EXPLORING STRATEGIES FOR SOUNDSCAPE DESIGN IN
LANDSCAPE ARCHITECTURE

By

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EXPLORING STRATEGIES FOR APPROACHING SOUNDSCAPE DESIGN IN LANDSCAPE ARCHITECTURE

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Landscape architects have a visual approach to design and consequently sonic environments are seldom acknowledged. This study aims to bring more awareness to the importance of the acoustic environment in landscape architectural practices. Steps for approaching soundscape design were devised through a literature review and a soundscape design for Day Park Beach, Cape Breton, Nova Scotia. The literature review provided context for the design by examining research related to sound. Data were collected through soundwalks, two focus groups, and on-site observations. Using a sound recorder, the researcher collected perceptions of three people residing in Cape Breton and six visitors regarding existing soundscapes during one day at Day Park Beach. Results show the importance of soundscape evaluation and the value of understanding the viewpoints of both residents and visitors during the design process. This thesis offers useful information for landscape architects interested in developing soundscape designs.

Keywords: soundscape, acoustic design, landscape architecture, soundwalks, perception
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Chapter 1| Introduction

During the summer of 2016, the development stages of a tourism route for the west coast of Cape Breton came into being. The tourism strategy, called Canada’s Musical Coast, devised ways to connect 41 different sites—including beaches, waterfalls, wharves, harbours, and look-offs—through a common design vernacular and narrative. Sound became a major story-telling component throughout all of the conceptual plans for the coast. Notable was the fact that the majority of the site analyses were based on visual and physical aspects of each site. There was little investigation into existing soundscapes and how sounds might influence design decisions. For the most part, designers and planners have more of a vision-oriented approach to design and management of public spaces (Fowler, 2012, Hedfors, n.d). Rarely is there mention of the positive aspects of soundscapes—the audio equivalent to landscapes. Auditory aspects of the landscape are typically considered only when noise is present, and is often considered in negative terms as ‘noise’. The result is that planners and designers refer to noises that need to be limited and controlled, rather than a characteristic that could add to the experience of the landscape.

Intuitively, most people understand the power of sound, as sound has an enormous effect on how we experience and interact with a space. “Sound unifies, surrounds and flows into the listener, as opposed to sight which creates divisions and distinctions” (Bernat, 2014, p.92). Yet, we spend little time thinking about sound in our daily lives. This could reflect the fact that we are living in a visually dominant world.
For the purpose of this thesis, soundscape design is referred to as a new inter-discipline, combining the talents of scientists, social scientists, and artists - particularly musicians - and “attempts to discover principles and to develop techniques by which the social, psychological and aesthetic quality of the acoustic environment may be improved” (Truax and Schafer, 1999, para. 1).

The research question to be answered is how can soundscape analysis and design be integrated into the landscape architectural design process to contribute to unifying the design? Therefore, this thesis compiles information from a variety of disciplines relating to sound as a way to provide direction for conducting soundscape analysis and design. Qualitative research methods - soundwalks, interviews and on-site observation - inform the soundscape design of Day Park Beach, Cape Breton, Nova Scotia.

**Goal & Objectives**

To answer the research question, the goal of the thesis was to explore how soundscape design could be integrated with landscape architecture to influence and shape the relationships people have to an environment. This was explored through the development of a soundscape design for Day Park Beach, Cape Breton, a site that is part of the Canada’s Musical Coast tourism route. In order to achieve this goal the following objectives were established.

1. Develop a glossary for different sounds in the environment.
2. Identify design implications developed from the literature review to inform the process of designing with sound.
3. Explore a soundscape framework for sound-based landscape architectural design.
4. Demonstrate the application of the soundscape framework through design of the selected site.

5. Critically reflect on the potential opportunities and limitations of incorporating soundscape design in landscape architectural practice.

**Relevance to Landscape Architecture**

In the realm of academia, soundscape design studies remains on the periphery or are generally not included in programs in landscape architecture. Landscape architecture students and professionals are not as likely to include the positive sounds of the environment in their site analysis plans; the visual and physical aspects of the site are accessible and more easily understood. The reason for this is that terminology used to describe the physical and visual senses of an environment have been developed by western culture over many centuries, while terminology used to describe sound is less understood and utilized. “This lack of language may relate to a lack of an aesthetic of sound and perhaps reflects the dominance of the visual in the design and conceptualisation of the environment” (Davies et al., 2012, p.229). Within the field of landscape architecture there is a need to look beyond the interpretation of the landscape in purely aesthetic terms. There is potential for a new opportunity to engage with space and time (Fowler, 2012, P. 112). In order to create more harmonious public spaces, landscape architects should consider the audio environment.

**Summary**

Chapter 1 sets the stage for the development of this thesis. The problem is identified and the research question is stated followed by the research goal and objectives and the
relevance of sound to the field of landscape is acknowledged. Chapter 2 compiles literature related to the topic of soundscapes. Information was gathered from books, journals, magazines, and websites.
Chapter 2.0 | Literature Review

Through the literature review, information was gathered concerning different disciplines that conduct research related to sound. This chapter provides context for the development of the thesis and supports the creation of a soundscape design for the chosen site in Cape Breton. The literature review revealed what is already known about the topic of sound/soundscape studies as well as gaps in the existing knowledge base. An emphasis on human-centred research of sound—is discussed in further detail below.

2.1 | Technical Terms Used to Describe Sound(scape)

Most people do not possess the necessary verbal tools to describe sounds. “This lack of language may relate to a lack of an aesthetic of sound and perhaps reflects the dominance of the visual in the design and conceptualisation of the environment” (Davies et al., 2012, p.229). In North America, we do not have words that specifically name sounds. For instance, according to Worby (2006), there is no word to describe the sounds of a guitar or telephone; people refer to the object that produces sound in order to give the sound a name. Therefore, the meaning of the sound is often invested in the object that created it. The work of landscape architects would benefit from an increased awareness and vocabulary to describe sounds. This section of the literature review consists of many useful terms for describing sounds.

Acoustic ecology examines the interactions of humans and the environment. As indicated in Figure 1, “the soundscape is linked to features of the natural environment such as biodiversity and landforms, and human systems” (Dumyahn et al., 2011, p. 1329-1330). The
terms anthropony, biophony and geophony to describe the sources of sounds in the environment. Anthropony defines human-made noise/sounds, biophony refers to the sounds of animals, and geophony relates to the natural non-biological sounds such as the wind. Figure 1 illustrates the main sound sources in the landscape.

![Figure 1 Main sources of sound in the landscape](image)

*Figure 1 Main sources of sound in the landscape*

*Adapted from Dumyahn et al., 2011, p.1330*

Terms used to describe sounds and soundscapes can be grouped into three categories. These categories are sound sources, sound descriptors, and soundscape descriptors. Sound sources are physical entities such as complex multiple objects (traffic) and components (brakes). Sound descriptors are descriptions of sounds such as nouns (rattle), adjectives (clicking), phrases (peaceful sounds) (Davies et al. 2012). Soundscape descriptors can be broken down to form four distinct categories:

1. Cacophony – negative mix of sounds and negative listening experience
2. Hubbub- positive mix and positive listening experience
3. Constant- monotonous, masks sounds, negative listening experience
4. Temporal-dynamic changes

Schafer’s (1977) concept of ‘tuning of the world’ relates to how the sounds of the urban environment are composed. Schafer limits his list of soundscape classifications to three: soundmark, keynote, and signal. Soundmarks are considered culturally significant sounds and for the most part are considered worthy of preservation (ex. church bells/temple bells, townsquare clocks, and foghorns). Keynotes on the other hand, are sounds that are continuous throughout a site and form background noise (ex. traffic, air conditioner sounds). Finally, sound signals represent foreground sounds within a soundscape and may change dynamically. Sound signals can also include local soundmarks (Fowler 2012). Schafer recommends that designers should strive to preserve soundmarks, as unique soundmarks reflect community character. One way of doing this is to draw attention to soundmarks of distinction, which could be achieved through design interventions. An artistic task for landscape designers is to design a suitable level of vibrancy by attempting to manipulate the mixture of sound sources and how they change over time (Davies et al., 2012)

The hi-fidelity (hi-fi) sounds are dominating historical soundmarks resulting in a greater number of low fidelity (lo-fi) sonic environments rather than having hi-fi qualities, where all sounds can be heard clearly without being crowded or masked. Bernie Krause expanded on Schafer’s ideas about hi-fi and low-fi soundscapes. He analysed frequency spectrums of ecosystem soundscapes. He deduced that a healthy ecosystem meant that “living creatures fill every possible frequency bond in the sound spectrum. On the other hand, recently developed
ecosystems, such as re-constructed forests, have prominent gaps in the spectrum” (Polli, 2012, p. 258).

According to Bernat (2014), Polish sound researchers use various terms to describe phenomena associated with sound in an environment. These terms include: audiosphere, phonosphere, melosphere, sonosphere, aural horizon, soundsphere, acoustic landscape, soundscape, acoustic space, phonic space, the sound layer of the landscape, and acoustic climate (Bernat 2014). The root word sphere refers to a spherical space located around the listener, which consists of a centre and peripheries. “The prefixes phono-, audio-, melo-, and sono- indicate the relationship with sound and auditory activity” (Bernat, 2014, p. 92). Audiospheres are human perceived acoustic environments. The following audiospheres were described by Bernat (2014):

1. Colloquial—all sounds of the immediate environments that are acoustically predictable.
2. Organized—various environmental sounds perceived as harmonious by the listener.
3. Specialise—site-specific sounds that help to distinguish a space (92)

When describing sounds in the environment, sonosphere refers to sonic qualities, melosphere would describe the musical qualities of a space and phonosphere would refer to the phonic qualities (Bernat 2014). Researchers use the phrase acoustic space to describe a space with no centre and boundary, perceivable through the balance of all senses and acoustic horizon as the farthest distance, in each direction, that sounds can be heard. The terms used to describe sound in this section, have been compiled into a glossary of terms (Table 1).
Table 1 Glossary of soundscape terms

*Source: Author*

<table>
<thead>
<tr>
<th>Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Acoustic Horizon</td>
<td>Is the farthest distance, in each direction, that sounds can be heard.</td>
</tr>
<tr>
<td>Audiospheres</td>
<td>Human perceived acoustic environments.</td>
</tr>
<tr>
<td>Acoustic Space</td>
<td>Describes a space with no center or boundary, perceivable through the balance of all senses.</td>
</tr>
<tr>
<td>Anthrophony</td>
<td>Human-made noise/sound (ex. Sound of a car engine or airplane)</td>
</tr>
<tr>
<td>Biophony</td>
<td>Refers to sounds made by animals (ex. Vocalizations of birds)</td>
</tr>
<tr>
<td>Geophony</td>
<td>Refers to the natural non-biological sounds (ex. Sound of the wind)</td>
</tr>
<tr>
<td>Keynotes</td>
<td>Sounds that are continuous throughout a site and form background noise (ex. traffic, air conditioner sounds)</td>
</tr>
<tr>
<td>Hi-fi Soundscapes</td>
<td>All sounds in the soundscape can be heard without being crowded and masked.</td>
</tr>
<tr>
<td>Lo-fi Soundscapes</td>
<td>Greater number of sounds in the sonic environment are masked and obscured by monotonous sounds.</td>
</tr>
<tr>
<td>Melosphere</td>
<td>Musical qualities of a space around a listener.</td>
</tr>
<tr>
<td>Phonosphere</td>
<td>Refers to the phonic qualities of the space around a listener.</td>
</tr>
<tr>
<td>Sonosphere</td>
<td>Refers to sonic qualities of the spherical space around listeners, which consists of a center and peripheries.</td>
</tr>
<tr>
<td>Sound Signals</td>
<td>Represent foreground sounds within a soundscape and may change dynamically and can also include local soundmarks.</td>
</tr>
<tr>
<td>Sound Sources</td>
<td>Physical entities such as complex multiple objects (traffic) and components (brakes).</td>
</tr>
<tr>
<td>Sound Descriptors</td>
<td>Descriptions of sounds such as nouns (rattle), adjectives (clicking), phrases (peaceful).</td>
</tr>
<tr>
<td>Soundscape Descriptors</td>
<td>Descriptors for soundscapes can be broken down into four categories: cacophony (negative mix of sounds and negative listening experience), hubbub (Positive mix), constant (monotonous, masks sounds, negative listening experience) and temporal (dynamic sounds).</td>
</tr>
<tr>
<td>Soundmark</td>
<td>Culturally significant sounds and for the most part are considered worthy of preservation. (ex. Church bells, foghorns)</td>
</tr>
</tbody>
</table>
There are many different communities of scientists who consider sound as their object of study. Researchers may focus on the physical (acoustic), semantic (psychological) or sociocultural (sociological) characteristics. According to Bild et al. (2016), there are two distinct scientific approaches to researching sound: object-centred and human-centred. The object-centred approach relies on physical properties of sounds through the use of tools, methods, and metrics agreed upon by a community of acousticians or computer scientists. This approach uses controlled lab experiments. The tests answer a variety of research questions on the physical properties or classification of sounds. On the other hand, human-centred research focuses on how people experience sound and different auditory environments. The human-centred approach comes from the psychological understanding of sound—how sounds are perceived and interpreted by humans. The emphasis is on experiential knowledge, as “sound is not reducible only to a quantifiable signal (i.e., a potentially audible pressure change as detected by an auditor/receiver) in the same way that perception is not simply signal processing” (Bild et al., 2016, p.423). This approach is closely related to psychology and human-centred disciplines such as social sciences, history, and linguistics.

2.3 Soundscape Research and Acoustic Ecology

In the 1970’s, the Canadian composer, writer, music teacher, and environmentalist, R. Murray Schafer popularized the term soundscape—the acoustic equivalent to landscape. For Barry Truax, a well-known researcher commenting on the topic of acoustic communication,
“Soundscape represents not merely the presence of an acoustic environment, which could be natural or simulated, but also the potential for such an environment to communicate information to a listener” (Fowler, 2012, p.113). According to Bernat (2014), soundscapes hold social and ecological significance and should be considered a natural resource to be protected. Environments have unique soundscape patterns; these patterns allow spaces to be differentiated. Even though sounds are not always noticed, they can create a sense of place.

**Soundwalks**

Hildegard Westerkamp - another leader of the acoustic ecology movement - developed the empirical technique of soundwalks as a method of acquiring information about people’s interpretations and perceptions of the auditory environment. Soundwalks allow people to personally connect with the soundscape through focused listening. The purpose is to listen to the environment. The soundwalk can be journeyed through a natural setting or a busy city street, journeyed alone or with people, and recorded or not recorded.

Schafer states that listening is the key to improving the world’s soundscape: “We must learn how to listen. It seems to be a habit we have forgotten. We must sensitize the ear to the miraculous world of sound around us...the ultimate aim would be to begin to make conscious design decisions affecting the soundscape about us” (Schafer, 1992, p. 11). He describes his intention for creating a new interdisciplinary field:

The home territory of soundscape studies will be the middle ground between science, society, and the arts. From acoustics and psychoacoustics we will learn about the physical properties of sound and the way sound is interpreted by the brain. From society we will learn how man behaves with sounds and how sounds
affect and change his behaviour. From the arts, particularly music, we will learn how man creates ideal soundscapes for the other life, the life of the imagination and psychic reflection. From these studies we will begin to lay the foundations of a new interdiscipline—acoustic design (Schafer, 1977, p. 4).

Schafer taught his music students how to be soundscape analysts. For instance, he introduced them to “ear cleaning” techniques, series of exercises that focus on listening to the acoustic environment, as a way to become more receptive to soundscapes. In 1969, Schafer encouraged his music students to use their imagination. He had them take historical documents and imagine what sounds would exist. These documents could include descriptions of events, renaissance paintings, poems, photographs. Schafer and his pupils came up with the following conclusions:

We found that at first when men were scarce and lived a pastoral existence the sounds of nature seemed to predominate: winds, water, birds, animals, thunder. Men used their ears to read the sound-omens of nature. Later on in the townscape men’s voices, their laughter and the sound of their handicraft industries seemed to take over the foreground. Later still, after the Industrial Revolution, mechanical sounds drowned out both human and natural sounds with their ubiquitous buzz and whirr. And today? (Schafer, 1969, p. 6).

Schafer’s students developed a table (Table 2) to visualize these ideas more clearly. They created hypothetical percentages for the amount of natural sounds, human sounds and sounds of tool and technology found in primitive cultures; medieval, renaissance; pre-industrial cultures and today. Their findings indicate a reversal of which group of sounds dominate. In early cultures natural sounds dominated, while nowadays mechanical sounds are pervasive.
Schafer wrote *A Sound Education 100 Exercises in Listening and Sound Making* (1992) which compiles interesting daily exercises that encourage more aural awareness. Schafer speaks of a true “acoustic designer” as someone who thoroughly understands the environment and has training in multiple fields such as acoustics, psychology, sociology, and music (Schafer 1992). Ultimately, landscape architects can learn a lot from Schafer’s sound education exercises and work towards greater awareness of soundscapes.

### 2.4 | The World Soundscape Project

The World Soundscape Project (WSP) was an international research project founded by Schafer in the late 1960’s at Simon Fraser University in Vancouver, British Columbia. The group used soundwalks to explore the sonic environments of rural and urban areas of both Canada...
and abroad. The primary functions of soundwalks according to Hildegard Westerkamp—one of the original members of the WSP—are orientation, dialogue, and composition. An action of the WSP group was to create environmental “compositions.” These musical representations of soundscapes were used in music and were an educational tool to bring more ecological awareness to soundscapes in urban areas.

During soundwalks—a qualitative method for gathering data used for this thesis—audio recordings capture the sounds of the environment, a similar process to recording verbal data, and the observations and discussion of the participants. According to Truax, an audio recording of the environment, when listened to carefully, makes us more analytically aware of sounds. Without distraction from the visual and the physical senses and without the concentrated focus used in listening to block out unwanted sounds, the tape recording represents a more objective aural representation of a subject (Truax, 1984).

The Canadian composer, radio artist, teacher and sound ecologist Hildegard Westerkamp views soundscape as more of a personal reflection of the social, technological, and natural state of an area (Westerkamp n.d). Westerkamp creates soundscape compositions, where sounds of nature are recorded and combined with musical instruments. She argues “that the immersive nature of a soundscape composition, or in other words its ability to transport the listener to another place and time, enhances a listener’s understanding of place” (Polli, 2012, p. 258). According to Davies et al., the concept of soundscape concept “is a broad one, accommodating the complete sound environment in a location and the human response to it”
(2012, p. 224). The latter definition is based on a definition used by the World Soundscape Project (WSP).

During the 1960s and 1970s, a group of environmentalists and activists worked at bringing more public awareness to the global disappearance of soundscapes and the urgent need for their preservation. The project initiated the study of acoustic ecology or soundscape studies and examined the relationship between humans and their sonic environment. The original group consisted of Howard Broomfield, Bruce Davis, Peter Huse, Barry Truax, R. Murray Schafer, Hildegard Westerkamp and Adam Woog. The aim of the group was the following:

(T)o contribute to and co-ordinate research on the scientific, aesthetic, philosophic, architectural, and sociological aspects of soundscape ecology...and to find solutions for an ecologically balanced soundscape where the relationship between the human community and its sonic environment is balanced (Westerkamp, n.d).

The WSP believed that listening and soundmaking have a delicate relationship to one another. They also came to the conclusion that “the noise of the modern world is often at odds with the environment, and urg[ed] that limits be set on ambient sound levels in industrialized societies” (Licht, 2009, p. 8).

**WSP Accomplishments**

The WSP project accomplished a lot over during the 1960s and early 1970s. By collecting qualitative data through soundwalks and focus groups, the project produced an archive of 300 audio tapes of sound environments throughout British Columbia and Europe, as well as written documents. After Schafer left the group in 1975, the momentum of the project slowed down. Distribution of WSP’s publications as well as maintenance and expansion of its archives were
continued by Barry Truax and Hildegard Westerkamp. The World Soundscape Project led to the contemporary international movement, the World Forum for Acoustic Ecology (WFAE), initiating a new wave of public soundscape awareness. This international association consists of individuals from an array of disciplines engaged in the study of social, cultural, and ecological elements of soundscapes across the world. The WFAE collaborates with an international network of related organizations to produce and promote research, education, events, conferences and publications involving acoustic ecology.

2.5 | The Positive Soundscape Project

As mentioned previously, more attention has been paid to negative sounds in the environment rather than the types of positive sounds that exist. Within the field of engineering acoustics, a large amount of data has been collected over the decades regarding the kinds of noises that irritate people the most. However, there has been very little consideration of the sounds in the environment that people enjoy (Brown and Muhart, 2004). Even the term “noise” has a negative connotation (Cain et al. 2008). In terms of noise control “sound is seen as a by-product, a waste to be managed” (Brown and Muhart, 2004, p. 829). Soundscapes are made up of a plethora of sound sources and relationships between those sound sources. In this way, soundscapes are far more complex than just a by-product or waste to be managed. There are many sounds that should not be thrown out but should be honoured and preserved.

In 2006 through to 2009, the Positive Soundscape Project (PSP) came into fruition. This interdisciplinary project incorporated perspectives on soundscapes from a range of disciplines and drew attention to the aforementioned imbalance in our perception of the sound
environment. The project seeks “to develop a rounded view of human perception of
soundscapes by drawing together methods from the disciplines of engineering sound quality,
acoustics, psychoacoustics, physiology, sound art, acoustic ecology and social science” (Cain et
al., 2008, p. 3262). The PSP utilized and adapted the concept of soundwalking established by
Schafer into a sociological methodology for identifying and understanding people’s experiences
and perceptions of the sonic environment (Adams et al., 2008). For this thesis, the PSP method
of soundwalking has been adopted and altered. The PSP soundwalk method has participants
stop at predetermined areas along the route to comment on different soundscapes, whereas
the Schafer method maintains silence throughout the walk until the discussion period occurring
at the end. The PSP method allows the researcher to identify valuable firsthand information
about how people perceive their sonic environment, while still in the moment as they walk
through the space.

Five universities in the UK formed the PSP. These universities include Salford, Warwick,
Manchester, Manchester Metropolitan and London Arts. Disciplines involved in PSP are
acoustics, manufacturing, sound art, social science, psychoacoustics, physiology and
neuroscience. The goals of the Positive Soundscape Project as discussed by Cain et al. (2008)
are the following:

1. To identify the relevance of positive soundscapes.

2. To move away from a cultural focus on negative sound as noise.

3. To identify a way for the concept of positive soundscapes to be incorporated into
planning.
4. To examine the relationship between the acoustic environment and the responses and behavioural characteristics of people living within it.

Schafer (1997) acknowledged the fact that the soundscapes of the world is changing. According to him, people are beginning to inhabit a world with an ever-changing acoustic environment. “Noises are the sounds we have learned to ignore. Noise pollution today is being resisted by noise abatement. This is a negative approach. We must seek a way to make environmental acoustics a positive study program” (Schafer, 1977, p. 4). Therefore, landscape architects should seek to create designs that promote more positive auditory environments.

2.6 | Perception & Psychoacoustics

The perception of soundscape is personal and affected by what people with their own experiences and preferences bring to the listening situation. The most common classification of sounds is natural sounds, mechanical sounds and human sounds. In order for soundscapes to be considered positive, they need to be compatible with one’s own purposes and behaviour within the space (Cain et al. 2008). Davies et al. (2012) identify four factors in evaluating a soundscape in terms of being positive or negative: behaviour, attention, information, and individual differences. In terms of behaviour, participants evaluated a soundscape based on whether or not they felt they had any control over their environment. “Soundscapes that are compatible for one’s own purposes and support one’s own behaviours are also evaluated as positive” (Davies et al., 2012, p. 227). Relating to attention, participants of this particular study categorised sound into foreground and background. In the opinion of these participants, negative soundscapes exist when foreground sounds command too much of a person’s
attention; on the other hand, positive soundscapes are when foreground, middle ground and background sounds blend together harmoniously. The third factor to evaluating soundscapes is how visitors of a space process information. Soundscapes that provide information to the listener are considered positive. “If a soundscape stimulates us to explore and comprehend the environment, this too is evaluated as positive” (Davies et al., 2012, p. 227). The fourth factor is the individual difference between listeners. The participants in this particular study (Davies et al. 2012) discussed how associations from memory can influence soundscape evaluation, as memories of the past soundscape is significant in order to understand the current one. “Emotionally charged associations were thought to be particularly influential” (Davies et al., 2012, p. 227).

According to Davies et al, (2012) soundscape perception refers to how people think about and categorize different sounds in an environment. Therefore, when designing a public space it is recommended that natural sounds and sounds from human voices should be the most dominant sounds (Davies et al., 2012). The natural sounds create feelings of relaxation and the human voices add vibrancy to a space. Another important factor when distinguishing positive soundscapes is sound-image congruence (Brown and Muhart, 2004). When sounds match the visual sound source then the environment is viewed as a positive soundscape. Similarly, according to the participants of Davies et al., (2012) research, information must be correct or expected—the sound and its visual source should be in agreement when distinguishing a positive environment. The term “Schizophonic” is used to describe the opposite of a harmonious soundscape, where sound is separated from its location, making it unpredictable and chaotic (Schafer, 1977).
Awareness of one’s own sound making and emotional state are also factors involved in perceiving soundscapes. Psychological reactance is a term that refers to how a perceived loss of control over a soundscape results in an individual’s attempt to regain control. Behavioural control is when people engage in behavioural responses to avoid or modify unwanted sounds. Cognitive control is a reassessment of sounds/soundscapes including tolerance of an unwanted sound (Davies et al., 2012). Control strategies relate to how habituated we feel in a space. For instance, when people adapt to soundscapes, they are not as likely to act out in order to gain control. Also, the extent to which people are aware of their own sound making and how we feel about it are all influenced by the soundscape (Davies et al., 2012). Therefore, there is a relationship between the soundscape and one’s mood. When the soundscape is in harmony with our feelings then we regard it as positive.

According to Jennings and Cain (2013), “to understand what is meant by a positive soundscape, it is necessary to relate “positive” to activity and to accept that different types of people carry out different activities at different times of the day/week/year for different durations…” (p. 295). Table 2 lists the factors that can affect the positive perception of soundscapes.

Soundscapes can be evaluated based on the how suitable sounds are within the landscape as well as the expectations and the recreational goals of an individual (Dumyahn et al., 2011). Context is important in soundscape perception and evaluation. Types of sound sources, users of a space and social factors form context. Pleasantness of sounds is judged in context. For instance, the sound of water can be considered pleasant in one context and might
be considered annoying if the sound level intrudes on a conversation (Jennings and Cain, 2013). These different contexts are crucial to a cognitive approach to soundscapes. “If spaces have a context, then it is possible that the individual’s expectation of a context is a key factor in their perception of that space” (Bruce et al., 2014, p. 1). According to Dubois et al. context—the type of noise, type of source and the meaning attributed to it—is more important than noise level in the evaluation of soundscapes. Listeners have expectations of how a location or source will sound (Bruce et al., 2014). The term “expectation” refers to events that are happening and the anticipation of the occurrence of events in relationships to the soundscape context. An individual’s experiences, beliefs, perspectives, values, and emotional state are all important factors which form a person’s expectation and perception of a soundscape. Context is important to soundscape evaluation and expectation is significant to context. The simple flow diagram below (Figure 2) suggests how expectation might work in practice to influence soundscape assessment.

![Diagram showing the relationship between experience, expectation, and soundscape evaluation](image-url)

**Figure 2** Expectation and soundscape evaluation

*Adapted from Bruce and Davies, 2014, p.2*
A recommendation for landscape architects in producing positive soundscapes is to allow people control over their exposure to sounds. People are drawn to the sounds of nature, which have associations with ideas of tranquility. Also, the sounds of humans are important as well to the perception of a soundscape, as these sounds convey a sense of being part of something social and can give people a sense of place (Davies et al., 2012). Thus, when people can choose their level of exposure to these sounds, they will have a more positive experience. Ideas such as these would benefit landscape architects dealing with soundscape design. Soundscape assessment should occur during the initial stages of site design in congruence with visual and physical assessments.

2.7 | Sociological Approach to Understanding Sounds in the Landscape

According to Greider et al., (1994), “landscapes are the symbolic environments created by human acts of conferring meaning to nature and the environment, of giving the environment definition and form from a particular angle of vision and through special filter of values and beliefs” (1). Sociology literature has been referenced as a way to learn different perspectives on how cultural groups assign symbolic meaning to specific features of the natural environment. Firstly, people construct landscape meaning based on how they define themselves (Greider et al., 1994). These definitions can lead to different attitudes toward certain changes in the landscape and in the case of this thesis, changes to the natural environment brought about by the creation of a soundscape design.
The social constructivist view is that every landscape is a symbolic environment, which reflects our self-definitions based on cultural background. Thus, each individual visiting a space will interpret the landscape based on how they define themselves with relation to their culture. How a native of the land draws meaning from the landscape would be quite different from how a first time visitor of the region might interpret the symbols of the landscape. However, both interpretations of the environment are valid and worth researching and understanding.

Individuals visiting the area, who have never experienced the landscape before, bring an important social collective interpretation of place. Naturally, without having grown up in the area, there is a gap in their individual knowledge of the space; however, these individuals bring their unique cultural perspectives. For instance, visitors might interpret the site by comparing it to other coastline areas that they are familiar with, which would help them gain more knowledge and understanding about the site. Ultimately, they cannot interpret it fully.

2.8 | Urban Soundscape Design

Since the 1970s, noise has been considered as a major problem in cities. Today, cities in the European Union are required to create ‘noise’ maps as a way to bring more awareness to certain areas of acoustic concern. However, how urban planners measure sound quality has little to do with people. “Urban planning management practices have shown that most city regulations are insufficient as they mainly aim at maximum noise weighted levels and therefore focus on physical measurements, neglecting human experiences of noise” (Raimbault et al., 2005, p. 340). Sound quality cannot be determined by physical measurements. Human
perception of noise—unlike physical instruments—is not absolute; People rely on the meaning and context of sounds in order to determine the quality of sound.

Various and contrasted decisions are made concerning noise complaints, noise mapping, noise monitoring or noise abatement and zoning, managing urban noise problems in physical terms only, and not in relation to their physiological and psychological consequences (Raimbault et al., 2005, p. 340).

Therefore, an assessment of urban sonic environment needs to take human perception of sound into consideration. This can be achieved through qualitative research methods such as soundwalks and focus groups.

**Sounds in New York City**

In New York City, some of the most sought-after and expensive real estate is located in the downtown area where the air, water and soundscape are most polluted. Like any large city, New York has problems with how noise is controlled and managed. The majority of the complaints registered to the city relate to noise alone—roughly 3 million phone calls to the city a year—are related to noise disturbances (Polli, 2012, p. 264). A growing concern for people residing in urban centres is that urban planners rarely take sound into account in their management of city spaces. For instance, the *Ground Zero Memorial*, located in the World Trade Centre in New York City, is a contemplative space. This site was originally planned to be positioned near a busy highway with no noise abatement (Polli, 2012, p. 264). This location would have been detrimental to how the site functions as a reflective space.

Polli (2005) notes that most New Yorkers consider soundscape a personal problem, which makes it less likely for people to band together to make changes to their environments.
“Instead of organizing in groups to combat increasing noise levels in the city, city dwellers are more likely to spend personal money to buy an IPod to try to control their sound experience” (Polli, 2012, p. 264). Consequently, when sound is considered a personal problem there is no longer a sense of urgency to discuss concerns about sound control publically. Similarly, Fluegge (2011) identifies the term “personal sound space” as an individual’s auditory experience, which includes what a person may be hearing, where they are hearing it and the social conditions affecting their understanding of sound.

In 2003, Polli (2012) co-founded the New York Society for Acoustic Ecology (NYSAE) with soundscape artist Michelle Nagai. The multi-disciplinary group was interested in field recording, soundscape composition, soundscape preservation, and problem of noise in the city (Polli, 2012). Public projects were developed to approach the issue of New York City soundscape through NYSoundmap. NYSoundmap acted as a forum for questions, research, and projects related to soundscape. Visual soundmaps already existed; however, these maps, developed by municipal governments, catered more towards noise abatement. Colour was used to identify decibel levels at various times per day. In the case of the NYSoundmaps, public soundwalks became part of developing soundmaps. The sound recordings were placed online. The reactions to soundscapes were dealt with in formal meetings referred to as Citizen Sound. Citizen Sound was held yearly in conjunction with the Ear to Earth Festival. “Citizen Sound encouraged participants to imagine the future of the New York Soundscape after participating in a soundwalk” (Polli, 2012, p. 265).
According to Schafer (1969), “we may now have entered an era in which the prevention of sound may well be as important as it production” (Schafer, 1969, p. 4). An approach that considers urban comfort is essential in order to assess city noise impact and the effects on people. Rather than focusing on noise annoyance alone, there needs to be consideration of both positive and negative effects of noise when defining the acoustic quality of an urban environment. Sound sources need to be identified and noted as well as the local contexts of which these sound sources belong. Relationships that give meaning to these perceived sounds also need to be examined. With the expanse of urban areas, there will be a higher demand for design of spaces. With higher density living, there will be a need for more creative ways to orchestrate and enhance the positive qualities of the sonic environment.

2.9 | Acoustic Communication

Barry Truax was also an original member of the World Soundscape Project during the 1960s and 1970s. He has published several books on the topic of acoustic communication. The goal for his book, *Acoustic Communications*, is to “present a communicational model to show how sound, in all its forms and functions, defines the relationship of the individual, the community, and ultimately the culture, to the environment and to those within it” (Truax, 1984, p. 4). Early in the book, Truax makes the distinction between hearing and listening. He identifies hearing as “sensitivity to both the detail of physical vibration within an environment and its physical orientation revealed through its modification of those vibrations” (Truax, 1984, p. 18). Comparably, listening is described as an active role involving different levels of attention, whereas hearing implies a more passive role. It is through listening to sounds where people can generate meaning from the environment. Similarly, according to Fluegge (2011) listening also
provides understanding and cultural context to an experience. Another way of describing listening and hearing has been discussed by Raimbault et al., (2005). Descriptive listening refers to the identification of specific acoustic sources or events. Holistic hearing refers to the soundscape as a whole, without semantic processing of particular sources (Raimbault et al., 2005).

Truax also identifies different levels of listening: distracted and active listening. In terms of distracted listening, when people detect change they become more in tune with their surroundings. These changes help people notice the environment and create memories. In the case of active listening, sound is identified as indicating the presence of an object or person, or reflecting a state of the environment. In between these two states of listening, Jennings et al. (2013) offers “listening in readiness.” This state of listening is when the listener’s attention is ready to receive significant information but the focus of attention is directed elsewhere.

Sound art could also be considered a form of acoustic communication. Artists have explored and are exploring many different techniques for producing sounds, recording sounds and using sound to bring awareness to political issues and environmental concerns.

2.10 | Sound Art & Music

Sound art is interdisciplinary in nature and has a range of subjects such as acoustics, psychoacoustics, electronics, noise music, audio media, found or environmental sound, explorations of the human body, sculpture, film and video. Sound art is not defined by a specific time period, geographical location or group of artists. The art form has “no specific timeline and can be experienced over a long or short period of time, without missing the beginning, middle
and end” (Licht, 2009, p. 3). Also, it is difficult to define how sound art came to be. According to Licht (2009), the root of sound art lies in the relationship between sound and image. He provided the idea that through the invention of the telephone, audio recordings and acoustic space, sound and image became separated into two distinct entities.

The work of the American composer John Cage blended both art and music. Cage revolutionized modern music with his unconventional instrumentation and idea of environmental music dictated by chance (The Art Story Foundation 2017). As described by Worby (2006), he collaborated with artists such as Robert Rauschenberg, breaking down divisions between art and music. Cage moved beyond the conventional musical structures in his work titled ‘4’33.’ This piece greatly influenced how people thought about how sound relates to music. The work involved three movements. The notation for each movement read ‘Tacet,’ which is a musical term for “be silent.” The piece required the performer(s) and audience to be silent, but still active for four minutes and thirty-three seconds. The only sounds that were heard in the space were from the audience—twitching, coughing and nervous shuffling. In this case, the method for producing sound was purely environmental. Thus, the roles of the composer, performer and listener had been broken down. Cage initiated the idea that all sounds could be considered music. This led to a wider public awareness of sound and an interest in sonic experimentation as well as exploration in all media (Worby, 2006).

In 1948, Pierre Schaeffer invented musique concrete. This was the art of recorded sound. Schaefer was a radio engineer who worked with recorded sound by cutting, splicing and reversing and changing speeds, creating sounds that never existed before. Schaeffer invented
the term sound object (l’objet sonore) defined as an acoustical “object for human perception and not as a mathematical or electroacoustic object for synthesis” (Schafer, 1977, p. 129). The sound object is the “smallest self-contained particle of a soundscape” (Schafer, 1977, p. 129). It has a beginning, middle and end forming an ‘envelope.’ “Envelope is a graphic term but the ear can be trained to hear its characteristics” (Schafer, 1977, p. 129). The beginning is referred to as the attack, the body (or stationary state) is the middle and the decay is the end. For instance, bells and gongs have no apparent body. They have just an attack and decay.

Sound art can be both playful and thought-provoking. Janet Schaefer’s piece, Recorded Delivery (1995) followed the first 72 minutes of a package’s journey through the postal service, through a sound activated Dictaphone machine enclosed in a package. In this way, Schaefer amplifies unseen sound or acoustic phenomena out of an unassuming space. Similarly, the international sound artist Christina Kubisch also amplifies unseen sound in her 2003 series called “Electric Walk.” Kubisch used soundwalking combined with audification to explore the inaudible electromagnetic spectrum. Participants wore custom-made wireless headphones that amplify above ground and below ground electromagnetic fields. Kubisch discovered that even though electromagnetic material varied from site to site the vibrations were found everywhere. Kubisch names several different human-made technologies that create electrical fields. These include: light systems, wireless communication systems, radar systems, anti-theft security devices, surveillance cameras, cell phones, computers, streetcar cables, antennae, navigation systems, automated teller machines, wireless internet, neon advertising, public transportation networks, etc. Kubisch amplifies unseen, unnatural sounds that are “hidden under cloaks of invisibility, but (have) incredible presence” (Kubisch: Polli, 2012, p. 261). The soundscape
compositions of Hildegard Westerkamp could also be considered sound art, as she uses recording equipment to amplify barely audible sounds in the environment. (Polli, 2012).

Most sound art is displayed and performed in gallery or museum spaces. However, there are instances where sound art is installed outdoors and is known to add significant value to public spaces. For landscape architects, sound art could serve as a useful tool for creating new interactions in the landscape as well as feelings of “sense of place.”

2.11 | Soundscape Conservation and Cultural Heritage

Soundscapes possess both ecological and social value. They should be considered natural resources worthy of management and conservation. Human and ecological benefits provided by soundscapes include the following: sense of place, cultural significance, interactions with landscape perceptions, and wildlife well-being (Dumyahn et al., 2011). The ecological systems of natural landscapes are threatened by the intrusion of human generated sounds. Traditionally, more emphasis is placed on regulating individual sources of noise while little attention is been given to conserving the natural acoustic environment. An approach to conserving and drawing attention to the vulnerability of natural soundscapes is through documenting and recording sounds.

During the summer of 2015, a unique mapping project began in the UK. In a three month crowd-sourced project called Sounds of our Shores, the public recorded sounds that shaped and defined their relationship with the coast in the UK. The project was launched by the National Trust, National Trust for Scotland and British library to “build a crowd-sourced
soundscape of the nation’s coastline” (Sounds of our Shores, National Trust). Cheryl Tipp, curator at the British Library said that “the sounds of our coast; they help us shape our memories of the coastline and immediately transport us to a particular place whenever we hear them” (Sounds of our Shores, National Trust). Sounds of Our Shores indicates a modern movement towards an interest and appreciation for acknowledging and protecting cultural heritage sounds for future generations.

According to Dumyahn et al., (2011) natural sounds have been referred to as an endangered resource. The ability to experience them has become rare. Soundscapes composed of anthrophony—sounds produced by humans—tend to fill available acoustic “spaces,” as a result species vocalizations and other sounds integral to species survival are masked. Any changes made to existing soundscapes can greatly impact functioning ecosystems. Therefore, management of soundscapes need to consider specific sounds and collective sounds in the environment.

2.12 | Summary and Design Recommendations

The information compiled in the literature review helped to direct the conceptual design for Day Park Beach and the research methods. The literature review has led to the following list of recommendations for soundscape design:

1. Soundscape assessment should occur during the initial stages of site design in congruence with visual and physical assessments.
2. Through understanding different symbolic systems and the relationship between human societies, nature and the environment, landscape architects could produce more functional designs with more meaningful results.

3. The work of landscape architects would benefit from an increased awareness and vocabulary to describe sounds.

4. An assessment of urban sonic environment should take human perception of sound into consideration, which could be achieved through qualitative research methods such as soundwalks and focus groups.

5. For landscape architects, sound art could serve as a useful tool for creating new interactions in the landscape as well as feelings of “sense of place.”

6. Soundscapes should be considered natural resources worthy of management and conservation, as they possess both ecological and social value.

7. Landscape Architects should consider four factors in evaluating a soundscape in terms of being positive or negative. These factors include behaviour, attention, information, and individual differences.

The literature review has directed the research methodology section of this thesis. In many instances, the literature has identified soundwalks as a valuable qualitative method for discovering peoples’ perceptions of sonic environments. A combination of the two approaches to soundwalks—the Schaferian method and the Positive Soundscape Project’s technique—will be explored in Chapter 3.
Chapter 3.0 | Research Methodology

Qualitative research methods were chosen for this thesis based on design recommendations stated in Chapter 2. One of the design recommendations stated that an assessment of urban sonic environment should take human perceptions of sound into consideration, which could be achieved through qualitative research methods such as soundwalks and focus groups. Therefore, soundwalks and focus groups will be conducted in order to explore how peoples’ reality is shaped and influenced by acoustic environments. The methodology has also been influenced by another design recommendation, which states that soundscape assessment should occur during the initial stages of site design in congruence with visual and physical assessments. Thus, on-site observations include the visual, physical and auditory aspects of the environment.

The term qualitative research refers to, “any type of research that produced findings not arrived at by statistical procedures or other means of quantification” (Strauss & Corbin, 1998, p. 10). The strategy for data collection is to be exploratory, which has the potential to provide deeper insight and richer information about how people feel about the sounds in an environment. Qualitative research is a beneficial approach for collecting data for this thesis, as a lot more can be understood about an environment by speaking directly to the people who live and work in the area.

This thesis has used multiple qualitative methods and is considered a multimethod study, as it combines two or more means of gathering data. “In multimethod uses, focus groups typically add to the data that is gathered through other qualitative methods, such as participant
observation” (Morgan, 1988, p. 3). Furthermore, the multimethod model used for this thesis is a blend of participatory observation (soundwalks) and focus groups. “A focus group is simply a discussion on a specific issue facilitated by the researcher” (Davies et al., 2012, p. 226). This form of qualitative data is similar to an interview, but in this case the researcher is posing questions to a group rather than an individual. According to Morgan (1988), the success of focus groups depends on the interaction within the group. This interaction can be instigated by the researcher, who also takes the role of moderator.

In the flow chart below (Figure 3), the diagram illustrates a breakdown of important components of this thesis, including research methodology.
Figure 3 Methodology

Source: Author
3.1 | Reasons for Selecting Day Park Beach

During the summer of 2016, I was involved in planning a new tourism signage and wayfinding strategy referred to as Canada’s Musical Coast. The Municipality of Inverness County, Cape Breton, hired the interdisciplinary design firm Ekistics Plan + Design and its sister company Form: Media to design the tourism plan for the region. As part of the job, I analyzed a total of 41 ‘signature’ sites along the west coast of Cape Breton—with Day Park Beach listed as a priority site. There were many factors that influenced the decisions for ‘designating’ Day Park Beach as a priority site. The most significant factor for the site’s selection was its existing high level of tourism development—compared to other sites along the west coast of the island. Day Park Beach is equipped with washroom facilities, change rooms, picnic shelters, water pumping station (for cleaning off sand after swimming), parking lot and seating areas along the boardwalk pathway.

Three priority sites were analyzed and the information was compiled into a detailed table (Table 3). The table includes site amenities, existing infrastructure, recreational access, ongoing cultural and music festivals, land ownership and adjacent land use. Three priority sites have been chosen as examples of the site selection process.
Table 3 Site selection criteria, November 2016

*Source: Author Based on the Selection Process Developed by the Author for Canada’s Musical Coast*

<table>
<thead>
<tr>
<th></th>
<th>DAY PARK BEACH</th>
<th>WHALE COVE</th>
<th>INVERNESS BEACH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>PROXIMITY TO TOWN/CITY</strong></td>
<td>1.7 kilometres from Port Hood</td>
<td>Approx. 15.5 km from Margaree Forks</td>
<td>.5 km from the town of Inverness</td>
</tr>
<tr>
<td><strong>SITE SPECIFIC CULTURAL HERITAGE VALUE</strong></td>
<td>abandoned coal mines</td>
<td>old Cemetery from the 1800's</td>
<td>fishing industry</td>
</tr>
<tr>
<td></td>
<td>history of Port Hood Island and</td>
<td>located at the top of the hill</td>
<td>coal mining history</td>
</tr>
<tr>
<td></td>
<td>fishing village</td>
<td></td>
<td>rails to trails</td>
</tr>
<tr>
<td></td>
<td>French Settlement of the area</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>SITE SPECIFIC NATURAL HERITAGE VALUE</strong></td>
<td>wetland freshwater ponds</td>
<td>ponds</td>
<td>beach</td>
</tr>
<tr>
<td></td>
<td>cranberry bogs</td>
<td>marsh</td>
<td>streams</td>
</tr>
<tr>
<td></td>
<td>sand dunes</td>
<td>coniferous trees</td>
<td>ocean</td>
</tr>
<tr>
<td></td>
<td>beach</td>
<td>rocky cliffs</td>
<td>grasses</td>
</tr>
<tr>
<td></td>
<td>ocean</td>
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<th>DAY PARK BEACH</th>
<th>WHALE COVE</th>
<th>INVERNESS BEACH</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>LANDOWNERSHIP</strong></td>
<td>Public Land</td>
<td>Private Land</td>
<td>Public Land</td>
</tr>
<tr>
<td><strong>ACCESSIBILITY</strong></td>
<td>just off of Route 19 Highway</td>
<td>just off of shore road</td>
<td>on Route 19 (Central Avenue)</td>
</tr>
<tr>
<td></td>
<td>Parking is sufficient (large area at the front of the site)</td>
<td>no established pedestrian path</td>
<td>access to large areas for parking</td>
</tr>
<tr>
<td></td>
<td>Flat accessible boardwalk path</td>
<td>road leading to the cemetary provides vehicular access to top of the hill</td>
<td>the northern area of the site is more accessible (flat accessible boardwalk path and seating areas are located along the path)</td>
</tr>
<tr>
<td></td>
<td>Numerous areas to sit</td>
<td>shortage of parking spaces (dangerous parking along the road)</td>
<td></td>
</tr>
<tr>
<td><strong>SITE CONDITIONS</strong></td>
<td>exposed to high winds</td>
<td>exposed to cliff edge</td>
<td>very exposed to the elements</td>
</tr>
<tr>
<td></td>
<td>shelter is provided by coniferous trees near the road</td>
<td>high winds</td>
<td>busy working harbour</td>
</tr>
<tr>
<td></td>
<td>established beach (ideal for beach volleyball)</td>
<td>good visibility throughout site</td>
<td>golf course (Cabot Links) is popular and brings in crowds of people</td>
</tr>
<tr>
<td></td>
<td>good visibility throughout site</td>
<td>cottages nearby</td>
<td></td>
</tr>
<tr>
<td></td>
<td>horse back riding area</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>VIEWS</strong></td>
<td>ocean</td>
<td>distant views of cheticamp</td>
<td>ocean</td>
</tr>
<tr>
<td></td>
<td>wetland</td>
<td>views of Margaree</td>
<td>harbour</td>
</tr>
<tr>
<td></td>
<td>coniferous forest</td>
<td></td>
<td>golf course</td>
</tr>
<tr>
<td></td>
<td>Port Hood Island</td>
<td></td>
<td></td>
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<tr>
<td><strong>ECOREGION</strong></td>
<td>sand dunes</td>
<td>river channel</td>
<td>beach</td>
</tr>
<tr>
<td></td>
<td>wetland</td>
<td>coniferous grove</td>
<td>grasses</td>
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<td></td>
<td>cranberry bogs</td>
<td></td>
<td>grasses</td>
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<tr>
<td></td>
<td>ocean</td>
<td>beach</td>
<td>cliffs</td>
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<td></td>
<td>white sand beach</td>
<td></td>
<td>pond</td>
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<tr>
<td></td>
<td>coniferous forest</td>
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<td></td>
<td>wetland grasses</td>
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<td></td>
<td>ponds</td>
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In summary, the study site was selected because it is located on public land. As part of the criteria developed for naming high priority tourism sites by the Municipality of Inverness.
and Ekistics Plan + Design in 2016, was whether or not the site is located on public land. Thus, this idea has directed the site selection for this thesis. The site also needed to be located near a major vehicular access route for better accessibility. The researcher predicted that the more ecoregions there are on the site the more dynamic the soundscapes. Therefore, the site also needed to include several different ecoregions. Finally, site selection was also based on whether or not the site had prominent cultural and natural heritage features. The well-used tourist destination, Day Park Beach, encompassed all of these attributes.

Situated along the western coastline of Inverness County, Cape Breton, Day Park Beach is one the most popular beaches, near the town of Port Hood. An interesting mixture of sounds can be experienced at Day Park Beach, making it an ideal research location. For instance, sounds from vehicles on the Highway Route 19, which cuts along the eastern side of the site juxtapose with the natural sounds of the bog, ocean and beach.

### 3.2 | Participant Recruitment Process

Before recruiting participants for the study, the researcher created inclusion and exclusion criteria. People included in the study were over 18 years of age, of any racial background, and of any gender. After establishing these guidelines, the strategy for recruiting participants for the research involved sending out emails, making phone calls and speaking to people in Nova Scotia. The process began with a telephone conversation with the assistant of the Inverness County Tourism Department, Amey Beaton, who directed the Canada’s Musical Coast project during the summer of 2016. She provided a list of people who live and work in the area of Port
Hood, Cape Breton. The researcher emailed the seven people mentioned on the list. The script for all recruitment emails had the following components:

1. An introduction stating the name of the researcher, information about the Master’s degree, and the topic of research. The name and contact information of the researcher’s academic advisor were also stated.

2. An explanation of the objectives of the research as well as the name and location of the study site.

3. An explanation of why participants are needed for the study— to help the researcher learn more about the particular site through experiences and knowledge the participants are willing to share. The explanation also included how relevant information from soundwalks and focus groups will be used to help guide the creation of a conceptual site sound-based design.

4. A brief statement about exclusion and inclusion criteria for the study—participants in the study must be over the age of 18, as the study is meant to reveal adult perspectives and experiences of the area.

5. A statement about which dates the researcher would be visiting Nova Scotia, the date of the actual data collection day, the amount of time that the participants would be involved in soundwalks and focus groups, and details about the soundwalk route (i.e. safety of the walk and duration)

6. The researcher’s contact information.
Five people responded to the recruitment emails and three people participated in data collection day at Day Park Beach. A follow up email was issued to these three people to determine agreeable times to meet for the soundwalks and focus groups. With the same recruitment email template, the researcher contacted friends, classmates and former professors in Halifax. Twelve people responded to the recruitment emails. A follow up email was also issued to the group. This time the follow-up emails included information about when to leave Halifax, where to meet in Cape Breton and what time the soundwalk would take place. In the end, six people from outside Cape Breton confirmed their availability and took part in the study.

3.3 | Soundwalks

Soundwalks are guided walks that emphasize the relationship between walking and listening. This method has been used by different disciplines as a methodological tool for the qualitative study of places. “Walking as a method of inquiry can be found in a wide range of approaches; geography, philosophy, architecture, acoustic ecology, and performing arts” (Paquette, McCartney, 2012, p. 139). In terms of orientation, soundwalks bring the study area and its acoustic elements into focus and help people orient themselves within a space. For instance, the sounds of the ocean can help direct people visiting the site to the coastline. Naturally, soundwalks create a number of significant interactions. Interactions occur between participants of the research, between the participants and researchers, and between the participants and the environment. A soundwalk is an exploration of the soundscape of a given
area using a ‘score’ as a guide; “the score consists of a map, drawing the listeners’ attention to unusual sounds and ambiances to be heard along the way” (Schafer, 1977, p. 213).

The soundwalk method adapted for this thesis encouraged participants to talk during the walks. Similar to the PSP method, participants stopped at three locations along the route to answer questions. When participants became distracted by visual features of the landscapes, questions were asked as a way to focus their listening. The ability to talk during the walk gave the experience more flexibility and naturalness. The benefit of this adapted version of a soundwalk is that participants’ responses to the environment are captured at the same time of exposure. These ‘fresh’ observations were recorded by the researcher through a sound recording device and through handwritten notes. Through soundwalks, the researcher sought to understand the following:

1. How space, a walk or an area is experienced when people are asked to become active listeners.
2. Whether the status of a listener as a visitor or a resident can impact perceptions of soundscapes.

3.4 | Ear Training

Schafer (1977), in the book Our Sonic Environment and The Soundscape: the Tuning of the World, emphasizes the idea that listening to and identifying all the sounds present in a particular environment is a skill that needs to be developed. He discusses the importance of ‘ear cleaning’ techniques as a way to achieve a higher awareness of the sonic environment.

Prior to the site visits in November, the author kept a ‘sound journal’ as a way to become more
aware of the sounds of the environment and to practice using words to describe sounds.

Journal entries were made at the researcher’s apartment during the same times of day— 9:00 am, 12:00pm and 10:00pm. These times were chosen because they are the most active times of the day and provided a wide range of sounds based on all different activities in the neighbourhood. The researcher also described the different sounds at each time of day and the different emotions that the sounds evoked.

3.5 | Field Day—November 16th, 2016

Prior to the field day, the researcher received research ethics approval from Research Ethics Board (REB) at the University of Guelph (Refer to Appendix A). Two soundwalks and two focus group sessions were organized for November 16th, 2016. Each group had a different level of direct engagement with the soundscapes at Day Park Beach. One group represented locals who grew up in Cape Breton and are still currently living in the area of Port Hood. This group consisted of three adults over the age of 51, all of whom have engaged with the spaces at Day Park Beach. The second group was representative of people from different areas of Canada and the US and consisted of adults in the age range of 20-30 years of age; each member of this group was a first-time user of Day Park Beach. Both groups of participants were taken along the same established pathway. See Figure 4 for the study site’s location in proximity to Port Hood and Port Hood Island.
The soundwalk route was chosen for several different reasons. First, the majority of the route is located on an established boardwalk path. Figure 5 depicts a section of the boardwalk and an existing seating area where the soundwalk terminates. The level grade offered by the boardwalk allowed for greater accessibility and participant safety. Also, the boardwalk is the most well-used path throughout all the areas of the site. Thus, the researcher hypothesized that the sounds heard along the boardwalk would be a more accurate representation of the sounds experienced at the site by visitors. The selected route explores different surface materials: gravel, boardwalk, and grass/bog. These changes in surface materials create acoustic contrast and can motivate people to become more attentive to their external environment.
The first soundwalk, with local Cape Breton people, was conducted from 11:00 am to 12:00 pm. The second group was taken out at 1:00 to 2:00pm on the same day. Both soundwalks began on the gravel path, next to the parking lot at the entrance to the site. The route is approximately 0.7 kilometers long. The boardwalk stretch is 500 meters, the gravel path is 160 meters and the grass path in the cranberry bog was roughly 32 meters. Each soundwalk lasted a total of 30 minutes including the time spent answering questions at the different predetermined stopping areas. The majority of the time was spent making observations along the route and at the three designated stopping points.
A Zoom sound recorder was used to capture participant observations along the way. Three stopping points, as shown on Figure 6, were made along the way; the stopping points were chosen because each area was perceived by the author to have a unique soundscape. At the stopping points, the following questions were asked:

1. What sounds do you hear?
2. What sounds are dominant?
3. Which sounds do you like the most?

The intention was to focus each group on sounds rather than the visual characteristics. Once the group reached the furthest point of the boardwalk they turned back around and walked back to the parking lot along the boardwalk.
3.6 | Focus Groups

The focus groups were naturalistic and semi-structured, meaning that there was flexibility around the wording of questions, probes and follow-up questions. The questions were open ended. The order of the questions changed based on the flow of the conversation; however, to keep data consistent the same major points were covered in each focus group. A sound recorder was placed in the middle of the focus group, which allowed the researcher to become more present and attentive during the sessions.

The following six questions were used and adapted for each focus group:
1. What is your overall feeling of this space?
2. Which sounds stood out to you the most in this area?
3. What sounds did you find pleasing? And what sounds did you find displeasing?
4. What memories do you have of this place?
5. Which areas of the site would you revisit and why?
6. Are you familiar with the cultural history of this site?

These six questions were revised based on the answers of the participants. For instance, if the answer to question 4 was also the answer to question 5, this was acknowledged. Naturalistic discussion allowed ideas to emerge and be tested by the group. The method explored how people understood the sounds in the environment and the way it might influence their feelings of the space. The focus groups were also meant to reveal how much the participants knew of the cultural heritage of the space and how different people’s perception of soundscape would differ depending on whether they lived in an urban centre versus a rural centre. These results would help dictate the usefulness of a new sound-based interpretive design for the site.

Focus groups were an important method in the data collection process. “Soundwalks capture participant response to a real environment at the time of exposure. Focus groups allow for the reflection on previous experience of soundscapes and testing of the ideas expressed, as well as producing an agreed upon group response” (Bruce and Davies, 2014, p. 2). The answers to the questions summarized and clarified participant observations during the soundwalks and provided a moment for the participants to reflect on the experiences of the day.
3.7 | On-Site Observations

The author has made a total of four site visits to Day Park Beach, two site visits during the summer of 2016 and two during the fall of 2016. The first two visits occurred in May 2016 when the author collected data for the development of the tourism signage and wayfinding plan, Canada’s Musical Coast. The first site visit on May 19, involved taking photographs of unique site features and characteristics and using a GPS to locate specific areas on site that lacked proper signage. This primary site visit also involved noting the different surface materials, species of vegetation, adjacent land uses, existing facilities and utilities and mapping pedestrian and vehicular access routes. This on-site observation period lasted from 6:30 pm to 7:00 pm. During the second site visit, the author took additional photographs and explored the neighbouring properties, more specifically Lawrence’s Beach. This beach is located south of Day Park Beach and connects to the study site via a boardwalk. Notably, during these initial site visits, the auditory landscape soundscapes at Day Park Beach were not acknowledged.

In November 2016, I conducted two on-site observations to become aware of the soundscapes at Day Park Beach and to determine the three pre-determined stopping points along the route. The first on-site observations were conducted on November 16, 2016. These observations were made during the period of time between the two soundwalk groups—12:00 pm to 12:30 pm. The researcher walked along the boardwalk, listening to sounds, recording sounds and jotting down observations and reflections in a notebook. After the field day, the sound recordings were uploaded to a computer. At this point the researcher was able to change the volume in order to listen more closely to the sonic environment.
The second on-site observation occurred on November 17, 2016 from 6:30 pm to 7:00 pm. The researcher recorded the ambient sounds of each of the three soundwalk stopping points. Each of these sound recordings lasted for four minutes; during this time, the researcher sat and listened.

3.8 | Summary

This chapter provides reasons for selecting Day Park Beach as a study site for this thesis and site context and location are also provided. The participant recruitment process was included in this chapter as well as an explanation for choosing the soundwalk route at Day Park Beach. The steps that were taken to collect data for the soundscape design—including soundwalks, focus groups and on-site observations—are provided. These techniques for collecting user’s perceptions and observations can be used for future soundscape research and design.
Chapter 4.0 | Soundwalk and Focus Group Results

This chapter presents the analysis and results of the research methods. Data collected from the soundwalks and focus groups were summarized through thematic coding. Sound recordings from the soundwalks and focus groups were transcribed and themes were drawn from the text. Comparisons were made between the two groups of participants taken on soundwalks. The first group, consisting of local residents, will be referred to as SW1. The second group, consisting of visitors to the area, will be referred to as SW2. As a way to reflect on research methods used in this thesis, an additional comparison is made between the research methods used in Bruce and Davies’ study in 2014 and the research methods used in this thesis. Finally, a list of research limitations will be presented.

4.1 | Similarities between Soundwalk Group 1 (SW1) and Soundwalk Group 2 (SW2)

For the most part, both groups of participants commented frequently on the positive soundscapes of Day Park Beach. It would seem that for users of the space, the negative aspects of the auditory environment were not a focus or concern. Both groups commented on the raw, natural beauty of Day Park Beach. Collectively, the participants in SW1 mentioned that it is always a beautiful place to be and that most locals became immune to its qualities. A participant reminded the group to embrace it. Both groups described the sounds of the space to be soothing. These pleasant sounds included wind in the grass, the sound of the surf, bird calls, and the sound of footsteps on the boardwalk.
All participants commented on the dominant sound of the waves lapping on the shore and how these sounds came to them at different intervals throughout the walk, depending on the landscape features. For instance, at certain points along the route, the sand dunes buffered the sounds of the ocean waves. A participant from SW1 commented on the waves saying, “The roll of those waves, that sound soothes me and makes me forget all my problems.” Another participant from SW1 commented “It’s important that the island is there. It’s like a buffer. If it were wide open you wouldn’t have that same sense of lapping.” These observations are unique and are the product of observations made over a number of years. Participants in the second group do not have memories of Day Park Beach, as they have never been there before. A participant from the SW2 commented on the similarities between the sounds of the surf and the sounds of the grasses in the wind. She even imitated these sounds with a pursed mouth. These “fresh” observations are just as valuable as the memories shared by participants in SW1 who reside in the area.

When the groups were asked to point out unpleasant sounds at Day Park Beach, both groups seemed to become more aware of the presence of the highway. They often referred to the sounds of traffic as “noises” not sounds, which was interesting to note. When they spoke about natural acoustics of the space they used the word “sound” rather than noise. Notably, the participants of the study classified sound in terms of “noise” or “sound” without being consciously aware of doing so. Therefore, sounds that were perceived as negative at Day Park Beach were sounds of traffic—anthrophonic sounds. Sounds of traffic are keynote sounds, as they are continuous and form background sound.
Both groups were asked how many different sounds they could hear other than the sounds of the waves. Participants in SW1 were aware of the sound of the wind hitting their ears and that the sounds of the waves drowned out the sounds of the vehicles on the highway. Interestingly, this observation was also made by participants of SW2.

Table 4 provides the descriptive words that participants from SW1 and SW2 used to describe sounds. The first column in the table—*sounds*—lists the most popular sounds mentioned during the soundwalks. Dominant sounds along the soundwalk were sounds of the ocean surf, sounds of the wind in the ears, grass, and on clothing, sounds of footsteps on the boardwalk, bird call, traffic and sounds of cars in the parking lot. When describing these sounds, the participants used similar words. The words listed under emotions were used by participants in both soundwalk groups. Participants often commented on the sounds in the environment by using the source as a way to describe the sound. The participants did not elaborate on the description of these sounds, except for when they were describing the sounds of the ocean surf. It is evident that the sounds of the waves were a focal point for the participants. The fifth column categorizes the sounds listed in column one. These categories were developed by R. Murray Schafer. Finally, the last column in the table categorizes the sounds as either pleasant or unpleasant.

**Table 4 Sounds commented on by participants**

*Source: Author*

<table>
<thead>
<tr>
<th>Sounds</th>
<th>Dominant Sound?</th>
<th>Emotions</th>
<th>Words to Describe Sound</th>
<th>Sound Classification</th>
<th>Pleasant?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sounds of the ocean surf</td>
<td>Yes</td>
<td>Calming, relaxing, soothing, melodic,</td>
<td>Lapping, roll of the waves,</td>
<td>Background/keynote sounds</td>
<td>Yes</td>
</tr>
</tbody>
</table>
4.2 | Differences between SW1 & SW2

The observations of participants in SW1 were based on memory and experience of the site over many years, whereas the perceptions of SW2 were fresh and spontaneous. Participants in SW2 spoke freely about what they were hearing in the present moment. Their attention was more focused on perceptions and experiences in the present, as this was the only option for receiving information about the space. Having their attention divided amongst so many aspects of Day Park Beach, most participants from SW1 commented on visuals or characteristics and sensations at the site. For instance, one participant noted the movement of the wind, but instead of commenting on the sound it would make, they commented on the visual patterns in the landscape: “It’s nice seeing the wind gust in the grass...it’s as if the waves crash in the water and they continue on into the grass.” There are several microclimates at Day Park Beach. One participant picked up on this when they described the sensation of being behind the sand dunes: “Once you’re behind the dunes, it’s warmer.”
Participants in SW1 were “walking down memory lane,” reminiscing about past events and experiences rather than focusing on the sounds that were occurring in the present moment. As a result, the researcher needed to remind them to listen to the sounds around them. Thus, the stopping points along the route were crucial as a way to bring participants in SW1 back on track. It is important to note that each observation, whether the observation was made from a participant from SW1 or SW2, is equally important and carries the same weight in value.

Distinctly, participants from SW2 commented on the soundscape “composition” at Day Park Beach. They connected the rhythms of sounds in the environment to compositions of classical music. When speaking about the ocean, one participant said “There’s always direction, it’s always predictable…how we developed music comes from us observing the patterns of nature, what we find soothing in nature and try to recreate that.” Another participant agreed, commenting on the movements of classical music, “the waves and fits and spirts, clashes and soothing string sections.” Thus, these participants are experiencing the auditory environment and creating meaning in the landscape based on their cultural background and knowledge.

4.3 | Participants’ Awareness of their own Sound Making

When asked how the participants felt about the boardwalk, a participant from SW1 said, “I like that sort of thud that it makes... my kids and my grandkids and the dog... and all of those different sounds!” The participants of SW1 reminisced about their grandchildren playing on the boardwalk and the sounds made by the strollers across the surface. They noted the temporal changes to the sounds of the boardwalk. For instance, participants commented on how the
boardwalk sounded crunchy on winter days or how on windy days the sounds of footsteps are dampened by the overspray of sand on the boardwalk. Again, for participants of SW1, more emphasis was placed on past memories of the site rather than on what was happening in the present moment. Participants in SW2 were more aware of the way that their bodies made sounds in the space than group SW1. They commented on the tones of their footsteps on the boardwalk compared to the cranberry bog trail and the sounds made by their clothing in the high winds: “I am aware of the sounds of my jacket in the wind.” The type of clothing participants wore on site also affected the way sound was perceived. For instance, most participants from SW2 wore hooded jackets, whereas participants in SW1 wore hats for protection against the elements. Ultimately, these clothing choices affect the audibility of the landscape. Hats dampen the sounds of the wind, while hoods amplify these sounds.

4.4 | Memories Inform Meaning in the Landscape

Participants in SW1 have lived and experienced more of the area. They shared memories of each area of the site. They talked about the people who would come in November to pick cranberries south of the boardwalk. One participant reminisced about skating on the freshwater ponds located in the bog. All three participants mentioned that horseback riders travel through the site. One of the participants helps to maintain the property by cutting back the grass on the boardwalk, by stabilizing the sand dunes, and shovelling snow during the winter. They also mentioned that this site is a bird sanctuary; endangered species nest in the area, such as the Piping Plover. The first group often talked about areas of the site that they like to spend time in or used to spend time in, such as the coniferous trees located east of the site.
and parallel to the highway. This space was considered as a pleasant place to sit and contemplate, “there used to be an opening there where you could sit and look at the marshes…it would be nice to open it up again, sit up there and look down at the different types of vegetation, you can hear all of these different sounds.” They mentioned that the sounds of the trees create a unique soundscape.

Since, the participants from SW2 are not as familiar with this space, they could only imagine places they might like to explore. They based their perceptions of the space on their experiences of other coastal areas. And through this comparison, they were able to familiarize themselves with Day Park Beach and understand what makes the space unique.

The participants from SW1 were able to hear nuances or changes in the soundscapes at Day Park Beach, whereas participants form SW2 could not. They were making observations that only locals or people who frequent this area could possibly make. For instance, “Each curl that comes in is heavy; it is heavy because it is full of the kelp that has been turned up. But in a different season where the water is clear the seaweed is not floating, you get a different curl, or a different sound.” These ideas are possible when people live in an area long enough to experience the changes in the seasons and they take a genuine interest in the natural processes of their surroundings.

Participants from SW1 recounted all of the seasonal variations of the soundscapes at Day Park Beach. One participant mentioned that the sounds of the reeds in the wind are prominent in the fall, “that’s what I hear, and that’s what I love.” Another participant said, “depending on where the wind is coming from, the grass and the weeds and the bushes make
different sounds as well.” During the spring, the marsh is “our alive place...the peepers are just singing, they are deafening little frogs...right now there are a lot of grasses in there but sometimes it is more open and you can see the ducks and the red wing black birds.” The same participant also mentioned that “those trees in the summer have leaves, the noise now is quite softer.” The participants agreed that there has been a decrease in the number of great blue herons in the area. Another interesting observation made by a participant in SW1 was that in the cranberry bog the group was “walking between are two different ecosystems; the salt water and the fresh water.”

According to the participants in SW1, Day Park Beach is considered a unique site along the west coast of Cape Breton Island. They talked about the bountiful cranberry bogs and that in the past the cranberries were used by the fishermen and First Nations peoples for Vitamin C. They also noted the changes to the environment that they have experienced over the years. For instance, the group mentioned the conditions of the sand dunes several times during the walk, “these dunes have built up...when they first built the boardwalk, there was lots of erosion happening.” The boardwalk was created as a way to preserve the dunes. The group was very aware of the how the sand dunes altered the auditory landscape. They commented on the way the dunes functioned as sound buffers. “You get a sense of quiet now, right?”

Participants in SW1 pointed to the area where abandoned coal-mining shafts are located amongst the coniferous trees. Day Park Beach used to be a mining centre. On the other side of the mining shafts, there is more water and when this water freezes in the winter, people living in the area skate on it.
One of the participants in SW1 used to live on Port Hood Island. They spent time at a beach, Park’s Beach, which mirrors Day Park Beach across the water. The island was a major early settlement with a bustling fishing community. The water would freeze, acting like a mirror between the island and Day Park Beach. They used to drive back and forth on the ice. The way would be marked by lines of spruce trees. A memorable sound was the sound of the ice cracking. This sound informed people crossing that the ice was strong enough, which almost seems contradictory as the sound of cracking would normally be considered a negative sign. Thus, the sounds of the ice cracking provided people with valuable information about their environment. There used to be horse racing over the ice.

4.5 | Results of Focus Groups

For the most part, the comments made during the soundwalks were repeated during the focus groups. The following six questions were used and adapted for each group of soundwalk participants.

1. What is your overall feeling of this space?

One participant from SW1 said, “I feel at home here. You meet people walking, but you still feel like it is your own space.” Another participant from SW1 remarked, “Most people from the middle United States and visitors from inland are often amazed at the scene.” The same participant compared Day Park Beach to a the object of a magnet, in that the site always attracts visitors. One participant in SW2 said the site was dynamic and windy. They commented on the fact that the group only got to see Day Park Beach at a specific time of year and the
experience of walking through the site would be totally different on a warm day during the spring where there is a lot of sun and less wind. One participant said the site was comforting: “I found it comforting. Growing up, I lived near the ocean. A place like that makes me feel at home.” In this case, this participant is creating context and meaning by comparing the site to experiences of similar landscapes. This same participant noted how, even though the sounds of the ocean were loud and powerful, they still felt calm inside. If the situation shifted so that the dominant sounds were the sounds of traffic, the response would not be the same. The experience would be negative. These ideas refer back to sections in the literature review.

According to Davies et al. (2012) in order for a soundscape to be considered positive, the dominant sounds should be natural.

2. Which sounds stood out to you the most in this area? And why?

The most popular answer for the dominant sounds of the area was the sounds of the ocean waves and the wind. One participant in SW1 mentioned that the sound of the waves are always in the background, “creating a calming influence, depending of the day…it’s constant and beautiful.” For a participant in SW2, the most dominant sound was the footsteps on the boardwalk. The individual referred to the sounds of footsteps on the boardwalk as artificial and noted the contrast to different surfaces of the natural landscape. This participant said, “for me, it was the people walking. It was something that didn’t fit the landscape but was artificial.” A significant comment was made by a participant in SW2, who said, “If I think about the sounds I tried to notice the most, I think it was the grass, because I was trying to find it.” Similar to the
intentions of sound artists Christina Kubisch and Janet Schaefer, this participant was trying to discover barely audible sounds at Day Park.

Other sounds that stood out to participants was the sound of the wind in their ears and against their clothing. One participant from SW1 commented on the nuanced sounds of the wind: “when you come out of the car, you’re thinking, should I bundle up? So you listen and that dictates whether or not I wear my gloves that day.” The sound of the northerly winds on the ocean sound different than southerly winds. “If you come and you don’t hear the surf, then it is probably a breeze from the south, it will be more relaxing and not as brisk. The northern sound of the wind in the waves seems to echo. You’re hearing it loud and clear.” Thus, sound provides information to the listener, as it provides clues to what the temperature is during the day. According to Davies et al., (2012), soundscapes that provide information to the listener are considered positive.

3. What sounds did you find pleasing? And what sounds did you find displeasing?

The majority of the participants commented on the agreeable sound of the waves and the different ways they sounded depending on where people were in the space; sound of the wind through vegetation and sand; and the sound of footsteps on the boardwalk. One participant’s comment from SW1 was, “The wind dictates whether it’s pleasing or not. If it is raw wind, even the grasses make noises and it’s like oh!” Most participants found it difficult to think of displeasing sounds at Day Park Beach. One participant said, “All sounds have a reason
and meaning.” The sounds of traffic on the highway were mentioned as displeasing sounds in the space. “Hearing the traffic from the road, when I could identify what is was, I found it distracting in contrast to the area.” Another participant commented on the sharp winds against hearing aids as a negative sound. Notable was the fact that the most dominant sounds of the space were the sounds the participants found the most pleasant.

4. What memories do you have of this place?

Because a lot was already shared about memories of Day Park Beach during the soundwalks, participants in SW1 summarized what they spoke about earlier. Each of the participants in this group have lifelong memories of Day Park Beach. One of the participants shared a story about their ancestry—“My uncle is on the list of miners. He was one of the last miners to be killed in a mine.” The same participant said, “I can feel my ancestors.” They remember picking cranberries, skating on the ponds, horseback riding, grandchildren running on the boardwalk, and the many seasonal changes at Day Park Beach mentioned earlier. The second group of participants were new to the beach; therefore, they did not have memories of the space.

5. Which areas of the site would you revisit and why?

Most participants in SW1 agreed that they would like to visit the point at the end of the boardwalk the most. “The point is like whoa!” Another area the participants like to visit is near the coniferous forest, “where a bench used to be.” They enjoyed looking out at the bog from the shelter of the trees. Participants from SW2 on the other hand mentioned that they would
like to revisit most areas of Day Park Beach, especially the end of the boardwalk where the
sounds of the waves are at their zenith.

6. Are you familiar with the cultural history of this site?

The participants from SW1 were familiar with the cultural heritage of Day Park Beach. All three group members have lived and worked in the area for decades. The participants from SW2 did not know about the cultural heritage. They were interested in the abandoned coal mining shafts when they were mentioned by the researcher.

4.6 | Results of On-site Observations

Before leading the soundwalks, observations were made by the author at the three stopping points along the soundwalks route. The table below indicates the different observations at each stopping point. As a reminder, the term ‘keynote sounds’ refer to continuous sounds throughout the site, ‘soundmarks’ refer to culturally significant sounds, and ‘sound signals’ describe foreground sounds within a soundscape that change dynamically.

Table 5 On-site observations of sounds at each pre-determined stopping points

Source: Author

<table>
<thead>
<tr>
<th>Stopping Point #1—Existing Look-Out</th>
<th>Key note</th>
<th>Soundmarks</th>
<th>Sound signals</th>
</tr>
</thead>
<tbody>
<tr>
<td>On-site Observations—November 2016</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Emotional Response to this location
- Excitement and amazement (the power of the ocean waves creates a powerful sound)
- Feelings of freedom and wonder
- The sounds of the ocean made it easier to be present—the sound of the waves blasted away any thoughts in my mind
- Feeling of being closer to Port Hood Island
- Constant sound of waves

### Stopping Point #2—Cranberry Bog

<table>
<thead>
<tr>
<th>Key note</th>
<th>Soundmarks</th>
<th>Sound signals</th>
</tr>
</thead>
</table>
| -constant sound of the ocean surf  
-continuous weak traffic murmur  
-whines of the wind in the listener’s ears  
-crack of jackets in the wind  
-the sound of footsteps on the boardwalk  
-sounds of the grass crunching underfoot | -whines of the wind through the grasses  
-sounds of the ocean are softer in the lower topography of the wetland  
-the popping sound made when a foot steps on cranberries  
-the rhythmic sounds of walking on the boardwalk contrast the quiet snap of branches and soft crunch of walking through the cranberry bog | -distant sounds of the barking of a dog reverberating in the open wetland landscape  
-the sound level changes at each stopping point on site  
-squawking of crows in the sky |

### Emotional Response to this location
- Feelings of solitude and peacefulness
- Introspection and awareness of the body

### Stopping Point #3—Seating area at the end of the boardwalk

<table>
<thead>
<tr>
<th>Key note</th>
<th>Soundmarks</th>
<th>Sound signals</th>
</tr>
</thead>
</table>

-constant sound of the ocean surf
-continuous weak traffic murmur
-whines of the wind in the listener’s ears
-crack of jackets in the wind
-sounds of grass crunching underfoot

- specific sound of the waves in the month of November when the kelp is thick and makes a dragging sound when collected by the waves
- the sound of the waves pulling back the sand is quite different from the sounds of gravel/sand beaches
- the sound of the rolling of the waves depends on time of day and when tide goes out

-sounds of the ocean waves are dynamic
-the sound level changes at each stopping point on site
-squawking of crows in the sky
-constant sound of the ocean surf
-modulating heavy low pitched rumble of traffic
-whines of the wind in the listener’s ears
-crackle of jackets in the wind
-the sound of footsteps on the boardwalk

| -specific sound of the waves in the month of November when the kelp is thick and makes a dragging sound when collected by the waves |
| -sounds of the ocean waves are dynamic and powerful |
| -squawking of crows in the sky |
| -distant sounds of the barking of a dog |
| -sounds of grasses blowing in the wind |

Emotional Response to this location

- Feeling of making it to the climax of the walk
- The view of a distant beach is compelling
- The soft sand in the distance makes this space peaceful
- Port Hood island feels much further away now

4.7 | A Comparison of Research Methods

Bruce and Davies (2014) combined field and laboratory methods for their research on expectation and its effect on soundscape evaluation. Field research included a total of four soundwalks in Manchester and London, England and laboratory research included four focus groups and a soundscape stimulation test in the laboratory. The aforementioned research methods will be compared to the methods explored in this thesis. The results of the comparison will reveal weaknesses and areas for future improvement.

Soundwalks

The soundwalks explored by Bruce and Davies (2014) differed from the “traditional Schaferian soundwalk.” Instead of an hour-long walk and discussion at the end, the researchers used a method involving regular stops. They found this adapted method to be more effective.
The walking route was designed prior to the soundwalk. The researcher walked around the city in search of contrasting listening environments. The goals were to “provide what could be seen as different contexts, to test if there were any similarity between perceptions of certain types of spaces, and if there was any correlation between perceptions of spaces” (Bruce and Davies, 2014, p. 2). Participants walked in silence over the course, along a predefined route, observing different soundscapes. Throughout the walk, participants were involved in semi-structured interviews which took place at specific locations. The researcher had them walk for 5-10 minutes and then asked them to stop and listen for 1 minute. Interviews were recorded and transcribed and content was analyzed through coding on the text.

For my research, participants were allowed to talk at any time during the walk. They were not limited to answering questions during the semi-structured interviews. The stopping points along the way were used as a way to direct the participants’ attention back to observing the sounds of the environment. This way, the walk felt more natural and participants’ observations were made while they were still fresh.

**Recruitment Process**

Recruitment sources for Bruce and Davies (2014) included contacting interested parties such as local residents, professional bodies, and by direct contact. There were a total of 42 participants between the ages of 22 and 65 years old. There was a route selection process for each soundwalk—for instance, there needed to be one public square and one green space along the routes. For my research, recruiting participants involved emails, phone calls and speaking directly to people in Nova Scotia. In the end, only three locals and six people from
outside the area showed up to participate. The group of locals residing in Cape Breton were between the ages 50 and 70 and the second group were between the ages 20 to 30. The soundwalks were along the same route to allow for a comparison between participants’ perceptions of each soundscape at the different stopping point locations.

4.9 | Summary

The analysis of the results will direct the approach to the conceptual design of Day Park Beach. Through completing the analysis, certain aspects became more prominent. For instance, the group of locals, during both the soundwalk and focus group, based their impressions of the site from memories of past events; instead of reacting to the sounds as they heard them, they needed to reflect on past experiences in order to make meaning in the present. To these participants, Day Park Beach is their home and a place for reflection. Before the soundwalk began, they were already talking about which areas on site have the best acoustics and views. Acquiring knowledge from the locals is easy; however, to reflect the information of Day Park Beach and convey that to new visitors is a challenge.

The second group of participants, who reside outside of Cape Breton, brought an important viewpoint to the study. Because they were experiencing the site for the first time, their attention was divided amongst many different aspects of Day Park Beach, considerably more than the locals. This caused them to focus less on the soundscapes and more on the visual characteristics of the site. They often skipped over the unique soundscapes the author was trying to bring to their attention. Therefore, the analysis of the results reflects on the unique
soundscapes of Day Park Beach. The next chapter will explore strategies for soundscape design.

The aim is to convey the unique soundscapes to new visitors through site design interventions.
Chapter 5 | Site Context

The information presented in this chapter supports and informs the development of a conceptual design for Day Park Beach that integrates and enhances existing soundscapes. Included is information regarding regional cultural heritage, current site context, soundscape dynamics, site inventory and soundscape analysis, biology, soundscape conservation, and tourism and recreation. The sources of information presented in this chapter include on-site observations, public documents and documentation available from the Canada’s Musical Coast project.

5.1 | Canada’s Musical Coast—Tourism, Signage and Wayfinding Strategy

A considerable amount of money has already gone into developing Day Park Beach as a tourist destination. The beach site is one of the few sites along the proposed tourist route, Canada’s Musical Coast, which has washrooms, change rooms, foot cleaning stations and picnic tables. The site is known for its cultural heritage and natural resources. Information from the initial draft report for Canada’s Musical Coast has been adapted to provide more information about the study site, Day Park Beach (LeBlanc et al. 2016). In Figure 7, the white lines depict Canada’s Musical Coast tourism route and the orange dots represent the 41 sites. Figure 8 provides detail on the location of Day Park Beach.
Figure 7 Canada's Musical Coast Route

Source: Author
Figure 8 Day Park Beach's location along the tourist route

Source: Author
5.2 |Regional Cultural History

Before the Europeans arrived, the first residents on Cape Breton Island were the Mi’kmaq. In 1497, the European explorer, John Cabot, visited the island and his discovery led to eventual settlement by Europeans, Scots, Irish, French and English (LeBlanc et al., 2016). The waters of the Northumberland Strait, the accessible and protected harbour front, and the abundant natural land resources made the area of Port Hood an attractive area for many early settlers.

Permanent settlement of the area began with the French in the 17th century. During the construction of Fortress Louisbourg, the French developed a stone quarry on what is now Port Hood. At this time the peninsula was connected to Port Hood Island by an isthmus (Gillies, n.d.). The old-growth forests were cleared to make space for farming practices in Port Hood and the surrounding area. Farming practices increased in the 1800s when products were exported to markets in Halifax. The fishing industry began in the 1700s and it wasn’t until the 1800s that fishing made an impact on the local economy. Lobster fishing and fish packaging were introduced to the area by New Englanders. Trade networks were established between local fishermen and the United States. Lobster canneries were built in almost every cove along the west coast of Cape Breton (LeBlanc et al., 2016).

Coal mining was an important to the development of the community of Port Hood. In 1865, Cape Breton Mining Company began. The Port Hood coalfields became the most southerly of the four small coalfields along the west coast Inverness County. Coal outcrops measured along the narrow strip of coastline and coal fields were submarine, extending
seaward in southwesterly direction from Port Hood. The opening of the second mine by Port Hood Coal Company and the development of the rail line caused a building boom in 1901. The Main Street was alive with a number of businesses. There was an economic boom until the fire of 1942. Mines were taken over by three independent coal mines—Chestico Coal Mines Corporation Limited. By the late 1950s and early 1960s the coal mines closed (Port Hood: Municipal Planning Strategy, 2015).

5.3 | Current Site Context

Today, the fishing industry continues to impact the economy of Port Hood. There are four wharves serving roughly 50 boats, with a public wharf at Murphy’s Pond. The town is adjacent to the shores of the Northumberland Strait, located 45 kilometres northeast of the Canso Causeway. Highway 19, which skirts the community, is the major transportation route of the area. The highway is part of the scenic tourism route, Ceilidh Trail and will potentially become the primary access route for Canada’s Musical Coast tourism network (Port Hood: Municipal Planning Strategy, 2015). Port Hood is well-known by tourists for its beaches, sunsets, boating, and Ceilidh Coastal Trail. Other notable tourist sites in Port Hood include Lawrence’s Beach, Day Park Beach (Port Hood Station Beach), Courthouse Beach (known as Lifeguard Beach by the locals), Murphy’s Pond and Murphy’s Pond Beach. Day Park Beach is a destination for horseback riding. Riders travel down the Ceilidh Trail towards the beach. In the fall, cranberry picking becomes a popular activity at Day Park Beach.
5.4 Soundscape Dynamics

According to Bernat (2014), auditory phenomena are a very important element when creating the context of a landscape, as “sound unifies, surrounds, and flows into the listener, as opposed to sight which creates divisions and distinctions” (Bernat 2014, p. 92). Sound—an ephemeral, transient phenomena—is an integral part of any geographical space. Space is described by sound, adding drama to the experience of space and contributing to the atmosphere of a place by providing rich sources of information for listeners. There are no acoustically empty spaces in the landscape, as sounds are dynamic in all environments.

Since sound has an impact on geographical space, space also has an impact on the production of sound. According to Bernat (2014 p. 91), “Propagation of sound depends on land relief, land cover and meteorological conditions.” Sounds are also characterized by dimensions associated with space—height, depth, length, volume. Thus, space allows sound to manifest; it highlights different qualities of sound, and adds depth and richness to sounds; “Sound enhances the sense of space, expanding it by what cannot be seen” (Bernat, 2014, p. 92). Therefore, in order to begin to understand how landscape features influence soundscape dynamics at Day Park Beach, the researcher conducted a geophysical and biophysical inventory and analysis.

An inventory of the hi-fi and lo-fi sounds was also conducted for the purpose of determining the ratio of natural sounds at Day Park Beach versus human derived sounds. According to Schafer (1977), hi-fidelity soundscape possess a favourable signal-to-noise ratio; discrete sounds can be heard clearly because of low ambient sound level. Sounds overlap less
frequently in hi-fi soundscapes. The quiet ambiance of the hi-fi soundscapes allows the listener a wider acoustic ‘arena’ and ‘horizon’. On the other hand, in lo-fi soundscapes the individual sounds are obscured in an over-dense population of sounds. Perspective is often lost. In the ambiance of the hi-fi soundscape, the slightest disturbance can communicate vital or interesting information. There are far more hi-fi sounds at Day Park Beach than there are low-fi soundscapes, as indicated in Figure 9. This means that there are more unique natural soundscapes at Day Park Beach, which means that there is also “acoustic space” for the communication of species in the environment.

Figure 9 Hi-fi versus lo-fi sounds at Day Park Beach

Source: Author
5.5 | Site Inventory & Analysis

As illustrated below, the highest point is located in the eastern region of the site, which is characterized by a stand of coniferous trees bordering a bog and by Highway Route 19, represented in Figure 10 as a thick black line. The landscape slopes from the highway towards the freshwater ponds in the bog. The lowest points on site are located in the bog, measuring at 2.4 meters. Small rivers flow in different areas of the bog making their way towards the ocean. The rivers trickle through the bog and make channels through the sand dunes. Figure 10 shows the different elevations in the landscape, measured in meters, as well as identifying the ecosystems.

![Figure 10 Topography and ecosystems (Elevations measured in metres)](image)

Source: Author (Information from ArcGis)
Vegetation and Land Cover

The coniferous stand of trees parallel to the highway consists of spruce trees, birch and polar. The majority of the trees are spruce. The trees thin out roughly 130 meters away from the entrance of Day Park Beach. This open space greatly affects the acoustics at the study site, as it provides an opportunity for unwanted sounds from the highway to enter the site. A consideration for the soundscape design would be to thicken and add more trees. This change next to the highway would provide a better noise buffer.

Day Park Beach has many regions of ecological significance. The bog, which covers the majority of the site (Figure 11), is sensitive to human and natural disturbances.

Figure 11 Cranberry Bog

Source: Author

The word bog comes from the Irish meaning ‘soft.’ The rate of decomposition of plant material is slower than the rate of production. Thus, when plants die, it takes a long time for their remains to break down into organic debris. This plant matter accumulates to form peat. A
spongy colourful moss called sphagnum grows on top of the peat. According to *A Guide to the Coastal Zone of Atlantic Canada* (1996) sphagnum moss can absorb up to 15-20 % of its dry weight. Precipitation, wind-dust and ocean spray are the three main suppliers of nutrients to the bog. In order to adapt to low levels of nutrients, plants find other ways to enrich their diets. Carnivorous plants grow in these wet, acidic, anaerobic conditions; these plants include the pitcher-plant, bladderworts and Sundews. Other plant species commonly found in Atlantic coastal bogs include leatherleaf, huckleberry, lambkill, Labrador tea, cranberry, crowberry, and cotton-grass.

Day Park Beach also features delicate ecological sand dunes. Dunes often occur in more exposed coastal areas. Sand is distributed on upper levels of the beach by waves and winds, and sand is then stabilized by the growth of American Beach Grass, *Ammophila breviligulata*, and is later colonized by woody plants. While the dune system progresses inland the diversity of the plant species increases (Bryson, 2009). Piping Plover, an endangered bird species along the coast of the Northumberland Strait, lays its eggs in the sand.

One of the goals stated in *The State of Nova Scotia’s Coast: Technical Report* is to maintain balance between ecological conservation and recreational use. Our Parks and Protected Areas: A Plan for Nova Scotia has Day Park Beach—referred to as Port Hood Station Beach in the technical report—as an existing protected area. A portion of the park is designated Provincial park land and is to be managed as a “supporting park” (Our Parks and Protected Areas: A Plan for Nova Scotia, n.d).
In terms of sounds, at certain points along the boardwalk the sand dunes create acoustically distinct quiet areas. These spaces occur when sand dunes buffer the sounds of the ocean waves. Thus, creating breaks in the dominant sound of the waves along the boardwalk. These changes in the volume of sound contribute to the rich and complex soundscape at Day Park Beach. Standing in the lower elevation of the bog, one can experience many different types of sounds such as vehicles on the highway, species vocalizations and vegetation rustling in the wind, all of which settle in the area.

5.6 | Biological Awareness

The effects of climate change and the changes to the landscape brought about by human development has had a huge impact on the wildlife along the west coast of Cape Breton island. Thus, new design interventions need to take into consideration the different patterns of wildlife in the area, especially endangered species such as the Piping Plover. This coastal bird breeds on less than 30 beaches in the South Shore and North Shore of Nova Scotia as well as in Cape Breton. Several of these breeding grounds are located on beaches in Inverness County, Cape Breton such as Day Park Beach.

Piping Plovers breed at Day Park Beach in late April and May, and in mid-July they migrate south. The site is ideal for Piping Plovers, as the vegetation is not dense and there is early successional habitat, which is preferred by these birds. From May to August, these coastal birds lay their eggs on the beach between the grassy dunes and high-tide line (Piping Plovers& Beach Habitat in Nova Scotia, n.d). There has been a considerable loss of these traditional breeding grounds due to natural and human related activities. As a result, Piping Plovers are
now federally and provincially protected. Their populations are threatened by habitat loss, predators and human disturbances. Habitat loss includes inappropriate placement of built structures, changes to beaches due to storms and an increase in the population of predator species, such as the fox, due to garbage left behind. The camouflaged eggs and chicks are difficult to see and are vulnerable to human activity, off-leash dogs, and motorized vehicles. Therefore, an awareness of species habitats and breeding patterns at Day Park Beach, especially more sensitive species such as the endangered Piping Plover, is incredibly important when considering a new soundscape design.

5.7 | Soundscape Conservation

Dumyahn et al., (2011) identified eight types of soundscapes that hold ecological and/or social value. The eight soundscapes identified in the literature are: natural quiet soundscapes, sensitive soundscapes, threatened soundscapes, unique soundscapes, recreational soundscapes, representative soundscapes, cultural soundscapes, and everyday soundscapes. In some cases, the soundscape types could be interrelated reflecting different landscapes and values. However, out of the eight only the following six were chosen to represent the soundscapes of Day Park Beach (Table 6): natural quiet soundscapes, sensitive soundscapes, recreational soundscapes, representative soundscapes, cultural soundscapes, and unique place-specific soundscapes.
Table 6 Categorizing soundscapes

*Source: Modified from Dumyahn et al., 2011, p.1335.*

<table>
<thead>
<tr>
<th>Soundscape Type</th>
<th>Values</th>
<th>Threats</th>
<th>Management Goals</th>
<th>Monitoring</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natural quiet soundscapes</td>
<td>Experiencing solitude, sense of place, wildlife well-being, landscape interactions</td>
<td>Anthrophony and loud invasive species</td>
<td>Protect area from more human generated noise (recreational noise and low frequency sounds from motorized vehicles)</td>
<td>Monitor for changes in ambient sound levels</td>
</tr>
<tr>
<td>Sensitive soundscapes</td>
<td>Bog ecosystem, sand dunes, wildlife well-being (endangered piping plover breeding grounds) and ecological integrity</td>
<td>Anthrophony and loud invasive species that mask native sounds</td>
<td>Protect area from additional human generated noise</td>
<td>Monitor for keynote sounds that are critical to ecosystem function</td>
</tr>
<tr>
<td>Cultural soundscapes</td>
<td>Sense of place, cultural and historic values</td>
<td>Loss of sound generating objects (foghorns), increase in anthrophony</td>
<td>Recognize culturally identifying sounds, identify targets, maintain hi-fi soundscapes</td>
<td>Monitor culturally significant soundmarks and associated soundscapes</td>
</tr>
<tr>
<td>Recreational Soundscape</td>
<td>Landscape interactions, sense of place, connecting humans with nature</td>
<td>Human generated noise, loss of landscapes that create natural sounds</td>
<td>Protect area from activities that create intrusive sounds</td>
<td>Monitor for specific types of sounds that are recreational in nature; protect those landscapes that support organisms that produce soundmarks of high recreational value</td>
</tr>
<tr>
<td>Soundscape Type</td>
<td>Values</td>
<td>Values</td>
<td>Management Goals</td>
<td>Monitoring</td>
</tr>
<tr>
<td>------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------</td>
<td>----------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Representative Soundscapes</td>
<td>Ecological integrity and research, sense of place</td>
<td>Loss of habitats/ecosystems, climate change</td>
<td>Protect soundscapes from threats from anthrophony and biophonic invasions, protect landscapes from land use changes</td>
<td>Monitor for selected representative soundscapes, determine natural ambient composition of these soundscapes (frequency, temporal patterns etc.)</td>
</tr>
<tr>
<td>Unique place-based soundscapes</td>
<td>Wildlife well-being, sense of place, loss of these would be irreplaceable</td>
<td>Loss of appropriate habitat to generate unique characteristics of soundscapes, from mechanical noises and biophonic invasive species</td>
<td>Identify unique areas and establish guidelines to protect both landscape and soundscape from alteration *Protect sounds of the ocean, bog plant species, and sand dunes</td>
<td>Monitor for presence of the unique sounds</td>
</tr>
</tbody>
</table>

### 5.8 | Tourism & Recreational Activities

After declining tourism visitations and spending on Cape Breton Island, the Destination Cape Breton Association (DCBA) proposed an island-wide tourism strategy to re-enter the global market place. A marketing plan was developed in 2008 and an analysis was conducted by the DCBA based on key consumer travel motivators—identified by the Province of Nova Scotia. The main travel motivators as mentioned in the *Destination Inverness County: Municipality of Inverness County 2014-2017 Tourism Plan* are:

1. Coastal experiences
2. Sightseeing and touring
3. Culture, entertainment, and heritage
4. Culinary experiences
5. Outdoor activities
6. Major and international events
7. Experiential accommodations

The soundscape design for the signature beach site, Day Park Beach, will focus on enhancing the coastal and sightseeing experience, highlighting cultural soundscapes, and promoting ecologically mindful outdoor recreational activities.

The water in the area near Port Hood is known for being the warmest in Eastern Canada—which is ideal for swimming. Day Park Beach is part of a network of beaches along the coast in Port Hood. These beaches include Lawrence’s Beach, Murphey’s Pond Beach, and Courthouse Beach. According to the Destination Cape Breton tourism centre, the busiest tourism time at Day Park Beach is from July 1 to August 25 when the beach is supervised. During this time, the beach is a hot spot for swimming as the water is calm and shallow due to sand bars. There is a canteen on site during peak season.

Day Park is a popular running and hiking destination. Walkers and runners can use the boardwalk which connects to Lawrence’s Beach in the south. There are tentative future development plans for the area. The idea would be to connect all beach sites along the coast via a raised walkway. These ideas were mentioned during a stakeholder consultation session for Canada’s Musical Coast in May 2016. The trail head for Chestico Trail, which is part of the Celtic Shores Coastal Trail, is located across the street from the beach. Often, horseback riders will cross the street from the trail network and ride along the path at Day Park Beach. The orange
dotted line in the map below (Figure 12) indicates the Chestico Trail system. The thin blue line that connects to the Chestico Trail in the south is part of the Celtic Shores Coastal Trail. Gillis Lobster Tours and Charter leaves from Port Hood wharf during the Lobster season in May. The service also includes a walking tour on Port Hood Island. During the winter, the fresh water ponds in the bog are used for skating.

**Figure 12 Chestico Trail**

*Source: Author*
5.9 | Summary

The information communicated in this chapter will provide site context and will inform the conceptual design for Day Park Beach. Understanding the regional cultural heritage is crucial, as it provides background about how people used to live in the area, which will help to direct current design decisions. The section on current site context sheds light on the uses of the site today, which is important when developing the design. Soundscape dynamics can dictate where certain site interventions are located. For instance, the sand dunes buffer the sounds of the ocean along certain areas of the path. Providing seating in these areas will encourage visitors to spend time in the presence of these unique soundscapes. The site inventory communicates where different features and elements are located and describes the existing ecosystems. The analysis identifies how the land cover might affect the soundscapes at Day Park Beach. The section on biological awareness highlights the breeding and nesting patterns of an endangered bird species, the Piping Plover. Soundscape conservation identifies different soundscapes categories. Finally, information on regional tourism and recreation at Day Park Beach are important to understanding the activities and behaviours of different users of the space.

Therefore, the information in Chapter 5 will direct the placement of site interventions. The categories highlighted in this section are important for understanding the uniqueness of Day Park Beach and provides motivation for helping to maintain these qualities through site design.
Chapter 6 | Conceptual Design

The conceptual design for Day Park Beach is presented in this chapter, beginning with the goals and objectives for design of the Day Park Beach site as it relates to soundscape design. Drawing from the literature gathered in Chapter 2, steps for approaching soundscape design as well as a list of design criteria have been developed for the new soundscape design for Day Park Beach. Inspiration for the design has been identified and information about site interventions has been included. The chapter concludes with a critical reflection and evaluation of the design as well the opportunities and limitations of integrating sound into the landscape architectural practice. The chapter concludes with a summary that compares the proposed soundscape interventions with guidelines developed from the literature review.

6.1 | Design Goals

The soundscape design for Day Park Beach addresses each of the design goals illustrated in Figure 13.

![Figure 13 Design concept](Source: Author)
In terms of **ecology**, the soundscape design for Day Park Beach seeks to do the following:

- To protect the sonic environment at Day Park Beach through drawing awareness to the natural soundscapes
- To avoid building structures in sensitive ecological areas such as Piping Plover nesting grounds in the sand dunes.

The **educational** aspects of the design include the following:

- To share the unique soundscapes of Day Park Beach with new site visitors
- To show people different ways to interact with the built environment

**Cultural and natural heritage** aspects of the design include:

- Using site structures and sounds to increase visitors’ knowledge of the cultural and natural heritage of the region. (ex. draw attention to the coal mining history and Celtic traditions of music)
- Framing the existing natural landscape (ex. drawing attention to the cranberry bog, sand dune ecology, and views to Port Hood Island)

In terms of **tourism** the new soundscape design for Day Park Beach will:

- Expand on Canada’s Musical Coast tourism strategy currently in the development stages
6.2 | Steps for Approaching Soundscape Design

Based on information gathered from the literature review, a soundscape framework (Table 8) has been developed for landscape architects for approaching soundscape analysis and design for Day Park Beach.

Table 7 Soundscape Framework for Landscape Architecture Design

*Source:* Author

<table>
<thead>
<tr>
<th>General Questions to Consider</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do visitors/users of the space have control over the environment? Can they control their level of exposure to sounds?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Do sounds blend together harmoniously? Or can sounds be described as “schizophrenic”?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Do soundscapes provide information to the listener?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Do site interventions incite memories and associations?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Can you identify the sounds that you want to preserve, encourage and multiply?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Are you creating feelings of relaxation?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Do sounds match the visual sound source?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Do materials on the site encourage one’s own soundmaking? Select surface materials and create site interventions that help people interact with the space.</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Do site interventions promote active listening?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Can you identify all of the unique soundmarks?</td>
<td>Yes/No</td>
</tr>
<tr>
<td>Are positive sounds in the environment emphasized?</td>
<td>Yes/No</td>
</tr>
</tbody>
</table>
Soundscapes should be integrated into the landscape architectural design process during the site inventory and analysis stages of the design. These initial design stages should be referenced during conceptual design and design development. Figure 14 is a diagram modified from *Site Planning and Design Process* by LaGro (2008) that illustrates where soundscape would fit in the landscape architectural design process.

**Figure 14 Soundscape Integrated into the Architectural Design Process**

*Source: Modified from LaGro Jr., 2008, p. 14*

### 6.3 | Design Criteria

A list of design criteria was developed from information gathered in the literature review to help direct the new soundscape design for Day Park Beach. The design incorporates
treatments and materials (built and natural) for minimizing emitted noise. Any new sounds produced on site will draw attention to natural processes (wind) and distinct character of the site, such as cultural/natural heritage features. New sounds produced on site will direct visitors to areas that have unique soundscapes. Design interventions will reduce anthrophony and emphasize biophony and geophony. The following design criteria have been derived from the literature review:

1. When speaking about positive soundscapes, it is necessary to relate “positive” to activity, and to accept that different types of people carry out different activities at different times of the day/week/year for different durations.

2. The design should emphasize positive sounds in the environment rather than focus on the negative sounds.

3. When designing a public space it is recommended that natural sounds and sounds from human voices should be the most dominant sounds (Davies et al. 2012). The natural sounds create feelings of relaxation and the human voices add vibrancy to a space.

4. A recommendation for landscape architects in producing positive soundscapes is to allow people control over their exposure to sounds.

5. Sounds at Day Park Beach should be honoured, preserved, and enhanced.

6. When the soundscape is in harmony with our feelings then we regard it as positive.

7. When distinguishing a positive environment, information must be correct or expected—the sound and its visual source should be in agreement.
6.4 | Soundscape Design Inspiration

The qualities of the sea shell, specifically the conch shell, have been referenced in each design intervention at Day Park Beach. The shell serves as a metaphor for sound and theme for the design of Day Park Beach. The form of the shell stood out to the researcher as a site specific form created by nature. During the research trip, the form contributed to the researcher’s feeling of sense of place. The most significant component of the shell, for the design of Day Park Beach, was the acoustic quality. Most people can imagine the type of sounds heard through a conch shell when held up to one’s ear. Oftentimes, the sounds are compared to ocean waves. However, in reality these sounds are a collection of ambient sounds of the environment amplified within the cavity of the shell. Thus, the shape of the sea shell acts as a natural amplifier of sounds and has inspired forms and acoustics of design interventions at Day Park Beach.
Figure 15 Master plan

Source: Author
6.5 | Site Interventions

The first intervention is located adjacent to the parking lot (1A on the Master Plan). A structure representing the cavity of a shell creates a tunnel which funnels the sounds of the ocean towards the parking lot (Figure 16). Ideally, the sounds of the ocean waves will reduce the noises made by moving cars in the parking lot. The design for Day Park Beach proposes an increase in the number of parking spaces.

Figure 16 Tunnel Perspective

Source: Author

During the warmer months, the beach is packed with visitors and parking spaces are usually hard to come by. Therefore, the island of lawn located in the centre of the parking lot
has been removed and twenty additional parking spaces have been added (the new size measuring 2466 m2). To reduce the noises coming from the parking, the new design for the parking lot will use asphalt instead of gravel. Currently, the sound of wheels on gravel contributes to anthrophony at Day Park Beach.

There is a large space near the entrance of the site that is open space (1B on Master Plan). This space allows the noises of vehicles on the highway to enter the site. The new soundscape design for Day Park Beach proposes that the existing coniferous trees be extended to fill this area near the entrance. These trees would help to buffer the sounds of highway traffic. Currently, area 6 on the master plan is a manicured lawn at the entrance to the site. In order to attract more wildlife to the area, the design proposes to naturalize this area. Therefore, through encouraging new habitat for wildlife, there will be an increase in biophony at Day Park Beach.

Walking south along the boardwalk, visitors will encounter another design intervention. At this point, the sounds of the ocean waves are dominant. A look-out point is proposed in the shape of a spiral that mimics the shape and curves of a sea shell (Figure 17 & 18). On one side of the look-out platform will be a curved white wall. The jagged lines of the wall are meant to represent a broken piece of sea shell that could be found along the beach. The curved wall will provide shelter at the second-most windy area of the site, positioned towards the North West. The view of the ocean will not be obscured by the broken shell wall, but framed by its form. Areas of the wall will dip down to provide views of Port Hood Island across the Northumberland Strait. Seating will be arranged along the bottom edge of the wall, facing the boardwalk path.
and cranberry bog out in the distance. The aim is to attract visitors to this unique soundscape along the boardwalk and provide them with shelter, so that they are more likely to stay awhile longer to listen to the environment.

**Figure 17 Plan view sketch of The Spiral Look-out**

*Source: Author*
Located at the mid-point of the boardwalk is another proposed design intervention. A seating area/wildlife observatory has been proposed (Figure 19). This boardwalk platform is parallel to the main boardwalk path, located in a section of bog (which was explored during the soundwalks). This location was selected for a stopping point during the soundwalks because of its distinct soundscape. The sounds of the waves are distant, the wind is prominent and the sounds of wildlife in the bog (biophony) are audible. Thus, this location represents another distinct soundscape and a unique space to visit.
The shape of the seats mimics the structure of a sea shell. At the top of each seat is an opening. Each opening will be different in size and will tilt in a particular direction, catching the different nuanced sounds of the coastal wind. Horns or megaphones are also located amongst the seats. These structures allow visitors a chance to listen to the sounds of the bog, as the shape of the horn captures sounds that are less audible to the unaided human ear.

![Figure 19 Cranberry Bog Seating Area](image)

Source: Author

Another seating area will be placed at the furthest point of the boardwalk (Figure 22). Several soundwalk participants mentioned the point as a place at Day Park Beach they would want to revisit. The point is one of the most dynamic areas of Day Park Beach in terms of sound and surrounding views. A seating area is proposed for this location as it would allow visitors a space to contemplate and appreciate the sounds of the environment. Undulating wooden seats rise out of the boardwalk in the shape of lounge chairs. The seats blend into the boardwalk as they are made of the same material. The undulating seats also mimic the nearby sand dunes and the ocean waves. The point would be a prime location for sound art.
installations, such as Aeolus (Figure 20) and Acoustic Pavilion by Luke Jerrum (Figure 21). The sculpture acts as a large musical instrument that resonates and sings with the wind.

Figure 20 Aeolus
Source: http://www.evolo.us/architecture/aeolus-acoustic-wind-pavilion-luke-jerram/

Figure 21 Acoustic Pavilion
Source: http://www.evolo.us/architecture/aeolus-acoustic-wind-pavilion-luke-jerram/
Another area for exploration is the boardwalk leading through the coniferous forest. In this area, a proposed boardwalk is constructed of multiple toned planks of wood, which create a rhythmic pattern when walked across (Figure 23). Through changing the sounds made by visitors’ footsteps on the boardwalk, awareness will be directed to the auditory environment and one’s own sound making. Structures referred to as “acoustic rings” loop overhead of the walk way (Figure 24). These white abstract structures mimic the contours of a sea shell. Each ring has several “windows.” In these openings are long harp strings, which are meant to catch the sounds of the wind. The idea came from a participant in soundwalk participant who commented on the nuances between the sounds the waves made by the bitter northern winds compared to warmer winds coming from the south. In this case, the different directions of the
wind will be audible through the resonating harp strings. Also, as mentioned earlier in this chapter, the shell amplifies the sounds of the environment. Thus, this sculptural form, which mimics the form of a sea shell, makes the sounds of the wind more audible. The perspective below (Figure 23) depicts the multi-toned boardwalk and acoustic rings in the distance.

**Figure 23 Forest boardwalk**

*Source: Author*
Figure 24 illustrates a closer view of the acoustic rings and the experience of walking through the “tunnel.” The rings are an abstract representation of the curved exterior of a sea shell. The harp, or the Aeolian harp as the ancient Greeks called the wind harp, is an instrument that resonates in the wind. The “acoustic rings” would amplify the sounds of the wind. Figure 25 illustrates the appearance of the harp stings when examined at a closer distance.
Design interventions unify the site through repetition of a form system. The sea shell acts as a repetition of form/ acoustics throughout the site. Elements of biomimicry include different representations of the visual form:

- *The Acoustic Rings* represent the contours of a shell.
- The shell wall at the *Spiral Look-out* signifies a piece of shell.
- *The Tunnel* characterizes a hollow cavity of a shell.

And representations of acoustics properties of the shell include:
• The seats at *The Bog Seating Area* capture the ambient sounds of the environment similar to how a shell captures sound in its cavity.

• The harp stings in *The Acoustic Rings* “play the wind” and are meant to abstractly represent the acoustic quality of the sea shell.

Design interventions have been located in specific areas of the site. These locations were selected based on their distinct soundscapes. Interventions are meant to emphasize these unique natural soundscapes through drawing awareness to the sounds of the environment (changes to the rhythmic pattern of the boardwalk), providing opportunities for interacting with the site (Listening to sounds through the horns/megaphones), and providing spaces to sit and listen (The seats at The Spiral Look-out). Human and ecological benefits provided by soundscapes include the following:

• Wildlife well-being

• Cultural heritage significance

• Creating a feeling of sense of place

• Interactions with landscape perceptions

The new soundscape design interventions are meant to enhance the natural soundscapes at Day Park Beach (biophony and geophony) and mitigate the existing human-generated sounds (anthrophony). New habitat for wildlife will be formed through naturalization of lawn area and through extension of the coniferous forest. There are some instances where new anthrophony has been introduced to the site, such as the different rhythmic sounds of the multiple toned boardwalk (Figure 23). In this case, in order to avoid detracting from the natural
soundscape and lower the impact of new sources of anthrophony at Day Park Beach, the multiple toned section of the boardwalk will be located in only one area of the walkway. This particular region of the boardwalk (identified in figure 15) is highlighted by this acoustic intervention, in order to draw attention to a unique cultural heritage site feature—abandoned coal-mining shafts. Even without new design interventions, the landscape at Day Park Beach holds special meaning to locals and visitors. The aim of the design is to strengthen this connection and promote this sense of place through different interactions with landscape perceptions.

Design interventions at Day Park Beach encourage visitors to actively listen to their environment. However, this is no small feat, as active listening takes practice. For instance, the first time a visitor walks through the site, their senses may be overstimulated. At this point, the sounds of the environment might not be in the forefront of their attention. The design can only direct their awareness to the auditory environment and the rest is up to them. However, visiting the site more than once, which is not always possible for new visitors, people initiate the process of ear training. With practice, their senses will become more in tune with the auditory environment. With a new awareness to the sounds of the environment, visitors might notice the seasonality and temporality of the site and other unique nuances.

Evaluating soundscape design is not as transparent as visual/physical landscape architectural designs and requires additional work. The following evaluation criteria could be helpful to landscape architects:
• Behavioural control is when people engage in behavioural responses to avoid or modify unwanted sounds in the environment. Landscape architects should note where behaviour control is occurring on site.

• Soundscapes can be evaluated based on the how suitable sounds are within the landscape as well as the expectations and the recreational goals of an individual (Dumyahn et al. 2011).

• Context is important in soundscape perception and evaluation. Types of sound sources, users of a space and social factors form context.

6.7 | Integrating Sound into Landscape Architectural Practice

There are several notable opportunities and limitations for integrating sound into the landscape architectural practice. Opportunities include:

• Integrating sound into landscape architectural designs has the potential to create more unified public spaces.

• Through soundscape design, landscape architects have a potential role in preserving and managing unique cultural soundscapes.

Limitations include the following:

• The integration of sound may lengthen the landscape architectural design process, as more time is needed for research, data collection, and soundscape assessment before and after the design implementation stage.
• Landscape architects would need access to and expertise in the use of audification technology and software.

6.8 | Summary

Chapter 6 communicates the different components, goals and theme for the new soundscape design for Day Park Beach. The design could not have been developed without a comprehensive literature review, data collection, or an understanding of the site's historical and present cultural context.

The design was created by addressing the following recommendations for soundscape design communicated in the summary of the Literature Review:

1. Soundscape assessment took place during the initial stages of site design in congruence with visual and physical assessments.

2. Through conducting a literature review and through gathering site specific information, acquired through the perspectives and perceptions of participants residing and visiting Cape Breton, an understanding of different symbolic systems and the relationship between human societies, nature and the environment began to form.

3. Assessment of the sonic environment at Day Park Beach centred on human perception of sound, which was achieved through qualitative research methods.

4. The soundscape design for Day Park Beach draws awareness to natural sounds and processes through different design interventions.

5. The sounds of the environment are considered a resource worthy of management and conservation and each soundscape possesses both ecological and social value.
Therefore, soundscape evaluation (after design implementation) would be important in order to monitor this resource.

6. When categorizing the sounds in the environment at Day Park Beach, three main categories were used: biophony, geophony, and anthrophony (Dumyahn et al., 2011).

The new soundscape design for Day Park Beach enhances the existing soundscapes and presents and directs visitors to unique site-specific sounds. Through interactive and intriguing environments, it is intended that visitors will want to spend time in these special areas.
Chapter 7.0 | Conclusions

Soundscape design provides a unique approach to developing public spaces. In an ideal world, soundscapes should be considered as natural resources worthy of preservation. The intent of the design for Day Park Beach was to interpret and reflect unique soundscapes of place and convey that to visitors. Qualitative research methods were developed to engage local residents and visitors. The participants were encouraged to share their perceptions and observations of the soundscapes at Day Park Beach through soundwalks. From the data, which was gathered through soundwalks, follow-up focus groups, on-site observations, and knowledge acquired of acoustics, a soundscape design for Day Park Beach was created.

Key results from on-site observations were that the majority of sounds at Day Park Beach were hi-fi sounds. In hi-fi soundscapes, discrete sounds can be heard clearly due to low ambient sound level. Viewpoints and perceptions of both visitors and residents of the area were both equally valuable—visitors brought a fresh outlook while residents of the area drew from the past to create meaning in the present. Oftentimes, it took a visitor to point out the value or originality of a soundscape. Both groups’ responses to the soundscape at Day Park Beach were considered during the initial stages of the site design.

The proposed design interventions emphasize the sounds that are unique to Day Park Beach which include the sounds of the sea and waves on the shore, surrounding grasses moving in the wind, and the sound of people walking on the existing boardwalk. Each intervention is intended to emphasize and call attention to the sounds identified by soundwalk participants and the designer.
7.1 Limitations

The major limitations for this study were the limited availability of funds and time. Limited funds shortened the duration of the trip and the amount of time spent in Cape Breton. Time restrictions limited the number of soundwalks, focus groups and on-site observations that were conducted at Day Park Beach. Other details to be considered by future researchers include the following:

- Both soundwalks were conducted on a Saturday in November, as this was the day that people were available.
- Only nine people took part in the research. Thus, with such a small sample size, the results are less specific and more generalized, and is a limited representation of the perceptions and behaviour of beach users. According to Cain et al., (2008), listener demographics can also affect the perception of soundscapes: age, gender, and visual or hearing impairment.
- The findings may have been richer had there been more soundwalks and participants. Ideally, there could be a soundwalk in the morning, mid-day and in the evening to capture the changes in the soundscapes.
- The groups of participants for the soundwalk/focus groups had an uneven representation of age demographics. For instance, one group consisted of people over the age of 51, while the second group consisted of people within the age range of 20-30. An ideal composition for each group would include people from 20 to 51 years of age.
• The acoustics in November are vastly different from the acoustics at other times of the year; thus, it would have been interesting to be able to compare these seasonal changes in soundscapes.

• The period in which the on-site observations were conducted is not representative of the auditory environment during the busy tourism season. According to the Destination Cape Breton tourism centre, the busiest tourism time at Day Park Beach is from July 1 to August 25 when the beach is supervised. The observations were made in May (which were mainly visual/physical observations of the site for the development of Canada’s Musical Coat) and in November due to the timing for completing this thesis. Conducting research during the busiest tourism months—July and August—was not feasible.

7.2 | Future Research

Further research into both urban and rural soundscapes would be beneficial in developing new public spaces. The principles and considerations for acoustic design outlined in this thesis would benefit landscape architects by expanding approaches to place-making that are grounded in a given site. More research would be needed to clarify the gaps in knowledge of acoustic design that were not considered in this thesis. Knowledge gaps that may need to be addressed include the following:

1. To understand the way different materials and surfaces affect sound.

2. To identify different techniques for recording sound, including audification technology and software.
3. To assess the impact of design interventions on perception of space.

4. To experiment with how different site interventions change existing soundscapes.

5. To investigate the new phenomenon of citizen sound, which involves residents of urban and rural spaces researching and collecting information about different sonic environments.

### 7.3 Final Remarks

This study of soundscape design in public space offers an expanded approach to creating interactive environments and harmonious spaces, drawing the aural senses into the design process. Royal Melbourne Institute of Technology University in Australia offers studio courses focuses on acoustic studies. Students examine theoretical concepts of soundscape studies and use a theoretical framework to inform their design assignments. The belief is that instead of hiring an acoustician to assess soundscapes, the landscape architect can tackle the jobs themselves (Fowler 2012). Studio courses combined with research courses on soundscape studies would be valuable for all landscape architecture students.

With the continued expansion of urban centres, there is an increasing need for well-designed public spaces. With more focus on soundscape design, there is a potential both to ameliorate the negative effects of undesirable sounds, to capture those sounds that contribute to the unique character of a place and to enhance the experience of place through the creation of sound.
References


Butler, Mark, Roland Chiasson, Richard Daury, Susan Dean, Sabine Dietz, Nancy MacKinnon, and Jamie Steel. “By the Sea: A Guide to the Coastal Zone of Atlantic Canada.” Department of Fisheries and Oceans, 1996.


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The members of the University of Guelph Research Ethics Board have examined the protocol which describes the participation of the human participants in the above-named research project and considers the procedures, as described by the applicant, to conform to the University's ethical standards and the Tri-Council Policy Statement, 2nd Edition.

The REB requires that researchers:

- Adhere to the protocol as last reviewed and approved by the REB.
- Receive approval from the REB for any modifications before they can be implemented.
- Report any change in the source of funding.
- Report unexpected events or incidental findings to the REB as soon as possible with an indication of how these events affect, in the view of the Principal Investigator, the safety of the participants, and the continuation of the protocol.
- Are responsible for ascertaining and complying with all applicable legal and regulatory requirements with respect to consent and the protection of privacy of participants in the jurisdiction of the research project.
The Principal Investigator must:

- Ensure that the ethical guidelines and approvals of facilities or institutions involved in the research are obtained and filed with the REB prior to the initiation of any research protocols.
- Submit a Status Report to the REB upon completion of the project. If the research is a multi-year project, a status report must be submitted annually prior to the expiry date. Failure to submit an annual status report will lead to your study being suspended and potentially terminated.

The approval for this protocol terminates on the EXPiry DATE, or the term of your appointment or employment at the University of Guelph whichever comes first.

Signature: Date: December 7, 2016

Stephen P. Lewis
Chair, Research Ethics Board-General