Hit the Ground Running: Enhanced Cross-Country Course Design at the University of Guelph Arboretum

by

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ABSTRACT

HIT THE GROUND RUNNING: ENHANCED CROSS-COUNTRY COURSE DESIGN
AT THE UNIVERSITY OF GUELPH ARBORETUM

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This study explored the nature and needs of cross-country runners and running, particularly how sport facilities and courses can be best designed for training and competition events. The existing University of Guelph Arboretum cross-country course and users were studied using a qualitative, inductive approach. A site analysis was conducted to evaluate the course and identify opportunities and constraints for further cross-country development. A semi-structured interview method was used to collect information on the needs and preferences of athletes, coaches, and Arboretum staff. Interview data was analyzed to develop themes and connections for necessary and desired elements of cross-country course design. Findings suggest that runners and coaches desire a safe, adaptable course richly varied in terrain, materials, scenery and close contact with spectators. A design framework was developed from these findings and applied to the Arboretum site to create an enhanced course. This research will help inform future cross-country course design.
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CHAPTER I: INTRODUCTION

Overview

The scope of modern sport is a worldwide phenomenon. From games played at schools and community grounds, to major international spectacles such as the American Superbowl and Olympic events, people all over the world love to play, and watch, many different sports.

Competitive sport events take place in a variety of settings, some of which are very synthetic and highly standardized, with the intention of controlling the parameters of the physical environment to the greatest possible degree. The space of such sports is deliberately placeless; as such technically controlled environments allow close comparison of detailed performance records (Bale, 1974). An example of this is track running: athletes compete in running races on synthetic, indoor tracks and results are recorded and compared based on exact timing. On the other end of the spectrum, numerous sports take place in environments that are minimally controlled and offer a distinct sense of place.

Cross-country running is a sport that takes place in outdoor settings which are not intended to be identical competition environments. In fact, competing in the natural landscape is a key component of the sport. Terrain, path surface materials, weather, and climate are just some of the elements that contribute to the uniqueness of place and time in the sport of cross-country. As a result of such uniqueness in setting, some cross-country courses are preferred over others, which is a subject of growing interest to runners, coaches, and spectators across North America and beyond. In contrast to the
large body of knowledge established for controlled sport environments, minimal formal attention has been given to the design of cross-country running environments.

Most international sports are governed for organizational and regulatory purposes. Numerous types of running races including track, marathons, and cross-country competitions are all included under the umbrella sport of Athletics. The Rules and regulations for Athletics are provided by the International Association of Athletics Foundations (IAAF). Compared to other types of running races, such as track events which take place on standardized surfaces designed according to detailed specifications, cross-country is rather loosely defined as running races that take place “on an open or woodland area, covered as far as possible by grass, with natural obstacles, which can be used by the course designer to build a challenging and interesting race course” (IAAF, 2013, p. 237). The IAAF also mentions that because of the extreme variations in conditions in which the sport is practiced, it is difficult to legislate international standardization of this sport: “it must be accepted that the difference between very successful and unsuccessful events often lies in the natural characteristics of the venue and the abilities of the course designer” (IAAF, 2013, p. 237). Another aspect of the sport is the fact that courses are often temporarily arranged on existing golf parks, golf courses or private property for competition events. These temporary courses, and most semi-permanent courses that have been established for years, are usually designed by runners and coaches using regulations provided by associations such as the IAAF.

Despite the fact that cross-country running is a popular international sport that is defined and regulated by sport associations, there are few, if any, guidelines for designing a cross-country course beyond basic standardized requirements. Quantitative standards
such as course length, width and marking are outlined by the IAAF, but there are no
suggestions as to how to design an ideal course for optimal performance and experience.
Additional considerations include drinking water availability for hydration, and facilities
to support runners and spectators during competition events.

**Cross-Country Running in Guelph, Ontario:** Competitive running is a popular sport in
Ontario from the grade school level to Olympic marathons (Ontario Trails Council
(OTC), 2013). This is particularly the case in Guelph, Ontario, which is regarded as
Canada’s running capital. Exceptional runners at the University of Guelph (U of G) are
guided by Head Coach Dave Scott-Thomas (Figure 1), who also trains many of Canada’s
professional, elite runners in the Speed River Track and Field Club (SRTFC). Guelph
runners successfully compete in national and international running events and have an
esteemed reputation across Canada and beyond (SRTFC, 2013).

![Figure 1: Coach Dave Scott-Thomas keeps a close eye during a Speed River Track and Field Club work out (McGinn, 2012).](image)
In addition to competitive running, recreational trail running is also growing in
popularity, as people of all ages and fitness levels become aware of the many benefits of
running on local trails (City of Guelph, 2005). There are many recreational trails in
Ontario, Guelph included, which are host to a variety of different uses such as cycling,
snowmobiling, hiking, dirt biking, skiing and horseback riding (OTC, 2013). Yet running
is often grouped with other uses, and it is assumed that runners find existing trails
adequate for their needs. Many recreational runners are currently using trails that are
designed for walking and hiking (OTC, 2013). However, the various user groups that
employ these trails are not necessarily compatible with each other. For example, dog
walkers and hikers have different needs, and therefore different preferences for trail
design. Preferences for trail characteristics such as aesthetics, topography, location, and
accessibility vary depending on type of trail use, including running.

Recreational runners may find existing local trails adequate, if not ideal, for their use.
However, there are key differences between recreational and competitive running, and
competitive runners having specialized needs. Running alone for recreation with freedom
of time and space differs greatly from running against competitors on a prescribed and
measured route while being tracked, timed, and watched. Competitive running involves
finitude and regulation, and is ultimately about contest and achievement. In contrast, the
freedom of recreational running is more independent, with a focus on individual fitness
and a personal, enjoyable experience (Bale, 1994).

During competition, runners experience a significantly higher level of psychological
and emotional stress than during training or recreational exercise (Vanek & Cratty, 1970).
These psychological differences in conditions may result in different preferences for physical characteristics, such as topography and surface materials.

**The Existing Cross-Country Course at the University of Guelph Arboretum:** While there are many recreational trails in and around Guelph and professional runners use many of these trails for training, they compete in cross-country events on an established course at the University of Guelph Arboretum. The existing course, based on walking trails and service roads, has been created to meet the distance requirements for competitions and marked with simple wood posts (Figure 2).

![Figure 2: Current wood markers at the existing University of Guelph Arboretum cross-country course.](image)
The Arboretum has various unique, natural sections including open fields as well as mature vegetation. It is a result of decades of work and dedication, based on the original 1970 University of Guelph Arboretum Master Plan. The Arboretum is intended to be “a living collection of woody plants, especially trees, shrubs, and vines, for educational purposes and adaptability testing, arranged to display the biological, physical, and aesthetic qualities of the plants” (U of G, 1970, p. 5). It is a library and an outdoor laboratory, including gene banks for preservation of species (U of G, 1970). Part of the challenge of using the University of Guelph Arboretum to host cross-country competition events has been to balance the needs of cross-country running with the limitations involved in using the Arboretum site. As a result, a relationship has developed between the Arboretum staff and the running community, which makes it possible for the runners to use the site for competition events.

The existing course may be adequate for recreational running as well as cross-country training and some competition events, but there are a number of problems to address in order to meet and exceed the needs all user groups and enhance experience, as well as satisfy the requirements of an IAAF course so that international events can be hosted in Guelph. This includes facilities and amenities for runners, coaches, competition officials, and spectators. These distinct cross-country user groups have different needs for competition events. While runners participate in races and are primarily concerned with how to best perform on the course, coaches and officials must manage the event, and spectators are concerned with finding an optimal location to view the race. Spectators play an important role in the sport of cross-country, and must be accommodated in course
design in order to ensure that there are abundant opportunities and locations to watch competition races (Figure 3). An ideal cross-country course would meet the needs and enhance the experience of runners, coaches, officials and spectators, as together they create ideal cross-country events (Figure 4).

Figure 3: Spectators watching a cross-country race at the Arboretum.

Figure 4: User groups involved in cross-country competition events.
In addition to the variety of users involved in cross-country competition events, including runners, coaches, officials, and spectators, there are several groups of these users at different levels of cross-country running. There are local recreational runners in the Guelph community that compete in open competitions, young runners in grade school and high school competitions, university level competitions, and races for elite athletes. Figure 5 illustrates the types of users and groups associated with cross-country and use of the existing course.

![Cross-country users and groups who use the existing Arboretum course.](image)

**Research Problem**

The existing cross-country course in the University of Guelph Arboretum does not adequately meet the needs of runners or spectators, specifically the needs that arise during competitive events. In addition, the Arboretum has a “mandate to promote education, research and outreach” with the objective of serving as an “outdoor learning resource, a living laboratory and a community resource” (U of G, 2004). Accommodating this mission is important in order to respect the unique environment of the Arboretum and preserve or enhance its sense of place.
Research Questions

This research seeks to understand the specific design requirements of cross-country running courses by identifying key features of top quality courses as identified by runners, coaches and spectators. Questions that arise from the research problem are:

1) What makes for an excellent runner experience?
2) How can course design affect runner performance?
3) How can course design affect coaching effectiveness?
4) What makes for a positive spectator experience?
5) What is involved in planning a competition event, and how can course design enhance events?
6) What are the opportunities and constraints involved in designing a cross-country course within the University of Guelph Arboretum?

Goal

The goal of this research is to design a world-class cross-country course at the University of Guelph Arboretum that meets the needs of runners, coaches, event planners, and spectators, and will respect the unique environment of the Arboretum and preserve and enhance its sense of place.

Objectives

Objectives that support the goal are:

1. Identify and evaluate characteristics of world-class cross-country courses by interviewing runners, coaches, and event planners.
2. Conduct a landscape analysis of the University of Guelph Arboretum and existing course using published material, field measurements, observations, and interviews with Arboretum staff.
3. Develop a ‘framework’ of needs and design factors for an ideal cross-country course based on interview results.
4. Create design alternatives for a cross-country course at the University of Guelph Arboretum using the design framework and site analysis.
5. Conduct an assessment of design scenarios with key informants.
6. Produce a design that meets the needs of coaches, runners, and Arboretum staff, and illustrate design recommendations.

Information necessary in the design of cross-country courses includes various competition lengths, distance markers, slopes, width, surface materials, and runner and spectator facilities such as viewing areas, seating and protection from weather conditions. In addition to these physical elements, the design must consider the unique environment and put forward an image that is responsive to the Arboretum’s mission and sense of place.

**Significance of This Study**

At a local level, the runners and coaches that currently use cross-country running trails at the University of Guelph Arboretum would benefit greatly from improvements to their current course. A designed and maintained course with supporting facilities would enhance runner experience and performance at Guelph, where many of Canada’s top runners train and compete. This course will also enhance the experiences of guests during national competition events. At a national level and beyond, design guidelines will help inform future cross-country running course design, and provide insight into the relationship of cross-country runners and their environment.

**Limitations**

The qualitative approach and site specificity of this study may not allow for results to be generalizable. The physical and cultural characteristics that are unique to this running
team and the Arboretum site may not be comparable to others; however this case may illustrate patterns and relationships that could prove valuable for course design in a variety of locations and situations. Although a facet analysis allows for triangulation of the data, the key informants played a particularly important role in this study. Data from more comprehensive approaches would add further strength by comparing runner performance results with course design in addition to this qualitative approach, which focuses more on preference and perceived performance. These limitations indicate the demonstrated need for further study.

Summary

Runners in Ontario are using existing trails designed for walking and hiking (OTC, 2013), despite having unique needs as a particular trail user group. In Guelph, Canada’s top running city, elite runners train together and are guided by Head Coach Dave Scott-Thomas in the Speed River Track and Field Club (SRTFC). These runners train on existing local trails, and compete on a course they have created over time at the University of Guelph Arboretum.

This existing cross-country course is functioning for the runners in Guelph at a basic level, however it requires further consideration and fine-tuning in order to satisfy all the requirements of an international course as outlined by the IAAF, as well as meet and exceed the needs and desires of runners, coaches, and spectators. Although cross-country is a popular international sport that is regulated by the IAAF, there are currently no guidelines for designing a cross-country course beyond basic standardized requirements, which are primarily quantitative.
The goal of this research is to design a world-class cross country course at the University of Guelph Arboretum that meets the needs of all users, and respects the unique environment of the Arboretum, which will benefit local runners and coaches as well as help to inform future cross-country running course design.
CHAPTER II: LITERATURE REVIEW

Overview

This chapter begins with the history of cross-country running up to the current professional status of the sport and its growing popularity. A brief review of the psychological and physiological aspects of running reveals unique characteristics of runners, and why cross-country is a significant component of athletic training.

Selected precedents for cross-country course design are examined and compared to identify key features and design trends, including examples from Canada and the United States. Lastly, a review of selected theories relating to the interaction of people and the environment add further understanding and insight into the relationship of runners and cross-country running environments.

Cross-Country Running: Past and Present

Early Homo sapiens ranged over large amounts of territory, running to hunt or compete for food and escape from danger (Morris, 1969.) It has been suggested that endurance running in human evolution originated in the genus *homo*, and along with walking, has contributed significantly to human evolution. Humans have distinct physiological features that seem to have evolved specifically for distance running. Today, endurance running is predominantly exercised for fitness, sport and recreation, but its roots are as ancient as the origin of the human species (Bramble & Lieberman, 2004).

The ancient Greeks idealized beauty of the body and the importance of health and fitness throughout their society. They believed that development of the body was equally as important as development of the mind. Greek society idolized athletes and associated...
them with godlike power (Morris & Powell, 2006). Running played a major role in their traditions, and perhaps the most famous example is the legend of the Battle of Marathon. Although ancient accounts vary, the famous story is that a runner by the name of Pheidippides ran over twenty-six miles from the battlefield at Marathon to Athens, bringing news that the Athenians won a heroic victory over the Persians. It is said that he then died of exhaustion after delivering his message (Morris & Powell, 2006). Pheidippides would have been a professional messenger able to cover dangerous ground on foot alone, over treacherous terrain in extreme weather conditions (Clarke, 2003). This has left a lasting mark on western tradition: the official modern marathon distance of 42.195 kilometers (26.2 miles) is based on the distance traveled from Marathon.

The modern sport of cross-country evolved in England during the nineteenth century, where the first cross-country race took place in 1837 (Bloom, 1978; Canham, 1953). Participation and popularity increased, leading to the first national championship in Britain in 1876. By the beginning of the twentieth century many other countries had adopted the sport, including America which held a national championship in 1938, organized by the National Collegiate Athletic Association (NCAA) (Bloom, 1978, p. 11-13). Cross-country was part of the Olympic Games in 1912, 1920, and 1924, however the event in Paris during 1924 was terribly organized and the race was a disaster. Since then, the sport has not been part of the Olympics, perhaps partially because of standardization challenges (Bloom, 1978).

Despite its non-Olympic status, cross-country is very popular and widespread. American national championships held by the NCAA, and Canadian championships by Canadian Interuniversity Sport (CIS), are major annual events drawing competitors from
coast to coast. Incredibly, 10,512 athletes from 167 countries competed in the 2011 IAAF World Cross Country Championships (IAAF, 2013).

Part of the appeal of the sport is owed to its unique method of scoring: cross-country is both a team and individual sport. The score is determined by totaling the points of the first five runners of each team to finish. The team with the lowest number of points wins, with a perfect score being 15 (first place receives one point, second place two, and so on for the first five places). Teams usually consist of seven runners, and although the sixth and seventh runners in a team to finish do not score points, if their final places in the race are better than those of the first five of an opposing team, they will increase the team score of their opponents (NCAA, 2013, p. 119). Therefore, athletes running in fourth and fifth place are extremely important in cross-country, which makes for a very exciting competition experience for both runners and spectators.

**Current Guidelines for Course Design Provided by Sport Governing Associations**

The existing standards for cross-country course design are very limited because “there are extreme variations in conditions in which cross-country running is practiced throughout the world and it is difficult to legislate international standardization of this sport” (IAAF, 2013, p. 237). It is widely recognized that variation in setting is essential to cross-country, and the IAAF admits that “the difference between very successful and unsuccessful events often lies in the natural characteristics of the venue and the abilities of the course designer” (IAAF, 2013, p. 237). The IAAF provides general guidelines for international events including course length, recommended course “loop” lengths, and limited design suggestions such as “the crossing of roads or any kind of macadamized
surfaces shall be avoided or at least kept to a minimum” (IAAF, 2013, p. 238). The full section on cross-country races from the official IAAF 2012-2013 document of competition rules can be found in Appendix 1. The guidelines provided by CIS and the NCAA are similar in that they focus on quantitative regulations and basic standards for safety and fairness, and do not include added suggestions for optimal cross-country environments (CIS, 2013; NCAA, 2013).

**Cross-Country Precedents**

One of the significant features of cross-country running is that no two courses are the same. Many professional sports involve highly controlled environments designed for consistency, while each cross-country course is different and has a unique atmosphere, or *genius loci*. Some courses are permanently established on sites such as parks and conservation areas, while others are temporary arrangements set up at golf clubs and around existing college grounds including soccer and football fields.

Despite this wide range in setting, all cross-country courses share a few things in common: they include natural terrain, vegetation, and surface materials, as well as areas for spectators to view races, and a course that measures *approximately* 10,000 meters in length (either in a single stretch or a series of loops). Some of these elements can be highly diverse, such as natural terrain, which can range from rolling hills to almost level. Surface materials can include anything from grass and mud to woodchips and stones. Spectators at some courses can see nearly the entire race without having to move, while at others they must choose a strategic location and see the runners at key points in the race. This richness in variety is part of what makes cross-country exceptional.
Cross-country course precedents were selected and compared to identify key design elements and themes. The first step in the selection process was the decision to narrow the selection to Canada and the United States, once it was clear that courses in Europe and elsewhere differ significantly from current North American cross-country designs and are beyond the scope of this study. From there, the selection process was both simple and difficult because of a large absence of published information about course design and existing cross-country competition sites. By reviewing running magazine articles and internet blogs that discussed cross-country courses, it became evident that there are two styles of course design in Canada and the United States; stadium courses and diverse, challenging courses. Stadium courses reflect a recent trend that focuses on “spectator friendly” environments, which are essentially open and flat, often laid out on golf courses and other sport fields. On the other side of the spectrum, diverse courses are created in the spirit of older cross-country environments which are legendary for challenging features including significant hills and remote wooded sections, limiting spectator visibility for part of the race.

In addition to the physical connection that cross-country has with golf courses by using them temporarily for competitions, it is interesting to note the similarities in the design trends of both sports. “Old style” or “Links” courses are based on the origins of the sport in Scotland where coastal terrain, soils and weather conditions create naturally challenging conditions and original courses fit closely within the landscape (Laird, 2003). In contrast, modern era “stadium courses” are designed and constructed to maximize spectator experience, and have a more contemporary, cultivated appearance. Cross-country courses from each end of this design spectrum, from natural, diverse
environments to “spectator friendly”, were chosen in order to compare qualities and identify design themes.

The next challenge was finding information about these “famous” courses. There is an abundance of information about competition results and individual athlete accomplishments, and photos of athletes running in races, but very little to be found on course design. Only a handful of course maps were found online, which further narrowed the courses available for selection. It should be noted that many of the courses considered for selection were connected with an American or Canadian university, and these schools clearly invest heavily in their athletic programs. Some websites are flamboyant; photos of competitions illustrate expensive events with large crowds. However, it seems that limited resources go toward creating ideal courses, and even less attention is paid to promoting the course and providing information about layout and other design features.

From the information gathered on existing cross-country courses, precedents were selected based on their reputation in the running community, information available, and their ability to serve as typologies in order to identify key themes and design elements. Four courses were selected in total, two from each country as shown in Table 1.

<table>
<thead>
<tr>
<th></th>
<th>Diverse Challenges</th>
<th>Spectator Friendly</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>United States</strong></td>
<td>Rim Rock Farm, Kansas</td>
<td>Springfield, Oregon</td>
</tr>
<tr>
<td><strong>Canada</strong></td>
<td>Clearbrook Park, British Columbia</td>
<td>Thames Valley, London</td>
</tr>
</tbody>
</table>

Table 1: Course Selection.
Some places have served as cross-country courses for many years, and have developed a history of the sport. Rim Rock Farm in Kansas has a rich, celebrated running history. For decades, it has been the home course for the University of Kansas (U of K) and several high schools. It is a beautiful course, with numerous ponds and two covered bridges (U of K, 2013). Features and sections of the course have been given names such as Cottonwood Trail and Kings Bridge. Many athletic icons have run the course over the years, including 1964 Olympic Gold Medalist Billy Mills, three time world record holder Jim Ryun, and many NCAA champions. These heroes and their stories are illuminated on the course: silhouettes of the famous runners have been positioned throughout the site, made of steel and larger than life at eight feet high (Figure 6)(Timmons, 2001).

Rim Rock is often called one of the toughest but favourite cross-country courses in America by runners and coaches because of its undulating terrain. These elevation changes are exciting challenges and add interest for runners and spectators. There are open areas where spectators gather, as well as more secluded wooded sections of the course with natural, mature vegetation. Surfaces include grass, packed dirt, gravel, and wooden floors of covered bridges. Spectators can catch runners several times throughout a competition race from different elevations (U of K, 2013). The numerous paths available at Rim Rock Farm allow flexibility in course layout (Figure 7).
Figure 7: A map of the cross-country course at Rim Rock Park in Kansas (U of K, 2013).
Other historic American courses that have built a rich cross-country running history and are famous for their challenging terrain include Mt. San Antonio College (Mt.SAC) in Walnut, California and Van Cortlandt Park in New York. With named features such as “Poop Out Hill”, the Mt.SAC course shares a similar design style and history with Rim Rock (Mt.SAC, 2013). Van Cortlandt Park in New York, which opened in 1913, has hilly geology which offers great challenges for runners. Named sections of the course include "The Wall" (Van Cortlandt Park Conservancy, 2013), “The Cowpath”, the “Back Woods”, and “Cemetery Hill” (Bloom, 1978). These celebrated courses share a long, rich running history and design characteristics such as varied topography and forested sections. Rim Rock Farm was selected as a precedent because of the creative way the history of the course is portrayed and celebrated on site.

In Abbotsford, British Columbia, a Canadian example of a course with variation in terrain and vegetation is host to runners from across the country and also has a rich history of running is Clearbrook Park. Clearbrook showcases the natural, local landscape with a course that winds through open and wooded areas over undulating terrain.

Minimal modification to the natural landscape has resulted in a diverse, challenging course.

“Running at Clearbrook Park brought back fond memories for me” stated University of Oregon graduate Chris Winter, now a Guelph runner after
winning a 2012 championship on the course, “It’s an excellent place for cross-country running” (BC Athletics, 2012). The course highlights the landscape of British Columbia with its varied topography, rich vegetation, and numerous natural trail surfaces.

Spectators can see athletes several times during competitions as they run the loops of the race, but there are moments when runners head out of sight into the forest, as illustrated in Figure 8. The course map (Figure 9) shows the looped layout of the course. This map is an example of a previously mentioned trend: in the world of athletics where university websites flash with trademark enthusiasm and competition events are covered extensively by the media, cross-country course maps do not often benefit from attention to quality and detail.

Figure 9: A map of the cross-country course at Clearbrook Park (BC Athletics, 2013).
In Eugene, Oregon, running is a way of life. Eugene earned an admirable reputation as the top running city in the United States decades ago and continues to excel. Their cross-country competition events take place on nearby golf courses, such as the Springfield Country Club in Springfield, Oregon (U of O, 2013). This course is made up of relatively flat, consistent loops, repeated several times in competitions (Figure 11). As is expected for a golf course site, manicured vegetation is abundant and the course is run entirely on grass (U of O, 2013). The layout is open: spectators are able to access the entire course, and can see much of a race without having to relocate (Figure 10). Such horizontal, open courses with repeated loops are often referred to as *spectator friendly*, and identify a trend followed by many American universities including Wisconsin and Oklahoma State.

Figure 10: The open, grass-covered cross-country course in Springfield, Oregon (U of O, 2013).
Figure 11: A map of the cross-country course at the Springfield Country Club (U of O, 2013).
Western University (WU) in London, Ontario, like Guelph, hosts cross-country meets with runners from across Ontario at Thames Valley Golf Course. The 2012 CIS championships took place here, with hundreds of athletes from over 24 schools. This competition marked the 50th anniversary of the first CIS men’s race. The course is quite open and relatively flat, laid out as a five kilometer loop on grass, as shown by the photos of the race and the course map (Figures 12 and 13).

Figure 12: Competition photo of the 2012 CIS Championship race at Thames Valley Golf Course (U of G, 2013).

Figure 13: Map of the cross-country course at Thames Valley Golf Course in London, Ontario (WU, 2013).
These four precedents for cross-country course design suggest a range in design style from consistent, open settings to diverse, challenging environments for runners and spectators, present in Canada and the United States. The identified typical design characteristics of diverse courses and spectator-friendly courses are displayed in Table 2. This general summary suggests cross-country course typologies. Many cross-country courses fall somewhere between wild, diverse environments and highly controlled, open settings. This design spectrum is illustrated in Figure 14, which suggests where precedents lie based on design characteristics.

<table>
<thead>
<tr>
<th>Design Characteristic</th>
<th>Diverse Courses</th>
<th>Spectator Friendly Courses</th>
</tr>
</thead>
<tbody>
<tr>
<td>Layout Structure</td>
<td>Series of Flexible Loops&lt;br&gt;Many Curves</td>
<td>Large, Consistent Loops&lt;br&gt;Some Straight Sections</td>
</tr>
<tr>
<td>Terrain</td>
<td>Challenging Hills</td>
<td>Minimal Changes in Elevation</td>
</tr>
<tr>
<td>Competition Visibility</td>
<td>Secluded Sections&lt;br&gt;With Few or No Spectators</td>
<td>Open: Most or All of the Race is Easily Accessible for Spectators</td>
</tr>
<tr>
<td>Course Width</td>
<td>Narrow Sections</td>
<td>Wide Throughout the Course</td>
</tr>
<tr>
<td>Surface Materials</td>
<td>Variety of Surfaces&lt;br&gt;Grass, Dirt, Gravel, Wood</td>
<td>Grass, Often Manicured</td>
</tr>
</tbody>
</table>

Table 2: Comparing Qualities of Cross-Country Courses.

Figure 14: Cross-Country Design Spectrum
One of the benefits of consistent courses, as perceived and expressed by some runners and coaches in running blogs and magazines, is that such well controlled cross-country environments allow for running times to be recorded and compared as statistics. However, others maintain that the sport of cross-country is based on individual and team finishing place in the race, not recorded times, and that such records are irrelevant. Despite these differences in opinion and preferences for course design qualities, courses in countless distinctive environments are widely enjoyed by everyone who participates in cross-country. Diversity is a key characteristic of the sport.

**The Guelph Running Community**

There are a variety of runners of all ages and skill levels who contribute to the running community in Guelph. Dave Scott-Thomas is a primary figure as University of Guelph Head Coach. Dave believes in developing both the student and the athlete. His whole-person approach contributes significantly to the success of his runners. He is the most decorated coach in CIS history, with 21 CIS Coach of The Year awards in track and cross-country, and twice the Fox 40 OUA Coach of the Year Award, since his arrival to Guelph in 1997 (U of G, 2013).

Dave is also the Director and Head Coach of the Speed River Track and Field Club, one of the strongest groups of National Team athletes in Canada. This team, founded for student athletes as well as local runners, now includes several Olympians, as well as athletes who have represented Canada at the World Track and Field Championships (U of G, 2013). The Speed River Track and Field Club have built a reputation as the top destination in Canada for training and running, and they train on the trails in the
Arboretum and surrounding areas (SRTFC, 2013). The club offers programs for athletes of all ages, from the “Xtreme Team” for children four to thirteen, right up to the Olympic Division. With nearly one hundred and fifty members in all, the Speed River Track and Field Club is now one of the largest and most successful clubs in the country (Guelph Running, 2012).

Another local group of runners are the Guelph Victors, an informal group of runners and triathletes, of all levels, with shared aspirations to be better runners. Members range from 10 to 50+ years old, and enjoy success in a range of competitions including sprints, ultra marathons and cross-country. In memory of Victor Matthews, who coached and encouraged hardworking runners regardless of their natural speed, the group is open to anyone who wants to run (Guelph Running, 2013).

With so much participation in running, the support and enthusiasm for athletics in Guelph is evident. Canada’s running capital continues to grow and improve with time and energy from a remarkable running community.

Figure 15: Spectators and runners at the Vic Matthews Open Invitational. (October 13, 2012)
Psychology and Physiology of Running

Most people can run. We run for cover in stormy weather for example, or when playing with children or dogs. Runners however, are not most people. They run for the sake of running. Some do it simply for fitness and individual enjoyment, while others are driven to run against competitors. Distance running, above other forms of physical activity, distinguishes trained athletes from the untrained; anyone who does not run regularly cannot compete with those who do. Successful performance is not possible without conditioning (Canham, 1953). Maintaining a level of fitness that allows one to run at a comfortable pace for over an hour requires commitment in training.

Those who are drawn to the challenge say that this level of running can create an altered state of consciousness, or an inner peace. When the stimuli are sensual and the body is united with the mind, a feeling of great power ensues (Bloom, 1978). Mental training is truly as important as physical training, especially for competitive running. Runners must have courage, ambition, and pride in their performance. They also must understand the need to pace when necessary, and be mentally prepared for the challenges of competition. Mental fatigue can affect a runner before his or her body is actually tired, and having an understanding of both mental and physical fatigue is essential.

Emotional support plays another important role. Many runners, including those in Guelph, do not train in a vacuum, but as part of a team. Training as a group allows runners to draw strength and support from others, and group dynamics often play a major role in individual success (McFadden, 1974). This is particularly important for the team sport of cross-country.
Physical performance can be enhanced by utilizing efficient form techniques, such as a low arm swing, and limited motion at the waist. It is important to remain comfortable and relaxed when running. Above all, practice is critical. Distance runners develop rhythm, simplicity, and comfort for good performance if they run enough (Canham, 1953). Cross-country running, with its varied terrain and soft footing, demands an increase in metabolic energy due to increased muscular work to keep joints stable. This stimulation strengthens muscles, and is one reason why many competitive road runners will train by running cross-country.

Runners from Kenya famously dominate competitions. Kenyans rarely run on pavement, and avoid tracks until competitions. They run on undulating, dirt surfaces that promote muscle adaptation (Reiter, 2012). In addition to the physical benefits of running cross-country, it also offers a mental break from road running and track. This “psychological edge” of unpredictable training and racing environments is employed by many professional runners, including Canadian Olympian Hillary Stellingwerff, who keeps cross-country part of her schedule because it makes her stronger (Reiter, 2012).

An individual's success or failure when it comes to sport lies in the ability of the individual to be mentally fit. Wellbeing, enjoyment, confidence, motivation, attitude, stress and arousal are factors that can influence mental fitness. An athlete's ability to maintain an optimum level of arousal is crucial for sport performance. Many things can affect an athlete's level of arousal, such as life stress, performance expectations, negative thinking, motivation, and injury, as well as external factors such as weather conditions, coaches, facilities and spectators.
Athlete performance increases with physiological arousal, to a certain extent. When levels of arousal become too high, performance is negatively impacted. This process is usually illustrated as an inverted U-shaped curve which increases and then decreases with higher levels of arousal (Figure 16). Thus, increases in stresses or anxiety during competitions can have physical and psychological effects on athletes that both positively and negatively affect performance (The Fitness Project, 2013).

Because athlete psychology affects physical performance, cross-country course design characteristics may aid in positively enhanced athlete performance and experience. For example, runners use landmarks as a mental short term goal during tough sections of the race. Designing these landmarks at critical points may enhance runner performance. By keeping intense focus, but shifting the focus to different aspects of movement, course layout, or other course aspects, running performance is improved during cross-country races (Lancaster, 2011).

![Figure 16: Diagram of the relationship between arousal and performance (adapted from The Fitness Project, 2013).](image-url)
Interaction of People and the Environment

Environmental Affordances

Gibson (1979) described an approach to psychology as *environmental affordances* in which the physical world described by physics is distinctly different from the environment as perceived by humans and animals. The environment and the observer are complimentary, as are a set of observers and their common environment (Gibson, 1979). We do not live in “space”; our environment consists of substances, which we distinguish by seeing surfaces that vary in texture, colour, shade and light, and “the composition and layout of substances constitute what they afford” (Gibson, 1979, p. 127). The affordances of the environment are what it offers to the animal, such as terrain, shelters, water, fire, objects, tools, and other animals. Affordances can offer benefit or injury, which is why they must be perceived. An affordance of support for an animal is not measured as in physics, but is unique and relative to the animal, such as posture and behaviour. The possibilities of the environment and the life of an animal are inseparable. Humans have changed the shapes and substances of our environment to change what it affords us, such as converting natural substances into artificial materials including plastic and concrete. However, this is done within the limits of our environment (Gibson, 1979). Gibson argued that because an animal or person and their perceived environment complement each other, studies on animals and people must be conducted in this environment, not in isolation (Gibson, 1979).
Carrying Capacity in Recreational Settings

Gibson explained that environments are relative to the observer, and that there are limits to environmental affordances. Let us now consider an approach to identifying and managing environmental limits in order to maintain or improve quality of experience.

Population continues to grow, and demand for outdoor recreational experiences is growing also. In response to a dramatic growth in use of natural areas for recreation, many studies have described and evaluated recreation impacts on both the natural and human environment. Much of this research generally falls under the title of “carrying capacity”, which is concerned with determining the minimum, maximum, and optimum number of users that can be accommodated by a given area without jeopardizing the quality of the natural environment and/or the visitor experience (Shelby and Heberlein, 1986, p. 1). Carrying capacity estimates involve value judgments, and require descriptive information about each unique situation in order to ensure quality. Establishing a carrying capacity involves descriptive components, such as management parameters, and evaluative components, such as judgments about the type of experience to be offered. Therefore, knowledge of the relationship between social impacts and management factors is required, including agreements among user groups and management (Shelby and Heberlein, 1986). Carrying capacity is the “level of use beyond which impacts exceed acceptable levels specified by evaluative standards” (Shelby and Heberlein, 1986 p. 7).

In a recreation setting, a minimum carrying capacity is what is required for facilities and activities to function. For example, public facilities involve maintenance costs, and without enough visitors this cost cannot be justified. From the perspective of visitor experience, some activities, including many sports, require minimum numbers of
participants. Maximum carrying capacity is reached when the area is full, such as a campground with every available site occupied and visitors encroaching on undesignated areas. When not managed, recreation areas tend to reach maximum capacity, which negatively impacts comfort, safety, and visitor experience. An optimal carrying capacity introduces the notion of quality in order to establish the “best number”, which means that value judgments “lie at the heart of any carrying capacity determination” (Shelby and Heberlein, 1986, p. 9).

There are several types of carrying capacities including physical, facility, ecological and social capacities. Physical capacity is concerned with the amount of actual space, facility capacity involves adjustments to handle visitor needs, ecological capacity is concerned with impacts on the natural environment, and social capacity refers to human experience. In some recreational settings, there are established standards recorded, which represent social norms. For example, many sports specify the number of participants, such as tennis or volleyball. Other types of recreation may not have such explicit standards, but involve unwritten rules. Campers in wilderness areas do not prefer to camp directly adjacent to other campers. In order to determine social carrying capacity where there are no established evaluative standards, measuring individual user preferences may help to identify a shared norm or group standard. If distinct user groups emerge, managers must separate opportunities with different capacities. Use levels should be measured by identifying specific location, units, and time (for example, the number of runners at a cross-country course during a competition day) (Shelby and Heberlein, 1986).
Recreation Opportunity Spectrum

In order to apply carrying capacity to resource management, the Recreation Opportunity Spectrum (ROS) was developed by the U.S. Forest Service as a tool for managing recreation on National Forest lands and integrating recreation with other land uses. ROS is especially effective in its treatment of social carrying capacity and is based on the idea of zoning to meet aesthetic and aspirational needs. Recreation is more than just the activity in which people participate, it includes the quality of the setting (Bell, 1997).

The spectrum is divided into six categories, which describe the degree to which experiences can be achieved. Each category can be broken down into three components: the activities most suitable, the character of the setting, and the expected experience to be gained (Bell, 1997). The categories are:

1. *Primitive*: remote, natural areas unmodified by humans and large enough so that visitors can find solitude.
2. *Semi-primitive, non-motorized*: the size of the area, degree of human intervention and chance of meeting people reduces the primitive experience.
3. *Semi-primitive, motorized*: motorized activities such as snowmobiles are allowed.
4. *Roaded, natural*: more human use and social interaction, including roads that provide easier access.
5. *Rural*: human activities start to dominate the natural character.
6. *Urban*: The widest range of activities is possible, but the setting is dominated by human activities and a large amount of facilities and management.

Use of the ROS helps to determine the amount and types of facilities provided in each category as they affect experience. For example, a *primitive* setting does not require paved paths; in fact they would feel out of place. Materials should be natural and local to
the site so that they blend in. In contrast to this, in *urban* settings, “more facilities will be necessary to deal with greater demand, higher visitor expectation of ease of use and comfort, as well as provision for more formal activities” (Bell, 1997, p. 21). The ROS can also be used to determine the amount of intervention needed to minimize the impact of visitors on habitat and wildlife.

**Nearby Nature**

Considering the ever-increasing demand for outdoor recreational space in natural areas and the abundance of studies about the benefits of spending time in nature, it is clear that the availability and management of outdoor recreational areas is of utmost importance. Large, remote areas such as provincial parks are essential and offer a place for extended retreats to natural areas. However, of equal importance are smaller areas that are integrated into the urban fabric in order to offer everyone a place close to home that feels natural compared to the surrounding city. Kaplan and Kaplan (1989) argue that the ROS model does not recognize the important of the “nearby-natural settings that people see, pass through, and even create for themselves . . . streets and backyards, fields and unused lots, courtyards and landscaped areas” (Kaplan & Kaplan, 1989, p. 151). Encounters with the natural environment, especially the unspectacular, “everyday nature” in cities and towns are as important as infrequent escapes to “far-flung poster places”, as city-dwellers appreciate such places which “make the heart grow fonder” of nature (Kaplan & Kaplan, 1978, p. 186). The Kaplans describe can how people enjoy nature without having to travel far from home: “people stand in our local ‘Arb’, and say ‘isn’t it wonderful, here in the wilderness’ . . . when they are in sight of tall buildings”. This suggests that even the
unspectacular form of nature in urban areas means a great deal to many people (Kaplan & Kaplan, 1978, p. 187). The urban category of the ROS classification model fails to account for nearby nature that can also act as a place to feel apart from the city, “a setting where tranquility is possible even in the midst of urban bustle” (Kaplan & Kaplan, 1989, p. 152).

The concept of nearby nature as an essential resource for people and the environment continues to gain support. In 2011, Nisbet and Zelenski explained that modern urban lifestyles disconnect people from nature, which may have consequences for the well-being of people as well as the environment. In their experiments, they found that the pleasant moods experienced on outdoor nature walks facilitated a subjective sense of connection with nature, linked with concern for the environment: “contact with nature fosters individual happiness and environmentally responsible behavior”, which suggests that avoiding contact with nature may contribute to environmental destruction (Nisbet & Zelenski, 2011, p. 1101). Humans evolved in natural environments and have lived separate from nature only relatively recently in their evolutionary history, which if considered along with people’s affection for natural scenery and the popularity of outdoor activities, suggests that people need nearby nature (Nisbet and Zelenski, 2011). Contact with nature has considerable health benefits, which will be discussed in the following section.

Attention Restoration Theory and Stress Recovery Theory

Spending time in nature has been shown to have a positive effect on people’s mental state. Environmental psychologists Stephen and Rachel Kaplan have developed Attention
Restoration Theory (ART), which focuses on cognitive functioning and the concept of stress as mental fatigue. Extensive action research into the effects of spending time in “nearby nature” on human psychology by the Kaplans lead them to suggest that natural environments provide ideal settings for restoration when cognitive functioning is exhausted (Kaplan & Kaplan, 1989). This theory is based on the concept that attention includes two components: *involuntary attention*, captured by interesting stimuli and requiring little or no effort, and *directed attention*, requiring effort (Kaplan & Kaplan, 1989). ART affirms that people have improved concentration after spending time in nature because it is an ideal restorative environment. Restorative environments contain several key components: a sense of “being away”, “extent” of space, a source of interest or “fascination”, and “compatibility” for the actions of the individual (Kaplan & Kaplan, 1989, p. 182-186). Natural environments are particularly rich in the characteristics necessary for attentional restorative experiences. Clouds moving across the sky, leaves rustling in the breeze or water bubbling over rocks in a stream can offer *fascination*, allowing a person to reflect with effortless attention (Kaplan & Kaplan, 1989).

Another contemporary theory on the benefits of exposure to nature is Roger Ulrich's Stress Recovery Theory, which maintains that natural environments reduce stress (as opposed to mental fatigue), whereas built environments hamper recovery from stress. According to Ulrich, natural environments, or even just scenery such as landscape paintings, promote stress recovery and evoke positive reflex reactions. Environments with natural scenery that include hints of water and shelter indicate that as humans, we could survive in it and that evokes feelings of safety. In contrast, the built environment
feels unsafe and induces stress. This can lead to physical reactions such as changes in blood pressure, pulse rate, sweating, and muscle tensions (Ulrich, 1986).

Ulrich’s theory of stress recovery differs from ART in several regards. According to Ulrich, the psycho-physiological response to natural environments is instantaneous (Ulrich, 1986). In ART however, restoration is described as a process extending over a longer period of time. In addition, ART suggests that recovery occurs after “attentional fatigue” while in Ulrich’s theory focuses on intense “stress”. Both ART and Stress Recovery Theory suggest that the psychological effects of nature on humans are derived from human evolution in nature, suggesting that humans have only lived in built environments for a short time and have a need for the natural environment. This research indicates that there are a host of positive psychological effects of spending time in nearby nature.

The Flow Experience

When watching an elite athlete at peak performance, one may wonder how the athlete seems to take no notice of elements surrounding them and utilize extraordinary focus, as if entranced within their own performance. This mental and physical state is termed flow, which has been studied extensively by Mihaly Csikszentmihalyi, author of “Flow: The Psychology of Optimal Experience”. The flow experience can happen by chance, but it can also be intentionally summoned and used to improve performance and experience. It is a state in which one is so involved in something that self-awareness disappears and undivided attention is focused on the task at hand, resulting in perfect balance between individual actions and the challenge itself. Experiences of flow can include anything from
playing chess, to rock climbing, to playing a musical instrument. Activities which have clear goals, such musical notes for playing an instrument, provide performance feedback and sufficient challenge in order to avoid feelings of security or overconfidence, which can destroy flow. This cannot be done at will, as it is a result of simultaneous physical and mental challenge, but can be invited by preparing for challenge, avoiding distractions and refining focus. A physical ritual is a necessary component. For example, the notion of athletes performing ritualistic tasks before performance is often mistaken for superstition, when in fact it contributes to the athlete’s state of flow by helping them to focus (Csikszentmihalyi, 1988).

**Summary**

This chapter described the history of cross-country running and the current international status of the sport, including its popularity in Guelph. An outline of the psychological and physiological aspects of running identified unique characteristics of runners, and why cross-country is a significant component of athletic training.

Selected precedents for cross-country course design were examined and compared to identify key features and design trends. Examples from Canada and the United States illustrated trends toward consistent, “spectator friendly” courses and historic, diverse courses that fit more closely with the natural landscape.

Lastly, a review of selected psychological theories relating to the interaction of people and the environment offered further understanding and insight into the management and relationship of runners and cross-country running environments.
CHAPTER III: METHODS

Overview

This section describes the research design of this study and provides details on the collection of data as well as ethical review, participants, recruitment, consent and strategies for additional rigor. Methods for data analysis are explained, as well as the site analysis process for the Arboretum and existing cross-country course.

An Inductive and Qualitative Framework

The approach to this study was exploratory and inductive in order to develop a framework for cross-country course design for the Arboretum based on a user needs analysis. Due to the nature of this research, comprehensive qualitative information about the site and subject matter was more appropriate than a predictive research design using quantitative measures. Qualitative methods are rooted in social science, but have a tradition of providing dependable knowledge in landscape architecture. Although qualitative research is not necessarily generalizable, it provides rich data and allows for detailed, contextual understanding (Perkins, 2011). In 1960, Kevin Lynch used inductive, qualitative research methods for his landmark work, “The Image of the City”. The subject of cognitive mapping and wayfinding explored in Lynch’s work are related to the types of information this study is focused on. This basic research provides a foundation for more explanatory studies, and future quantitative analysis of data such as trail condition measurements may be a later phase of cross-country research.
Research Design

A single case study was the focus of this research: the existing University of Guelph Arboretum cross-country running course, used for training and competition, as the unit of analysis. The runners and coaches who use this course have a wealth of cross-country experience from all over the world, and are able to identify and discuss features of other locations that contribute to successful or unsuccessful course design. The story of this running team is unique and offers excellent insight into cross-country with a high level of expertise. Canada’s top coach and best runners are here, and have traveled from numerous places to gather here, which is worthy of close examination. A facet analysis approach was employed using qualitative interview data along with site analysis information, literature review including design precedents, and observations (Figure 17).

Figure 17: Facet Analysis Diagram.
Site Analysis of the Arboretum and Existing Cross-Country Course

The study site was explored and analyzed in order to evaluate opportunities and constraints for cross-country course design, use, and maintenance. This began with simply spending time on site during different times of day to acquire a sense of the *genius loci*. I walked the course many times from the established start line to the finish, as well as in the opposite direction, to gain familiarity. I also explored areas of the site off the course, including additional paths and natural, vegetated areas.

A base map of the site was created using Geographic Information Systems (GIS) software called ArcMap 10 by Esri, available at the University of Guelph Library. High quality aerial imagery, contour data, and street names provided valuable information for the base map, which was printed to 1:1500 meter scale. The accuracy of this base map was tested on site using an imperial surveyor’s wheel to measure the distance on the course. Measurements were taken in feet and converted to meters along the entire length of the course, which confirmed the accuracy of the base map and generated a record of the existing course distance. Photos were taken during sites visits while I walked the course and collected distance information. This process began in August, 2012 and continued throughout the fall months, which allowed me to experience the change in seasons on site during the time of year when cross-country takes place.

Several major running events took place in October, including the Vic Matthews Open Invitational Competition and the Central Western Ontario Secondary School Association (CWOSSA) Championship. I attended both events to observe how the site operates during competitions. Acting as a spectator, I took notes and photos during the races, recording my thoughts and comments, and some that I could hear from others.
Beyond running events and my experience on the course, I examined the Arboretum by reading official documents including the Arboretum Master Plan, the Operational Plan, and the original master plan created in 1970. In addition to site observations and review of published material, interviews with the manager and staff of the Arboretum provided further information and insight.

**Ethics Review and Approval**

This study was reviewed by the Research Ethics Board at the University of Guelph. A Certification of Ethical Acceptability of Research Involving Human Participants was granted on October 25, 2012 (REB number 12OC009), after which the runners and other participants were contacted. Consent forms were reviewed and approved by the Research Ethics Board, and all participants provided written consent. The researcher reminded participants that information is confidential, and that upon completion of this study the results will be made available to them.

**Study Participants**

Purposive sampling was used to select key informants for this study involving experts in the sport of cross-country and the Arboretum site. Individuals were selected to provide an in-depth understanding of their knowledge and experience. A total of twenty-one individual interviews were conducted with a focus on the case study of the University of Guelph Arboretum. In order to support the facet analysis of the research problem and incorporate a diverse range of perspectives, representation was sought from five groups:
• Professional and Elite Runners
• Professional and Volunteer Coaches
• Arboretum Manager and Staff
• Running Event Planners
• Local Running Enthusiast

Recruitment

Professional runner participants were recruited by Coach Dave Scott-Thomas at the University of Guelph Department Of Athletics and the Speed River Track and Field Club. The coach provided information forms about the study and posted a sign-up sheet in the Athletic Field House for participants to sign up for interview time slots. All runners have been running cross-country competitively throughout their high school and university careers, and some are elite professional runners who have competed at the 2012 London Olympics. All runners have trained and competed on numerous courses across Canada and beyond, with a concentration on the University of Guelph Arboretum course. Coaches, running event planners, Arboretum staff and a local running enthusiast were contacted directly by the researcher via email.

Consent Process

Potential key informants were provided with an information letter outlining the procedures, types of questions, information about voluntary participation and withdrawal, and information on how to contact the researcher and faculty advisor with any concerns
or to obtain results of the study. Written consent was obtained by the researcher prior to
the interviews, and verbal permission to record interviews with a digital audio device.

Data Collection

Data was collected using semi-structured interviews. This allows for rich, detailed data
to be collected about individual experiences. Interviews permit greater depth than other
methods such as questionnaires by allowing the researcher to probe and obtain more
complete data. Semi-structured interviews provide opportunity to explore complex
relationships which may be too elusive for straight-forward questions (Isaac & Michael,

All interviews were conducted by myself and recorded to reduce the introduction of
bias which is a risk when summarizing interviews with written summaries (Isaac &
Michael 1981). Question scripts were created for interviews with runners, coaches, event
planners, Arboretum manager and staff, and local running enthusiasts (Appendix A). I
made every attempt to accommodate the needs of participants, and ensured that interview
times and locations were convenient for them. At the suggestion of Coach Dave Scott-
Thomas, the interviews with professional runners, their coach, their event planner, and
the local running enthusiast were conducted at the University of Guelph Athletic Field
House on campus. A small room within the building provided privacy and a reduced
noise level to ensure confidentiality and effective recordings. This location acted as a
familiar place for the runners; they felt at ease discussing running at the Field House.
Interviews with the Arboretum staff were conducted at the Hilton Centre within the
Arboretum site, which provided sufficient room and acted as a comfortable place for the
participants. I traveled to two places away from campus to interview one high school coach and one high school running event planner at their places of work, and conducted the interviews in a quiet classroom and office space shortly after teaching hours ended. Recorded audio data, consent forms, and field notes are stored in a locked home office and all computer files are password protected. I am the only person to review the original data.

The semi-structured interviews consisted of open-ended questions and ranged from 14 minutes to 89 minutes in length. Interview data was recorded with a digital audio recorder and my hand written notes. I recorded additional audio notes between interviews including thoughts and contextual circumstances.

In qualitative research, the richness of the data rather than the number of participants often determines sample size, and the interviews concluded once “no new or relevant data seem to emerge regarding a category” (Isaac & Michael 1981, p. 212). Data collection concluded when the depth of data was apparent and repetition was recognized, and the objective of a detailed understanding of participants’ experiences in the context of this specific place was achieved. Data was not analyzed during the collection phase, but after all interviews were complete.

**Data Analysis**

The data were analyzed using an inductive process. I first listened to each interview alone in a quiet room, which minimized any chance of distraction. Listening to the original recordings prevented the loss of critical details such as voice emphasis, emotion and context. The richness of this original data was preserved by avoiding the use of
transcriptions. The process of *open coding*, which Corbin and Strauss (1998, p. 61) define as “breaking down, examining, comparing, conceptualizing, and categorizing data” began by way of making memos or *code notes*, which are “the products of coding”. While listening to each interview, every key word or phrase was written down on small, individual Post-It notes. When a participant was particularly emphatic, I noted it with an asterisk. Positive comments were noted with check marks, and negative remarks were noted with an “X”. After each recording ended, I grouped the notes into clusters based on themes. This continued until each group of participant interviews, such as runners for example, was complete. Then I condensed all notes from the user group in an organized grid system based on *categories* “grouped together under a higher order, more abstract concept” (Corbin and Strauss, 1998, p. 61) on 8.5 by 11 inch sheets of paper.

This resulted in hundreds of small notes and several grid sheets per group. I then used this information to generate concept maps in the style of digital bubble diagrams to further organize the dominant themes that emerged. This allowed me to visualize the data and represent themes using size and colour (Appendix 2). Relationships between themes and specific design elements were illustrated by connecting selected bubbles within each concept map as well as by connecting multiple maps of user groups. Once the concept maps were complete, the data felt much more manageable. Clear themes had emerged, which I refined by referring to the literature review and my research objectives in order to sort through the themes and discard information that was beyond the scope of my study. This allowed me to then further condense the data into written summaries for each user and stakeholder group.
Summary

This section described the research design of this study and with details on the collection of data as well as ethical review, participants, recruitment, consent and strategies for academic rigor. Methods for data analysis were explained, as well as the site analysis process for the study site located within the University of Guelph Arboretum including the existing cross-country course.

The approach to this study was exploratory and inductive in order to develop a framework for cross-country course design for the Arboretum based on a user needs analysis. Attending running events and spending time alone on site allowed me to gather valuable observations on how the site functions for cross-country. The groups who use the existing course have a wealth of cross-country experience from all over the world, and were selected for interviews because of their anticipated ability to identify and discuss features of other locations that contribute to successful or unsuccessful course design.

Semi-structured interviews with runners, coaches, running event planners and Arboretum staff provided rich qualitative data. The data were analyzed using an inductive process using open coding, code notes, and concept maps in order to identify and organize dominant themes within the subject of cross-country running and course design.
CHAPTER IV: RESULTS

Overview

This chapter provides a synopsis of the results that emerged from the site analysis and interviews. The site analysis results include my personal observations from time spent on site alone and as a spectator during competition events, as well as written summaries and graphic representations of the site analysis. The interviews provided very rich data. I was impressed at how open and enthusiastic all of the participants were about talking to me and sharing their stories about cross-country. Because of the small sample size and the concentrated nature of the running community, personal indicators have been avoided as much as possible to ensure confidentiality of the participants.

The concept maps that were created and used as part of the analysis process are included in Appendix 2. User and stakeholder interviews are summarized in groups: Runners, Coaches, Event Planners, Arboretum Staff, and Local Runners. Interview scripts can be found in Appendix 3.

Site Analysis Results

Location: The University of Guelph Arboretum consists of 165 hectares of University land, adjacent to the northeast side of the core campus east extending to Victoria Road. The study site is a portion of the Arboretum, bordered by Victoria Road to the northeast, the Cutten Golf Club to the north and west, and College Avenue to the southeast (Figures 18 and 19). Adjacent land uses are currently another portion of the Arboretum, a golf course, and the Guelph Turfgrass Institute (GTI). It is important to note that these adjacent uses will change significantly in the future: plans are underway for the
development of the government land across Victoria Road where the GTI currently resides. In addition, plans are underway to relocate the GTI onto this study site and construct new facilities to accommodate their needs.

Figure 18: Location and Context of the Study Site (Aerial Photography: Ontario Ministry of Natural Resources (OMNR), 2010).
Figure 19: Base map of the study site. (Aerial Photography: OMNR, 2010).
Landscape Characteristics: The topography of the site is “generally rolling”, with a prominent feature being a small stream valley (U of G, 1970, p. 7). The small stream, supplied by a swamp south of the site, flows north, crossing Cutten Fields and emptying into the Speed River. Soil conditions are generally good quality and well drained (U of G, 1970). The highest point on site offers significant viewsheds of the city of Guelph and the Arboretum collections (Figures 20 and 21).

Figure 20: Significant viewshed from a high point on site.
Figure 21: Elevational diagram of the study site: half-meter intervals increase with lightness of colour.
Interview data suggest that the study site is liked by the Arboretum staff, who believe that it is a good place for general public use as well as research and education. The site is currently functioning and achieving its goals as outlined by the Arboretum Master Plan. However, there is always room for improvement. Gene banks have been developed for conservation, and could be further defined and protected. Beautiful collections such as oak, beech and linden could be enhanced to promote public awareness and enjoyment of such resources. Although the fall colour collection could be enhanced, it is quite a beautiful feature, as is the significant viewsheds at the highest point on site. The “wild feel” of this part of the Arboretum contributes to its popularity and therefore staff would like to enhance it, in contrast to the portion of the Arboretum on the other side of College Avenue which is more manicured.

Figure 22: The fall colour collection.
As shown in Figures 22 and 23, the site has various sections including open fields as well as mature vegetation. This is a result of decades of work and dedication, based on the original 1970 University of Guelph Arboretum Master Plan. It was intended to be “a living collection of woody plants, especially trees, shrubs, and vines, for educational purposes and adaptability testing, arranged to display the biological, physical, and aesthetic qualities of the plants” (U of G, 1970, p. 5). It is a library and an outdoor laboratory, including gene banks for preservation of species (U of G, 1970). At the time this master plan was created, the study site was being used for agriculture, sheep, and beef herds (U of G, 1970). This explains the abundant amount of open space on site, as most of the current vegetation has been established by Arboretum staff.
Figure 23: Location of key collections and gene banks (Aerial Photography: OMNR, 2010).
The Existing Cross-Country Course: In the late summer and fall months of 2012, I spent a significant amount of time on site as part of this study, both during major competition events with thousands of other visitors, and alone when no events were taking place and the site was very quiet. This resulted in a stronger understanding of the site as well as the existing cross-country course, and a personal connection with this unique environment from the perspective of a researcher (as opposed to a runner). What I discovered was that the study site was not chosen as a cross-country course by chance or simply because of convenience aspects. Aside from the efforts of runners, coaches, event planners and volunteers to organize cross-country competition events, this site offers its own unique advantages to the sport.

The terrain works well for cross-country training and competition, as discussed later in the interview results. The rolling hills and varied sections of open areas and sections with dense, mature vegetation offer variety for runners, which is a key component of cross-country. This rich landscape is also aesthetically pleasing for spectators and add to their enjoyment of cross-country events. The fall colour collection of the Arboretum, in particular, is stunning during cross-country season in the autumn, and is a popular backdrop for photographers during events.

Although the location of the existing Arboretum course is convenient in the sense that it is very close to the core of the University of Guelph campus, there are some challenges involved in event organization in regards to wayfinding. I noticed myself that it is difficult to find the course and a place to park during competitions, even though there is some space available for parking on site (see Figure 24 for competition event layout). Part of this challenge is simply that the course, despite its history, does not actually have
a name, nor does any permanent signage exist to indicate its location. As a result, event planners generate temporary signs made of paper for competitions that they place on College Avenue for event days. Despite this, there are many spectators who end up at the main Arboretum building located in another section of the Arboretum, or even main campus which is a significant walk from the course. On event days, limited parking is available on site for cars and buses, and additional parking is sometimes available in University of Guelph lots. Additional parking on site, or the development of College to allow for street parking would be ideal.

Once spectators have parked and walked onto the site, the large hill where races being and finish is an obvious landmark for them. During events, this hill is densely populated with athletes, coaches, officials, planners, and spectators, as well as tents, fencing, and sometimes seating. Portable toilets are rented and places on site near this main hill, and although they are expensive, many visitors find them unpleasant. At the very least, the view of portable toilets in such a natural environment is not aesthetically ideal. Access to permanent washrooms on site is definitely desired by all competition guests, and it is speculated that even if such facilities were limited, waiting in a short line for such amenities would be preferred over the portable toilets.
Figure 24: Site organization and layout for cross-country competition events. (Aerial Photography: OMNR, 2010).
When a race begins, runners line up on the hill and take off along the course at an amazing speed. Generally, spectators line the wide path at this stage, and once the runners disappear they make their way down the bumpy, grassy hill to the “Junction”, where they catch another glimpse of the runners within the first kilometer of the race. Most spectators remain at the Junction for the remainder of the race, viewing runners a number of times over the duration of several loop laps. For the men’s race at the university level, for example, runners pass through the Junction five times, until they have completed the 2.5 kilometer loop four times and then run up the hill to the finish line. Many spectators make their way back up the hill to the finish line near the end of the race. I did notice that spectators often cross the course in order to obtain a better position for race observation, or sometimes access their vehicle. The layout of the course seems to encourage this because of parking and optimal viewing locations in relation to the start and finish lines.

One notable issue is that spectators are not aware of the layout of the course, and often do not know where runners are headed or how many laps remain. As a result, spectators actually stand on the finishing section of the course on the hill until race officials ask them to move out of the way of incoming runners. It has been suggested by event planners and coaches that the ideal way to avoid this problem, and add to the excitement and enjoyment of race events, is to provide more race information to spectators in the way of electronic performance scoreboards. For the purposes of this study, I would like to make the argument that this would in fact add further excitement, but should not be necessary and is not the only way to provide course information to spectators. A more intuitive route would aid this, as would a clear, legible course map.
A course map may also help athletes and coaches who visit the site on for competition events and are not familiar with the course. Currently, coaches and runners have to learn the course upon arrival and warm up on site to ensure sufficient wayfinding. There are some simple distance markers on the course, made of wood and painted yellow for 500 meter marks and red for 400 meters, but visitors do not know what they represent and this causes confusion. Markers that are easier to interpret would be ideal, and intersections where runners must choose a correct route over another must be clear. Currently, the Junction and the 2km split intersections cause confusion when runners are not sure which way to run.

The first turn of the course is problematic. I was told that it is too sharp and too soon after the start, when many runners are in a dense cluster, so I positioned myself near that turn at the beginning of several races for both men and women. That turn is indeed a problem, as I watched many runners struggle to get ahead of other runners or face the struggle of a dense crowd at the tricky turn. One young male runner actually fell down and was briefly trampled as a result of the turn. In this case he was physically unhurt, but it did cost him the race, which is far from ideal and does not present a fair, safe environment.

In general however, everyone seemed to enjoy the site and the events, which is due to a combination of factors. Events at the University of Guelph Arboretum course are very well organized by event planners and coaches. Runners are grateful and respectful of the site, and spectators are tolerant of the outdoor conditions and appreciative of the existing amenities. When events are over, all tents, fencing, toilets, and litter are removed from the site, and it appears by the end of the day that no one has set foot on that hill, let alone
over a thousand people. For this reason, the Arboretum course can serve as a powerful example of what can be accomplished when an excellent site, as well as outstanding users including athletes, coaches, organizers, officials, and spectators, work together to create outstanding cross-country experiences. This course could be improved in several areas, which this study seeks to address, but it is also very good and highly valued by the Guelph running community and beyond. Figure 25 illustrates the various sections of the course, and Table 3 provides brief summaries of the qualities of each section.
Figure 25: Diverse sections of the existing Arboretum cross-country course (Aerial Photography: OMNR, 2010).
<table>
<thead>
<tr>
<th>Course Section</th>
<th>Cross-Country Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Start</td>
<td>• Often not wide enough for large races.</td>
</tr>
<tr>
<td></td>
<td>• Grass with problematic lumps and holes.</td>
</tr>
<tr>
<td>First Turn</td>
<td>• Sharp, narrow turn very early in the race. Unsafe and overly challenging.</td>
</tr>
<tr>
<td></td>
<td>• Grass with some small stones.</td>
</tr>
<tr>
<td>Breakaway Section</td>
<td>• Early in the race, this section is too narrow and crowded with runners.</td>
</tr>
<tr>
<td></td>
<td>• Runners complain of path cross slope.</td>
</tr>
<tr>
<td></td>
<td>• Grass with some small stones.</td>
</tr>
<tr>
<td>Woodchip Section</td>
<td>• Woodchip surface material and cross slope are not liked by runners.</td>
</tr>
<tr>
<td></td>
<td>• Great views of the fall colour collection.</td>
</tr>
<tr>
<td>The Gravel Stretch</td>
<td>• Described by runners as “an okay section, relatively quiet with decent surface material”.</td>
</tr>
<tr>
<td></td>
<td>• Dense rows of trees near the path.</td>
</tr>
<tr>
<td></td>
<td>• Mostly fine gravel.</td>
</tr>
<tr>
<td>The Loop Split</td>
<td>• A wayfinding concern. The 2km turn is unclear.</td>
</tr>
<tr>
<td>The 2km Loop Section</td>
<td>• Pleasant and open, but with some wayfinding concerns.</td>
</tr>
<tr>
<td></td>
<td>• Views of gene banks, trees near path.</td>
</tr>
<tr>
<td></td>
<td>• Grass with some bumps; “good footing”.</td>
</tr>
<tr>
<td>“The Back Section”</td>
<td>• Very “quiet” section of the course, away from spectators.</td>
</tr>
<tr>
<td></td>
<td>• Open views of oak and linden tree collections.</td>
</tr>
<tr>
<td></td>
<td>• Gravel with some small stones.</td>
</tr>
<tr>
<td>Favourite Course Feature</td>
<td>• “The Little Hill”, with trees next to the path hanging overhead, pine needles underfoot.</td>
</tr>
<tr>
<td>Favourite Course Section</td>
<td>• Trees line the path and no spectators in view.</td>
</tr>
<tr>
<td></td>
<td>• Grass with very little cross slope.</td>
</tr>
<tr>
<td>“The Junction”</td>
<td>• Intersection; spectator attraction.</td>
</tr>
<tr>
<td></td>
<td>• Loud and exciting for runners and spectators.</td>
</tr>
<tr>
<td></td>
<td>• Some wayfinding concerns.</td>
</tr>
<tr>
<td></td>
<td>• Gravel and some mud.</td>
</tr>
<tr>
<td>Uphill Finish</td>
<td>• Lined with spectators, fencing and tents. Loud and exciting for runners and spectators.</td>
</tr>
<tr>
<td></td>
<td>• Grass with some small lumps.</td>
</tr>
</tbody>
</table>

Table 3: Section characteristics of the existing Arboretum cross-country course.
Interview Results

Runners

In the interviews with runners, the questions I asked covered a range of topics and providing opportunities for them to share stories and preferences relating to course design and their experience as cross-country competitors. Complete interview scripts are included in Appendix 3. Some examples of questions are:

1) What are the positive qualities of the courses you like best?
2) Can you identify some strengths and weaknesses of the course at the Arboretum based on your experience as a runner?
3) How do spectators affect you during competitions? Do you find that the current course enhances this relationship?

A total of thirteen runners volunteered to participate. All of them have been cross-country runners since childhood, and are currently active as University level athletes or beyond, as Olympians in the Speed River Track and Field Club. Each one has traveled across Canada and the United States to compete in cross-country championships, and some have been to other countries as well. Collectively, the range of experience on many unique courses provided a very rich source of information. The primary concerns that runners have about cross-country course design fall generally under two dominant themes: a safe, fair competition environment, and an exciting, enjoyable course.

A Safe and Fair Course

Although one of the identified aspects of the sport is enjoying a race in a natural, outdoor environment and getting dirty in the process, runners insist that safe footing is a top priority for them. Responses to very open-ended questions were consistently specific
in this regard. Grass is the most preferred surface material, specifically when it is on soft ground and is well drained. Dirt is also acceptable, “but not mud”, and it slows runners and has the capability to steal a shoe right off their feet. Gravel is tolerated but not loved, and mulch and pine needles are liked but are very rare. Above all, the large woodchips currently used at the Arboretum site are despised. Runners usually wear spikes during competitions to increase foot traction, and these chips get stuck in their spikes. This has a very negative impact on runner performance. Beyond this issue, they slide under the movement of the runners’ feet, reducing speed and control “like in the cartoons when they run but don’t get anywhere”. Beyond surface materials, footing is also affected by slope. While hills are desired by runners and referred to as an ideal feature, cross slope is a very different story. While running perpendicular to slope, runners experience a loss of control and balance, and often suffer from painful injuries to their ankles and shins. However the largest risk for injury is holes in the ground dug by small animals. This is a problem at the Arboretum, causing falls and broken ankles on several occasions.

Course layout plays another important role in a safe and fair cross-country race. The strongest example of this is the first turn at the Arboretum course. Less than one hundred meters after hundreds

Figure 26: A high school level runner fell during the first turn of the race at the 2012 CWOSSA Championship at the Arboretum.
of runners take off at the start line at top speed, they are forced into a very sharp right turn and must funnel into a pathway only wide enough for three. This has resulted in runners tripping, falling, and getting trampled (Figure 26). Furthermore, those who manage to take the lead have an enormous advantage over runners behind them because of the limited ability to pass: “you have to work extra hard and get out in front, otherwise you’re screwed because it’s really difficult to pass after that”. Curves and turns are desired, but they must be far from the start line to prevent these problems.

**An Enjoyable and Exciting Course**

An ideal course layout can also enhance runner experience. While reviewing the literature and searching for design precedents, I found that there are several ways to structure a course. Some begin in one area, run along a single stretch and finish elsewhere, with runners never crossing the same place twice. This structure makes it very difficult for spectators to watch the race and is therefore very rare. Typically, cross-country courses are organized as one large loop or a combination of several smaller loops. Large loops, such as the five kilometer loop at Thames Valley, is not preferred by runners because it makes a race “feel longer” to runners, making a race “mentally tough”. On the other hand, too many repetitions of small loops have a similar effect. Therefore, a series of loops that range from two to four kilometers in length are ideal. All runners stated that the existing 2.5km loop at the Arboretum works very well.

A second design characteristic that runners identified as difficult, also present at the Thames Valley course, are long, very straight sections of a course. Having the ability to see far into the distance has a negative impact on runners, as it creates the perception that there is much more distance that still must be completed. For this reason, large, gentle
curves are ideal, especially when enhanced by vegetation or other features that interrupt sight lines during a race. In addition, visual features such as natural vegetation or topographical outcrops serve as landmarks for runners and play a role in their individual competition strategies. In addition to individual features in strategic positions acting as landmarks, environmental qualities enhance experience in other ways. Without exception, every runner interviewed stated that varied sections, creating unique environments during a race, are desired. Forested areas offer shade and visual interest, as well as a feeling of increased speed as runners fly through narrow paths lined with trees. Open areas offer a change of scenery and allow runners to pass each other more easily. Running a course that ventures through secluded patches of forest as well as open fields is ideal. This want for variety applies to terrain as well, with preference given to courses with “rolling hills”. Furthermore, such physical variation encourages spectators to gather in some places over others, which results in runners experiencing “quiet” as well as “exciting” moments during a race. The majority of runners stated that this is also ideal, as it allows them to get excited by the energy of enthusiastic crowds at some points but also “get their thoughts together” during quiet moments. A small minority mentioned that this does not bother them, but if given the choice, they would prefer most or the entire course to be filled with spectators.

Figure 27: Runners’ favourite feature of the Arboretum course.
Spectators are therefore a very important part of cross-country, but most of the runners who were interviewed were sure to state that for an ideal cross-country course, there needs to be a balance between spectator accessibility and a diverse, challenging course. In their experience, running in overly consistent environments, such as around golf courses and soccer fields is very boring. Such “American” designs place “too much focus on time, when it should all be about place”. Natural courses are much preferred over “artificial” environments such as golf courses. This is reflected in the way the runners all favour a natural feeling part of the Arboretum course (Figure 27).

A unique feature of the Arboretum course is a large hill. The uphill finish has become an icon and is a significant contribution to the history of the course (Figure 28). There are legends told about battles won and lost on that hill in the final moments of races. It is also the place where races begin, and therefore the gathering place for coaches, officials, and spectators. To the cross-country runners of Guelph, the hill is “home”. Another significant feature of the Arboretum course is what coaches and runners refer to as the “Junction” (Figure 29). It is an intersection where runners must first turn sharply left early in the race, slightly right to return to the start for another lap, and lastly straight up the final hill to the finish line. This energetic area is where many spectators choose to watch the race, and runners enjoy the excitement.
One necessary requirement for all cross-country events is marking the course, and this can be done to various levels of quality and effectiveness. Every runner told a story of getting lost during a race because the course was not marked well. This issue is often avoided when athletes arrive at a competition location with enough time to review the course and learn the route. However, they would prefer that the course is clearly marked both for wayfinding and the desire for distance information. Many competition courses places markers at every kilometer, which is sufficient. The Arboretum course has markers at every four hundred and five hundred meters, which is a useful amount of information for training, but sometimes actually distracting during competition.

The overall opinion of the Arboretum course is very positive. Runners admitted that it would be very convenient to have amenities on site, but this is not critical and not typically included in cross-country course design. Even the metal fencing that must be set
up before each race is not a concern for runners, as it looks and feels “official” to them and enhances the finish line experience. However, storage for belongings, an established presence supported by signage, and washroom facilities would all be welcome additions to the course. Two of the runners revealed that the teams have a routine when warming up for a competition: they urinate in a secluded, vegetated area off the course. To them, this is not really a problem, just part of the cross-country experience at their home course.

**Coaches**

Coaches share many preferences with runners regarding course design, which is logical considering that they want their runners to have an enjoyable running experience and a successful performance. Coaches are also often experienced runners themselves, as is the case with participants of this study. In addition to shared preferences, they also discussed the role they play in the sport and specific concerns and opinions they have about course design from a coaching perspective.

As with the runners, I asked questions that covered a range of topics and provided opportunities for them to share stories and preferences. Complete interview scripts are included in Appendix 3. Some examples of questions are:

1) What are some of the positive qualities of courses that are best for coaching?
2) Can you identify some strengths and weaknesses of this course based on your experience as a coach?
3) What are some common patterns of movement that you follow as a coach during competitions on this course?
Two coaches were interviewed. One is a professional, elite coach with many years of experience and numerous coaching awards. The other is a volunteer high school coach with several years of experience. Both have traveled to many different courses to coach their runners, in Canada and elsewhere.

A Safe and Fair Course

Like runners, coaches believe that a challenging, natural outdoor environment is essential to cross-country running, but safe footing is critical. Hills are a desired course feature, but cross slope should be avoided wherever possible. Gopher holes are a constant concern, as are small dips and bumps on the course. They explained that runners exert themselves to mental and physical exhaustion during competition, and as a result they often are oxygen deprived. Simple psychological or physiological tasks that people normally have no problem with, such as avoiding stones on a path or reading a sign, can be very challenging for an athlete during a race.

Surface material preferences were relatively consistent which those of the runners, however coaches placed less emphasis on wanting grass to be the dominant material. A variety of surfaces including dirt, gravel, and mulch is entirely acceptable, “as long as one size of spike can handle them all”. Like the runners, coaches do not favour large woodchips because of their negative impact on runner performance, and also because they are time consuming to apply on the course, which is usually done by coaches and volunteers prior to competition events.

Wayfinding is an important consideration in cross-country course design. Ideally, direction should be intuitive to minimize the risk of runners moving off course, and to create an enjoyable experience for runners as well as spectators and coaches. If signage is
necessary, they need to be obvious and easily understandable. Current methods used for many competitions include temporary markers such as spray paint or small flags on the ground. Ideally, markers would be permanent and “classy” looking. The existing markers at the Arboretum work for the Guelph runners but are confusing for others during competitions. In addition, coaches would like to see the physical quality and aesthetic appeal of markers improved. A strong and attractive start and finish line is desired, along with clear distance markers along the course. In addition, these distance markers need to be accurate, and admittedly the current ones are not. This is because the course is short a number of meters from where it should be for official competition lengths. This needs to be corrected and accurate distance markers installed.

Although runners enjoy the Junction and coaches identify it as a key feature of the course, significant effort is required in order to keep it functioning effectively. Coaches must ensure that runners know how to navigate the Junction, and admit that it could be improved to make wayfinding clear and reduce crowding in the area.

An organizational facet of competition events that “could improve” is the arrival of spectators and parking. Currently, for an event day to run smoothly, competent and experienced marshals are necessary to control entrances, exits and parking areas. Spectators have also complained that the course is difficult to find. This is partially due to the absence of a specific street address, which results in spectators from out of town arriving at the Arboretum Center or the main entrance of the University of Guelph campus instead of the course. There is a clear desire for understandable and attractive maps and signage for the course.
Course layout is important to ensure fairness. Coaches identified the first right turn of the Arboretum course as an example of how strongly course design can impact cross-country strategy and performance. If runners do not have a “strong lead before that turn, they experience a significant disadvantage”, as it is difficult to pass competitors afterward. Similarly, course width is important for this reason; a fair course allows runners a wide enough path for passing, at least in sections if not the entire course. This also reduces risk of injury by preventing dense massing of runners.

**An Enjoyable and Exciting Course**

Coaches also identified the existing 2.5km loop as a good length for competitions, explaining that very large loops are difficult for several reasons. Large loops make races “feel longer” for the runners, are not ideal for spectators, and make it difficult for coaches to access runners during a race. Long, straight sections should be avoided for the runners’ sake, and also because they result in a “boring race for spectators”. It is important to create an enjoyable and exciting atmosphere for spectators and the media, in order to further promote the sport of cross-country. In some cases, including the Arboretum site, an enjoyable cross-country spectator experience also benefits the location of the competition, in this case awareness and support for the Arboretum.

In addition to preferences regarding length of course loops and avoiding long stretches of straight path, coaches also share with runners an appreciation for a course with varied sections. Forested areas as well as open fields add interest for spectators and runners alike. Runners mentioned that secluded areas of a course allow them to focus their mental energy and competition strategy. Coaches agree that “quiet” areas have a positive effect during competitions, provided that such sections are not too long as to create a “lonely”
atmosphere. They explained that when runners disappear into the woods for limited periods, coaches and spectators wait excitedly, and frequently when they resurface there have been changes in runner placement including who is in the lead. “Stuff happens out there” mentioned one coach, who explained that loud, energetic areas with lots of spectators are vital to a great cross-country race, but so are “back sections where runners are alone in battle”.

Coaches also discussed the cross-country design “trend” happening in the United States: long, flat courses which offer opportunities to gather timing statistics. Like the runners, coaches considered these courses boring, and maintained that this places too much focus on time, when it should all be about place. European course design was mentioned briefly as the opposite, typically with very “tough” conditions. The Arboretum is considered a good balance of the consistency of American style and the very demanding nature of cross-country in Europe. It is sometimes often referred to as “European style” by American runners. To the coaches interviewed for this study, natural challenges and interesting variety are essential to the “art of cross-country”.

The overall opinion the coaches have about the Arboretum cross-country course is that “no section is unliked, but all could improve”. The scenery is prized, as coaches discuss how aesthetics matter greatly in cross-country. The large hill at the Arboretum is appreciated because of the uphill finish of the course, which has become an important part of the history of the course. It was noted that the uphill finish is enhanced and balanced by the slight downhill section that comes just before it, along with the energy of the Junction. The hill is also a visual landmark for spectators, and offers excellent viewsheds of the city. Like the runners, coaches also identified the “Little Hill” as a
favourite feature. Such an attractive location is highly valued, as is the very convenient location near campus and the fantastic cooperation provided by the Arboretum staff. Coaches wish for further promotion of the sport. Improved access to the site, greater visibility and additional media exposure are desired. Ideas such as elevated areas for cameras and use of a router were mentioned.

Facilities such as water, electrical power, washrooms, and storage would all be welcome additions on site as cross-country amenities. The rented metal fencing currently used for competitions events is expensive and labour intensive (Figure 30).

Purchasing permanent fencing and having a place to store it would be a significant improvement. To supplement this, some permanent fencing on site would be helpful, such as wood guards which may be aesthetically pleasant. A structure near the finish line on the hill would offer shelter for officials and equipment during competitions, provide

Figure 30: Rented metal fencing currently used for competition events.
storage space, and serve as a lookout for media and spectators. This would offer some protection from the rain and wind that can present significant challenges during events, and would further enhance the existing viewsheds on site of the city.

**Running Event Planners**

Running event planners are not a standard addition to the athletic staff at most schools. Typically, coaches organize events, especially at the high school level but also at most Canadian universities. In the case of the University of Guelph Athletics department, the Assistant Coach takes on most tasks involved in organizing competition events. He coordinates recruiting efforts and event logistics in addition to acting as an assistant coach. A former running champion, he also offers insight and assistance to the Speed River Track and Field Club. These numerous roles were discussed prior to the interview, and the participant stated that he would answer questions primarily from the perspective of an organizer, which was the focus of the interview script. The second running event planner was selected based on his experience organizing CWOSAA events at the Arboretum course, where other high school level coaches travel to for competitions.

When discussing course design, event planners shared some preferences with runners and coaches, but focused more on logistical aspects of organizing competition events including the creation of a site map, parking information, cost and ordering of rented equipment, and the labour required for events. Complete interview scripts are included in Appendix 3. Some examples of questions are:

1) In your experience with the Arboretum, what are some of the best features of the course? What can improve?
2) What kind of things do you need to organize for running events? How big can the crowds get?
3) How do spectators behave during competitions? Do you find that the current course enhances their experience?

One of the responsibilities of event organizers is the safety of everyone at competition events. In this regard, they share the concern of runners and coaches for safe, even footing to minimize the risk of injury for the athletes. “Gopher holes” are a constant problem. Organizers spend an hour each night prior to competition events filling them in to the best of their ability, and still a runner recently broke an ankle on the course. There are also some slightly larger bumps along the course can cause runners to “face plant”. Ideally, footing would be even and risk of injury minimal. Grass is the preferred surface material by far, dirt is tolerated, but gravel is not liked.

Organizers are also mindful of spectators, and work to ensure that there are exciting, stimulating aspects to the race. “Rolling hills” are desired, as well as varied sections complete with “quiet” moments where coaches can access their runners without crowds, which also enhances the “sense of excitement for spectators”. In this regard, the Arboretum course is well liked for its varied sections and rolling hills, which results in quiet moments in a race as well as a “loud, fun wall of people” at the Junction and finish line.

The location and layout of a course should be intuitive. Anyone should be able to arrive at on site and get a sense of the course and where the race start and finish line is. Currently, there are some challenges with the Arboretum course regarding sense of arrival. To begin with, the course does not actually have a name, which would be helpful in creating a stronger sense of place. Planners wish for a “welcoming sign at the main entrance to display the course name, map, and distance marking information”. The
entrance needs better surface materials and improved drainage, as there are current problems with potholes and mud.

Amenities such as permanent fencing and washroom facilities would be ideal. Although the metal fencing currently rented for competition events is liked by runners for its “official” aesthetic, there often is not enough, as it is costly and labour intensive. A structure on site would allow fencing to be purchased and stored, which is economically beneficial in the long term. A structure could also provide shelter from the elements on event days, a designated first aid area to improve safety, space to post sponsor information, and an elevated platform for an improved view of the race.

In general, tight turns and narrow pathways should be avoided wherever possible. The current layout of the Arboretum course could improve in several key areas. The start line needs to be wider and could be moved “backward” to increase the distance after the start before the first turn, which is too narrow and needs to be modified to widen the turn. The current looped structure, including the flexibility of “having two different loops is great. Although, it would be nice to have a clearer 1km loop too. In fact, it would be nice if the whole course was clearer regarding which way to run.” There is a desire for better direction and distance markers, which would reduce the need for marshals as well as strengthen the aesthetic identity of the course. Ideally, courses should be designed to function smoothly without the need for marshals to direct runners or spectators during a race.

The uphill finish is a historic and iconic feature of the Arboretum course: “Love the uphill finish! Seven years of battles and legendary stories about that hill”. The large hill is a dramatic finish for competitions and a great viewing location for coaches and
spectators. It also reinforces the “natural” sense of place at the Arboretum, compared to other “manufactured” or “artificial” feeling courses that do not have such elevational challenges. In addition, having the start and finish line close together on the hill helps events stay organized and keeps everyone in one area, the “tent city” on the hill. The Junction is also a positive feature, particularly because of the vantage point it offers for spectators and the energy it provides the runners. Organizers admit that the Junction could be improved to make wayfinding more obvious for runners and spectators, but it is an exciting area and should remain a key spot of energy during competitions.

Event planners also discussed the need to promote the sport and how important the course is in the community. They especially encourage young runners to enjoy cross-country running. The fact that the course is currently used by runners as young as six years old up to Olympic elite runners is ideal.

Arboretum Manager and Staff

The Arboretum, particularly the segment that is this study site north of College Avenue, is a “natural” feeling place and is host to many different user groups. The manager and staff of the Arboretum work to balance the needs and desires of these users. In addition, there are numerous plant collections and research projects conducted on site that require protection and care. The existence of the Arboretum and cooperation of its manager and staff have played an essential role in the development of this cross-country course for the Guelph running community. Therefore, they are included in this study as key stakeholders.
Separate scripts were created for maintenance staff and the manager. However, both scripts shared many of the same questions, and results indicated that the two stakeholder groups are “on the same team” and were grouped together accordingly. Complete interview scripts are included in Appendix 3. Some examples of questions are:

1) What are some of the most popular areas of the study site?
2) Are there areas that are sensitive and need to be protected?
3) What are some of the biggest challenges in maintaining the trails?
4) Have there been times when you have had to give directions to someone on how to get to the Arboretum?
5) How does parking affect the condition of the Arboretum, on an ongoing casual basis and during running competitions?
6) What are the positive and negative aspects of having cross-country runners train and compete here? Are there unique demands placed on you for large events?
7) On average, can you estimate how many people visit and use this part of the Arboretum in a week? Per day?
8) Is liability a large concern? Do you have safety concerns for yourself, other workers, or users of the Arboretum?
9) What are some of the major costs that influence maintenance and development of this site?

The manager and assistant manager of the Arboretum were interviewed. The manager has worked in the position for over thirty years and plays an important administrative role at the Arboretum. The assistant manager has over a decade of experience working on site and has very diverse responsibilities including tree and shrub propagation, operation of gene bank and research projects, maintenance of woody plant collections and leading site tours.
Qualitative data from these interviews contributed to the site analysis by identifying areas of the site that require protection and areas that could be promoted to enhance use. The study site is liked by the Arboretum staff, who believe that it is a good place for general public use as well as research and education.

Gene banks are the primary areas that have been developed for conservation and could be further defined and protected: “beautiful collections such as oak, beech and linden could be enhanced to promote public awareness and enjoyment of such privileged resources” (See Figure 31).

Figure 31: The oak and beech collections.

The large hill offers open space and spectacular viewsheds, and although the fall colour collection could be enhanced, it is quite a beautiful feature. The “wild feel” of this part of the Arboretum contributes to its popularity and therefore staff would like to enhance it, in
contrast to the portion of the Arboretum on the other side of College Avenue which is more finely manicured.

Trail maintenance is currently not a challenge for staff. The condition of the existing service roads works well for their needs, and they are willing to mow the grass in a few additional areas to complete the cross-country course. However, they explained that resources are limited and they cannot provide materials or labour to further improve the course. The creation of new trails, including grading and leveling, is a significant investment, however a new section is currently under construction in order to complete the service roads as designed and illustrated in the original master plan.

The site entrance was identified by runners and coaches as weak and in need of improved signage or other feature that would make it seem more “official”. The Arboretum staff agree that the entrance is confusing, for their needs as well as those of the running community. Despite the identified weakness of the entrance, the site is very popular not only for cross-country training and competition, but for general public use including dog walking, bird watching and jogging. It is also an educational setting for many university user groups including photographers, painters, and horticulturists. As a result of such popularity, it is estimated that over fifty people use the site on an average day, except perhaps during the coldest days of the year.

The overall relationship that the runners and coaches have with the manager and staff at the Arboretum, specifically the Hilton Centre which is on the cross-country study site, is very positive. This relationship is based on the hard work and respectful approach of runners and coaches throughout years of using the Arboretum site for cross-country. To the Arboretum staff, “the runners are role models! They are ideal users of the site, often
leaving the place cleaner than they find it after competition events”. Runners and coaches also act as a “third eye”, helping to improve safety and maintain the site both physically and socially.

The few concerns from the manager and staff about the use of the Arboretum for cross-country are with regard to major events. Parking on the hill is not a problem, no precious vegetation is at risk and drainage is sufficient. However, cars are often parked at site entrances, making it difficult for staff to get in and out. Major running events often take place on weekends which helps to avoid this problem, but events during the week have inconvenienced staff on occasion. For this reason, additional parking is desired, along with improved drainage at the Hilton Center entrance off of College Avenue. Offsite parking for major events is preferred in order to lighten the burden on site. The portable washroom facilities that are rented for competitions can be also be hard on the site, therefore it would be ideal to somehow reduce this need.

An ongoing aspect of the Arboretum is ensuring that donors can access the site, specifically features that they have donated. Staff mentioned that there have been occasions when running events have limited site access, and that if cross-country becomes more formal on site, there will be a further need to make people aware.

The Arboretum staff mentioned that because of the location of the site so close to the University, there has long been pressure to develop the site instead of using it for conservation. This is part of the reason why the staff like the runners as a user group. They promote awareness and stewardship, with little demand for site resources or development. When the cross-country course draws runners from across Canada and beyond, Arboretum staff have noticed runners pause during their warm up run amongst
hundreds of people to read a tree label and enjoy the site, which always makes them smile.

**Local Running Community**

A singular interview with a key local running enthusiast from the Guelph community was included as another facet to the ongoing success and use of the Arboretum cross-country course. The local running community in Guelph is connected to the elite runners and has a very positive relationship with the university and the SRTFC. In this interview, I asked most of the same questions as with the university and elite runners, again covering a range of topics and providing opportunities to share stories and preferences relating to course design and cross-country experience. The complete interview script is included in Appendix 3. Some examples of questions are:

1) Can you identify some strengths and weaknesses of this course based on your experience as a runner?

2) As a spectator, what makes for an excellent experience? Do you find that the current course enhances this? What are some common compliments or complaints that you hear?

3) Do you think there are things unique to Guelph that you are doing that others should be doing?

The participant in this interview started running later in life, approximately fifteen years before retirement age. He does compete in cross-country races from time to time, but falls more appropriately under the category of recreational runner and cross-country spectator. He also helps at competitions to record race results at the Arboretum course, and coaches local runners in the Guelph community. Although this individual has only visited a
handful of other courses in Ontario, his experience and insight into the Arboretum course is invaluable. He shares many of the same concerns as elite runners, coaches, and event planners about a safe, fair competition environment and an exciting, enjoyable course. This section will focus primarily on the additional subject matter discussed in this particular interview: the Guelph running community and the unique experience of the Arboretum course.

There are a few distinctions of recreational runners to be considered in course design. In addition to shared desired elements, such as trees on either side of the path to create a greater sense of movement, recreational runners desire more visual information than university and elite runners in order to support the sense of “getting somewhere” and therefore dislike courses that feel “placeless”. If a course does not have varied sections and loops that are appropriately sized, running for many recreational runners can feel like a “waste of time”. Recreational runners understandably do not train the same way as elite runners, and as a result rely on the physical environment to give them distance information instead of their own personal internal abilities. When it comes to distance marking, “the more the merrier, even every one hundred meters!”.

Although recreational runners mention that cross slope is not preferred, they are less sensitive to subtle surface changes than elite runners. Surface materials are not a primary concern, and turns are desired including the first right turn of the Arboretum course which is simply “fun”. Course layout was also mentioned in relation to the location of the existing finish line and the parking area, which encourage spectators to cross the course path constantly. If there is a way to avoid this and discourage traffic across the course by
adjusting the layout, it would be preferred. The common issue of finding the course was mentioned once again, including the desire for an attractive sign at the site entrance.

The relationships between elite runners, coaches, event planners, Arboretum staff, and the local running community are all very positive and strong, and stem from the example Dave Scott-Thomas has set for his athletes: “Dave has trained his runners to smile and say hello to anyone they pass while they are out for a run. Old couples walking, people with dogs, and children. It’s so important. That’s why there is so much support, it’s all about attitude”. Scott-Thomas’ simultaneous efforts of promoting the sport and the elite athletes of Guelph as well as building and maintaining a humble approach and strong relationship with the local community is what makes the Guelph running community so successful.

The concept of cross-country performance based not on time, but place in the competition, was discussed. When a course is established and builds a story at the same location, a history of the course can be recorded and athletes can “run against the history of the course”. Time records gain power and legitimacy when collected and compared over time when the conditions of the course do not change. It is critical to the sport of cross-country to have a rich, varied landscape for wayfinding, and distance information, and perhaps most importantly, landmarks: “runners map a landscape in which they run and they know their performances over time. And they know the performances of other runners on the same landscape”. He used the example of a mailbox that has existed as a landmark on another course for many years: “when runners see that mailbox, they know that they should reach that mark by a certain time. Young runners think ‘oh I can’t do it’,
until one day they reach that mailbox in that time, and they know they have reached another level” and then they can compare times with those who have run before them.

**Summary**

A site analysis of the Arboretum and existing cross-country course revealed strengths and weaknesses of the site and current cross-country use. Surface materials, cross slope, facilities, spectator amenities and wayfinding could improve for enhanced cross-country experience.

Semi-structured interviews with university and elite level runners as well as coaches, event planners, Arboretum staff and a local runner revealed rich, detailed information about the sport cross-country running and preferences for course design, with focused attention on the Arboretum course that they know so well. Overall, the opinion of the existing course is very positive. Desired improvements to enhance the course varied between user groups within common themes.

Runners enjoy the varied sections and topography of the Arboretum course, which they prefer over “American” style courses. Design characteristics that create a safe and fair course were discussed, including slope and surface materials. The current course layout is liked by all user groups; however there are aspects that need improvement such as the first turn of the course. Features such as “The Hill” and “The Junction” are icons of the course and play important roles in creating an exciting competition environment.

Coaches and event planners shared many preferences with runners, with added attention to organizational and safety concerns. A name for the course, a good course map, and entrance signage are desired. The course itself is liked, but needs “fine tuning”
in order to meet official distance requirements for competitions, and reduce the need for marshals and coaches to direct runners and spectators. A structure on site to store fencing, provide shelter, and act as a viewing platform would be a welcome addition. Washroom facilities, drinking water, electricity on site, and entrance signage would be ideal.

The management staff at the Arboretum agree that a safe competition environment is important, and explained that liability is a concern. Overall, staff think the runners are a wonderful user group for the Arboretum, and are satisfied with the way the site is treated during and after competition events. Cross-country events currently promote awareness and stewardship, with little demand for site resources.

Local recreational runners in Guelph are proud of the running community that has flourished over the years. The Arboretum is a precious resource as a cross-country course for participating in competitions or watching as a spectator. The course also serves as recreational trails as part of a local running network, which supports a city of many enthusiastic runners of all ages and skill levels.
CHAPTER V: DISCUSSION, RECOMMENDATIONS AND IMPLICATIONS

Overview

The goal of this study was to explore the environment of cross-country running, and determine the best design for a cross-country course at the University of Guelph Arboretum for its users and stakeholders. In this section, the study results are placed within the context of others studies and literature.

The relationship between runners and their environment in the sport of cross-country are explored, along with related users and stakeholders. Cross-country course design for competitions is discussed with general recommendations provided for ideal course design. Specific recommendations for the Arboretum site in Guelph are suggested, with the intention of enhancing the existing cross-country course by highlighting its strengths and improving weak areas. The implications of this study are discussed along with suggestions for further research.

Exploring the Cross-Country Experience

Participants in this study described the experience of cross-country running in relation to the environment of the sport. Runners, spectators, coaches, event planners, and Arboretum staff discussed cross-country course design in general, based on their collective experience with many courses in several countries, and specifically discussed the Arboretum course in depth. The importance of place in the sport of cross-country was strongly emphasized, including the variation and uniqueness of every individual course.

The only other study found that was conducted on this subject is also a landscape architecture thesis. Lancaster (2011) examined the cross-country courses using elements
of golf and ski courses to inform cross-county design, and interviewed coaches exclusively. This study employed some of the same methods used by Lancaster, such as key informant interviews with coaches and literature review of design precedents, but expanded the facet analysis to involve elite runners, local runners, event planners, stakeholders, and detailed investigation of a significant existing course in Canada’s top running city. Findings are consistent with Lancaster (2011) in that the best approach for cross-country courses is to design for the athlete. Although all participants in this study recognized the importance of several cross-country user groups including coaches, officials, and especially spectators, it was made clear that a course must serve runners first, and if it does, all other user groups will have an optimal experience. By designing for the athlete, a cross-country course should be designed to heighten levels of “motivation, excitement, interest, and success, but without unnecessary difficulty” (Lancaster, 2011, p. 98).

Findings suggest that the cross-country community in Guelph, which includes runners from a myriad of origins, strongly prefers the approach of designing for the athlete. This contrast to the “American” design trends outlined by runners, coaches, and published material, which can be considered as designing for spectators. These environments feel unnecessarily artificial, and do not enhance runner experience for the sport of cross-country. However, the important role of spectators in the sport was emphasized by all groups, indicating that an ideal cross-country course should accommodate spectators and offer an enhanced experience by providing essential optimal viewing locations, as well as amenities such as washrooms and nearby parking. Spectators are fundamental to runner
performance and experience, and their enjoyment of cross-country encourages investment and promotion of the sport, as well as environmental stewardship.

**The Environment of Cross-Country**

The uniqueness of place and time and the importance of natural characteristics in the sport of cross-country reflect established theories in relation to people and the environment. Findings are consistent with Attention Restoration Theory and Stress Recovery Theory, as discussions with runners and coaches reveal desires for “quiet” sections of the course, which allow runners to “collect their thoughts” and “regroup”, as well as “exciting, energetic” sections with many spectators which provide “a burst of energy”. This supports the idea that psychological arousal levels must reach optimal, balanced levels of high and low. Sections of the course that do not have significant natural challenges or the noise and energy of spectators restore the athletes, while loud or challenging areas stimulate them. Creating a course which balances low and high levels of arousal will support optimal performance and experience.

The psychology of an athlete plays a key role in their performance and experience during competitions, and cross-country course design can impact runner psychology. Runners who participated in this study discussed desired course elements, suggesting that appropriate design principles applied to course design can enhance athlete psychology and stimulate optimal performance. Course characteristics and features, such as natural landmarks, smooth curves, and limited sight lines, allow runners to mentally focus during the race, and create a motivating course that is not unnecessarily difficult. In addition to the psychological effects that course design can influence, the natural physiology of
running can be supported by designing a course for athletes. Elements such as appropriate slopes and secure surface materials for safe footing will enhance the physiology of cross-country running, without sacrificing the uniqueness and natural appeal of the site.

Findings indicate that designing for the athlete is about creating “a safe and fair course” that is also “enjoyable and exciting”. Key elements of ideal courses designed for runners are outlined in the next section.

**Design Guidelines for Cross-Country Running Courses**

The following guidelines are suggestions that are intended to compliment the quantitative standards provided by associations such as the IAAF and the CIS. The guidelines have been informed by this facet analysis of the University of Guelph Arboretum course consisting of interviews, site analysis, personal observations, and literature review including precedent studies. The qualitative guidelines suggest ways in which landscape architects and other cross-country course designers can best design courses and facilities to enhance the performance and experience of athletes, as well as coaches, spectators, and other user groups. In keeping with the approach of *designing for the athlete*, these guidelines have been developed with focus on elite runners, after concluding that a course designed for elite athletes will perform well with all runner groups.

**A Safe and Fair Course**

- **Course Layout:** An ideal cross-country course should include a variety of smooth, gradual curves and short, straight sections. Avoid excessively sharp turns if possible, especially within the first 150 meters of the race, and ensure that there is a relatively straight section of approximately 200 meters leading to the finish line.
Course Width: The carrying capacity of a course should be determined based on the size of competitions (the number of runners in a race). For large races at maximum carrying capacity, the start line and first 200 meters of a course should be as wide as possible in order to accommodate large numbers of race participants and allow enough space for passing. The course may narrow to a minimum of two meters in the last sections when runners are typically running single file or side by side.

Wayfinding: Ensure that the course is well defined, so that runners do not experience difficulty in determining which direction they need to run. Ideally this should be intuitive; if signage is necessary ensure it is clear, and if marshals are needed ensure that they are informed and competent.

Distance Marking: Although many runners prefer an abundance of distance information during training, a good approach for competitions is to keep distance marking limited to kilometer marks, and ensure the athletes know what the markers represent in order to avoid confusion.

Safe footing: Well drained, moderately soft surfaces such as grass and packed dirt are preferred. Avoid uneven ground, extreme transitions, and hard surfaces such as pavement or concrete (even in very small quantities).

Slope: The ideal course should have gently rolling terrain, with hills as well as selected flat sections. The maximum slope on the Arboretum course is 12.5%, which is the finishing stretch on “The Hill”. It is suggested that the maximum slope for cross-country should be 12%, and reserved for key features and sections of the course. Most of the course should not exceed 8% slope, especially where running downhill, and it is recommended that flat areas be included to balance elevation changes on the course. Path slope should crown in the center and slope to edges should be approximately 1.0%. Cross slope should be avoided wherever
possible, except when it is possible to create super elevated turns for top running speeds.

An Enjoyable and Exciting Course

- **Varied Sections:** To create optimal levels of arousal, ideal courses should include stimulating challenges (both for runners and spectators), as well as sections that are relatively “quiet” and offer runners mental and physical restoration. A balance of open and closed spaces (such as fields and forests), and areas with and without spectators are ideal.

- **Undulating Terrain:** Although varied sections can be created with natural elements such as vegetation or water features, undulating terrain (“rolling hills”) is a specifically desired landscape characteristic for cross-country running.

- **Loops:** Looped layout provides mental structure for runners and creates an optimal viewing environment for spectators. Ideally, the ideal course should consist of a series of loops. For loop lengths, 2 kilometer and 2.5 kilometer loops work well, and fit within competition lengths of 6km and 10km. It is useful to have a 1 kilometer loop for race flexibility. If a small loop, such as a 1 kilometer loop, is included in a long race, it is best to include near the end of the race to help prevent athletes from lapping each other.

- **Landmarks:** In addition to wayfinding for safety and necessity, include numerous natural landmarks for enhanced runner experience and performance.

- **Spectator Curiosity:** Spectators do not need, nor ultimately want, to see the entire race. There is a sense of excitement experienced when runners disappear and emerge again. The ideal course should offer accessible, convenient locations for spectators to watch most of the race, and ample space provided around the start and finish sections where emotion is most heightened.
Sense of Place: Design with the landscape so that uniqueness of the setting is not lost, but in fact highlighted in order to enhance the *genius loci* of the site and the cross-country course.

Course History: Great cross-country courses acquire a running history over time. Design features can enhance this aspect of the sport, and are ideal additions to any cross-country environment. Examples such as the silhouettes of Rim Rock Farm can inspire unique, creative design elements to support the historical development of cross-country courses.

**Design Recommendations for Cross-Country at the University of Guelph Arboretum**

The design guidelines mentioned in the previous section are intended to be *guidelines*. Every cross-country course is set within a unique environment with distinct natural characteristics which offer opportunities and constraints for cross-country course design. These guidelines, combined with other facets of this study including observations, site analysis and interview results have been applied to the Arboretum site in order to best design for cross-country within the Arboretum environment, as seen in Figure 32 which outlines the design recommendations for the Arboretum course.

**The Arboretum Site**

- Site Entrance: The entrance needs to improve to feel established, obvious and welcoming. Permanent signage illustrating the cross-country course as well as the Arboretum is desired (Figure 32).

- Facilities: Secure storage space for fencing, seating, and other cross-country equipment is desired and recommended. Parking space should be increased and clearly defined. Ideal additions are washrooms, drinking fountains, and electricity available on site.
A Safe and Fair Course

- Course Route: Refinement of the course layout is recommended, including a smoother first turn, widened path in several sections, and spatial adjustments to the Junction. The start area should be widened to accommodate larger races.

- Wayfinding: Improve the course marking system for distance and wayfinding, with the goal of creating an essentially intuitive course for cross-country running. Desired competition marks of 500 meters will be clear. Smaller markers for 400 meter increments are designed to be obvious only to Guelph runners. Red and yellow colour codes will honor existing course colours (Figure 33). Similar markers will be designed for the start and finish areas.

Design recommendations improve the Arboretum site for cross-country use, and create a safe and fair course (Figure 34). It is interesting to note that the revised first turn is based on recent developments by Arboretum staff to establish a new service road in order to more accurately reflect the original intended layout as outlined in the 1970 Arboretum
Master Plan (see Appendix 4). As changes are implemented, additional course distance measurements and adjustments will be necessary in order to ensure correct and accurate course distances for competitions. Additional suggestions for an *enjoyable and exciting* course will follow Figure 34.
Figure 34: Outline of recommendations to enhance the University of Guelph Arboretum cross-country course and facilities. As changes are implemented, adjustments will be necessary in order to ensure correct and accurate course distances for competitions.
An Enjoyable and Exciting Course

- Provide spectator amenities, such as seating and enhanced viewing locations.
- Create unique course elements that speak of the history of the course and provide natural landmarks for runners.
- Runners currently use a secluded area of the site to urinate during warm-up routines before competitions. This is a tradition, and should be supported with design elements such as vegetated screening for improved privacy and the addition of gravel for optimum drainage.
- Present titles to key features of the course to pay tribute to important contributions and support the development of a course history. This may include naming the runners’ favourite little hill the “Wilson Corner”, and renaming the Junction to “Dave’s Junction”. Further definition of gene banks can promote awareness of the Arboretum, and a portion of the course could be selected for planting of donated trees on either side, creating an “Alley of Honour” (Figure 35).

Figure 35: Design concept rendering of an “Alley of Honour” and enhanced junction area.
**Key Informant Feedback on Research Findings and Design Recommendations**

The results of the study, including literature review, site analysis, researcher observations, interviews, and design recommendations were evaluated by two key informants selected for their expert knowledge and extensive experience with cross-country running and other sport environments. Both key informants were participants in the initial interview component of this study. One informant is an elite level, award winning running coach with many years of experience with the sport of cross-country. The other informant is a local runner who coaches many athletes in the community and often plays a central role in running event organization and official time recording at the Arboretum course.

Informants were contacted directly by the researcher and asked if they would be willing to review the study findings and respond to questions about their expert opinion of the study. Both informants agreed to concurrent semi-structured interviews (a small focus group). This meeting took approximately one hour to complete. The researcher provided a brief oral overview of the study based on a written summary, as well as colour copies of Figure 25 (diagram of the existing Arboretum course illustrating varied sections) and Table 3 (describes each course section). General guidelines and specific recommendations for the Arboretum course were discussed, as well as results of the literature review including examination of precedents and key concepts concerning people and the environment.

Key informant feedback was very positive and verified the study findings. The unique aspects of cross-country running were discussed, including the importance of *genius loci* to the experience of the sport, and the disadvantages of recent design trends that focus
heavily on accessibility and convenience for spectators. The approach “design for the athlete”, which includes rich variation and selected sections away from spectators received very positive feedback, as did the general guidelines for ideal cross-country course design.

Specific recommendations for the Arboretum site and existing course were discussed and received positive feedback. The informants discussed concluded that this study is an excellent first step in the enhancement of the Arboretum course, but further attention is necessary, including additional design details. Based on the success of this study, the need for further design development, and the acknowledged gap in knowledge about course design, it was agreed that the researcher will act as a consultant for the ongoing development of the Arboretum course. Key informants discussed a clear demand in Ontario and beyond for design professionals who understand cross-country environments. As work on the Arboretum course continues, the researcher will investigate the need for cross-country enhancement beyond Guelph, and hopefully help inform future course design as a qualified consultant.

**Increasing Cross-Country Use at the Arboretum Site**

Although this study did not focus on the determining the optimal carrying capacity for the Arboretum study site, it was a consideration when interviewing Arboretum staff. Currently, the site receives an estimated average of approximately fifty users per day, of many different types. During competition events, particular areas of the site carry significant numbers of users, up to several thousand. Presently, these numbers do not seem to exceed the carrying capacity of the site. However, the Arboretum manager pointed out that if the cross-country course were to be enhanced and larger competitions
take place with increased frequency, careful consideration will have to be given to the
management and planning of events in order to support the increase in use. For example,
donors who may wish to visit the Arboretum to view donated features should be notified
in advance if a cross-country competition will impact their ability to access the site. A
study focusing on the carrying capacity of the Arboretum site may be necessary in the
future, especially considering a new residential development planned for a neighboring
site across Victoria Road.

Cross-Country and the Profession of Landscape Architecture

If the findings from this study were applied to cross-country course design, the result
would be an ideal environment for the sport. Qualitative information from user groups,
combined with regulation information (such as IAAF guidelines), is what landscape
architects use to create successful designs. Landscape architects are ideally suited for the
design of cross-country courses, in collaboration with coaches, event planners, and
runners. Currently, there is a clear shortage of qualified individuals for cross-country
course design, as well as a general lack of design direction. This study suggests that
although there are several design approaches for cross-country environments, Canadian
user groups prefer the approach of designing for the athlete, which involves preserving
and enhancing the natural sense of place. In addition to possessing the technical skills
necessary for course design, landscape architects are uniquely in tune with the concept of
place, and as this study reveals, the genius loci of landscapes is key to the sport of cross-
country.
Implications of this Study

At a local level, the Guelph running community, as well as the University of Guelph Arboretum, will benefit from this research as it is applied to the existing cross-country course. Improvements to the course suggested in this study will provide an enhanced cross-country environment for many of Canada’s top runners, and the community of spectators who support them.

At the national level and beyond, the qualitative information revealed in this study has been developed into general design guidelines for cross-country course design. The design guidelines, which are principles for designing for the athlete, may supplement the regulations provided by sport governing associations, such as the IAAF. The combination of international sport standards and design guidelines for course design is ideal in order to create courses that enhance the performance and experience of runners, as well as coaches and spectators.

Suggestions for Further Research

Currently, there is a general gap in knowledge about enhanced cross-country course design and a lack of targeted study on the subject. Successful courses, although quite rare or at least rarely discussed in relation to course design, do exist and require further study and preservation. Historic courses, such as Rim Rock Farm, continue to thrive because they are successful and are preserved by their users. This study examined a course that is considered successful, as an opportunity to explore cross-country course design and identify strengths and weaknesses based on a single case study. Further case studies should be conducted on other successful courses.
The methods used in this study and the application of general design guidelines could be used in further studies, and the resulting courses designed by utilizing these guidelines should be later assessed by post occupancy evaluation methods. Study on this subject is necessary in order to further identify and understand the facets of cross-country running, and how enhanced course design can advance the sport.

**Final Thoughts**

Many sport and recreational environments are highly controlled, artificial, and consistent, including many types of running events. In addition, some sports which are based on a history of natural, outdoor settings are becoming increasingly focused on environmental control, such as stadium style golf courses and spectator friendly cross-country courses. However, alongside these trends, there is a strong, increasing appreciation – and demand - for minimally controlled, natural sport environments such as “Links” style golf courses, and “classic” cross-country running environments. In these cases, uniqueness of place and time is desirable, in fact essential, to performance and experience.

Natural cross-country courses, designed with the landscape as opposed to being superimposed on top of it, are preferred by the participants of this study and have a demonstrated following in Canada and beyond. Such courses are essentially managed or maintained natural environments that have minimal impact on ecological systems and allow flexibility of use for a variety of groups. This is especially important as nearby nature becomes increasingly scarce. Flexibility of use and minimal environmental impact
promote a more sustainable approach to natural, recreational environments and promote outdoor use resulting in improved mental and physical health.

Cross-country running, as one participant pointed out, is “a sport for people who don’t like sports”. Running in the natural environment is simple, pure, and classic, an activity as old as the human race. It highlights the landscape and creates feelings of connection with nature. Such simple, and yet profound, aspects of the sport suggest important reasons why cross-country running is so popular and deserves to be preserved and enhanced. Promotion of the sport is needed to increase awareness, appreciation, and participation. Enhanced course design can support these goals by creating optimal environments for all cross-country user groups and stakeholders. As Marc Bloom (1978) eloquently stated, “We have to distinguish cross-country from road running by capitalizing on cross-country’s main attraction – the course” (Bloom, 1978, p. 28)

The unique environment of cross-country is essential to the sport. This research is a step toward enhanced cross-country environments, which is necessary as the sport continues to evolve.

Sport and recreational activities that celebrate landscape and promote stewardship of natural places can act as catalysts for environmental awareness and protection. Contact and interaction with nearby nature is more important than ever as the world population continues to increase and urban areas intensify. Promotion, support, and enhancement of activities such as cross-country running have numerous positive impacts, both direct and indirect, on many user groups and the natural environment. It is my hope that this study has brought attention to a truly unique and wonderful sport, and sparks further curiosity into how we think about recreational environments.
REFERENCES


APPENDICES
IAAF COMPETITION RULES 2012-2013
SECTION IX - CROSS-COUNTRY RACES
RULE 250
Cross-Country Races

General
1. There are extreme variations in conditions in which Cross-Country running is practiced throughout the world and it is difficult to legislate international standardization of this sport. It must be accepted that the difference between very successful and unsuccessful events often lies in the natural characteristics of the venue and the abilities of the course designer. The following Rules are intended as a guide and incentive to assist countries to develop Cross-Country running. See also the IAAF Distance Running Manual for detailed organizational information.

Season
2. The Cross-Country season should normally extend throughout the winter months after the close of the Track and Field season.

The Course
3. (a) The course must be designed on an open or woodland area, covered as far as possible by grass, with natural obstacles, which can be used by the course designer to build a challenging and interesting race course.
(b) The area must be wide enough to accommodate not only the course but also all the necessary facilities.
4. For Championships and international events and, wherever possible, for other competitions:
   (a) A loop course must be designed, with the loop measuring between 1750m and 2000m. If necessary, a small loop can be added in order to adjust the distances to the required overall distances of the various events, in which case the small loop must be run in the early stages of the event. It is recommended that each long loop should have a total ascent of at least 10m.
   (b) Existing natural obstacles shall be used if possible. However, very high obstacles should be avoided, as should deep ditches, dangerous ascents / descents, thick undergrowth and, in general, any obstacle which would constitute a difficulty beyond the aim of the competition. It is preferable that artificial obstacles should not be used but if such use is unavoidable, they should be made to simulate natural obstacles met within open country. In races where there are large numbers of athletes, narrow gaps or other hindrances which would deny the athletes an unhampered run shall be avoided for the first 1500m.
   (c) The crossing of roads or any kind of macadamized surfaces shall be avoided or at least kept to a minimum. When it is impossible to avoid such conditions in one or two areas of the course, the areas must be covered by grass, earth or mats.
   (d) Apart from the start and finish areas, the course must not contain any other long straight. A “natural”, undulating course with smooth curves and short straights, is the most suitable.
5. (a) The course shall be clearly marked with tape on both sides. It is recommended that all along one side of the course a 1m wide corridor, heavily fenced from the outside of the course, shall be installed for the use of organization officials and media only (obligatory for Championship events). Crucial areas must be heavily fenced; in particular the start area (including the warm-up area and the call room) and finish area (including any mixed zone). Only accredited people will be allowed access to these areas.
(b) The general public shall only be allowed to cross the course in the early stages of a race at well organized cross-over points, marshalled by stewards.
(c) It is recommended that, apart from the start and finish areas, the course be a width of 5 meters, including the obstacle areas.

**Distances**

6. Distances at IAAF World Cross-Country Championships should be approximately:

<table>
<thead>
<tr>
<th></th>
<th>Men</th>
<th>Women</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>12 km</td>
<td>8 km</td>
</tr>
<tr>
<td>Junior Men</td>
<td>8 km</td>
<td>Junior Women 6 km</td>
</tr>
</tbody>
</table>

The distances recommended for Youth competitions should be approximately:

<table>
<thead>
<tr>
<th></th>
<th>Boys</th>
<th>Girls</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>6 km</td>
<td>4 km</td>
</tr>
</tbody>
</table>

It is recommended that similar distances be used for other International and National competitions.

**The Start**

7. The races shall be started by the firing of a gun. The commands for races longer than 400m shall be used (Rule 162.2(b)). In international races, five-minute, three-minute and one-minute warnings shall be given. Departure boxes shall be provided and the members of each team shall be lined up behind each other at the start of the race. On the command “On your marks”, the starter shall ensure that no athlete has his foot (or any part of his body) touching the start line or the ground in front of it, and shall then start the race.

**Drinking / Sponging and Refreshment Stations**

8. Water and other suitable refreshments shall be available at the start and finish of all races. For all events, a drinking / sponging station shall be provided every lap, if weather conditions warrant such provision.

**Race Conduct**

9. If the Referee is satisfied on the report of a Judge or Umpire or otherwise that an athlete has left the marked course thereby shortening the distance to be covered, he shall be disqualified.
Appendix 2 - Concept Maps

Runners

Complete concept map for runners.

Detail view of runner concept map.
Coaches

Complete concept map for coaches.

Detail view of coaches concept map.
Arboretum Manager and Staff

Complete concept map for Arboretum staff.

Detail view of Arboretum staff concept map.
Event Planners

Complete concept map for event planners.

Detail view of event planner concept map.
Complete concept map for local runners

Detail view of local runner concept map.
Appendix 3 – Interview Questions

**Runners:**
How long have you been a runner?  (so about 10 years?  20?  Grade 3 = 8 years old)
How long have you been running cross country?
Do you do any other types of running?

How many different cross country courses have you run in Canada?
How many outside the country?

What are the positive qualities of the courses you like best?
What are the negative qualities of the courses you do not like?
What other characteristics do you like or dislike?  (Such as nearby trees, etc)

Do you have a preferred surface material for cross country running?  (Why this choice?)

Do you like a variety of different sections within a course?  (Open area, forest, etc)

Do you have different preferences for training versus competitions?  (Such as narrow vs wide, loops, etc)

Have you ever been confused about which direction to run during a competition?

Markers are also used to indicate distance in cross country. Do you ever experience a need for more of this information when running?

How familiar are you with the current cross country course at the University of Guelph Arboretum?

How do you arrive at the Arboretum course?  Do you need space to warm up? How does this experience compare to arriving at other locations?

Can you identify some strengths and weaknesses of this course based on your experience as a runner?
Do you like the looped layout of the course? Do you like the uphill finish? The first hard right turn?

Running cross country in the summer is a different experience than running in winter. What kind of seasonal changes do you experience as a runner on this course?

How do spectators affect you during competitions? Do you find that the current course enhances this relationship?

This information will ultimately be used to design a cross country course for the Arboretum. Do you have any other thoughts about how to improve this course?
Coaches:

How long have you been a cross country running coach?

How many different cross country running courses have you coached on?

What are some of the positive qualities of courses that are best for coaching? (Facilities, washrooms, scenery, safety, physical features)

What are some of the negative qualities of courses that make coaching difficult?

Do you like a variety of sections within a course?

As a coach, do you have different course/trail preferences for training versus competitions?

How do you arrive at the Arboretum course? Do you need space to warm up? How does this experience compare to arriving at other locations?

Can you identify some strengths and weaknesses of this course based on your experience as a coach?

Do you like the looped layout of the course? Do you like the uphill finish? The first hard right turn?

What are some common patterns of movement that you follow as a coach during competitions on this course? Please use markers to illustrate on the base map.

Have you experienced problems with you or your runners not knowing which direction to run during competitions at other courses? How does the Arboretum course compare with others in this regard?

Markers are important for distance as well as direction. Do you find that the current markers work well for you and your team? How does this system compare to others?

What kind of seasonal challenges do you experience as a coach on this course? What are some experiential highlights?

How do spectators affect you and your runners during competitions? Do you find that the current course enhances this relationship? How does it compare to other courses?

This information will ultimately be used to design a cross country course for the Arboretum. Do you have any other thoughts about how to improve this course?
**Event Organizers/Managers:**
How long have you been managing running events?

Is it common to have someone in this kind of position for cross country/track and field? What kind of communication goes on between organizers? Are websites a common tool?

How many different cross country courses have you seen in Canada? Outside the country?

What are the positive qualities of the courses you think work best? What are the negative qualities of the courses you do not like?

What kind of things do you need to organize for running events? Portable toilets, parking, signage, fencing, advertisement/website updates, volunteers, etc. What are the special challenges associated with seasonal changes? How big can the crowds get?

How do you arrive at the Arboretum course for competitions? Do you need space to prepare? How does this experience compare to arriving at other locations?

In your experience with the Arboretum, what are some of the best features of the course? What can improve? Location, looped structure, scenery, uphill finish, first right turn, etc.

What kind of challenges do you face regarding directions? People need to park and find the course, runners need to know where to run, spectators watching runners, coaches, equipment set up, etc.

What are some common patterns of movement that you follow during competitions on this course? Please use markers to illustrate on the base map.

What are some common compliments or complaints that you hear?

How does the media get involved in competitions, and is this a challenge?

Have there been events that were particularly memorable? Why? Do you think there are things unique to Guelph that you are doing that others should be doing?

How do spectators behave during competitions? Do you find that the current course enhances their experience?

This information will ultimately be used to design a cross country course for the Arboretum. Do you have any other thoughts about how to improve this course?
**Maintenance Personnel:**

How long have you been working at the University of Guelph Arboretum? Have you worked in similar positions elsewhere?

What are the qualities of the Arboretum that you like?

What are some qualities that you do not like?

What are some of the most popular areas? Areas that people avoid? Please illustrate on the map.

In your opinion, are there existing features, or “undiscovered treasures”, that could be enhanced or highlighted? Unique things that only the Arboretum can offer?

What about areas that are sensitive and need to be protected?

What are some of the biggest challenges in maintaining the trails on site? Other site features?

What are some of the seasonal challenges in maintaining the Arboretum? Snow, flooding, etc.

In a more positive light, what are some of the experiential highlights of the seasons?

There are various user groups that use the Arboretum: dog-walkers, casual joggers, cross country runners, etc. What kind of different maintenance needs to they have? Do they conflict with each other?

Do you have any kind of safety concerns for yourself, other workers, or users of the Arboretum? Such as trees, crime, blind spots, etc.

Have there been times when you have had to give directions to someone on how to get to the Arboretum? Do you ever need to give directions on navigating the trails? Such as returning to the parking lot?

How does parking affect the condition of the Arboretum, on an ongoing casual basis and during running competitions?

Are there unique demands placed on you for events, such as national competitions? Such as extra garbage, signage, etc. Who performs these duties as needed?

In your opinion, what kind of features could be incorporated into the Arboretum that would make your job easier? If you could change anything, what would it be?

This information will ultimately help inform future running trail design, and will focus on the Arboretum site. Is there anything else you would like to add that you believe is important to this subject?
**Arboretum Manager:**

How long have you been working at the University of Guelph Arboretum? Have you worked in similar positions elsewhere?

What are the qualities of the Arboretum that you like? What are some qualities that you do not like?

What are some of the most popular areas? Seasonal highlights? Please illustrate on the map.

In your opinion, are there existing features, or “undiscovered treasures”, that could be enhanced or highlighted?

What are some of the biggest challenges in maintaining trails and other site features throughout the year?

Are there concerns for sensitive wildlife habitat? How does this limit maintenance, and future development?

How does this place compare to other Arboretums? Do you communicate with others on a regular basis?

Are there others with cross country running trails that you are aware of?

What are the positive and negative aspects of having cross country runners train and compete here? Are there unique demands placed on you for large events?

There are various other user groups that use the Arboretum: researchers, students, casual walkers and joggers, dog-walkers, and cyclists. Are there additional user groups? What kind of different needs to they have? Do they cause conflict? Who would you like to see more of or less of?

On average, can you estimate how many people visit and use this part of the Arboretum in a week? Per day?

Is liability a large concern? Do you have safety concerns for yourself, other workers, or users of the Arboretum?

Do you often need to provide directions to this site? Directions on navigating the trails and parking?

How does parking affect the Arboretum on an daily basis and during events? Physical condition, experiential…

What are some of the major costs that influence maintenance and development of this site?

Do you feel that this area of the Arboretum is fulfilling its primary goals and objectives?

This information will ultimately help inform future running trail design, and will focus on the Arboretum site. Is there anything else you would like to add that you believe is important to this subject?
**Local Community Runner**

How long have you been a runner?
How long have you been running cross country? Do you do any other types of running?

How many different cross country courses have you run in Canada? How many outside the country?

What are the positive qualities of the courses you like best?
What are the negative qualities of the courses you do not like?
What other characteristics do you like or dislike? (Such as nearby trees, etc)

Do you have a preferred surface material for cross country running? (Why this choice?)

Do you like a variety of different sections within a course? (Open area, forest, etc)

Do you have different preferences for training versus competitions? (Such as narrow vs wide, loops, etc)

Have you ever been confused about which direction to run during a competition?
Markers are also used to indicate distance. Do you ever experience a need for more of this information?

How familiar are you with the current cross country course at the University of Guelph Arboretum?

Can you identify some strengths and weaknesses of this course based on your experience as a runner?
Do you like the looped layout of the course? The uphill finish? The first hard right turn?

Running cross country in the summer is a different experience than running in winter.
What kind of seasonal changes do you experience as a runner on this course?

As a spectator, what makes for an excellent experience? Do you find that the current course enhances this? What are some common compliments or complaints that you hear?

How does the media get involved in competitions, and is this a challenge?

Have there been events that were particularly memorable? Why?

Do you think there are things unique to Guelph that you are doing that others should be doing?

This information will ultimately be used to design a cross country course for the Arboretum. Do you have any other thoughts about how to improve this course?
Excerpt from 1970 Original Arboretum Master Plan