Olmsted’s vision in that it was more linear and rectangular (Figure 2). In 1995, one hundred years after the establishment of the Botanic Garden, the Smith College community decided to re-evaluate its vision for the campus. The college was planning to add a parking garage and a campus center, and before deciding on potential locations for these structures, they re-evaluated the landscape in terms of its aesthetics and function as well as its safety and efficacy, and created a landscape master plan to refer to when making changes to the landscape in the future. To do this, they hired the Rolland/Towers LLC team and landscape architect Cornelia Hahn Oberlander, a Smith alum, to assess the landscape, and from this assessment suggest potential locations for the two new structures and other changes that could be made to the landscape. Their efforts were guided by three principles: preservation, restoration, and rehabilitation. They defined three objectives of their re-evaluation: to enrich the teaching and learning environment, to enhance the human environment, and to strengthen the built environment (Towers and Oberlander Part Two, 75). They made it a priority to preserve the remaining open spaces and otherwise ‘Olmstedian’ spaces that exist on campus (Figures 3 and 4). When asked about this effort, Oberlander noted that she and Shavaun Towers intended for this document to depict what the college would look like in the future and would enable future decisions to be made, but she noted that not many of their recommendations had been implemented since the writing of the plan. Examples include their proposition for a wetland study area at the bottom of the president’s lawn and a connection to the quad, in addition to open space restoration (Oberlander, personal communication, 1 May 2012).

The most recent official re-evaluation of the landscape by members of the Smith College community took root in the fall of 2011 with the formation of the Landscape Subcommittee, a branch of the Committee on Sustainability focused on the sustainability and environmental impact of the Smith landscape. Concern regarding the sustainability of the Smith landscape is not new; in 2003, one of the student capstone projects for the Environmental Science and Policy seminar was entitled “The ‘Greening’ of the Smith College Campus: Fertilizers, insecticides, fungicides, and herbicides used to maintain Smith grounds.” In 2009, when Smith worked on its Sustainability & Climate Action Management Plan, commonly referred to as SCAMP by the Smith community, the writers included a section on Landscape Ecology, which outlined some of the sustainable operations employed by the Grounds Department but also identified areas for improvement. Leslie King, a sociology professor at Smith who has been a long time member of the Committee on Sustainability and was its chair in the fall of 2011, noted that this issue of sustainability and the Smith landscape was not new to the committee. During one meeting of the Committee on Sustainability in the fall of 2011 in particular, however, a student brought up the issue of
sustainable landscaping, which spurred a discussion among the members of the committee (Leslie King, personal communication, 28 March 2012.). King suggested that there be a Landscape Subcommittee that would meet outside of the regular Committee on Sustainability meetings.

During the first Landscape Subcommittee meeting, the members raised concerns related to the sustainability of the landscape. Concerns that arose included water use and irrigation of lawns, the use of gas and oil-powered machinery, noise, and most significant, the use of chemicals on lawns (Leslie King, personal communication, 28 March 2012). The use of chemicals were a concern in part because they had heard of an event in which several students developed rashes from sitting on a lawn that had just been treated, but that did not have any signs informing them of this (Maya Kutz, personal communication, 25 April 2012). They decided to first review the 1995 Landscape Master Plan and then reevaluate the landscape by determining the perceptions of those who inhabit and otherwise interact with the Smith landscape, such as students and alumnae.

When it comes to making decisions about the landscape maintenance and management, the final say is typically of the Grounds Department, but the decision itself, and the decisions that are continuously being made to shape the landscape, are influenced by a decentralized body of stakeholders working together in the system that is the Smith College landscape. According to Donella Meadows in *Thinking in Systems*, a system is composed of elements that interact with each other in a series of interconnections to serve an ultimate function or purpose (11). Many of the elements of the Smith College landscape system are the individuals and groups who interact with or in other ways influence what is done to the landscape: the stakeholders. In order to make changes to the landscape, the intentions of these stakeholders must be met; this is one of the most significant challenges in making changes. It is important to identify these stakeholders and identify the ways in which they interact with the landscape, and each other, in order to make progress.

Perhaps the most direct stakeholders include the Grounds Department and the Botanic Garden, who work together to maintain the landscape. The responsibilities of the Grounds Department include “mowing, spraying, fertilizing, lawn repairs, leaf removal, mulching, tree work, snow removal, ivy and hedge trimming, irrigation repairs, drainage work, field prep, and sidewalk and parking lot maintenance” (*About the Office*). The Botanic Garden works with the Grounds Department as it is responsible for maintaining records of the herbaceous plants and the trees on campus and ensuring that President Seelye’s intentions reflected in the Olmsted plan, that the campus grounds are educational as well as aesthetically pleasing, are still being met (*Welcome...to the Botanic Garden of Smith College*). Both departments must coordinate with each other and work with the Smith College administration when maintaining the landscape.

Beyond these two departments, significant stakeholders include the faculty, staff, and students who work, and live, on the Smith College campus. For these individuals, particularly for students, the functions of the landscape are important, in addition to the aesthetics, in that the students interact with the landscape on a regular basis. In a focus group conversation consisting of three students residing in Chapin House, they mentioned that the Smith landscape was not their main reason for coming to Smith, but being in a beautiful place with grassy areas was important to them. They did not know where the headquarters of the Grounds Department was located, but were aware of their presence on campus, noting that they often see them riding on their carts to get around campus.

Less direct stakeholders in the Smith College landscape include prospective students. Many visit Smith College every year when deciding where to spend their undergraduate years, and in some cases, graduate years. Though each student is looking for something slightly different in a college, all of the visiting students must interact with the landscape during their time at Smith. For this reason, the landscape is a significant aspect of the college admissions process. In an informal poll of two Gold Key tour guides, they both noted that they mention the Smith landscape during their tours, often mentioning that the Smith landscape was designed by the same person who designed Central Park, and explaining that the entire Smith campus also serves as an arboretum (*Gold Key Guide #1, Gold Key Guide #2*).

In addition to current and potential students, past students who return to Smith for reunions are less direct but also important stakeholders in the Smith College landscape. This time spent at Smith is a
treasured time for many students, and returning to the Smith landscape often produces a sense of nostalgia for these alums. Therefore, many alumnae value the parts of the Smith landscape that remain timeless. In November of 2011, for example, the Alumnae Association published an illustrated story on their website documenting the places on the Smith campus that remain near and dear to the alumnae hearts. Lie Guidon, ’65, recalls “not feeling homesick anymore after walking through the Botanic Garden.” Jennifer Kramer ’03 remarks:

I have always loved the wooden swing right on the hill overlooking Paradise Pond. No matter the season, it provides a place to sit quietly and take in all the beauty that surrounds you. The pond and all the Technicolor trees during fall, or the icy look of winter, is so calming. Whenever I come back to visit, I make a special point to sit there again.

Wary of these and other related sentiments about the Smith landscape, and the immense support that the alumnae provide to the college year after year, the Landscape Subcommittee acknowledges the possibility that the alumnae may be hesitant to accept certain changes to the landscape, particularly if these changes alter the landscape too drastically from the way it was when they were students (Leslie King, meeting minutes, 14 December 2011).

Other more distant yet still significant stakeholders are the citizens of Northampton who use the Smith College campus. From its establishment, Smith was meant to be integrated with the city of Northampton. For example, the unique housing system of Smith, which consists of a collection of small houses as opposed to a large dormitory, was intended to bring “the pupils more into the social life of the town” (Horowitz, 71). Evidence of this relationship between the city of Northampton and Smith can be found when one walks on campus on any day; community members can be found strolling through the Olmstedian paths and Botanic Garden quite regularly. Though not as directly affiliated with Smith as the faculty, staff, and students, the community is still a stakeholder in the Smith landscape as the tie between Northampton and Smith is one that has been intended since the founding the college.

Making the final decisions are members of the administration. Of the role of the administration and the Trustees in the Smith College landscape, Oberlander writes, “These are the most important stakeholders since students and alumni are transitory”, and she and Towers made sure to secure support from both entities before preparing the Landscape Master Plan (Oberlander, personal communication, 1 May 2012). When it comes to large decisions regarding changes to the landscape or facilities, the Campus Planning Committee is consulted (College Committees and Governance). This committee consists of faculty members and the Vice President of Finance and Administration at Smith. Whenever the Botanic Gardens or Grounds wants to make a change to the landscape that would affect many stakeholders and their interactions with the landscape, their decisions must first pass through this committee. Smaller decisions regarding day-to-day operations and that would not significantly affect the campus aesthetic or the stakeholders’ interactions with the landscape are left up to the discretion of the individual department. The extent to which the Campus Planning Committee is involved depends on the scale of the issue at hand (Ruth Constantine, personal communication, 1 May 2012). In certain circumstances, the Campus Planning Committee may consult the Board of Trustees for their insight on how this decision would affect donations and admissions. (Michael Marcotrigiano, personal communication, 23 April 2012). Constantine noted that the Campus Planning Committee does refer to the Landscape Master Plan from 1996, but implements its recommendations gradually due to budget constraints. This is why many of the recommendations have not yet been implemented. Constantine also acknowledged that when the college plans to implement one of the ideas from the Landscape Master Plan or from SCAMP, they review it to make sure it is still a relevant recommendation for the college considering the stakeholders at the time (Ruth Constantine, personal communication, 1 May 2012).

Despite challenges that may arise due to the multitude of stakeholders and unique obstacles relating to the valuable aspects of the Smith landscape, considerable progress has been made in terms of sustainability and environmental stewardship in the Grounds Department of Facilities Management. The Smith Grounds Department is on par with other institutions of similar size in terms of its grounds practices. For example, Bowdoin College in Maine (1,762 students compared to Smith’s 2,500) uses the
same grasses (Tim Carr, Bowdoin Grounds Department, personal communication, 22 May 2012). Both Smith and Bowdoin use a mixture of Kentucky blue grass, tall fescue, rye fescue, and rye and use these different mixtures dependent on the aesthetic and use of the area (ibid). Both campuses use ryegrass on the athletic fields because it has the ability to quickly germinate and is therefore well suited to an area of high intensive use. The similarities in turf management between these two colleges show the trend towards more sustainable landscaping that is happening nationwide on college campuses. Smith has made it a point to include good stewardship and sustainable practices in their mission statement (Smith History: Mission of Smith College) and Bowdoin has done the same to make sure that sustainable practices are core to both incoming students and the institutions themselves for years to come.

With this being said, landscaping is still said to be one of the most unsustainable and unnecessary services. Lawn care and allocation of resources to lawncare have been called into question in terms of sustainability and its effect on the environment. The Smith Grounds Department is doing its best to combat these misconceptions while making sure to maintain the aesthetic beauty that the campus is known for while also keeping along with the Smith College mission of good stewardship of the land.

The way that the college handles grass and turf management in term of the types of grasses, fertilizers, and water regimen practices on campus have the potential to have a large effect on the surrounding environment. The main problem with grass is that we have been taught since we were young that green grass is what looks best, but sustaining green grass requires a large amount of energy and resources. Dead grass has come to mean that someone does not care to take care of that area. In a study done by the College of Agriculture and Natural Resources of University of Delaware titled “Turf Grass Madness,” the American infatuation with wide expanses of green lawns and where that sentiment came from is studied. They trace the history of the obsession with green lawns back to a couple of different stages. They found that the first instance of this sentiment for green spaces occurred in eighteenth century in Europe when close-cut lawns were a status symbol (Pineo and Barton 1). Having a well-kept lawn meant that you were able to hire and pay the people required to care for the lawn (ibid). It also meant that you had the luxury of being able to dedicate a parcel of land to something other than a food crop (ibid). Next, in the 1950s a well-kept, green lawn became a part of the image of the ‘American Dream’ (ibid). Front lawns were no longer a status symbol but rather “a measure of a middle-class family’s ability to keep up with the Joneses” (ibid). The third stage of turf infatuation, the stage we are currently in, is where turf and lawns are the norm (ibid). Lawns are found in front of all different kinds of buildings from homes to commercial buildings with a large, well-kept lawn being what every homeowner and business owner hopes to have in front of their building (ibid). Leslie King, a sociology professor and chair of the sustainability committee last semester here at Smith College, has spoken to this cultural norm of large expanses of green lawns saying that lawns require so much watering and resources that we need to relearn what is pretty as far as landscaping and turf are concerned (Leslie King, Personal Communication, 28 March 2012).

So what is to be done? Changing a cultural norm is not something that is readily pursued but making lawns more sustainable could be. Today, 40 million acres of land are devoted to turf grass in the United States with about 75 percent of this being home lawns with more than 30 billion dollars a year spent on lawn maintenance (SULIS). Many acknowledge that this sentiment of a required perfectly mowed, green, turf lawn is not rational, as it is an extreme drain on resources that are becoming finite, but it is well embedded in our cultural ideals of the time. Someday we may see a time when having a green lawn is no longer deemed necessary in our culture but until that time comes making sure that lawn management as sustainable as possible could greatly decrease the impact that lawn care has on resource allocation and the environment. One way of making lawn maintenance more sustainable is to choose a type of grass that is well suited to the use of that area, the pursued aesthetic, and the environment.

The selection of which grass type to use depends on the site itself, including the degree of use and the desired aesthetic for that area. Cool season grasses are those used most often in landscaping in the Northeast, as they are best adapted to the climate (Fescue Grass Seed Varieties for Lawns & Sports Fields). In different areas, where the heat is more intense or there are other threats like pests, there are
different sustainable grasses that are recommended (Angie’s List). Most of the lawns on Smith College Campus, especially the athletic fields (where most of the college’s grass is located) is defined as high maintenance lawn, or lawn areas composed of turf grass species and varieties requiring higher levels of water, fertilizing and mowing to remain healthy (SULIS). The main grasses used by Smith College landscaping are Kentucky Blue Grass, Fescue grasses, and Rye grasses.

Kentucky Bluegrass
Kentucky Blue Grass is the most sustainable turf grass in use today (Angie’s List, SULIS). Kentucky Bluegrass has a strong rhizomatous nature that allows it to quickly establish an area and repair itself from damage due to pests and use (SULIS). It also has the ability to survive extended periods of drought by going into dormancy (ibid). Some water may be required during extended conditions of very hot and dry drought in order to prevent permanent injury to the crowns and rhizomes that will prevent the plant from growing back (ibid). Kentucky Bluegrass can be planted from seed or sodded and is one of the most popular turf grass lawns in Northern America (Fagerness and Keeley 2). Bluegrass requires medium amounts of lawn care and makes beautiful home and sports grasses (SULIS). Bluegrass is often used in low to medium traffic areas and is often incorporated with other grass species to produce a better multi-purpose lawn that has good "lawn mending" capabilities (ibid). Two disadvantages of this lawn variety are that it has relatively shallow root systems under mowed conditions and has a relatively high demand for water (ibid).

Rye Grass
Rye Grass is usually used within a mix of Kentucky Bluegrass to create a greater multi-purpose lawn. Rye Grasses are used on newly sown lawns of cool and warm season grasses and acts as an erosion barrier while the permanent lawn develops and gives the area almost "instant" green coverage (Rye Grass Seed Perennial & Annual Lawn, Pasture). This green coverage is the chief purpose for using annual ryegrass as it allows lawns to look nice while recovering from a disturbance (ibid). Being an instant green cover means that it is what they call a "throw and grow" species that “can be sown without the hassle of tilling, scarifying, or digging into the soil and destroying any of the permanent ground covers already in place” (ibid). Ryegrass is ideally suited for short-term seasonal use in areas reaching below the transition zone (ibid). Annual ryegrass is also very beneficial to problem areas that are infected with pests as it helps to limit the need for chemical control and makes it ecologically friendly (ibid). Also the clippings from mowing are left on the developing lawn as it grows as it helps to add extra nutrients as the ryegrass decomposes (ibid).

Fescue Grass
There are two sub-species of fescue grasses, Tall Fescue and Fine Fescue. Fescue grasses are drought tolerant, require less fertilizer, and develop a deep root system (Fescue Grass Seed Varieties for Lawns & Sports Fields). They are also shade tolerant unlike the majority of cool season grasses which makes them a likely candidate for use on college campuses (ibid). Fescue grasses perform well in the lower areas of the transition zone where the season is too hot for other cool grasses in the summer or in the area where it is too cold in the winter for the warm season grasses (ibid). Fescue grass seed is found in the other two grasses mixtures that we use on campus. It stays green all year and is easy to establish from seed (ibid). Fescue grasses are usually used in a mixture with Kentucky Bluegrass for summer northern lawns (like the hill on Helen Hills Hills Chapel) and with warm season grasses in winter lawns (ibid). Fine Fescue grasses are more cold and shade tolerant than Tall Fescue but Tall Fescue are coarser and are dense clumping grasses (ibid).

Fertilizer
The fertilizer that Smith uses is called Polyon fertilizer. Polyon fertilizer has a special coating on the outside of it that allows for a gradual release of the fertilizer throughout time (Polyon Controlled-Release Fertilizer). Within a week of application, the polymer that coats the fertilizer allows soil moisture in to activate the nutrients (ibid). Over the next several months, the membrane slowly releases dissolved nutrients through diffusion as it is triggered by temperature (ibid). This membrane around the fertilizer allows for the root zone to be fed slowly, constantly, daily, for months at a time (ibid). Bob Dombkowski, head of the Grounds Department at Smith College, says that with this fertilizer they can apply the fertilizer less often and therefore allows for less chemicals to be put into the system. Mr. Dombkowski also claims that these fertilizers are more sustainable than organic compost in the ratings because it has the right amount of nitrogen and has more rapid release of nutrients.

Organic fertilizers have a slow and gradual release of nutrients that makes it both a good and bad product. This gradual release is an advantage because the fertilizer does not need to be reapplied frequently but a disadvantage as the release of nutrients from organic fertilizers can be dependent on both ambient temperatures and the presence of microorganisms in the soil. (Gore 2012). It is also a major disadvantage to use organic fertilizers with damaged soils as the slow and steady release of nutrients may not get the soil or plant the nutrients that it needs in time to save the plant (ibid). Bowdoin uses a combination of organic and traditional fertilizers on their campus (Tim Carr, Phone interview, 17 April 2012). Bowdoin posts many facts about their organic fertilizer use and boasts that “Bowdoin has expanded the organic treatment across 60 percent of the central campus” (ibid). Bowdoin lists the components of the fertilizers to utilize ingredients such as corn gluten, seaweed, bone meal and manure, and pest deterrents such as red pepper and garlic oils (Landscaping; Bowdoin Grounds Dept). Unfortunately, there is not any information posted on the type of traditional fertilizers used on the other 40% of the campus. This regimen of both organic and traditional fertilizers is used to combat the disadvantages of the organic fertilizers but also allows for minimal traditional fertilizer use and therefore puts minimal chemicals into the system. Further research is needed to assess which system is better for the environment and is most effective.

**Watering Regiment**

Currently, the watering system that the Grounds Department uses to water the lawns around campus is out of date (Bob Dombkowski, Personal Communication, March 2012). The irrigation system that Smith currently uses is fragmented and is not computerized making it difficult for the Smith College Grounds Department to do things with great efficiency. Further, this creates problems for sustainability because if there is an issue in the system the head must be found and manually shut off instead of being able to turn it off with the push of a button. This longer process is not only tedious but wastes a lot of water as the problem is found and diagnosed. Mr. Dombkowski said that if he were to have access to unlimited funds that one of the first things he would fix would be the irrigation system (Bob Dombkowski, Personal Communication, March 2012). Not only is the irrigation system out of date but it also has no way of being regulated. The water for the lawns is stiffened out of the house water systems nearby to the lawn. Although the general water use is recorded for each house, there is no way of telling what of that water was used to water the lawns or was used domestically by the students living in the house. As far as sustainable practices are concerned, the inability to tell accurately how much water the college is using to water the lawns is a disadvantage.

“The use of potable water to water the grounds is also of concern” (Bob Dombkowski, Personal Communication, March 2012). Mr. Dombkowski, as well as many others on the Smith College campus, would like to see Smith water their lawns with the water from the Mill River. In our visit to the Northampton Water Filtration Plant we asked them what they thought about this idea, they were split on what should be done. David Sparks came from an economics side, realizing that Northampton would lose money with the loss of Smith College as a client while Greg Nuttelman came from an environmental side, realizing the importance and limitation of Northampton’s watering sources (David Sparks and Greg
Nuttelman. Northampton Water Filtration Plant, DPW. Personal Communication. March 2012). Although the DPW staff itself is split on this decision, a couple of years ago the project was proposed but was blocked by the EPA and not by Northampton DPW. The potential of this project warrants further research and attention.

**Integrated Pest Management**

In addition to the selection of grasses at his disposal, Mr. Dombkowski and the rest of the Grounds Department also practice IPM principles. Integrated Pest Management (IPM) principles are a series of evaluations of the life cycles of pests and their interaction with the environment. They are used to manage pests with the most economical means and the least possible damage to people, the environment, and homes and other properties (IPM, Epagov). IPM also encompasses other turf management practices such as proper lawn mowing techniques, proper water use practices, updated irrigation systems, etc., to create a systematic approach to creating a landscape with a decreased pest problem. To put it another way, IPM can be considered to be integrated preventative management, because “a sound IPM program has the potential to reduce reliance on pesticides [since] applications are made only when all other options to maintain the quality and integrity of the turf have been exhausted” (Owen and Lanier 6) Smith participates in the standard IPM guidelines, outlined briefly as follows from an email correspondence with Mr. Dombkowski: 1. Survey- Inspect the lawn areas on a regular basis and looking for changes in color, health, response to water, and the possible need for fertilizer. 2. Investigate Changes- Look for insects, disease, nutrient deficiency, and the damages caused from each. 3. Remedy-Implement treatments or cultural practice. 4. Maintain long-term goals- Includes preventative measures (Message to one of the authors). Furthering IPM testing remains the largest contributor to making a more sustainable landscape, including in depth entomological scientific study of various bio-control options against insects to best management practices (BMP’s) to researching organic lawn care for feasibility. Currently, Smith uses an insecticide called Acelepryn to control billbugs and white grubs. Merit, another insecticide, is sometimes used for grubs as well. The pesticide is sprayed once a year. Acelepryn, a petro-chemical with the generic name chlorantraniliprole, is a relatively new kind of insecticide that is much more non-toxic to mammals and many terrestrial vertebrates than other insecticides on the market, although it is still highly toxic to aquatic invertebrates, shrimp, and oysters (Pesticide Fact Sheet 19). Therefore, runoff and drift may harm aquatic invertebrates in aquatic environments adjacent to the site of Acelepryn use. These insecticides also kill beneficial organisms found in the soil, such as mites and springtails, which help in the production of additional soil nutrients. Acidity of the soil is increased as well, so more time and material costs are spent to rectify the acidic soil (Wenning “List of sampled beneficial insects”). Bio control, which employs various non-toxic alternatives to petrochemical pesticides, offers excellent environmental sustainability, and “integrating non-chemical controls into the management plan can help reduce pesticide dependence, as well as labor and costs. Integrating non-chemical controls also helps reduce the likelihood of pests developing resistance to insecticides” (Redmond 9). One example of a bio control alternative or addition to Acelepryn to control white grubs, which kill grass by eating the roots, is the use of nematodes. Certain species of nematode carry bacteria in their guts that are pathogenic to white grubs. The microscopic nematodes are dissolved in water and applied to the turf, wherein the nematode finds and enters the grub through its openings. It feeds on the grub’s insides and the bacteria are released, killing the grub. The nematodes lay eggs inside the dying grub, and once hatched, the nematodes find more grubs and the cycle begins again. One species of nematode that is currently commercially available is Heterohabditis bacteriophora (HB). HB has shown a control of white grubs as high as 70-90%. A promising nematode that is not currently commercially available is Steinernema scarabaei (SS), which has shown to be extremely consistent at an 80 to 90% control of a wide range of white grub species (Vittum). The nematode needs the right amount of soil moisture and certain kinds of soil to thrive, so research and testing would need to be done on campus to see if the nematode can thrive and successfully control the white grub population (Koppenhofer and Fuzy).
Artificial Turf

Artificial turf is often hailed as a step forward in more sustainable landscape design due to its non-reliance on constant watering, and typical pesticide and fertilizer use. However, most artificial turfs are made with a material called crumb rubber, which is made from recycled tires. This material has been shown to create a leachate that can be high in zinc and other toxic compounds (Xiaolin et al 279). A very small amount of toxic vapor has also been shown to exist above the playing field. One study in which field studies of these vapors were conducted showed that with 30 years of intensive artificial turf use, an athlete would have an increased cancer risk of 1x10^-6 (Menichini et al 4957). The researchers admit that there is almost no work done in this area, so more field studies need to be conducted to reach more comprehensive conclusions of vapor inhalation risk, but it is apparent that there is something that could potentially be harmful. Additionally, most artificial turf today has to be replaced every ten years, at which point it is taken to a landfill, producing more plastic waste. Although the most sustainable and ecologically sound scenario would be replacing our artificial turf with a robust grass that uses less water and pesticide, another alternative is to buy our artificial turf from a company that offers the most sustainable choice. A company called Brock international has recently become cradle to cradle certified, which means that their artificial turf meets certain non-toxicity, water, and renewable energy standards (Brock International). The main core of the artificial turf is one hundred percent recyclable and is rubber crumb material free. After the artificial turf has been used for ten to twenty years, the old turf panels are cleaned and remade into new turf panels, although the food grade polypropylene that makes the “grass” part is disposed of as waste (Athletic Fields Powerbase).

De-icer

Being a campus in the northeast means coping with the ice and snow. Typically a combination of salt and sand are used to get rid of the ice. Road salt contamination is often seen in the degradation of aquatic and terrestrial life along major highways and roads. Sand is also a major contributor of phosphorus and particulate matter (pm-10) that can be unsafe to work around (PM10NAAQS). Thankfully, Smith uses a product called distiller condensed solubles (DCS), which are a sugar byproduct obtained from molasses factories (Tenenbaum). It is a liquid, brown spray faintly smelling of soy sauce that is sprayed onto walkways and small areas, and can be sprayed onto salt to drastically decrease the corrosiveness and runoff of salt but increase the ice melting power (Ice B Gone). It also works better at colder temperatures than normal road salt. A calcium component is added to keep the spray from freezing. Before using the spray, Smith consumed 3 tons of salt and tons of sand. Now, with the use of the spray, the Grounds Department only uses yards of salt and sand (Dombkowski, personal interview).

Composting

Composting is another part of a sustainable landscape. There is a 400-yard leaf compost pile at Fort hill of which the garden department uses a little, but if there was more funding it could be processed and used for the grounds. A more comprehensive composting plan could produce a potential source of organic fertilizer for Smith. Additionally, a large quantity of food waste from smith is brought to a dairy farm in Westhampton, where it is composted on site so that the farmer can use it on his lands. In one month alone, Smith produced 44,000 pounds of food. Mr. Dombkowski claimed that the Grounds Department does not have the capacity to process the food compost, but it is all used as compost for the farmer, which means that the only non-sustainable aspect is the transportation of the food waste to the farm (personal interview).

Conducting sustainable landscape practices are a privilege. Not only does it require a dedicated and committed Grounds Department (like the Smith College Grounds crew) but it also requires adequate
funding and support from the administration. There are many things that the college needs to budget its money towards. Smith College is lucky enough to have a large endowment (1.43 billion currently) and even a large individual endowment for the botanical garden that is supposedly larger than the endowment for the entirety of Hampshire College (Hampshire College).

**Potential Recommendations**

The need for the Grounds Department to use buggies for the transportation of people, materials, and tools has caused a heavy dependency on fossil fuels. A potential step towards reaching a higher level of sustainability would be to curb this use, by switching from gas-powered buggies to solar powered buggies, or electric buggies that would be charged by a solar station. While initial investments may be high, the long-term savings created by a lack of dependency on oil may be significant. The use of electric or solar powered buggies provides an additional advantage as well, as they are an incredibly visible symbol of campus efforts to be sustainable, or be “green.” The use of electric and solar powered machinery within the Grounds Department does not need to stop at buggies, there are more and more companies beginning to make other solar and electric equipment, such as lawnmowers (People Powered Machines). We strongly recommend that further inquiry be made into the feasibility of the use of electric or solar powered machinery within the Grounds Department.

Updating our irrigation system would be another potential way to greatly increase our sustainability by preventing unintentionally wasted water. The creation of a centralized computer system would be one way to prevent water waste, as it would immediately notify staff of problems such as leaks or sprinkler malfunction. A smart computerized system would also allow for more accurate watering times, and prevent unnecessary irrigation, such as right after a rain event. This system would also allow us to accurately determine how much water is being used for the purpose of irrigation, information that would be incredibly useful in times of drought.

A final recommendation would be to increase the visibility of the Grounds Department and their sustainable practices. This could be achieved in multiple ways, two of which include the creation of a web page, and the use of educational signs on campus. The creation of a web page on the Smith College official website (www.smith.edu) could prove an invaluable resource for students and faculty curious about the landscaping practices on their campus. Such a web page could outline sustainable practices done within the Grounds Department, such as an outline of their Integrated Pest Management plan, and the names of herbicides, pesticides, and de-icers used and why they were chosen. Potentially, a survey could be conducted on campus that determines what questions the campus community has for the Grounds Department, which could provide a clearer idea of what should be addressed on the web page. If deemed feasible, this work could be done by a dedicated student intern. The use of signs around campus could also help correct misconceptions about the Grounds Department’s practices. For example, in addition to the necessary warning signs applied to any areas where pesticides or herbicides have been used, an additional sign could be placed that lists the names of the products, with a short blurb that explains how the product works, and why it was chosen. Similar signs could also be used in places where de-icers, fertilizers, or grass seedling mixes have been applied.

**Conclusion**

Though we did begin to examine the system in which Smith must operate when making further changes to the landscape, there are areas of the system in which more research can be done. In Termorshuizen and Opdam’s writing on landscape change, they argue that the three components of landscapes that must be considered before making landscape changes decisions are the social, the
econmic, and the ecological (2009). The social component is one that changes, as new faculty and staff are hired and approximately one quarter of the student body changes per year. We did not have time to examine student perception of the landscape as deeply as we would have liked, but this may be done in the near future by the Landscape Subcommittee as they re-evaluate the Smith College landscape.

In the past several decades, visibility of sustainable efforts on college campuses has increased. Many colleges now have an Office of Sustainability of some kind and are actively implementing sustainable practices into their operations. Smith College is one of these colleges. Smith has even gone so far as to incorporate the values of sustainability into its mission statement, stating, “Smith prepares women to fulfill their responsibilities to the local, national and global communities in which they live and to steward the resources that sustain them” (Mission Statement). To further increase visibility of sustainability on campus, the landscape would be an ideal target. As Leslie King noted in the meeting of the Committee on Sustainability, there exists in this group of individuals that currently comprises Smith College an energy around landscape concerns. And though it is difficult for a more or less decentralized body of many stakeholders to make decisions regarding the landscape, a successful sustainability initiative in the Smith College landscape, and even greater publicity of the sustainable landscape practices that are currently implemented at Smith, which is quite a privilege, would greatly increase visibility of Smith’s commitment to fostering environmental stewardship in its students.

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Appendix 1: The Smith College Landscape Over Time

Figure 1. Plan of Smith College by Frederick Law Olmsted, 1893.
Figure 2. Smith College Campus Plan by John Nolan, 1914.
Figure 3. Campus Plan of 1995 by Rolland/Towers with Cornelia Hahn Oberlander.
Figure 4. Potential ‘Olmstedian’ Spaces in the Smith College Landscape, by Rolland/Towers with Cornelia Hahn Oberlander, 1995.
Figure 5. Smith College Campus Map, 2012.