TRANSPORTATION INFRASTRUCTURE AND PSYCHOSOCIAL WELL-BEING

THE RELATIONSHIP BETWEEN NEW TRANSPORTATION INFRASTRUCTURE AND PSYCHOSOCIAL WELL-BEING: A CASE STUDY OF THE RED HILL VALLEY PARKWAY IN HAMILTON, ONTARIO

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Abstract

This research attempts to understand how the alteration of green space to install new transportation infrastructure has impacted the daily life and psychosocial health of area residents. Psychosocial health refers to the distress, dysfunction and disability manifested in a range of psychological, social and behavioural outcomes as a consequence of actual or perceived environmental exposure. A case study was employed using the Red Hill Valley Parkway (RHVP) located in Hamilton, Ontario. To investigate this research problem, a mixed methods approach was utilized with self-administered surveys (N=216) and in-depth interviews (N=21) of residents living within 1000 metres of the RHVP to understand how the parkway has affected the everyday lives of those living in close proximity to the road. The findings do not address specific characteristics of respondents who are more likely to report concerns with the parkway, as well the study may not represent the general population; nonetheless the findings provide us some insight into the lives of those who identify concerns with the parkway and how these concerns have affected their daily life. The findings of this research indicate that concerns are linked to distance as the majority of residents who express concerns about the parkway live within 200 metres of the road. The results suggest that the presence of the Red Hill Valley Parkway and the increase in noise and vehicle exhaust has contributed to negative perceptions of the neighbourhood, has led to an increase in annoyance, activity and sleep disturbances, and impacted the quality of life of residents. Residents experienced a number of psychosocial symptoms relating to the parkway as they no longer are able to use their home or outdoor environment like they used to which was essential for general well-being and daily behaviour. The study concludes by providing recommendations to assist policy makers in eliminating and mitigating such impacts, as well as outlining future studies which should focus on the long-term effects of exposure to transportation infrastructure and traffic on psychosocial health and well-being.

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RM 10

Table of Contents

List of Figures

List of Tables

CHAPTER 1: INTRODUCTION

1.1 The Research Problem and Context

Within society, people come into contact with many different environmental exposures or stressors that are known to affect their physical, mental, and social well-being. Traffic can be considered an environmental stressor affecting individuals in urban society. It is well known that transportation infrastructure and traffic have negative effects that are considered to be a chronic, consistent and daily hassle, affecting large numbers of people (Amundsen, Klaeboe, and Fyhri, 2008; Ohrstrom, 2004; Ouis, 2001; Song, Gee, Fan, and Takeuchi, 2007). This chronic and daily hassle can negatively affect both the physical and psychological health of those individuals exposed to the stressor (Abelson and Hensher, 2001; Bonita, Beaglehole, Kjellstrom, 2006; Brugge, Durant, and Rioux, 2007). On the other hand, there are environments that act as a health resource that promotes physical, mental, and social well-being (Abraham, Sommerhalder, and Abel, 2010; Frumkin, 2003). Studies have shown that contact with nature or natural environments act as a buffer or moderator of adverse conditions which can positively affect people's physical and psychological well-being (Gidlof-Gunnarsson and Ohrstrom, 2007; Hartig, 2007). Presently, constant change to various environments due to population and development pressures is creating residential environments with fewer natural areas. As transportation infrastructure and traffic increase and in some places replace natural areas, the health and quality of life of those who reside in close proximity will be negatively impacted (Whitelegg, 1997).

Health studies related to vehicular traffic reveals that people are concerned about the long-term impact exposure to traffic will have on health and well-being (Lipfert and Wyzga, 2008; Ohrstrom, 2004). However, a limited amount of research has focused on the impact altering the natural environment as a result of the transportation infrastructure has on the health and well-being of individuals. Does the alteration of the natural environment directly affect human health and well-being? What effect does the alteration of a restorative environment have on those who reside in close proximity? This research attempts to understand what impact the alteration of green space to install new transportation infrastructure has on the daily life and psychosocial health of residents who reside in close proximity.

1.1.2 Research context

This thesis uses a cross-sectional research design involving both quantitative and qualitative methods to determine the psychosocial health implications of residents due to the creation of new transportation infrastructure and the loss of natural area. While there is a growing body of research on the physical effects of traffic exposure, research on psychosocial impacts because of transportation infrastructure and traffic is limited.

Psychosocial impacts are defined as the "complex of distress, dysfunction and disability, manifested in a wide range of psychological, social and behavioural outcomes as a consequence of actual or perceived environmental contamination" (Dunn, Taylor, Elliott, and Walter, 1994, 1094). These impacts can occur at the individual, social, and community level. The focus of this research will be on the effects at the individual level. Specifically, this research will examine the emotional, behavioural and somatic effects of exposure to an environmental contaminant, in this case exposure to transportation infrastructure and traffic. For this research a case study approach was employed. The case study included neighbourhoods adjacent to the Red Hill Valley which is located in Hamilton, Ontario (see Figure 3.1). These neighbourhoods were deemed appropriate because a north-south parkway was built through the Red Hill Valley in 2007 (The Hamilton Spectator, 2007b). For this thesis four main research objectives are addressed:

1) To determine the prevalence of psychosocial impacts amongst people who reside within close proximity to transportation infrastructure and traffic;
2) To examine the impacts the new transportation infrastructure has on the lives of the residents;
3) To examine the coping mechanisms employed by individuals in the area faced with the impacts of increased traffic exposure;
4) To determine whether psychosocial effects are related to distance from the source and to length of residence.

1.2 Research Rationale and Contributions

There are a number of reasons that warrant the study of the effects of new transportation infrastructure and its impact on the health and well-being of individuals. First, traffic exposure is considered a chronic and daily stressor that has been known to have a negative effect on the health and well-being of residents residing within close proximity to the traffic (Ohrstrom, 2004; Song et al., 2007). Studies have shown that there is a rising trend of health concerns related to vehicular traffic as people constantly worry about the long-term impact of increased traffic exposure (Lipfert and Wyzga, 2008). Therefore, what is the impact new transportation infrastructure has on a population that has not previously been exposed to such a stressor? Second, long-time residents have lived in or near a quiet area prior to the construction of new infrastructure and have experienced the pre-traffic environment. On the other hand, newer residents chose to live in a neighbourhood with possible knowledge of the transportation infrastructure (Evans and Jacobs, 1981). Therefore, as new infrastructure is built in or near a quiet area, individuals who are more sensitive to the negative impacts will feel the effects more than individuals in areas with current transportation infrastructure (Van Wee, 2007).

Third, the benefits of natural areas such as green spaces are essential for the environment as well as to the individual. Green spaces, for example, active and passive

parks, (urban) forests, valleys, creeks, river and water fronts, are beneficial to the environment as they improve air quality by absorbing pollutants; they act as a moderator against urban noise; they reduce water runoff; and provide habitat for wildlife (Gatrell and Jensen, 2002). As well, green spaces provide benefits to the individual as they act as a restorative environment promoting positive health and well-being (Gidlof-Gunnarsson and Ohrstrom, 2007). Transportation infrastructures that are built – partially or entirely – through natural landscapes contribute to higher levels of air and noise pollution which can negatively affect the restorative quality of the natural environment and diminish the quality of life of those living close to such an environment (Hartig, 2007; Ouis, 2001).

Finally, the Red Hill Valley constituted one-third of all the parkland in the city of Hamilton and was the largest green space in the east end of the city (Friends of Red Hill Valley, 2005). However, the removal of this significant green space and tens of thousands of trees to make way for the new transportation infrastructure has impacts. The area not only provided habitat to a variety of animal species, offered leisure and recreational opportunities but also acted "as an important urban climate moderator and filter of pollutants" (McKay, 2001, 14). The alteration of this green space to accommodate the building of the parkway can lead to an increase in air pollutants that will not only contribute to poor air quality in Hamilton but will also have further implications on the global scale. As well, with the previous bypass route (Highway 403 to QEW), automobiles were carrying pollution around the town (Harvie, 1997). However, with the parkway, these vehicles that previously bypassed Hamilton come through bringing traffic, noise, and exhaust which will affect the health of residents. A study completed by researchers at McMaster University has linked unhealthy living and proximity to highways around Hamilton. Specifically the researchers found an "18% higher death rate for people living within 50 to 100 metres of Hamilton roads carrying 35,000 to75,000 vehicles a day" (Kanaroglou and Pengelly, 1998). The Red Hill Valley Parkway carries approximately 40,000 to 70,000 vehicles a day (City of Hamilton, 2010). As well, according to the Land Use Assessment report, the Red Hill Valley Parkway has the "potential to result in noise and air quality impacts as well as visual and aesthetic impacts on existing residents in the area" (City of Hamilton, 2003). As a result, the stress of worrying about such impacts puts a strain on the physiological and psychological well-being of the residents.

Furthermore, the residential neighbourhoods close to the parkway are home to a number of vulnerable populations. For one, the area is home to a high percentage of people aged 65 and over (The Hamilton Spectator, 2010); and studies have shown the elderly to be one of the populations most affected by traffic (Brugge et al., 2007; Frketich, 2010). As well, the areas along the Red Hill Valley also have one of the highest rates of respiratory – related emergency room visits and cardiovascular – related emergency room visits (The Hamilton Spectator, 2010). There are strong links between respiratory health and cardiovascular disease and exposure to traffic (Finkelstein, Jerrett, and Sears, 2004; Morgenstern, Zutavern Cyrys, Brockow, Gehring, Koletzko, Bauer, Reinhardt, Wichmann, and Heinrich, 2007) and as a result, the population in the area is at an

increased risk of further complications due to an increase in traffic exposure in the neighbourhood.

1.2.1 Contribution

Only a few studies on the effects of traffic on health have been done in Canada, as most studies focused on European examples. European cities differ from Canadian cities in the layout of streets and homes, as well as in the relative proportion of diesel to gasoline powered vehicles (Gauderman, Avol, Lurmann, Kuenzil, Gilliland, Peters, and McConnell, 2005). Of those studies conducted in Canada, most have focused on the impact of noise. This present research complements previous research by examining how the negative effects of transportation infrastructure and traffic, such as noise and air pollution, has impacted the living quality and health of neighbourhood residents. As a result, the research contributes to our understanding of the relationship between traffic and the health and well-being of individuals who reside in close proximity to the transportation infrastructure; specifically the effect new transportation infrastructure has on the everyday lives of residents. Furthermore, this research will contribute to a growing literature that seeks to address the relationship between the alteration of the natural environment and its effect on human health and well-being.

1.3 Chapter Outline

This thesis consists of 7 chapters. This chapter, **Chapter 1** (*Introduction*), introduces the topic and provides the background and rationale for this research. **Chapter 2** (*Literature Review*) provides a review of the literature on the impacts of environmental exposures on the environment. The literature examines environmental stress and coping; psychosocial impacts of environmental exposure; the physiological, psychological, and ecological effects traffic and transportation infrastructure have on the individual and the environment; and the benefits of access to green space.

The next chapter, **Chapter 3** (*Methodology*), describes the methodology used for this research, specifically the research methods used, site and sample selection, research design, and data collection. Following the discussion on the methods employed, **Chapter 4** (*Case Study: the Red Hill Valley*) provides a description of the study area, the Red Hill Valley, and the history surrounding the parkway.

In Chapters 5 (*Descriptive Analysis*) and 6 (*In-depth Interviews*), the findings of the study are presented. **Chapter 5**, a descriptive analysis of the survey results presents respondents' perceptions of the neighbourhood, followed by site-specific concerns, effects, and actions. **Chapter 6** presents the results of the in-depth interviews to investigate parkway-related experiences and concerns. The chapter examines how the presence of the parkway affects the daily lives of residents living in the vicinity of the

road by examining neighbourhood perceptions; and site related concerns, effects, and actions.

The final chapter, **Chapter 7** (*Discussion and Conclusion*), presents the major findings of the research by linking the results to the literature. The thesis concludes with recommendations policy makers can take to eliminate and mitigate such impacts, as well as areas of future research.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The relationship between humans and their environment is a major area of study within geography. Specifically, research has focused on the impact the environment has on the health and well-being of individuals. The World Health Organization (WHO) has defined health as "a state of complete physical, mental, and social well-being and not merely the absence of disease or infirmity" (World Health Organization, 2003). Within society, individuals come into contact with many different environmental exposures that have been known to affect their physical, mental, and social well-being. Research has shown in numerous contexts that environmental exposures have been known to threaten health; however the natural environment has also been known to enhance health (Fumkin, 2001). As the world's population continues to grow and cities continue to expand, negative environmental exposures will encroach, alter or destroy natural areas that are considered to be beneficial to health. Within this research, the negative impacts transportation infrastructure and traffic have on a natural environment surrounding residential homes will be explored.

This chapter will review the literature which addresses the impacts of environmental exposures on the environment. The literature examines environmental stress and coping in general, followed by a review of the psychosocial impacts of environmental exposure. Second, the physiological, psychological, and ecological effects transportation infrastructure and traffic have on the environment will be discussed. Finally, the benefits of access to green space will be examined.

2.2 Environmental Stress

"Stress has become a popular construct for explaining a wide variety of outcomes" which are mostly negative and can lead to a number of conditions such as anxiety and discomfort (Baum, Singer, and Baum, 1982, 15). This concept can be used as a tool to analyze different environmental stressors, specifically the relationship between people and their surroundings (Evans, 1982). "Stress is the process by which environmental events or forces, called stressors, threaten an organism's existence and well-being and by which the organism responds to this threat" (Baum et al., 1982, 15). Many environmental risks have direct effects on human health and well-being. However, many of these environmental risks also have indirect effects on human health and well-being (Evans, 1994). Environmental stress theory can be used to broaden the understanding of human health and well-being, and how it is affected both directly and indirectly by environmental conditions.

There are three major classes of stress that vary in intensity, duration, and impact (Lazarus and Cohen, 1977). The first type of stress is cataclysmic phenomena which are sudden and extremely powerful events that affect large numbers of people (Krupat, 1985). These stressful events range from natural disasters such as floods and earthquakes to oil and gas shortages (Baum et al., 1982). The second class of stressor deals with events that can be sudden and powerful, but deal with a single individual or small set of people (Krumpat, 1985). Such events include illness, death, or the loss of one's job (Baum et al., 1982). Due to fewer people being involved, there is increased pressure on the individual to cope with the stressor as their social support is limited (Baum et al., 1982). Finally, the third stressor focuses on "daily hassle" events that are chronic and repetitive problems encountered in daily life (Lazarus and Cohen, 1977). Daily hassles that can cause stress include neighbourhood problems, crowding, noise, and pollution (Baum et al., 1982). Chronic stressors may not be as abrupt and powerful, however they pose as much of a problem as the acute stressors. For example, individuals may not perceive the stressor to be severe, however due to the regular and prolonged exposure on a daily basis, the stressor becomes a problem (Baum et al., 1982).

According to Baum et al. (1982), after a stressor has been identified, there are many factors that affect the evaluation of the stressor and whether the stressor is considered threatening. First, attitudes towards the stressor are important in perceiving and appraising of stressors. Annoyance levels are a good measure to determine an individual's attitude toward the stressor. Second, the perception of risk and danger of a stressor will also determine the evaluation of the stressor as knowledge of a particular stressor affects the individual's perception of the risks and dangers posed by the stressor. Third, "factors related to individuals' prior experiences and predispositions are also important in mediating the effects of stressors" (Baum et al., 1982). Control is the final factor that affects the evaluation of the stressor, and refers to the ability to cope, predict, and determine what will happen (Baum et al., 1982).

Another important component of stress theory is the response made by the organism (Baum et al., 1982) as "stressors lead to the implementation of coping mechanisms to effectively minimize and/or eliminate stressful impacts" (Haalboom, 2002, 23). If an individual appraises an environmental condition as threatening then a set of coping processes come into play with the goal of removing the threat (Evans, 1994). Coping response is likely to be successful if one is familiar with the stressor; if the stressor is specific in time and space; and the individual has knowledge of the effectiveness of previous coping strategies and responses (Baum et al., 1982). Lazarus and Folkman (1984) refer to two general types of coping processes: direct action and palliative coping. Direct action or instrumental coping refers to attempts made by the individual to change the environmental condition. Direct action deals with the stressor directly (Baum et al., 1982), for example, closing the window in response to air pollution (Evans, 1994), joining a community organization or relocating to a new area (Haalboom, 2002). Typically, these coping processes are used when the individual feels they can do

something about the situation or if they feel they are in control of their environment (Lazarus and Folkman, 1984).

The second coping strategy, palliative coping, is directed towards the self and involves cognitive regulation of emotion (Campbell, 1983). Also known as emotion-focused coping (Haalboom, 2002), this coping strategy refers to individual adjustments to the environmental condition in order to reduce the threat (Lazarus and Folkman, 1984) by making themselves feel better or experience less discomfort (Baum et al., 1982). Examples of cognitive and emotional responses to the stressor include denial, acceptance, and withdrawal (Haalboom, 2002). Here, the individual deals with the stress emotionally by altering their "internal environment" to reduce the threat (Baum et al., 1982). This alteration may include cognitive reappraisal of a stressful situation (for example, "it isn't really that noisy here"), or insulation from the stressor through defence mechanisms such as taking drugs, using alcohol, learning to relax or engaging in meditation (Baum et al., 1982).

Two other coping responses that can be employed to reduce the threat of a stressor include information seeking and inhibition of action (Campbell, 1983). Through information individuals can increase their sense of control and confidence; as well by seeking out information one can gain some control over the stressor's effect. Inhibition of action refers to individuals doing nothing to cope with the stressor; they are allowing things to happen as they do (Baum et al., 1982). As well, other resources that are able to help individuals cope with a stressor include social support and health (Lazarus and Folkman, 1984). For example, social support can be drawn upon during stressful situations, as the emotional support gained through contact with others help people cope with the stressor (Haalboom, 2002). For example, Fleming, Baum, Gisriel, and Gatchel (1982) found that people who had higher levels of social support after the Three Mile Island nuclear accident were more likely to report fewer psychological symptoms of stress. In terms of health, "[those] in a good state of health will have more energy to effectively deal with an environmental stressor" than those in a weaker state of health (Haalboom, 2002, 26).

Finally, the effects of stressors can be classified into different categories (Evans, 1994). The first effect is the physiological effects of the stressor, for example cardiovascular arousal. Performance measures are the second effect of stressors, which focus on the information-processing capabilities. Third, interpersonal behaviours, such as mood and social interaction are affected by the stressor, which can include increased aggression. Observation measures of stress are another effect of the stressor and include strain on speech, signs of anxiety, and nervousness. Finally, adaptation processes also have an effect on human health and well-being. Such adaption measures can cause fatigue and reduced capacity to deal with environmental demands.

2.3 Psychosocial Health

Overall, stress can cause wear and tear on the physiological and psychological well-being of individuals (Baum et al., 1982). Even though a particular environmental problem may not pose immediate threat to an individual, the constant worry about potential effects from the environmental problem can cause the individual's health to deteriorate. This perceived exposure can lead to psychosocial impacts and as a result, "the mere threat of possible contamination can be considered an exposure which may elicit psychosocial impacts such as concern, fear, and anxiety" (Baxter, 1992, 17). Therefore, studying the psychosocial impacts to health and well-being are important since "psychosocial impacts associated with environmental exposures have become increasingly recognized as legitimate health impacts" (Crighton, 2000, 7). Psychosocial impacts are defined as the "distress, dysfunction and disability, manifested in a wide range of psychological, social and behavioural outcomes as a consequence of actual or perceived environmental contamination" (Dunn et al., 1994, 1094).

According to Elliott (2008) psychosocial impacts are important to study for a number of reasons. First, psychosocial impacts of an environmental exposure are just as important to health as actual physical ones, as people constantly worry about the long-term health effects of exposure. As well, psychosocial impacts are considered a health impact; as one cannot have full health if they are anxious, worried and depressed. Finally, psychosocial impacts are related to physiological health, as constant stress from actual or perceived exposure can lead to physical illnesses. For instance, when a chemical factory exploded in Seveso, Italy in 1976, workers and local residents received high doses of dioxin exposure (Bertazzi, 1989). Dioxin exposure is believed to be a cancer hazard to people (U.S. Environmental Agency, 2008). After the chemical factory blew up in Seveso, researchers were expecting to find elevated rates of cancer among the population they had followed for over 30 years (Bertazzi, 1989). However, instead of finding elevated cancer rates, the researchers found a five-fold increase in cardiovascular disease. The researchers hypothesize that the stress of worrying about developing cancer caused the exposed population to worry themselves into cardiovascular disease (Bertazzi, 1989).

There are two issues that need to be considered when investigating psychosocial impacts of an environmental exposure: exposures and impacts. Environmental exposures which vary in type and magnitude range from acute to chronic (Baum, Gatchel, and Schaeffer, 1983). Acute exposures include natural disasters such as floods, hurricanes, and earthquakes; as well as technological disasters such as the accident at Three Mile Island (Baxter, 1992). These exposures are short term events where psychological disturbances subside once the event ends and effective coping increases (Baum et al., 1983). On the other hand, chronic exposures such as exposure to pollution, low level radiation, and toxic contamination from hazardous waste sites and non-hazardous waste sites (Baxter, 1992) lead to years of threat, uncertainty and confusion, and therefore is

"considered a chronic aftermath that has inhibited recovery and generated stress of its own" (Baum et al., 1983, 565).

The second issue that needs to be considered is the range of psychosocial impacts that may occur. These impacts occur at the individual, social, and community level. The individual level impacts include emotional (worry, anger, fear), behavioural (task performance), and somatic (headaches, fatigue, depression); at the social level impacts may be positive (social cohesion, cooperative coping) or negative (family disruption, social isolation); and the community level can experience positive (empowerment and enablement) and negative (stigmatization and dislocation) impacts (Baxter, 1992; Dunn et al., 1994). The focus of this thesis will be the effects of exposure at the individual level.

At the individual level, studies have examined different levels of concern that have an impact on psychosocial outcomes. These can be categorized as follows: health, economic, safety, political, aesthetic, and environmental. Health concerns from exposure can cause fear, anxiety and worry among exposed individuals; individuals have economic concerns with regard to lowered property values; safety concerns involve both traffic accidents and the ability to monitor exposure; politically individuals may be concerned with the way the government is involved or had been involved; aesthetic concerns relate to the smell or visual appearance of the exposure; and air, water and noise pollution are environmental concerns expressed by the individual (Baxter, 1992).

Haalboom (2002) notes six components of environmental exposures that can have an effect on psychosocial health. These components are the perceived costs versus benefits, where the stressor becomes more accepting if the benefits outweigh the costs; the degree of control, as the stressors negative impacts will be reduced if the individual feels they have more control over the stressor; the ability to place blame to the government, organization, or individual; the duration of the event as the longer the stressful event the increase in adverse effects to the individual; visibility of the contaminant as stressors that are invisible are more likely to increase levels of stress; and the uncertainty surrounding stressors "as stressors that contain more ambiguity tend to increase the psychosocial impacts because the situation can be understood in varying, indeterminate ways" (Haalboom, 2002, 23).

2.3.1 Psychosocial research

Research on psychosocial impacts associated with environmental exposure have demonstrated "the complexity and seriousness of impacts associated with real or perceived contaminate exposure" (Crighton, 2000, 21). Studies have shown that residents living close to an affected area have been found to have higher levels of emotional distress, psychiatric disorders, and mental health problems than those living further away (Havenaar and van den Brink, 1997). For instance, Baum et al. (1983) studied the psychophysiological impact of living within close proximity to a nuclear accident at Three Mile Island. The researchers found residents within the Three Mile Island area

exhibited more symptoms of stress than people in the control group. As well, a 1996 study by Havenaar et al. found 65% of the sample population scored above the threshold on the General Health Questionnaire, and this is indicative of probable case of emotional distress (Crighton, 2000). Furthermore, studies on the effects of exposure to solid waste facilities have shown individuals who reside near such facilities experience greater psychosocial symptoms then those further away (Elliott, Taylor, Walter, Stieb, Frank, and Eyles, 1993).

Research on psychosocial effects related to traffic exposure has also been studied in the past (Gidlof-Gunnarsson and Ohrstrom, 2007; Ohrstrom, 1989; Ohrstrom, 1991; Ohrstrom, 2004). For example, Ohrstrom's 1989 study looked at residents who had lived for many years in an area with high levels of road traffic noise during night hours. The author found that both sleep quality and mood were affected more in the noisy area than in a control area. As well, in Ohrstrom's 1991 study, residents who lived in apartments with windows facing the street felt depressed more often compared to those who had windows facing the courtyard. A commonality of these two studies is residents with exposure to high levels of road traffic experience greater psychosocial symptoms than those not exposed. In contrast, some studies have revealed that individual's psychosocial well-being has been known to improve. For instance, Ohrstrom's 2003 study found an improvement in psychosocial well-being as the number of psychosocial symptoms reported (tired, uncomfortable, unhappy, unsociable, irritable, worried) decreased as a result of a reduction in traffic. As well, research undertaken by Gidlof-Gunnarsson and Ohrstrom (2007) examined psychosocial well-being in relation to green space. The authors found an association between availability to nearby green areas and improved psychosocial well-being by reducing long-term exposure to noise annoyances; residents with better access to green spaces exhibited less stress-related psychosocial symptoms (very tired, angry, stressed). These studies attempt to provide a better understanding of the impacts traffic exposure has on the psychosocial health and well-being of exposed individuals; this research will attempt to expand and build upon the existing research, specifically the impact transportation infrastructure and traffic has on residents living along a green space.

2.4 Environmental Impact of Traffic Exposure

Motor vehicle exhaust, automobile noise, and traffic volume and congestion are common occurrences in modern urban society. Official recognition of the significant contribution of motorized vehicles to air pollution dates to the late 1950's when the State of California passed the first regulations on motor vehicle emissions (Balbus and Triola, 2005). Since then, governments have enacted policies and allocated funds in an effort to reduce, mitigate or prevent environmental problems such as exposure to road traffic and their anticipated negative impacts on human health (Woods, Konisky, and Bowman, 2008). However, even with mitigation efforts in place, traffic continues to pose a serious issue to the environment and overall health and well-being of the population. According

to Roseland (1992), the environmental impacts associated with transportation can be broken down into four categories:

- Vehicle manufacturing – impact on the environment of resource extraction; pollutants generated from extraction and disposal;
- Infrastructure effects – congestion, visual intrusion, and severance of natural resource such as land;
- Vehicular effects – air, water, and noise pollution; contribution to global warming; safety to user and non-user; and health effects;
- Traffic volume effects – congestion; and building of further infrastructure.

The two environmental impacts of concern for this thesis involve vehicular (air and noise pollution, health effects) and infrastructure effects (intrusion into a natural area). The research to be examined will look at the impacts traffic has on the health and well-being of individuals; and the impact traffic infrastructure has on existing environments, both the built and natural environment.

2.4.1 Physiological health effects of air pollution

Air pollution can be considered a chronic environmental condition that can pose a serious threat to the health and well-being of individuals. According to the Environmental Protection Agency, the transportation sector accounts for 30 to 50% of important criteria air pollutants (Balbus and Triola, 2005). Some major health problems can be attributed to exposure to urban air pollution, specifically exposure to automobile exhaust (Bonita et al., 2006; Brugge et al., 2007). The pollutants that have most consistently been reported at elevated levels near roads include ultrafine particles, black carbon, nitrogen oxides, carbon monoxide, and particulate matter (PM_{10} and $PM_{2.5}$) (Brugge et al., 2007). These pollutants not only affect air quality but also the overall health of individuals. The majority of research on exposure to traffic took an epidemiological approach and focused on the physical health effects of exposure. Individuals exposed to vehicular pollution face a number of adverse health outcomes (Lipfert and Wyzga, 2008) such as premature mortality (Finkelstein et al., 2004); cardiovascular disease (Brugge et al., 2007); lung cancer (Visser, van Wijnen, and van Leeuwen, 2004); impaired respiratory health (Morgenstern et al., 2007); and asthma prevalence (Brugge et al., 2007). These studies have shown that individuals residing in areas near heavy traffic experience greater health effects than those further away (Finkelstein et al., 2004).

There are many factors that influence individual's exposure to traffic pollution. Distance from roadways influences exposure, as the amount of pollution decreases the further away from the source of emission (Gower, Shortreed, and Chiottii, 2005). However, minimum distances from roads vary among studies as it is not always clear whether "distance from a roadway" is measured by the roadway centerline or edge (Lipfert and Wyzga, 2008). Brugge et al. (2007) found people living or otherwise

spending substantial time within 200 metres of highways are exposed to highway pollutants more than persons living at a greater distance; while Finkelstein et al. (2004) found that the highest concentrations of emissions occur within 50 to 100 metres of a major roadway. Lipfert and Wyzga, (2008) make note of three other important factors influencing exposure: traffic intensity, traffic density, and position of houses. Traffic intensity and density influence exposure as increase in vehicles per day or hour affect exposure outcome. The position of housing with respect to roadways influence exposure as some buildings or homes are built directly beside a major roadway, while others are separated by very short setbacks from the street (Lipfert and Wyzga, 2008). Those homes built directly beside will experience the negative effects of traffic more than homes built further away. As well, position of the windows and whether they are open can affect exposure to traffic nuisances, as outdoor environmental pollutants become part of the indoor air in homes (Oliver and Shackleton, 1998).

2.4.2 Psychological health effects of air pollution

Psychological health may also be significantly affected by air pollution. Some social psychologists tend to view air pollution as primarily a biological problem that can be solved by applying some technological solution (Rotton, Frey, Barry, Milligan, and Fitzpatrick, 1979). However, the effect of air pollution on human behaviour is more complex and encompasses both the direct and indirect effects of air pollution. In contrast to studies looking at direct health effects on the individual from pathogenic exposure to air pollution (Zeidner and Shechter, 1988), the psychological effects can be considered the indirect effects of air pollution; the annoyance, irritation, and displeasure of breathing in the polluted air which can lead to psychiatric symptoms, including anxiety and changes in mood, cognition, and behaviour (Colligan, 1981; Lundberg, 1996). It has also been reported that the public is as concerned about the indirect effects as much as they are of the direct effects (Rotton et al., 1979).

The effect of air pollution on human behaviour has been studied using the psychological stress perspective which has linked the psychological, behavioural and health outcomes of exposure to air pollution (Zeidner and Shechter, 1988). According to the stress perspective, "the resultant strain on individuals exposed to acute levels of ambient air pollution over time constitutes a continuous overload condition, often characterized by heightened levels of anxiety, tension, anger and depression" (Zeidner and Shechter, 1988, 192). The anxiety, fright and fear associated with exposure to air pollution can cause heart and breathing rates to increase (Colligan, 1981).

2.4.2.1 Stress and air pollution

Stress from exposure to actual or perceived air pollution can cause symptoms of illness. Studies have shown that living near polluted communities have caused elevated rates of stress and anxiety (Lundberg, 1996). The stress of living in a contaminated environment can reduce one's coping capacity and lead to depressive symptoms as well

as physical illness (Zeidner and Shechter, 1988). Given the established effects of air pollutants on the physiological health of humans, dealing with "the chronic discomfort of such effects could lead to more serious mental health consequences" (Evans and Jacobs, 1981, 99). For instance, the constant worry about the potential effects of air pollution from living near heavily trafficked roads can put a strain on an individual's overall health. In a Norwegian study, 70% of residents in the eastern part of Oslo stated that they worry about the long-term health effects of road traffic pollution (Amundsen et al., 2008). As well, air pollution affects human behaviour by limiting the amount of time spent outdoors (Evans and Jacobs, 1981). Limiting physical activity and the amount of time outdoors can also lead to increased stress and anxiety, especially for vulnerable populations who have to worry about the effect pollution levels will have on their health (Brugge et al., 2007). As a result, these neighbourhoods with heavy volume traffic can be considered an unhealthy area that has an enormous impact on the quality of life of humans (Williams and Bird, 2003), as "it's not just about the physical characteristics of the spaces in which people live but also how they feel about, identify with and act in their place of residence that affects their health" (Bolam, Murphy, and Gleeson, 2003, 400).

2.4.2.2 Annoyance and air pollution

The chronic, consistent, and daily hassle of air pollution has been considered a major source of environmental stress in urban society, affecting large numbers of people. Even though some air pollution may be colourless and odourless (Amundsen et al., 2008), many people complain about the nontoxic and unpleasant components of air pollution (Rotton et al., 1979). The main source of air pollution in cities derives from exhaust fumes from automobiles (Forsberg, Stjernberg, and Wall, 1997) and people consistently complain about being annoyed from this vehicular exhaust (Amundsen et al., 2008). Studies have established an association between annoyance and vehicular air pollution where higher exposure to traffic resulted in higher levels of annoyance (Amundsen et al., 2008; Forsberg et al., 1997; Jacquemin, Sunyer, Forsberg, Gotschi, Bayer-Oglesby, Ackermann-Liebrich, de Marco, Heinrich, Jarvis, Toren, and Kunzli, 2007; Rotko, Oglesby, Kunzli, Carrer, Nieuwenhuijsen, and Jantunen, 2002). In Ohrstrom's (2004) study, respondents in the exposed area, reported exhaust fumes as the second most dominate source of annoyance relating to traffic; while the study by Forsberg et al. (1997) found that respondents reported traffic exhaust as the most dominate source of annoyance as subjects report being annoyed by dirty and sooty air more than smelly or irritating air.

Annoyance due to air pollution can be considered as a health problem. Specifically, annoyance from air pollution can be considered as an ambient stressor causing stress-mediated diseases (Amundsen et al., 2008). People may be aware of the risks of air pollution but may not be able to escape which can cause frustration and lead to higher annoyance (Jacquemin et al., 2007). Individuals more likely to be annoyed by exhaust fumes include women, those with a negative attitude to traffic, and those with respiratory symptoms (Forsberg et al., 1997). It has been argued that women are more

sensitive to environmental risks and have a better sense of smell than males (Jacquemin et al., 2007). As well, some researchers hypothesize that women spend more time at home, as according to the EXPOLIS study, which found adult women spent more time at home on average than males (Rotko et al., 2002). Therefore, women would have a better perception of the home environment leading to higher annoyance to air pollution (Jacquemin et al., 2007). It is unclear why individuals with respiratory illness report higher annoyance but researchers speculate that "respiratory symptoms cause subjects to be more sensitive and vulnerable to irritant substances such as air pollution" (Jacquemin et al., 2007, 816). Therefore, studies have shown that the psychological impacts of air pollution on humans are just as important to health as the physical effects.

2.4.3 Psychological health effects of traffic noise

Noise pollution is another major environmental concern that poses a threat to individual health and well-being. Sources of noise in communities, residential dwellings, offices, and factories are numerous. They range from the moderately disturbing sounds of neighbours, children, pet, and televisions (Michaud, Keith, and McMurchy, 2005) to the high-intensive sounds of aircraft, automobiles, trains, trucks, and construction equipment that plague neighbourhoods (World Health Organization, 2000). Noise, defined as unwanted sound, has been considered an environmental nuisance for many years (Ohrstrom, 2004). Many people around the world, especially large cities are exposed to unwanted community noise, and the health effects from these exposures are considered to be an important public health problem (World Health Organization, 2000). Studies have shown that environmental noise can lead to a variety of adverse health effects such as hearing loss, hypertension, and ischaemic heart disease (Ohrstrom, 2004). While environmental noise may not directly cause mental illness, it is believed it can lead to the development of some mental disorders (World Health Organization, 2000).

Traffic noise is one of the most constant and chronic noises found in residential settings, and it is more frequently heard than other environmental noises, such as noises from aircrafts, trains and factories (Langdon, 1977; Michaud, Keith, and McMurchy, 2008). Studies have been conducted in laboratory settings (Ward and Suedfeld, 1973), as well as out in the field, which have shown that noise from traffic exposure has an effect on the health and well-being of people (Langdon, 1977; Lercher and Kofler, 1996; Michaud et al., 2008; Ohrstrom, 2004). Traffic noise not only affects the individual's physiologic health but also their psychological well-being. Many of these studies compared a noisy area (one near a major traffic route) with a control area and determined that psychological symptoms, such as irritability, nervousness, feelings of unhappiness, and depression are prevalent in individuals residing in the noisy area (Michaud et al., 2008; Ohrstrom, 1991; Ohrstrom, 2004). A distance decay effect has also been noted in the literature, where individuals residing closer to traffic feel a greater effect than those residing further away (Michaud et al., 2008; Ohrstrom, 2004).

There have also been studies that looked at a reduction in the volume of road traffic and how this reduction will improve health and well-being. In Sweden, measures were undertaken to improve the environmental situation of people living near heavily trafficked roads, and one of these measures was the construction of a tunnel over a major roadway. With the completion of the tunnel, Ohrstrom (2004) found that road traffic on the main road decreased by 90%; specifically the introduction of the tunnel had an effect on improving the psychosocial well-being of the surrounding residents.

2.4.3.1 Noise and annoyance

According to the World Health Organization (2000), noise annoyance is considered an adverse health impact, where strong annoyance has been associated with increased risk of stress-related conditions (Michaud et al., 2008). A definition of annoyance is "feelings of displeasure associated with any agent or condition, known or believed by an individual or group to adversely affect them" (World Health Organization, 2000). The WHO recommend an outdoor noise level of 55 decibels (dB) to protect from serious annoyance, however automobiles range from 80 to 90 dB (Ouis, 2001). Michaud et al. (2005) found traffic noise was identified as the most annoying source of environmental noise reported by Canadians; specifically 39.9% of people were "extremely" annoyed. As well, those individuals residing less than 30 metres from roads were six times more likely to be bothered by noise than residents half a kilometre away (Michaud et al., 2008). Reduced traffic has also shown an association with annoyance, where individuals report a decrease in annoyance to road traffic. Ohrstrom (2004) found that noise annoyance decreased significantly in the exposed area as a result of the introduction of the Lundby Tunnel. Specifically, the percentage of those reporting they were "very annoyed" decreased by 50%. Road traffic noise has also been deemed most annoying in comparison to other environmental nuisances such as traffic exhaust, vibrations, and dust and odours from industries (Ohrstrom, 1991; Ohrstrom, 2004).

Resident's annoyance towards road traffic has been viewed to have a negative impact on one's health. Michaud et al., (2008) noted that those individuals that reported they were highly annoyed by road traffic noise were more likely to report this annoyance had a negative effect on their health. Road traffic annoyance has been reported to cause a number of psychological symptoms, with higher psychological symptoms found in the exposed area. For instance, symptoms that are prevalent in the exposed area are tiredness, irritability, wanting to be left alone, worried and nervousness, uncomfortable/upset stomach, and unhappy and depressed (Ohrstrom, 2004).

Some studies demonstrate that some individuals vary in their sensitivity to noise which could explain their variability in reporting annoyance to traffic noise than others. For instance, Michaud et al. (2008) found that females were significantly more likely than males to report they were extremely annoyed by noise (4.5 versus 2.4). Differences in sex was one of a few demographic characteristics looked at by Michaud et al., that was statistically significant at the $p<0.05$ level. However, a potential reason for women being

more highly annoyed by noise is they are more exposed to the noise than men because men are often away at work (Jacquemin et al., 2007). In terms of age, individuals between the ages of 25 and 44 years of age were more likely to indicate they were highly annoyed by road traffic noise; however the authors did not give an explanation as to why this may be (Michaud et al., 2008). The researchers did not find any statistically significant differences between the educational attainment of participants, however they noted that post-secondary students report a higher increase in annoyance due to road traffic noise.

2.4.3.2 Noise and disturbance on daily activities

Prolonged exposure to noise can lead to a disruption of daily activities, mainly while at home. Noise interference with speech comprehension can lead to problems in communication, irritation, and misunderstandings (World Health Organization, 2000). Michaud et al. (2008) reported a disruption in communication between individuals; specifically 18% of respondents had to raise their voice while outside their homes in order to speak to someone. Again, those residing closer to the traffic were more likely to raise their voice to speak to someone next to them compared to those living further away from the heavily trafficked road. As well, 13% of respondents found traffic noise interfered with hearing other people indoors. Ohrstrom (2004) reported 15% of individuals in the exposed area, before the Lundby Tunnel was built, were disrupted while having a conversation on the telephone. However, when traffic noise was reduced, none of the residents reported telephone conversations being disrupted. As a result of the noise, people have to raise their own voice just to be heard, and this causes a strain on the speaker (World Health Organization, 2000).

Daily activities are also disrupted by traffic noise. The ability to watch television or listen to the radio is severely compromised as a result of the environmental nuisance. Michaud et al. (2008) found that traffic noise interrupted resident's ability to watch television and listen to the radio. Ohrstrom (2004) also found individuals reporting disturbances in daily activities, such as radio and television disturbances. However, when the Lundby Tunnel was built, activity disturbances were reduced. Exposure to traffic noise can also affect other daily tasks. Michaud et al. (2008) reported 11% of respondents indicated traffic noise affected their ability to concentrate on tasks such as reading or writing. Ward and Suedfeld (1973) also noted that students found traffic noise to interfere with the ability to hear lectures and take notes in the classroom, which led to overall less participation and attentiveness.

Enjoyment of outdoors is also disrupted as a result of road traffic noise (Lercher and Kofler, 1996; Michaud et al., 2008; Ohrstrom, 2004). Outdoor activities such as gardening, recreation, and the ability to be on the patio or terrace have been reported to be negatively affected by road traffic noise. Ohrstrom (2004) reported 60% of respondents did not like to be outdoors or on the patio. Individuals perceive that a disruption in such activities has a negative effect on their quality of health (Lercher and Kofler, 1996;

Michaud et al., 2008). In particular, not being able to enjoy the outdoors contributed to an overall negative effect on mood, which can lead to symptoms of stress and depression (Ohrstrom, 2004). Even in rural, alpine areas, Lercher and Kofler (1996) note that outdoor activities and recreation are affected by road traffic noise, and lead to a decrease in life satisfaction, loss of well-being, and overall poorer health ratings. Residents that live away from any heavy traffic noise report a greater enjoyment of outdoors due to the quiet and calmer environment (Ohrstrom, 2004).

2.4.3.3 Noise and sleep disturbances

"Uninterrupted sleep is known to be a prerequisite for good physiological and mental functioning of healthy persons" (World Health Organization, 2000). The WHO has set standards for noise levels indoors to protect against sleep disturbances (Ohrstrom, 2004). According to the WHO, to get a good sleep, indoor sound levels should not exceed approximately 45 dB more than 10 to 15 times per night (World Health Organization, 2000). However, neighbourhoods exposed to heavy traffic have been shown to have indoor sound levels higher than expected. In Ohrstrom's (2004) study, households in the neighbourhood closer to traffic had indoor noise levels of 55 dB (rooms facing road) and 50 dB (rooms facing away).

Exposure to noise at night can directly and indirectly affect the quality of sleep. Regardless of the length of residence near an area marked by noise annoyance, residents experience disturbances to their sleep quality (Ohrstrom, 1989). Quality of sleep in the noisy area was worse than in the control areas in many of the studies, with individuals reporting a greater difficulty in falling asleep, a greater difficulty in going back to sleep, poorer sleep quality, and greater tiredness in the morning (Michaud et al., 2008; Ohrstrom, 1989). Ohrstrom (2004) also found a correlation between sleep disturbance and noise. As traffic volume decreased due to the introduction of the Lundby Tunnel, residents reported improvements in sleep quality as a result of a quieter area; specifically improvements were found in sleeping with open windows. The quality of sleep is not only affected by individual sensitivity to noise (Ohrstrom, 1989) but also by the location of the rooms and windows in relation to the road. Residents report higher sleep disturbances when their windows face the noisy streets (Langdon and Buller, 1977). However, Ohrstrom (1989) found no correlation between sleep quality and location of the bedroom or type of window, indicating that the lack of a relationship might be due to selection; those who are more concerned or sensitive to noise may have changed the type of window and their location of the bedroom.

The indirect or after effects from night-time noise are the effects measured the following morning (World Health Organization, 2000). Tiredness can lead to the inability to function properly, where studies have shown a decrease in individual's performance the next day (Ouis, 2001). Individuals exposed to nocturnal noise are also significantly slower in executing tasks than more rested subjects (Ohrstrom, 1989; Ouis, 2001). Sleep deprivation can affect learning and memory, where people who slept after

learning a task did better on tests as they are better able to concentrate (Harvard Medical School, 2006). Poor sleep quality can also lead to personal disorders, such as nervousness, anxiety and depression (Ouis, 2001). Individuals who reported that they were awakened by road traffic noise and found it difficult to fall asleep were more often anxious, nervous and depressed than individuals who did not report any disturbance while sleeping (Ohrstrom, 1989). Finally, sleep deprivation can lead to cardiovascular disease (Harvard Medical School, 2006) as noise levels lead to increase stress in residents living in a noisy neighbourhood (Ohrstrom, 1989).

2.4.4 Effects of transportation infrastructure

Another approach to studying the impact of traffic relates to the destruction or disturbance transportation infrastructure and traffic have on its surroundings. This is linked to the idea that traffic and its related components, design, construction and maintenance of roads, have an impact on existing environments. These existing environments fall into two categories: residential neighbourhoods and natural habitats. In the early years of highway development, the building of new highways received popular and unwavering support by the majority who viewed construction as essential to economic growth (Johnston, 2004). However, by the mid-1960s, protest against highway construction became common (Deka, 2004), as these new highways became "symbols of dissent and division, with demonstrations...and bitter election battles, especially where roads involved demolition of houses or loss of green space" (Goodwin, 2001, 22). Some examples of protests against highway construction occurred in New York City, Washington D.C., and Memphis, Tennessee, where protesters argued highway infrastructure would demolish or align through minority and low income areas (Deka, 2004). As protests against highways became common over time, researchers started studying the relationship between highway construction and residential neighbourhoods. These studies found that race rather than income was associated with living close to transportation infrastructure (Boone and Modarres, 2006; Schulz, Williams, Israel, and Lempar, 2002); and this led to the degradation of the physical quality of the neighbourhood; many minority residents being forced to give up property; community life becoming disrupted; and an increase in crime (Deka, 2004).

The issue of habitat destruction revolves around the idea that roads can disrupt wildlife and environmentally sensitive areas, such as green space. Studies have shown that traffic and related infrastructure can have a number of negative effects. Traffic infrastructure is aesthetically damaging as it can lead to an intrusion of a natural area or result in the complete destruction of that natural area (Foreman and Alexander, 1998). For instance, the United States in the past 40 years has seen the loss of over a million acres of natural habitats as a result of highway infrastructure (Bae, 2004). As well, Geist and Lambin (2002) assessed 152 case studies to determine the proximate and underlying causes of deforestation and found that transportation infrastructure accounted for 61% of the cases. The intrusion of a new road or extending an existing road can also lead to recreational settings, urban green spaces, and natural areas being sacrificed or modified,

which in turn leads to unwanted sounds of cars in places valued for their quietness and solitude (Hartig, 2007). This loss of access to restorative environments or compromised restorative quality can lead to further health implications (Jim, 2004). Finally, studies have found that traffic can also change the dynamics of plant species causing vegetation to be covered by dust from vehicles and the road affecting photosynthesis, respiration and transpiration (Coffin, 2007).

As well, studies have shown that the intrusion of new infrastructure and vehicle use can be environmentally damaging to wildlife. This disruption, alteration and/or destruction caused by roads and traffic have had an impact on wildlife populations as roads extend into adjacent landscapes resulting in areas becoming uninhabitable (Coffin, 2007). Not only do areas become uninhabitable, studies have shown that the intrusion of roads impact wildlife movement as migratory pathways are disrupted (Brody and Pelton, 1989); lead to wildlife mortality due to roadkill or destruction of wildlife habitat (Dodd, Barichivich, and Smith, 2004); and cause behaviour modification in wildlife populations as noise from traffic cause species that incorporate sound into their basic behaviour to have to adapt to their new surroundings (Tigas, Van Vuren, and Sauvajot, 2002).

Overall, the impact roads and traffic have on natural habitats have both direct and indirect effects on humans. The direct impacts include a potential loss of animal and plant species; an increase in animal-vehicle collisions; destruction of green space; damage to the landscape; and negative aesthetic effects. Indirectly, the loss of biodiversity due to transportation infrastructure and traffic can lead to air, water and soil pollution; an increase in greenhouse gases and global warming; and have a negative impact on individual physical, psychological and social well-being (Coffin, 2007; Forman and Alexander, 1998).

2.5 Benefits of Green Space

The link between the environment and health is increasingly recognized as important in research (Frumkin, 2001) as environments have an impact on individual's physical, psychological, and social well-being (Wells and Evans, 2010). As a result, many people will favour places that promote positive health and well-being. Individuals value their health and consider the environment to be an important influence on their health; and therefore want to live, work, and play in healthy environments (Frumkin, 2003). The presence of natural environments such as urban parks and forests in urban contexts contributes to the quality of life of urban residents (Chiesura, 2004) as these environments act as a buffer or moderator of adverse conditions (Gidlof-Gunnarsson and Ohrstrom, 2007). Research has shown that people consistently prefer nature and natural environments over built environments (Jim and Chen, 2006; Maller Townsend, Pryor, Brown, and St. Leger, 2005; Velarde, Fry, and Tveit, 2007). For example, when shown images of natural scenes versus urban scenes, many North American and European adults

gave higher ratings of liking, scenic beauty and pleasantness to the natural scenes (Van den Berg, Hartig, and Staats, 2007).

Urban green spaces consisting of trees and other vegetation in an urban setting are an integral component of urban environments providing both direct and indirect benefits (Chen and Jim, 2008). A city with high-quality and generous green spaces contributes to "sustainable development, landscape and environmental quality, quality of life, and citizen health" (Jim and Chen, 2006, 338) as well as bestow a sense of pride on citizens and the government (Jim, 2004). Parks were originally designed to provide strong health advantages as a result of open space, as they helped reduce disease and crime, and provide "green lungs" for the city, and areas of recreation (Maller et al., 2005). Today, urban parks and green spaces are important to the quality of life of the urban population (Chiesura, 2004) as they not only enhance the natural beauty of the area but provide privacy, wildlife habitat, sense of place, and clean and fresh air. In particular, the benefits of urban green spaces to quality of life can be examined through four dimensions: health and well-being, environmental, aesthetic, and economic (see Figure 2.1).

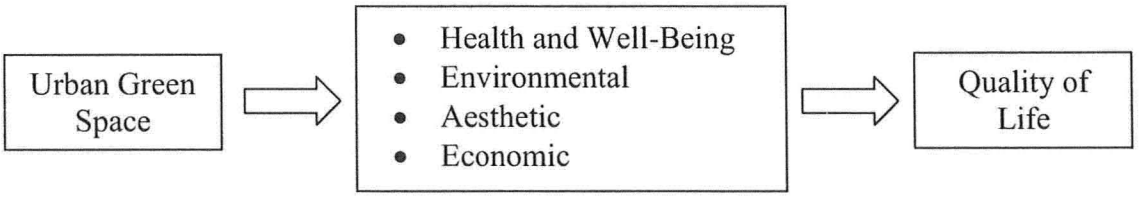


Figure 2.1: The link and relationship between green space and quality of life (Chiesura, 2004).

2.5.1 Health benefits

Studies conducted on the benefits of green space have shown that green space in people's living environment had a significant relationship to general health. A study on the relation between the amount of green space in people's living environment and their perceived health found areas where 90% of the environment around the home is green, only 10.2% of the residents feel unhealthy (Maas, Verheij, Groenewegan, de Vries, and Spreeuwenberg, 2006). As well, according to Godbey, Grafe, and James (1992) those who used local green spaces frequently were more likely to report good health than those who did not. Another study looked at the greenness of the living environment between urban and rural areas and found people in the urban areas were less healthy than those in the rural areas (de Vries, Verheij, Groenewegen, and Spreeuwenberg, 2003). Therefore, due to urban stressors such as noise and congestion from traffic, fear of crime, and crowding, many people may prefer to live near natural environments due to their potential

benefits on health and well-being. Studies have also shown that contact with natural environments "offers a relatively effective way of obtaining restoration from stress and mental fatigue compared to ordinary outdoor urban environments" (Van den Berg et al., 2007, 80). There are three levels of engagement one can experience with green space: viewing green space through a window or painting; being in the green space through walking or biking; and active participation or involvement with the green space such as gardening (Pretty, Peacock, Sellens, and Griffin, 2005). Each level of engagement with the green space has been found to provide residents a significant advantage in promoting mental, physical, and social well-being.

Green space has been known to improve mental well-being. Specifically, the advantage of living near green space has been shown to improve attention restoration and recovery from mental fatigue (Hartig, Evans, Jamner, Davis, and Garling, 2003; Kaplan and Kaplan, 1989); the ability to recover from stress (Gidlof-Gunnarsson and Ohrstrom, 2007; Parsons, Tassinary, Ulrich, Hebl, and Grossman-Alexander, 1998); and evoke positive emotions such as feelings of joy and satisfaction (Kaplan, 2001). A study by Chiesura (2004) looked at the importance of nature to individual well-being in urban settings. The top three motives mentioned by visitors to the use of nature were "to relax" (step away from the hectic and busy city life), "to be in nature" (listening and observing the surrounding), and "to escape from the city" (away from the traffic, noise, and pollution of the city).

Green space also has a positive association with physical activity. The location of a park plays an important role when it comes to outdoor physical activity (Abraham et al., 2010) as green spaces provide opportunities for recreation, exercise, and the ability to spend time outdoors (Pretty et al., 2005). For example, a study by Gordon-Larsen, Nelson, Page, and Popkin (2006) found individuals who had limited access to outdoor spaces for physical activity had an increased risk of suffering from obesity than people with access to outdoor spaces. Green areas lead to people spending more spare time outdoors and therefore being physically active. Finally, individual's social well-being has benefited from urban green spaces. According to some studies, urban parks can enhance social integration and interaction of neighbours (Leyden, 2003); increase companionship by providing an area for meeting and engaging with other people (Abraham et al., 2010); and strengthen family ties and provide safe places for children to play (Chiesura, 2004).

2.5.2 Environmental benefits

Urban green spaces also have a number of environmental benefits however the three major benefits to residents living close to these green spaces include reducing airborne pollutants, noise reduction, and energy conservation. As was mentioned, urban parks have been known to be the lungs of the city by absorbing airborne pollutants that have been emitted into the air (Gatrell and Jensen, 2002). In a study conducted by Jim and Chen (2006) the importance of air pollutant absorption was ranked high in a list of ecosystem services generated by green spaces in the city of Guangzhou, China. Urban

green spaces not only improve the air quality but also affect the quality of life for individuals as cleaner air leads to a healthy life. Noise abatement has also been perceived as an important function of urban green spaces (Jim and Chen, 2006). Access to trees has been shown to reduce noise (Fang and Ling, 2003) by absorbing and deflecting sound (Chen and Jim, 2008) and therefore improve health. Gidlof-Gunnarsson and Ohrstrom's (2007) study on the potential role of nearby green areas on noise and well-being found that the availability to nearby green spaces had an effect on resident's response to road traffic noise. Specifically, people who had good access to green spaces had low noise annoyance and better psychosocial health. Green spaces also improve energy consumption by reducing the amount of electricity generated. Results from a study by Akbari, Pomerantz, and Taha (2001) found urban trees reduce cooling costs by providing shade to the house and this resulted in a reduction in cooling costs of 26% to 47%. As a result, trees reduce the dependence on fossil fuels and lower carbon emissions leading to cleaner air for residents to breathe (Donovan and Butry, 2009; Gatrel and Jensen, 2002).

2.5.3 Aesthetic benefits

Aesthetically, urban green spaces provide more comfortable and visually pleasing environments. The importance of viewing natural areas has been documented in several studies as many people appreciate colourful flowers, big and small trees, budding bushes, the sound of a bird's song, or the presence of wildlife (Frumkin, 2001). Aesthetic enhancement was ranked second in terms of the importance of green spaces to the urban environment in Jim and Chen's (2006) study. Another study found that 99% of residents living in retirement communities indicated living within pleasant landscape grounds is either essential or important (Frumkin, 2001). Views of nature are not only pleasant but studies have shown that viewing natural areas such as green spaces can have an impact on health and well-being. For instance, patients with views of trees out their window were more likely to have shorter hospital stays than patients without views of nature (Ulrich, 1984). As well, a study at a State Prison compared cells with different window views and found prisoners who had a view of inside the courtyard had a higher frequency of sick calls than prisoners with windows that viewed out into farmland and trees (Moore, 1981). Similar to prisoners, employees who had views of nature at work were more likely to report fewer headaches and greater job satisfaction than those without a view (Frumkin, 2001). Overall, the visual benefits of greenery not only improve health and well-being but they "decorate the otherwise dull and gray cityscape" (Jim and Chen, 2006, 342).

2.5.4 Economic benefits

Finally, the value of green space in a neighbourhood has an economic benefit for citizens as evidence shows that trees and nature add to the value of a home and neighbourhood (Boone and Modarres, 2006). Specifically, parks and nature increase the property value of the dwelling, where urban green space has contributed to increased property values of resident's homes in two ways. First, the closer one lives to the green space, the higher the value of their property. According to a study by Luttik (2000) the

further away the dwelling is from the green space the lower the value of the home. In a Finnish study, the authors also found a relationship between distance as "a one kilometre increase in the distance to the nearest forested area leads to an average 5.9 percent decrease in the market price of the dwelling" (Tyrvainen and Miettinen, 2000, 205). Second, dwellings that overlook a green space on average had higher property values than those that did not. Again, Tyrvainen and Miettinen (2000) found resident's homes with a view of the forest were on average 4.9 percent more expensive than dwellings that did not have a view of the forest.

Overall, greenness in the living environment influences people's health and psychological well-being. Even though urban green spaces provide many benefits, the four mentioned above have a direct impact on residents in an urban environment, specifically residents living near the green space. As a result of the benefits, urban green spaces need to be protected and preserved. Jim (2004) argues that every resident should be within walking distance of green spaces; however this may not be possible as natural areas continue to be paved over, altered or destroyed in favour of urban development. Therefore, research needs to determine what impact such alteration or destruction has on the health and well-being of individuals. Specifically, Maller et al. (2005) recommends research to tackle the issue of whether the alteration or destruction of the natural environment directly affects human health and well-being.

2.6 Summary

This chapter began with a discussion on environmental stress which found living in a contaminated or polluted environment can lead to stress (psychological force) which can ultimately lead to physical illness. The adverse environmental effects of road traffic include air pollution, noise, visual intrusion, danger, and physical irritation. Noise and air pollution from road traffic can be considered an environmental stressor which can affect annoyance and irritability, and lead to a diminished capacity to deal with the stressor. As a result, individuals can experience a number of psychological symptoms due to disturbances to their daily lives, which include helplessness, anxiety, fatigue, and depression. As well, these effects have an impact on lifestyle, as a large number of people reduce outdoor and recreational activities, especially those residing in close proximity to heavily trafficked roads. Transportation infrastructure also impacts the environment negatively as it destroys or intrudes into the built and natural environment; a natural environment that provides many benefits that improve the quality of life of individuals. Therefore, the results from this discussion on traffic and its related impacts show an association between traffic exposure and the negative effect on the health and well-being of people, which serves as the necessary foundation for which this research is grounded. The next chapter will discuss the methodological approach undertaken in this research, including site and sample selection, and the development and administration of the research design.

CHAPTER 3: METHODOLOGY

3.1 Introduction

The research methods employed are determined by the objectives of the research and the specific questions of the study (Yin, 2009). This chapter details the methodology used to explore the following research objectives:

1) To determine the prevalence of psychosocial impacts amongst people who reside within close proximity to transportation infrastructure and traffic;
2) To examine the impacts the new transportation infrastructure has on the lives of the residents;
3) To examine the coping mechanisms employed by individuals in the area faced with the impacts of increased traffic exposure;
4) To determine whether psychosocial effects are related to distance from the source and to length of residence.

Given these research objectives, this chapter will discuss the research methods, research design, site selection, sample selection, and data collection.

This research design uses both quantitative and qualitative methods. Quantitative research is focused on "descriptive statistics; and refers to the distribution, frequency, prevalence, incidence, and size of one or more phenomenon" (Crabtree and Miller, 1999, 6). The primary aim of quantitative research is to aggregate, compare, and summarize numerical data to form a relationship between an independent variable and another set of dependent variables (Babbie, 2004; Singh, 2007). Qualitative research, on the other hand, is defined as "the non-numerical examination and interpretation of observations, for the purpose of discovering underlying meanings and patterns of relationships" (Babbie, 2004, 370). Where quantitative research focuses on questions such as how much or how often the phenomenon of interest occurs; qualitative research "explores the meanings, variations and perceptual experiences of the phenomenon" (Crabtree and Miller, 1999, 6). Therefore, this study will use qualitative data to enhance a quantitative study design.

3.2 Research Methods

The most common approach to collect quantitative data is through surveys conducted over the telephone or by mail. However, these two methods are not without their limitations as response rates to telephone and mail surveys have been declining over the years (Dillman, 2007; Dillman, Phelps, Tortora, Swift, Kohrell, Berck, and Messer, 2008; Steele, Bourke, Luloff, Liao, Theodori, and Krannich, 2001). Therefore, in order to improve the accuracy and quality of the data this research uses a mixed-method approach.

The purpose of mixed-methods is to combine two or more modes of data collection in an effort to collect richer and stronger evidence, as well as to increase response rates and lower cost (Creswell and Plano Clark, 2007; Dillman, 2007). The research can mix or combine quantitative and qualitative research techniques and approaches into a single study which provides a more complete picture of the research problem (Creswell and Plano Clark, 2007). There are many different approaches to the use of mixed-methods; the type applied to this research involves collecting data from the same sample by two different methods (Dillman, 2007). This method is known as a triangulation design and the purpose is to "obtain different but complimentary data on the same topic" (Creswell and Plano Clark, 2007). The methods used in this research included surveys and interviews. Both the quantitative and qualitative data collection methods (survey and interviews) were implemented during the same time frame, however each method involved separate collection and analysis of the data. The goal of the study was to converge the results of the surveys with the results of the in-depth interviews to better understand how a new transportation infrastructure has affected the daily lives of residents living within close proximity.

3.2.1 Surveys

The first method of data collection required participants to complete a self-administered survey. The surveys were appropriate for a descriptive summary of the research, specifically describing the prevalence of psychosocial illness in the study area. Self-administered surveys require the selected participant to complete a questionnaire themselves (Bourque and Fielder, 2003). Advantages of using self-administered questionnaires include respondents filling out the questions themselves at their own speed; lower cost of implementation; wider coverage within a single population; they are shorter and simpler in structure; and the data can be quantified (Bourque and Fielder, 2003; Bowling, 2005).

In an attempt to find a feasible alternative to mail back surveys, the questionnaire used in the study was converted to a self-administered format and delivered by hand to the sample population. This method involves dropping off the survey to a sample of households, allowing respondents time to complete the survey, and picking up the completed survey on a specified date. There are many advantages to the use of the drop-off/pick-up procedure. First, this procedure is "appropriate for studies in which the population of interest is contained geographically" (Melbye, Bourke, Luloff, Liao, Theodori, and Krannich, 2000, 6). Second, the personal delivery of questionnaires can be conducted by the researcher. Compared to the mail method, this method allows the researcher to interact with participants and motivate people to respond. The researcher can convey to the respondents directly the importance and legitimacy of the research, as well as who should complete the questionnaire and how it should be completed (Steele et al., 2001). This method also offers advantages associated with working directly in the local areas where the study subjects live. Specifically, researchers are provided with additional insights such as exposure to conditions, landscapes, or residents (Steele et al.,

2001). Therefore, the researcher can experience what the study subjects experience on a daily basis. Finally, the drop-off/pick-up procedure reduces sample bias, as the researcher does not need complete or up-to-date lists of addresses or phone numbers. As a result, members of the population whose phone numbers are unlisted or addresses are unknown have an equal or known chance of being included in the sample (Dillman, 2007).

3.2.2 Interviews

The second method of data collection involved the use of in-depth interviews. To increase the number of participants and the richness of the data an effort was made to contact and interview participants who resided in the study area. The use of the in-depth interviews allows respondents to share their experiences, opinions, and perceptions about the topic of interest. The interviews provide more in-depth information about the topic, where respondents can expand on responses and the interviewer is able to probe for greater clarification or detail (Crabtree and Miller, 1999). Furthermore, the interviews were used to expand on the quantitative results; specifically the data collected from the interviews provided a more in-depth description and a better understanding of how the presence of the parkway affects the lives of residents living in the vicinity of the road.

3.3 Research Design

The use of surveys and interviews (see Appendix 2) were chosen as the methods to study the research objectives. The survey was designed to determine the psychosocial health and well-being of a sample of the population living close to the study area (Elliott, 1992). The questions that were used for the survey and interview were adopted from the instrument used to collect data by Elliott (1992). However, the survey was adapted to a self-administered format that was administered by hand rather than by the telephone. The survey used by Elliott (1992), when developed into a self-administered format was over 16 pages in length which was judged too long, as it has been recommended that self-administered surveys range between 4 and 12 pages (Bourque and Fielder, 2003). As well, Dillman (2007) notes that questionnaires should be short and easy to follow as this reduces the social cost of responding, as respondents are more likely to respond to self-administered questionnaires if the respondent trusts that the rewards of participating outweigh the costs. Therefore, the questionnaire was reduced to appear shorter and easy to fill out as questions were shortened, grouped together, or eliminated all together. For example, the use of open-ended questions was included for respondents to answer regarding how their physical and psychological health has been affected by the parkway.

The final survey consists of four pages back to front, totalling eight pages; six sections; and a combination of open- and closed-ended questions. Closed-ended questions provided a response category for respondents to choose from; while open-ended questions contained three lines for the respondent to fill in a response, and as Dillman

(2007, 41) notes "to visually suggest a longer answer is desired." The first section addresses individual perceptions of and attitudes towards the area, specifically how satisfied residents were with the neighbourhood as a place to live. Dillman (2007) notes that the first question in a survey is important; it should relate to and be answerable by everyone. The first question in the questionnaire asked respondents "in general, how satisfied are you with your area as a place to live?" This question is not only easy to answer but is related to the topic mentioned in the cover letter. As well, two questions were asked regarding residents' likes and dislikes about the area. These questions required respondents to write in order of importance the three most important things they liked and disliked about the area as a place to live. This was of particular interest to determine whether the Red Hill Valley Parkway was volunteered as a like or dislike about the area (Crighton, 2000).

Section two contained one question, a general health question, which asked, compared to other people, how the respondent would rate their health. The third section contained site specific questions regarding concerns, effects, and action. The section used a "combination of open- and closed-ended questions to determine residents' levels of awareness, concern and action regarding the site" (Elliott, 1992, 82). The section begins by asking residents to rate the physical environment in the neighbourhood. The question was formulated based on the study by Gidlof-Gunnarsson and Ohrstrom (2007) which studied the relationship between how individuals perceive their physical environment and their health. After asking respondents to rate the physical environment, a general question on road traffic was included to determine whether residents are bothered, disturbed or annoyed with road traffic in the neighbourhood. The formulation of this question was drawn from Ohrstrom's (2004) study. The next set of questions dealt with concerns regarding the site: did they have concerns and what were these concerns. To determine the effects of the site, questions asked how the concerns have affected their daily life; whether the concerns were health related; and if so, how has their health or the health of members in their household been affected. Finally, to determine action against the site, a closed-ended question asked respondents how they dealt with their concerns.

Section four dealt with questions regarding environmental concerns in general, and respondents were asked the same set of questions as the previous section except action against the concern. These questions were asked to determine if there are other environmental problems of significance in the neighbourhood. It was important to determine the extent to which other environmental concerns in the area are more or less significant compared to concerns regarding the Red Hill Valley Parkway. However, further analysis within this thesis was not undertaken due to a high degree of non-response regarding environmental concerns.

The fifth section documented site-specific actions, in particular whether residents have considered moving away because of the Red Hill Valley Parkway. If respondents chose 'yes' they were asked what steps, if any, they have taken if they have considered moving away. As well, a question was asked to all participants that if they were to move

away from the area, how far they would move. Finally, the section ended with a question asking if there is anything positive about the Red Hill Valley Parkway in the area.

The final section included standard socio-demographic characteristics, for example, age, gender, education level, household income, ownership status, and whether children under the age of 18 live in the household. These questions were included to determine whether these factors influence psychosocial health. As well, length of residence was asked in this section, which is related to the fourth objective of whether long-time residents experience greater psychosocial health effects.

The questionnaire used in the survey guided the interview schedule. However, as was mentioned, conducting the interview allowed me to probe and ask respondents to expand on answers. The questions for the interviews contained the same questions as in the survey, except questions from section four (environmental concerns) which were excluded, since the interviews were more concerned about how the residents have been affected by the Red Hill Valley Parkway. The in-depth interviews were open-ended so participants were not limited with their responses.

3.4 Site Selection

This research uses a case study design to examine residents in neighbourhoods along the Red Hill Valley Parkway. The Red Hill Valley Parkway which officially opened to traffic on November 17, 2007 (The Hamilton Spectator, 2007b), is a municipal four-lane expressway located in Hamilton, Ontario, connecting the Queen Elizabeth Way (QEW) to the Lincoln Alexander Parkway (see Figure 3.1). The Parkway is approximately 7.5 km in length with speeds averaging 90 km/hr, and carries approximately 40,000 to 70,000 vehicles a day (City of Hamilton, 2010). The parkway had been the subject of controversy for the past 30 years (see Chapter 4) as over 90% of the parkway runs through the Red Hill Valley (Friends of Red Hill Valley, 2005). The original intent of the valley was to provide the city with parkland and open space, and become a natural barrier against the harms of urban development (Peace, 1998); however, at least 25% of the valley has been cleared to pave the way for the parkway.

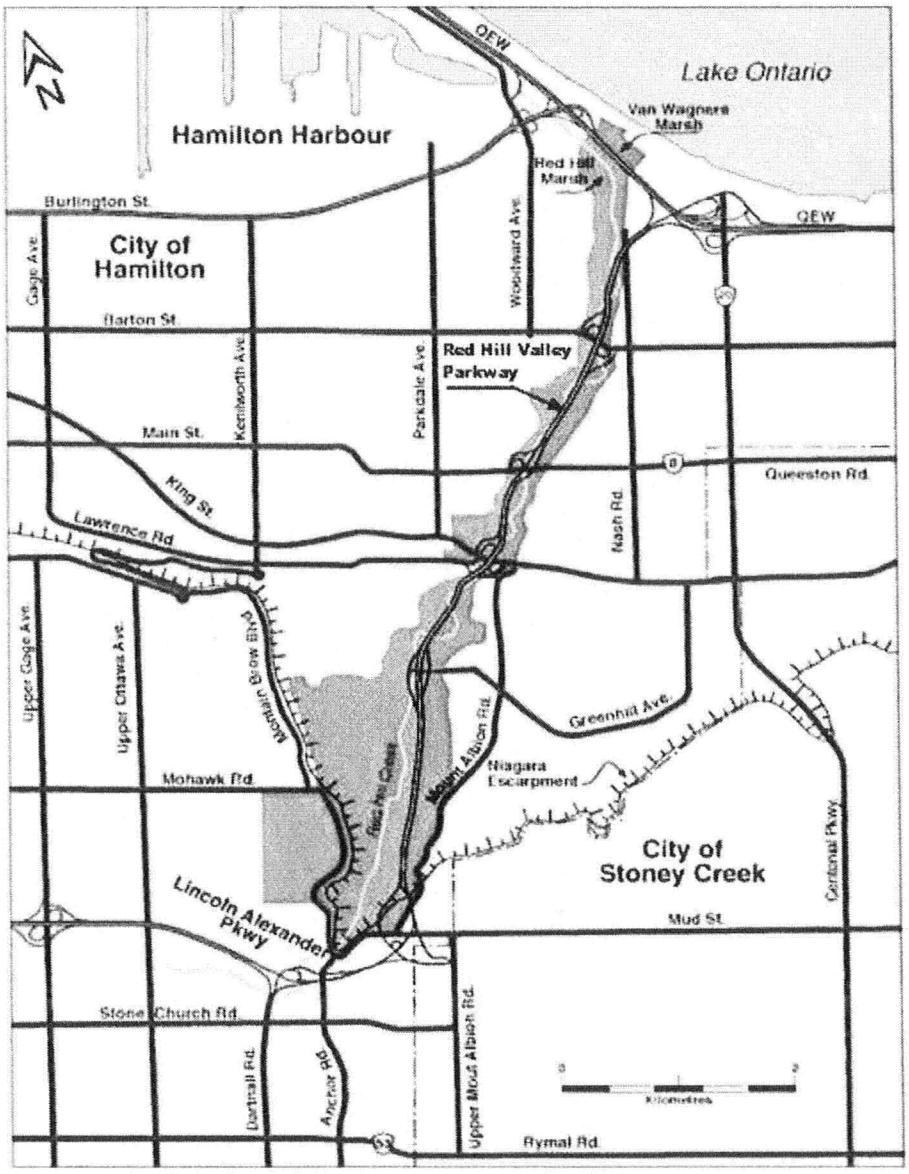


Figure 3.1: The Red Hill Valley Parkway, running through the Red Hill Valley, connects the Lincoln Alexander Parkway in the south with the Queen Elizabeth Way in the north (Source: Canadian Environmental Assessment Agency, 2009).

The Red Hill Valley Parkway is an ideal case to study the research objectives for a number of reasons. First, the Red Hill Valley was one of Canada's largest urban green spaces, and was a prominent natural green space in the east end of Hamilton (Peace, 1998, xv, 89) (see Figure 3.2). The valley provided many urban residents a place of retreat that promoted physical, mental, and social well-being. As well, the forest and

trees of the valley provided a green backdrop against Hamilton's poor air quality, which over the years has been considered one of the worst in Ontario (Collier, 2003). However, the area that once played an important role has now been reconfigured, thereby altering the natural environment and recreational activity. As a result, the loss of parkland and the environmental destruction caused by the parkway will worsen Hamilton's polluted reputation. More importantly, this area that was once considered clean and regarded as a luscious green space has now become a noisy freeway (CATCH, 2007).

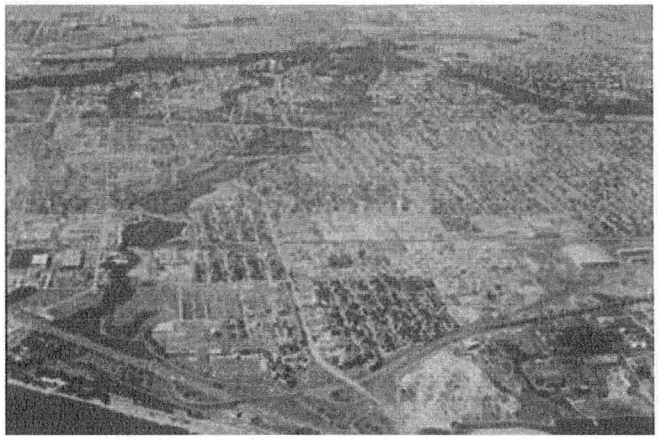


Figure 3.2: "The significance of the Red Hill Valley in the east end of Hamilton in an otherwise entirely urbanized area" (The Red Hill Valley Neighbourhoods Association, 2010).

Second, the Red Hill Valley Parkway runs through many residential neighbourhoods that were established in the mid 20th century. With the new parkway, vehicles that once detoured around the city, are now bringing an increase in traffic, noise and pollution into an area that was once considered the 'lungs of the east end.' It is important to understand what impact this alteration to the environment; going from predominately green space to having transportation infrastructure has on the resident's quality of life and health. Therefore, this study area provides an ideal location to study the effects of transportation infrastructure on residents that have lived in the area prior to the building of the parkway. As well, as the natural green space is altered, it is important to determine what effect this will have on the health and well-being of east end residents.

3.5 Sample Selection

3.5.1 Survey sample

The sampling criteria for the survey portion of this research included all residents older than 18 years of age who were residing within 1000 metres of the Red Hill Valley Parkway. Residents from three different areas within this 1000 metre buffer were chosen to participate in the survey. The 1000 metre buffer was chosen as studies have shown that minimal health effects occur past 1000 metres (Brugge et al., 2007; Finkelstein et al., 2002; Michaud et al., 2008). As well, the inclusion of three study areas will help explore the objective of whether distance plays a factor in participant's psychosocial health. The first area consisted of participants who resided within 200 metres of the Red Hill Valley Parkway, as this is the area that experiences the greater health risks (Brugge et al., 2007; Gower et el., 2005). The second area consisted of participants residing within 200 – 500 metres of the Red Hill Valley Parkway, while the third area consisted of participants who resided within 500 – 1000 metres of the parkway.

The study sites were based on a number of criteria, for example: similar noise exposures, no other dominating noise than road traffic, similar dwelling types (single family, detached), and similar population characteristics. The areas investigated are shown in Figure 3.3. The boundaries of the investigation area include the Red Hill Valley Parkway to the west, Queenston Road to the north, King Street East to the south, and Nash Road to the east. There are approximately 215 households in the first study area (within 200 metres), 258 households in the second study area (200 – 500 metres), and 309 households in the third study area (500 – 1000 metres). As well, households located within the 200 metre buffer between Queenston Road and Barton Street East, and between Queenston Road and King Street on the west side of the parkway were also included into the sample to increase the sample size of the first study area. It was determined households from Barton Street to King Street to the east, and Queenston Road to King Street on the west shared similar characteristics such as exposure, dwelling type, and socioeconomic status; therefore their inclusion in the study was justified.

Figure 3.3: Study area (North – Queenston Road; South – King Street; East – Nash Road; West – Red Hill Valley Parkway) (Map generated using Arcview GIS 3.2).

The areas investigated focused on a specific neighbourhood to avoid the influence of confounding factors. First, the socioeconomic status of the households within the study boundaries was similar (Statistics Canada, 2006 Census). It has been found that socioeconomic factors do have an influence on health (Lynch and Kaplan, 2000; Ross and Mirowsky, 2008). Second, participants were chosen within these boundaries to avoid the influence of the Lincoln Alexander Parkway or the QEW on participant's responses. Finally, the density of the forest would have the same impact on the households within the boundaries as they are exposed to similar noise and pollution levels. Studies have shown that trees act as a natural barrier to sound and pollution (Fang and Ling, 2003). An area with a higher density of trees along the parkway may lead to less exposure to households. Therefore, the sample of the survey population included all households within the study boundaries outlined in Figure 3.3.

The survey samples were not matched to any controls. Controls were provided by means of internal controls, comparing residents living closer to the site with those living further away (Elliott, 1992). As well, the third study area (500 – 1000 metres) can be considered a 'control' community because even though it is in the range of being affected it is far enough away from the parkway that little or no effect may occur, therefore allowing the area to be considered a control and compared to the other two. The goal of the study was to sample 70 households within each of the three study areas for a total of 210 households. Using the Hamilton City Directory (2009) and GIS an address sheet with a list of households from the three study areas was compiled.

3.5.2 Interview sample

The sampling criteria for the interviews included residents over the age of 18, who had been living in the area for a period of three years, a long enough residence period to experience the area prior to the completion of the Red Hill Valley Parkway. Participants were sought who resided within 200 metres of the parkway as it was believed these individuals would be the most information rich, since these residents would likely be impacted the most. These information rich cases were provided by a key informant who was a member of the Red Hill Valley Neighbourhoods Association. Key informants have the advantage of providing access to information that is unavailable to the researcher (Crabtree and Miller, 1999). For this research, the key informant provided me with access to residents who were interested in sharing their experiences on how the Red Hill Valley Parkway has affected their daily life. Therefore, once I was given the contact information I called the interested residents to find out if they would be interested in participating in the study, and to set up a time and place to interview the resident. The original goal was to interview residents who lived within the study boundaries outlined in Figure 3.3, however many residents included who were interested in sharing their experiences lived outside these boundaries.

3.6 Data Collection

3.6.1 Self-administered survey

The survey received ethics approval in December 2009 by the McMaster University Research Ethics Board. A pilot test of the survey was conducted prior to the survey administration. Two weeks before the final version was administered to the selected population, 10 households within the study area were selected at random and given a copy of the questionnaire (5 households were given a copy of the questionnaire that was double-sided, while the other 5 households were given a copy of the questionnaire that was single-sided). The pilot test also included an open-ended question at the end of the survey for respondents to answer if they had any additional comments, concerns or suggestions regarding the survey. It was determined that this question would

remain in the final version of the questionnaire as it allowed respondents to expand on answers or add to the topic that was not covered by the questions in the survey.

The pilot test had two main objectives. The first objective was to test the questionnaire; specifically to test the length of the questionnaire, to see if mistakes were present, and whether respondents were answering questions appropriately. In general, the questionnaire performed well, however it was determined that the questionnaire would perform better if it was double-sided as respondents complained about the length of the single-sided version. The second objective of the pilot test was to gain experience with the data collection method (the drop-off/pick-up procedure), specifically how to introduce myself and the study. This led to improvements in how to obtain cooperation from respondents; as I became more experienced with this method, my ability to secure cooperation of residents increased.

The final version of the survey was administered to residents during the period of February 2010 to April 2010. In the three study areas, the survey was administered via a drop-off/pick-up procedure. I visited each household in the three study areas up to three times "as multiple attempts to contact potential respondents are essential" (Dillman, 2007, 13). However, some households were not approached because the homes were vacant; had locked gates or fences around the porch; or had no stairway leading to the door. It was determined the best day to conduct visits to households was on the weekends between the hours of 11:00 am to 5:00 pm. It was during this time that many of the households either accepted or declined participation. However, if no one was contacted on the weekend, visits to households occurred Monday to Friday between the hours of 4:00 to 6:00 pm, as these were the hours most people were home.

At the door I used a prepared introduction to describe a study in the neighbourhood was being conducted by McMaster University, and if a member of the household would be interested in participating in the study by completing a survey. The survey was introduced as a study on neighbourhood satisfaction and quality of life. However, in order to possibly persuade those who declined participation I explained the study dealt with the Red Hill Valley Parkway. As a result, more people were inclined to participate. When the survey was introduced as a study on the Red Hill Valley Parkway comments were made such as:

"its rotten"
"wish it was never built"
"disaster; ruining the neighbourhood"
"fought it for years"
"I have developed allergies"
"does not affect me at all"
"glad it was built"

Residents were told the survey would take approximately 10 to 15 minutes to complete and they did not have to complete the survey right at that moment. By informing those who answered the door that the survey did not need to be completed right away, it prevented participants from declining to fill-out the survey because they were busy at that moment. In most cases, a resident over the age of 18 was spoken to; however if no one was available I agreed to come back at a later date. For those households who agreed to participate, instruction was given that the completed survey would be picked up on a specified day, usually one week from drop-off, unless the participant did not need the full week to complete the survey. However, if the participant needed longer than a week to complete the survey due to work, being away or sick, I agreed to stop by at a later date. After thanking the resident for agreeing to participate, I recorded what transpired on the address sheet. If a survey had been accepted or a resident declined participation a 'Y' or 'N' was placed next to the address, as well as any special instructions or additional information that was needed. Special instructions and additional information included what day the survey was dropped off; whether the survey needed to be picked up at an earlier date or later date; if the survey would be placed in the mailbox or on the door; if respondent would call, email or mail the survey back; and the reasoning why the household was not interested in participating.

A respondent who accepted participation was given the survey package. The package included the 8 page questionnaire and a detailed cover letter explaining the nature of the study and why a response was important. The cover letter (see Appendix 1) explained that participation in the survey was voluntary and responses to the survey were confidential. Residents who agreed to participate were given the option of allowing anonymous quotations to be used in the thesis; however responses would not be connected in any way to the respondent's personal information (name or address). The cover letter also explained that there were no known or anticipated risks to participate in the study, and the participant may decline to answer any of the questions if they wished. Participants were also informed that they could withdraw from the study at any time without any negative consequences, and if the participant did not wish to be involved with the study they could return the blank survey in the envelop provided. There were a total of four participants who took a survey but returned the surveys uncompleted.

Upon completion, respondents were encouraged to place the survey in the envelope provided and to leave the completed questionnaire in the mailbox or on the door. Within a week I returned to collect the completed survey. If the survey was not displayed in the mailbox or door, I knocked on the door to retrieve it. When the survey was collected a check mark indicating pick up was placed beside the address. However, many households had not completed the survey within the week because they had either forgotten to fill it out, they did not have enough time, or no one was home. If the household was still interested in participating I offered to return in another week. I visited each household up to three times to collect the survey. Approximately 50% of respondents completed the questionnaire upon the first visit, and 30% of respondents completed the questionnaire upon the second visit. If upon the third visit the survey was

still not completed, I instructed the participant to contact me by phone or email if they completed the survey.

Response to the survey was positive as I encountered generally cooperative residents. A total of 216 households completed the hand delivered questionnaire (71 households in study area one, 69 in study area two, and 76 in study area three). Common reasons why households declined to participate are listed in Figure 3.4. Researchers report many different ways to calculate response rates (Groves and Lyberg, 1988), while Fowler (2002, 42) reports "there is no agreed-upon standard for a minimum acceptable response rate." However the most widely accepted measure takes into account the number of people responding divided by all eligible participants (Steele et al., 2001). Overall, the response rate was 28%, which according to Fowler (2002) is not uncommon, as many mail surveys have response rates as low as 30%. Specifically, a response rate of 33% was found in the first study area, 27% in the second study area, and 25% in the third study area. However, it should be noted that the results may be overestimated due to potential bias, as residents who are more interested or have strong feelings about the issue are more likely to participate (Fowler, 2002).

Figure 3.4: Reasons for nonparticipation

- Unavailable
  - Not home at time of visit
- Refused
  - Just moved into home
  - Not interested in topic
  - Opposed to surveys
- Timing
  - Sick
  - Going away
  - Busy with renovations, work, children
- Language barriers
  - Unable to read, write or speak English

(Melfi Survey, 2010)

However, to gain a better understanding of the success of the drop-off/pick-up method, Steele et al. (2001) report several alternatives to calculate response rates. In total, the response rate was measured four ways: response rate, contact rate, cooperation rate, and completion rate (see Table 3.1). The contact rate ranged from 51% in study area

three to 67% in study area one. For the entire sample, the contact rate was 58%. The cooperation rate was found to be 49% in study area one, 46% in study area two, and 49% in study area three; with an overall cooperation rate of 48%. Finally, the completion rate, which measures the proportion of respondents completing the questionnaire after agreeing to do so (Steele et al., 2001) was 81% in the first study area, 78% in the second study area, and 84% in the third study area. For the entire sample, the completion rate was 81%. Reasons for residents not completing the questionnaire after agreeing to do so are summarized in Figure 3.5.

Table 3.1: Survey response summary

	Study area 1 (within 200 m)	Study area 2 (200 - 500 m)	Study area 3 (500 - 1000 m)	Total
Total questionnaires delivered	88	88	90	266
Total eligible households[1]	215	258	309	782
Total households contacted[2]	144	150	156	450
Total questionnaires completed	71	69	76	216
Contact rate[a]	67%	58%	51%	58%
Cooperation rate[b]	49%	46%	49%	48%
Response rate[c]	33%	27%	25%	28%
Completion rate[d]	81%	78%	84%	81%

(Response categories by Steele et al., 2001; response values by Melfi Survey, 2010)

[1] Eligible households include all households within the study area
[2] Contacted households include those houses that accepted the questionnaire and refused at the door
[a] Total contacted/Total eligible
[b] Total completed/Total contacted
[c] Total completed/Total eligible
[d] Total completed/Total delivered

Figure 3.5: Reasons residents did not complete survey

- Lost
- No time/busy
- Not interested in topic
- Illness
- Forgot
- Don't remember getting survey
- Lack of availability

(Melfi Survey, 2010)

3.6.2 In-depth interviews

Interviews were administered during the same time period as the self-administered questionnaires. The interviews were structured, where an ordered interview schedule directs the interview (Crabtree and Miller, 1999), with me being the interviewer. Most interviews lasted between 30 minutes to an hour. Arrangements were made with residents to conduct the interview at their home, in order to give me a true perspective of what the resident's are living with. The interviews were similar to a spoken questionnaire, and questions were asked similar to those from the questionnaire used in the survey. Answers were recorded by the interviewer. As was mentioned, interviews allow for the respondent to provide a rich description of the information, and provide a more in-depth account of what residents living next to the Red Hill Valley Parkway experienced. As well, the interviews allowed respondents to answer in as much detail as they wished as well as allow me to ask respondents to expand on the answers they provided. For instance, the question regarding how the concerns affected their daily life, respondents of the survey just wrote that their outdoor activities have been affected. When conducting the interviews, I was able to ask respondents to expand on what they meant by 'outdoor activities'. As well, for questions that required respondents to choose an answer from the response category (such as Question 1, Section 1), respondents were able to expand on why they chose the particular response category or how their response differs pre-expressway versus post-expressway. For instance, the question asking 'how satisfied are you with this area as a place to live,' respondents explained they were 'very satisfied' with the area until the Red Hill Valley Parkway moved in.

In addition to the self-administered survey, in-depth interviews were completed by 21 participants (16 within 200 metres and 5 between 200 and 500 metres). The opinions of these participants represent a select minority who were members of the Red Hill Valley Neighbourhoods Association and therefore share similar perspectives on the issue. Roughly an equal proportion of males and females was reached in the sample, and the majority of the respondents were older than the age of 50 (see Table 3.2). As well, twelve

of the respondents had lived in the area for over 25 years; 8 within 200 metres and 4 between 200 and 500 metres. Even though these interviews were started during the same time frame as the self-administered survey, many of the interviews were conducted in May 2010 as a result of reaching and setting up a time when residents were available. In total approximately half of the households interviewed (10 households) were within the study boundaries of the research as outlined in Figure 3.3, and the other 11 households were scattered along the Red Hill Valley from King Street to Mount Albion Road. As was mentioned, these interviews provided a more in-depth account of what people living beside the Red Hill Valley Parkway have to live with on a daily basis.

Table 3.2: Participant Attributes

Total Number of Participants (N)	21
Place of Residence	
Within 200 metres	16
200 - 500 metres	5
Age	
31 - 40	2
41 - 50	1
51 - 60	7
60+	11
Gender	
Male	11
Female	10
Length of Residence	
Not Available	1
1 - 5 Years	3
6 - 10 Years	3
11 - 15 Years	1
16 - 20 Years	1
Over 25 Years	12
Residence	
Own	20
Other	1
Children Under 18	
Yes	1
No	20

3.7 Summary

This chapter outlined the design and methodology used for this research. The research used a combination of quantitative and qualitative methods to better understand the research objectives outlined at the beginning of the chapter. A mixed-methods approach was undertaken, with the use of surveys and interviews as the two methods of data collection. The questionnaire used in both the hand delivery and the interview portion of the study design was adopted from the survey instrument used to collect data by Elliott (1992). Self-administered surveys were hand delivered using the drop-off/pick-up method to a sample population of residents older than 18 years of age, who were residing within 1000 metres of the Red Hill Valley Parkway. Residents from three different areas within this 1000 metre buffer were included in the sample.

A total of 782 households reside in the study area. There were 216 respondents (71 in study area one, 69 in study area two, and 76 in study area three) which meant a total response rate of 28%, which is not uncommon for surveys. However, response rates for the self-administered surveys were calculated several ways which is more appropriate for the drop-off/pick-up method for collecting data. In addition to the survey respondents, 21 in-depth interviews were conducted with residents along the Red Hill Valley Parkway. These interviews consisted of both men and women over the age of 18 who had been living in the area for a period of three years, and were members of the Red Hill Valley Neighbourhoods Association. The structured interviews lasted between 30 minutes to an hour and were conducted in the resident's home.

The subsequent chapter will discuss the Red Hill Valley study area, including a description of the area and the factors that have led to the construction of the parkway through the Red Hill Valley.

CHAPTER 4: THE RED HILL VALLEY

This chapter provides a brief overview of the Red Hill Valley study area. Specifically, the chapter will describe the natural landscape of the valley; how urban growth impacted the valley; and provide a detailed account of the history surrounding the controversial Red Hill Valley Parkway and why it took over 50 years to complete.

4.1 Natural Landscape

The Red Hill Creek Valley, which begins at Ryckman's Corners and runs into the Hamilton Harbour, is a 26 mi^2 (67.34 km^2) watershed that is located in the east end of Hamilton (Peace, 1998, 6). It is "the last of 14 creeks that once flowed into Lake Ontario" (Agar, 2006, A15). The name Red Hill comes from the reddish shale that is present throughout the valley. It is an important aspect of Hamilton's geography and is associated with many important events in Hamilton. As a natural landscape, the Red Hill Creek Valley was formed between 12,500 and 10,000 years ago as a result of the former Lake Iroquois during the retreat of the Wisconsin ice sheet (Peace, 1998 10). The valley forms a natural corridor that connects the Niagara Escarpment and Lake Ontario.

The Red Hill Valley has aesthetic and environmental value as it is a prominent natural green space in the community. This 700 hectare (1729 acres) of forested parkland provides a natural habitat for a large variety of mammal, bird, and fish species including white-tailed deer, red foxes, mink, coyotes, and the southern flying squirrel; the provincially rare Cooper's Hawk and Carolina Wren; and rainbow trout, northern pike, and Chinook salmon (Friends of Red Hill Valley, 2005). As well, the landscape contains a diverse range of trees and plants including two nationally rare plants "Slender Satin Grass and Green Violet," and rare trees such as chinquapin oak, soapberry, and hispid goldenrod (Peace, 1998, 92-93).

Due to its large green space the valley contains a diversity of parks, open spaces and agricultural lands that provide a green backdrop and a place for retreat from the noise and stress of urban living (Collier, 2003). This parkland provides hikers, naturalists, and bird watchers, as well as residents with a natural setting with trees and wildlife, where people can enjoy themselves whether on a walk or through recreation. The recreational uses of the land include baseball diamonds and soccer fields; two golf courses (King's Forest and Glendale); and forested trails that connect the mountain to the lake.

4.2 Urban Growth

The Red Hill Creek was first occupied by "Paleo-Indians" around 10,000 years ago after the retreat of the last Ice Age (Peace, 1998, 25). From this period onwards settlement of people continued to grow. The area thrived as a farm community in the 19th and early 20th centuries, with its rich abundance and variety of fruits and vegetables, providing a way of life for farmers and fruit-growers. However, the valley would see a shift in land use through the 20th century, going from agricultural to residential, as a result of the "rapidly growing urbanization of the city" (Peace, 1998, 216). Housing development on the land started to the west of the valley and would spread to the east after 1950. As a result of this urban expansion and population growth, development eventually "encircled and entered the valley" (Peace, 1998, 225) (see Figure 4.1). Today, the Red Hill Valley is home to a population of approximately 27,548 people (population is based on census tracts with the Red Hill Valley as a boundary) (Statistics Canada, 2006 Census).

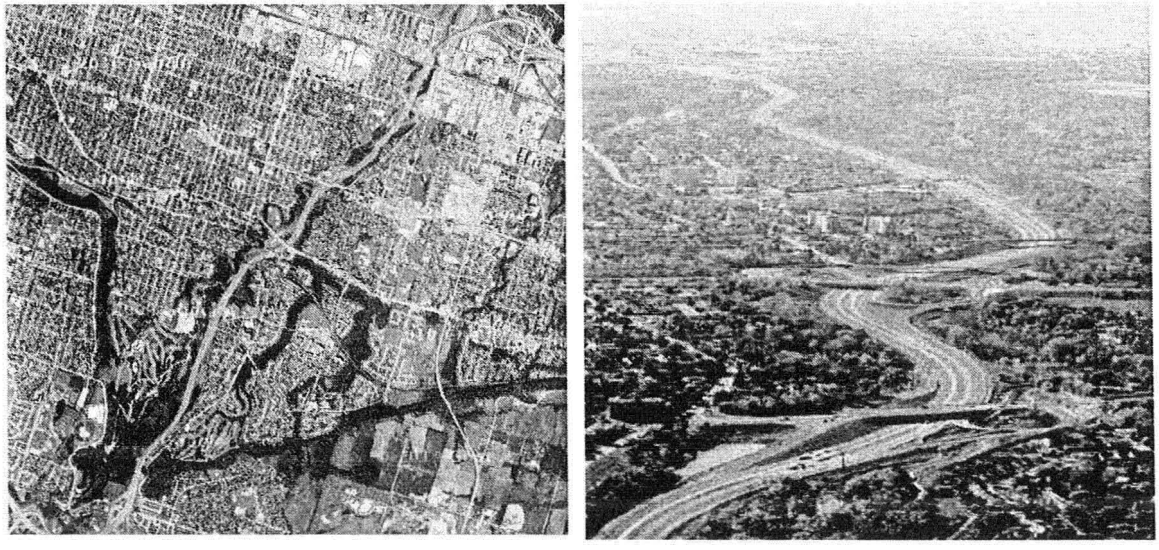


Figure 4.1: Red Hill Valley Parkway running through a number of residential neighbourhoods in the east end of Hamilton (Source: Google Images, 2010; Gray, 2007).

4.3 History of the Red Hill Valley Parkway

The idea of the Red Hill Valley being used as an expressway had been an issue for over 50 years (see Table 4.1). In 1929, Thomas Baker McQueston purchased 645 acres of the Red Hill Valley plus 20 additional acres for $198,000 (Peace, 1998). The intention

was to build a park belt, envisioned by Noulan Cauchon, "which would encircle the city to become a great rampart against ill-health and the evils of congestion" (Terpstra, 1985, 123) (see Figure 4.2). However, by the mid-twentieth century, Hamilton was growing both economically and geographically and in order to accommodate this growth, it was proposed that a road be built through the Red Hill Creek Valley. The road was expected to bring economic growth to the city and to provide residents with better access to the mountain.

Table 4.1: Chronology of the Red Hill Valley Parkway

1929 Purchase of 645 acres of parkland in south end of valley

1950 First proposal to use Red Hill Valley as a transportation route

1963 Hamilton Area Transportation Study (HATS) reports need for major east-west and north-south routes; city opposed to Red Hill Valley as a route

1975 City passes bylaw deleting Red Hill Creek from list of possible routes

1976 Red Hill Creek identified as one of twenty-six environmentally sensitive areas in Hamilton-Wentworth

April 1976 Technical Advisory Committee key to keeping Red Hill Creek option open

July 1977 City and regional council reverse position – valley route now being considered

Oct. 1985 Joint board votes 2-1 in favour of Red Hill Expressway

March 1987 Ontario Cabinet approves project

May 1990 Project officially named 'The Red Hill Creek Expressway'

Dec. 1990 Newly elected provincial government (NDP) withdraws funding for Red Hill Valley route

1991 Construction shifts to phase 3 of the project (east-west portion)

March 1993 Government committed $18 million to restore, protect and improve the valley

1995 Conservative government restores funding for the expressway

Oct. 1997 The east-west portion, known as the Lincoln Alexander Parkway (LINC) opens for traffic

May 1999 Federal Environmental Assessment of project ordered by Environmental Minister

April 2001 Federal Court rules Environmental Assessment Act not relevant to Red Hill Valley project

Oct. 2003 Tree cutting begins in Red Hill Valley

2004 City files lawsuit against Federal government over delays to the expressway

2005 Expressway gets the name "The Red Hill Valley Parkway"

2005 Re-alignment of the Red Hill Creek – longest, continuous channel restoration

Nov. 2007 Red Hill Valley Parkway opens for traffic

Summer 2009 Rain causes flooding in homes along Red Hill Valley

(Peace, 1998; Hamilton Spectator, various dates)

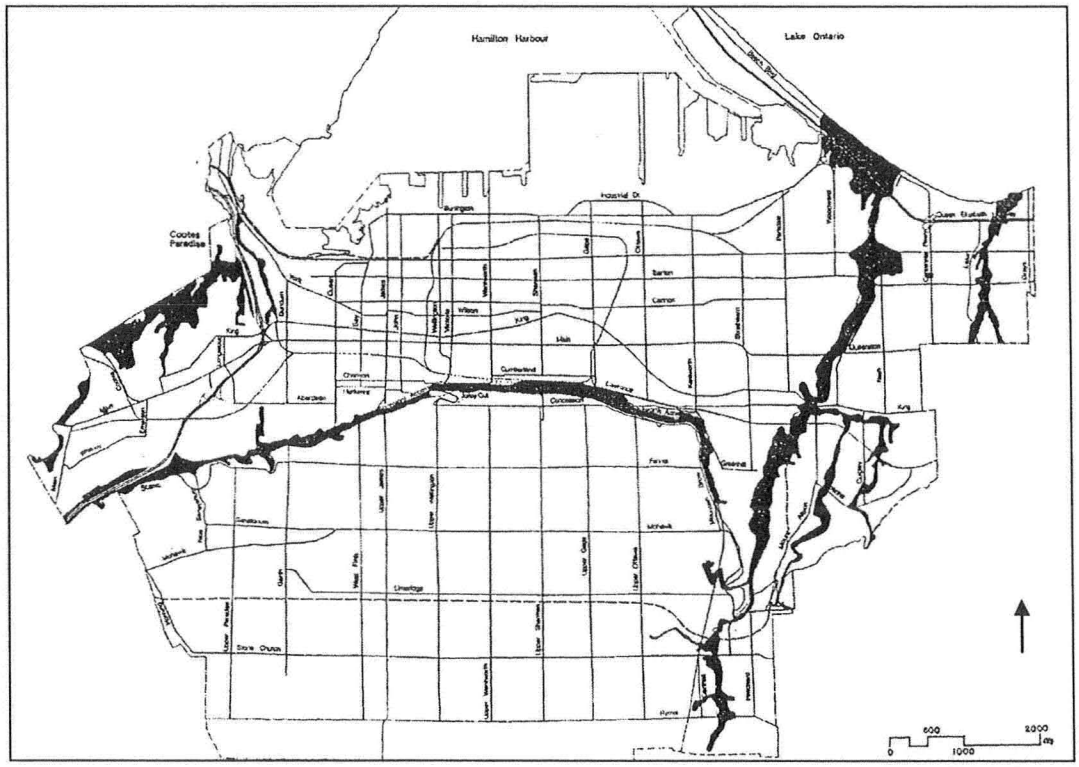


Figure 4.2: The park belt envisioned by Noulan Cauchon: Niagara Escarpment (south); Red Hill Creek (east); Chedoke Creek Valley (west); and Burlington Beach (north) (Source: Terpstra, 1985).

The proposal to use the Red Hill Valley as a transportation corridor that connected the Queen Elizabeth Way (QEW) with Highway 403 first appeared in a city document in 1950 (McKay, 2000). In 1963, Hamilton Area Transportation Study verified the need for the expressway to be built. However, even though there was a need for a road, the city was opposed to it running through the valley. From the initial proposal in 1950 the city of Hamilton did not endorse the Red Hill Creek Valley route (Peace, 1998). The city wanted to keep the valley intact, and maintain its natural character as the originally intended use of the valley was open space and parkland (Peace, 1998). The city of Hamilton stood firm on its position for over 20 years insisting the valley "be excluded from any study on possible alignments for this freeway" (Peace, 1998, 228). The city of Hamilton even passed a bylaw that deleted the valley from being considered an alternative. However in 1977, the valley was being considered along with other routes since it was viewed by some as not worth saving due to poor water quality. It was also determined that an expressway was needed in the area as a result of the increase in Hamilton's population and traffic problems in the east end of Hamilton. The city's decision to change its position on the issue led to protest and opposition. Among the

opposition groups that expressed concern were Clear Hamilton of Pollution (CHOP) and Save the Valley. These groups protested against the building of the expressway, hoping to keep the valley's natural environment. Even with growing opposition, the city still stood by its decision to consider the valley as an alternative route over other possible routes such as Highway 20, Fruitland Road, and Kenilworth Avenue (Peace, 1998).

In the mid 1980s, the Provincial government supported and approved the valley route. It was chosen as the best north-south route over the other alternatives for a number of reasons. The Red Hill Valley was an ideal choice because it was the only route "to use a three-per-cent grade to get from Burlington Street to the top of the Mountain," as all the other routes were steeper (Wheeler, 1998, A7); the valley would act as a natural noise barrier against the sounds of traffic; and the route provided the best economic advantages. It was believed the Red Hill Valley Expressway would attract businesses, jobs and people to Hamilton. The fact that the road would cut into one of Hamilton's "last remaining natural corridor between Niagara Escarpment and Lake Ontario" (McKay, 2001, 2) was not enough to persuade the region to choose another alternative.

In 1990, after a panel of three divisional court judges gave the road the approval, the project was officially named the Red Hill Creek Expressway and the official ground breaking ceremonies occurred on June 26, 1990 (Peace, 1998). However, six months later, on December 20, 1990, the provincial government's newly elected New Democratic Party (NDP) cancelled government funding for the road due to environmental concerns. According to the Transportation Minister at the time "the Red Hill Creek Valley [was] irreplaceable, it [was] a natural asset that Hamilton must not lose" (Peace, 1998, 234). Instead, the government committed $18 million to restore, protect, and improve the valley.

Originally, there were three phases for the Highway 403 to QEW connection. Phases one and two were the north-south valley portion, and phase three was the east-west mountain portion. After the NDP cancelled funding, the region shifted construction to the east-west portion of the expressway. However, bridges were still constructed over King Street, Queenston Road, and TH&B railway. Also, during this time the 'Friends of Red Hill Valley' was formed. This group was in favour of preserving the Red Hill Creek Valley, and throughout the years was a major opposition force to those in favour of the expressway.

In 1995, the Conservative government was elected and restored funding for the north-south section. The project had only been postponed for five years but the costs of delay had a significant impact on jobs, businesses, and development. As a result, the Conservative government announced that they would "provide $100 million over 5 years to 'get the expressway back on the road'" (Peace, 1998, 237). Construction continued on the east-west section until October 15, 1997 when the 'LINC' (Lincoln Alexander Parkway) was officially opened for traffic. With the first and second phases of the project

complete it was only a matter of time before the final north-south section down the Red Hill Valley began.

For six years drivers were using the 'LINC' as a connector between the QEW and Highway 403 as delays continued to halt the construction on the north-south section of the project. Opponents continued to demonstrate against the building of the Red Hill Expressway and in May 1998, 1,500 people gathered at Hamilton City Hall to participate in "the largest demonstration on a municipal issue in the history of the regional government" (Friends of Red Hill Valley, 2005). The following year, the Federal government ordered an Environmental Assessment to take place citing significant adverse environmental impacts and public concern. However, two years later a federal court ruled the Canadian Environmental Assessment Act was not relevant to the Red Hill Valley project (Friends of Red Hill Valley, 2005; Hamilton Spectator, 2007a). The city of Hamilton eventually filed a lawsuit against the Federal government in 2004 over delays to the Red Hill Valley Expressway (Macintyre, 2006). Construction on the north-south section did not resume until the spring of 2003, when work began on roadbed and the creek alignment, as well as tree cutting. In May 2004, further delays to the project were caused by protesters who sat in the trees of the valley for 112 days; these protesters were eventually arrested and sued by the city (De Almeida, 2005).

As construction resumed, neighbours along the valley wanted the city to provide compensation and mitigation measures to protect the residents' health and well-being from noise and traffic impacts. The city agreed to provide noise walls along the top of the valley wall; landscaping or fencing to screen the backyard living area from the expressway; and air conditioning or triple glazed windows for residents whose homes would be affected (Van Harten, 2005). However, only households that were directly against the expressway were provided with mitigation efforts, and mitigation and compensation were for noise and not polluting effects. It was also during this time that the Red Hill Valley Neighbourhoods Association (RHVNA) formed. This organization is still active today and is committed to fighting for the rights of residents as they may suffer adverse effects from the expressway. From 2005 to 2007, the road faced minimal delays as the $245 million construction project neared completion (Macintyre, 2007a). It was not until November 2007 that the road, which became known as The Red Hill Valley Parkway, officially opened to traffic.

During the whole debate, proponents had argued the parkway was needed to spur growth by encouraging development and businesses to move to Hamilton. The proponents also believed the parkway would reduce not only traffic flow but the amount of air pollution emissions. As well, in response to protests of putting a road through a natural green space, the city's position was that they were building 'more than a road' by ensuring the environment is protected. Among the city's projects to make the parkway more environmentally-friendly were realignment of 7 km of the creek which would increase fish habitat; adding sewer overflow tanks 2 km long that would collect sewage that previously ran off into the valley; planting trees to replace those cut; and replacing

parkland lost by creating trails and open spaces in other parts of the valley (Honywill, 2005).

The expressway opponents, on the other hand, claimed the building of the road was not worth the environmental destruction to the valley. The anti-expressway faction had been and continues to be concerned about the destruction of natural habitat to the environment, and the health and well-being of the citizens of Hamilton. Specifically, concerns have been expressed regarding impacts to health; air and noise emissions; flooding issues; loss of biodiversity; elimination of recreational areas; and the excavation of the Rennie Landfill.

From the very first proposal, the Red Hill Valley Parkway has been Hamilton's most controversial road and was the longest and most heated planning debate. The construction and completion of the road has had an impact on both the environmental and cultural significance of the valley. Construction has had a significant impact on habitat, wildlife, air quality, and flooding in the area. As well, the physical landscape has been altered as trees were cut; the Niagara Escarpment was blasted; archaeological sites belonging to the Aboriginals were disturbed; the Red Hill Creak was relocated; storm water ponds were constructed; and the Greenhill Avenue interchange was redesigned. Today, the Red Hill Valley Parkway cuts through residential areas, and what was the last significant green space for the citizens in the east end of Hamilton. With an understanding of the study area and the issue surrounding the parkway, the following chapters present the findings from the surveys and interviews.

CHAPTER 5: DESCRIPTIVE ANALYSIS

5.1 Introduction

This chapter and the one that follows will present the results of the analysis of the surveys and interviews. Specifically, in this chapter a descriptive analysis of the self-administered surveys will be presented. The four objectives that guide the research are:

1) To determine the prevalence of psychosocial impacts amongst people who reside within close proximity to transportation infrastructure and traffic;
2) To examine the impacts the new transportation infrastructure has on the lives of the residents;
3) To examine the coping mechanisms employed by individuals in the area faced with the impacts of increased traffic exposure;
4) To determine whether psychosocial effects are related to distance from the source and to length of residence.

The chapter is divided into three sections. First, perceptions of the neighbourhood will be explored, by determining respondents' satisfaction with the area as well as their likes and dislikes about the area. This will be followed by site-specific concerns, effects and actions. Finally, the overall satisfaction of the neighbourhood and whether the Red Hill Valley Parkway has any positive impacts within the neighbourhood will be explored.

5.2 Neighbourhood Perceptions

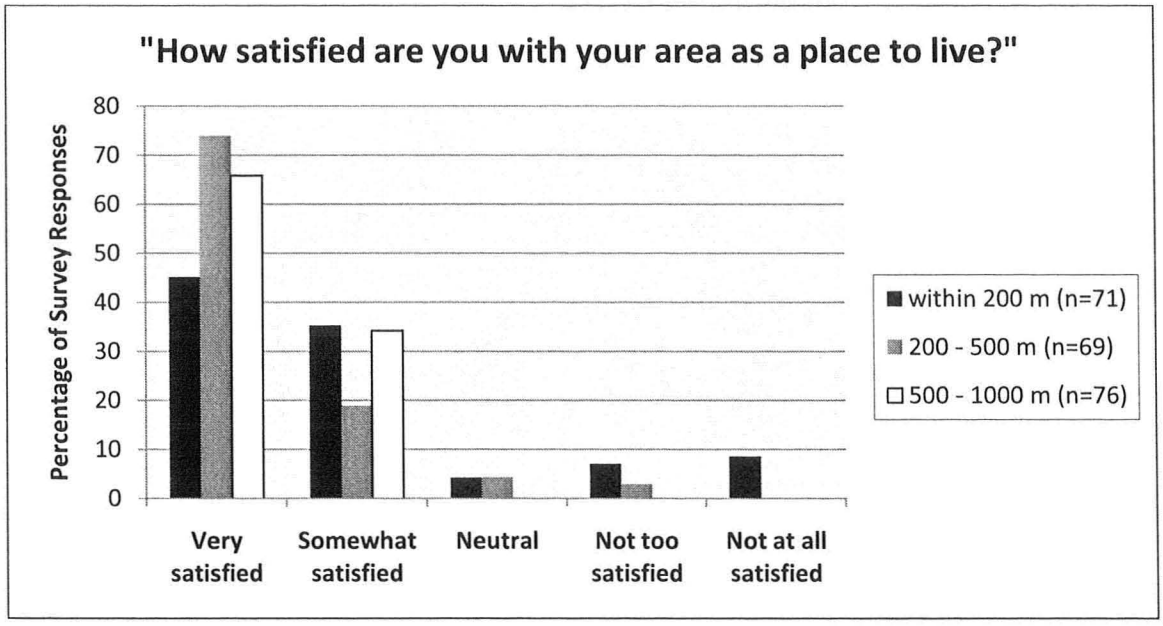
To gain a general understanding of how the residents perceived their neighbourhood and living environment, several indicators were employed. These indicators include satisfaction with the area as a place to live, likes and dislikes about the area, satisfaction with the outdoor physical environment, and road traffic annoyance while at home.

5.2.1 Neighbourhood satisfaction

Residents were first asked how satisfied they were with the area as a place to live (see Figure 5.1). In general, the majority of the participants in the three study areas were satisfied with the area as a place to live; specifically 61.6% of the residents indicated they were 'very satisfied'. The second study area (living between 200 – 500 metres from the parkway) had the highest percentage of residents reporting they were very satisfied, followed by the third study area (500 – 1000 metres), and finally the first study area (within 200 metres). As well, the first study area saw the highest proportion of respondents indicating they were 'not too satisfied' or 'not at all satisfied' with the area

compared to the other two study areas. There were no residents in the third study area that were unsatisfied with their neighbourhood. In a few cases, those that reported they were unsatisfied in the first study area explained that their feelings about the area changed as soon as the parkway was built.

Figure 5.1: Residents' satisfaction with the area



5.2.2 Likes and dislikes about the area

The second measure to determine the residents' perception of the local area was asking respondents to list in order of importance the things they liked and disliked about the area where they live. Respondents were allowed up to three mentions for both the likes and dislikes about the area. This question was also asked to determine if residents were aware of the site (the Red Hill Valley Parkway), and whether they volunteered the site as a like or dislike about the area. In general, there were no major differences among the three study areas. Overall, respondents ranked their neighbourhood as the most important like of the area in the first two study areas, and the second important like in the third study area. Specifically, the neighbourhood was liked because it was "*quiet and peaceful*," there was "*low traffic*," and it was considered a "*mature neighbourhood.*" Access to goods and services (which included being in close proximity to the mall, grocery stores, and public transportation) was ranked first by residents residing in the third study area. The next major features about the area that were mentioned included

social factors, location, the environment, and property (see Table 5.1). Social factors mentioned included "*close to family*" and "*friendly neighbours*;" location included being "*close to work*" and living in a "*good part of town*;" environmental responses included close to "*green space*" and "*nature*," "*lots of trees*," "*presence of wildlife*," "*breathe clean air*," and "*the natural setting of the Red Hill Valley*;" and property included "*large lots*," "*large backyards*," and "*privacy*."

Table 5.1: Resident likes about the neighbourhood

RANK	**200 m (n=71)**	**200-500m (n=69)**	**500-1000m (n=76)**
1	Neighbourhood	Neighbourhood	Access to goods & services
2	Access to goods & services	Access to goods & services	Neighbourhood
3	Social	Social	Location
4	Environment	Location	Social
5	Location	Environment	Environment
6	Property	Site (RHVP)	Site (RHVP)
7	Site (RHVP)	Property	Property

The Red Hill Valley Parkway was also mentioned as a like about the area, specifically it was ranked seventh in study area one, and sixth in both study area two and three (see Table 5.1). The residents mentioned they liked the close proximity the parkway provided; the ease of mobility; the improvement in the condition of the valley and creek; and the improvement in traffic, noise, and pollution in the residential neighbourhood. In total, the parkway was mentioned 14 times by residents residing within 200 metres, 16 times by those living between 200 to 500 metres, and 7 times by those residing further than 500 metres from the parkway, which totalled 6.4% of all the mentions (see Table 5.2). In one case, a resident even mentioned "*the Red Hill Valley Expressway made a good area even better*."

Table 5.2: Frequency RHVP was mentioned as a 'like' about the area as a place to live

STUDY AREA	1 (200m)	2 (200-500m)	3 (500-1000m)	Total
FREQUENCY	14	16	7	37
TOTAL	192	195	192	579
PERCENT	7.3%	8.2%	3.7%	6.4%

Residents were also asked to rank their dislikes about the area where they live. The Red Hill Valley Parkway ('site') was ranked as the major dislike in all three study areas. Dislike about the parkway in the neighbourhood included increase in noise, pollution, and dust; and intrusion into resident's property, and destruction to the Red Hill Valley. However, after the parkway, differences emerged between the three areas (see Table 5.3). The city and city services (i.e., high taxes, snow removal) was ranked second by residents residing within 200 metres of the parkway; this was followed by 'other' (i.e., lack of recreational facilities, route for driving schools); air quality (i.e., industrial emissions); traffic (i.e., going through stop lights); location (i.e., close to railway, industry); and neighbourhood (i.e., deteriorating). For residents living between 200 and 500 metres of the parkway, 'other' (i.e., crime, wildlife) was ranked second, followed by location (i.e., east end of Hamilton); social factors (i.e., loud neighbours); city/city services; traffic (i.e., congestion on city streets); and litter (i.e., garbage thrown in the ravine). Residents living beyond 500 metres mentioned the major dislikes after the parkway as 'other' (i.e., presence of high school), traffic, garbage/litter, the neighbourhood, location, and noise. Also, 30 of the total residents indicated there were no dislikes about the area they live.

Table 5.3: Major dislikes about the area as a place to live

RANK	**200 m (n=71)**	**200-500m (n=69)**	**500-1000m (n=76)**
1	Site (RHVP)	Site (RHVP)	Site (RHVP)
2	City/city services	Other	Other
3	Other	Location	Traffic
4	Air quality	Social	Garbage/litter
5	Traffic	City/city services	Neighbourhood
6	Location	Traffic	Location
7	Neighbourhood	Garbage/litter	Noise

The Red Hill Valley Parkway was mentioned as a dislike 32.2% of the time or 132 out of 410 mentions (see Table 5.4). Specifically, residents in study area one mentioned a dislike for the parkway 78 times (56.1%), those in study area two mentioned a dislike 42 times (31%), and residents in study area three mentioned the parkway as a dislike 12 times (9%). In the total sample, 44% of respondents reported the Red Hill Valley Parkway (and its related components) in the first mention. In study area one, one resident said the area was like living in an industrial part of town because of the expressway: "*once a pristine area has become very filthy – comparable to an industrial area.*" The frequency of mentions decreased the further away one lived from the parkway which might be the result of residents who live further from the parkway may not associate the parkway as being in their neighbourhood, or they are far enough away that the negative effects of the parkway has no impact on how they perceive their neighbourhood.

Table 5.4: Frequency RHVP was mentioned as a dislike about the neighbourhood

STUDY AREA	1 (200m)	2 (200-500m)	3 (500-1000m)	Total
FREQUENCY	78	42	12	132
TOTAL	139	137	134	410
PERCENT	56.1%	31.0%	9.0%	32.2%

5.2.3 Physical environment

Residents were also asked to rate their outdoor physical environment to see if the intrusion of the parkway through the Red Hill Valley affected people's perception of the neighbourhood. Overall, the majority of residents considered the physical environment to be 'very good' (see Figure 5.2). In study area three, a higher percentage of residents said the physical environment was 'excellent' compared with residents from the other two areas. In study area three, 15.8% of residents surveyed said the physical environment was 'excellent' compared to 14.5% in study area two, and 12.7% in study area one. This may be the result of the presence of a park located within the neighbourhood which may provide residents with green space and trees. As Figure 5.3 illustrates, almost twice as many residents surveyed within 200 metres reported the physical environment to be fair to poor compared to the other two areas, with zero residents living between 500 and 1000 metres rating the physical environment as poor. Again, for residents residing within 200 metres of the parkway, their opinion about the physical environment changed because of the Red Hill Valley Parkway, with one respondent indicating the physical environment "*was*" good. Another respondent living between 200 and 500 metres rated the physical environment as 'good' commenting that the "*physical environment decreased significantly with the Red Hill Valley Parkway...would have rated it excellent; still good because there are trees.*"

Figure 5.2: Residents rating of the physical environment in the neighbourhood

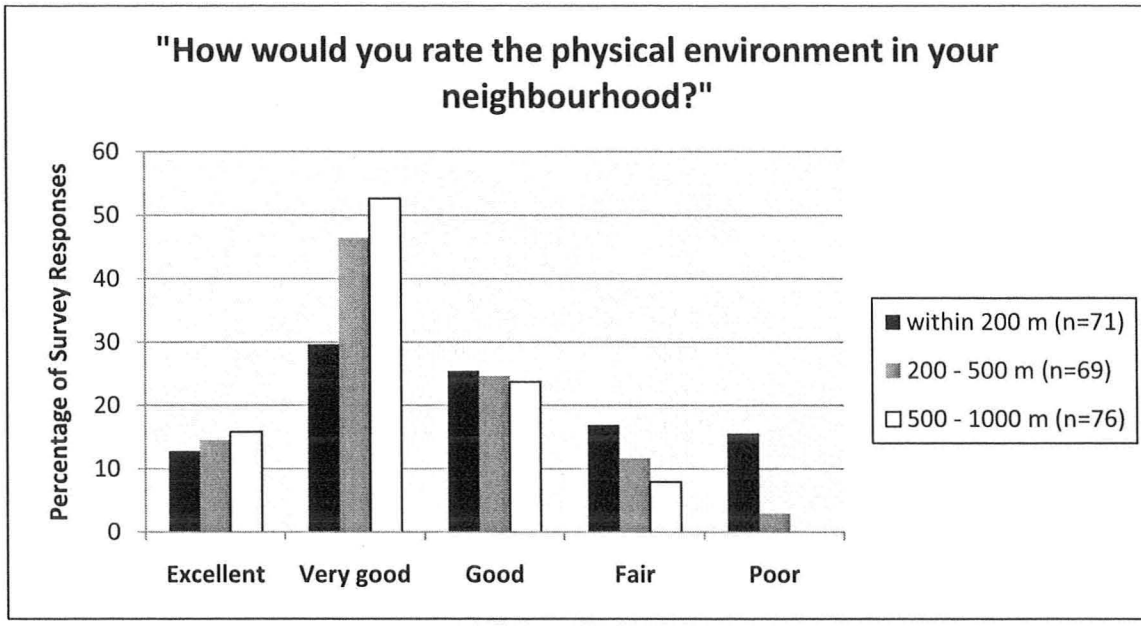
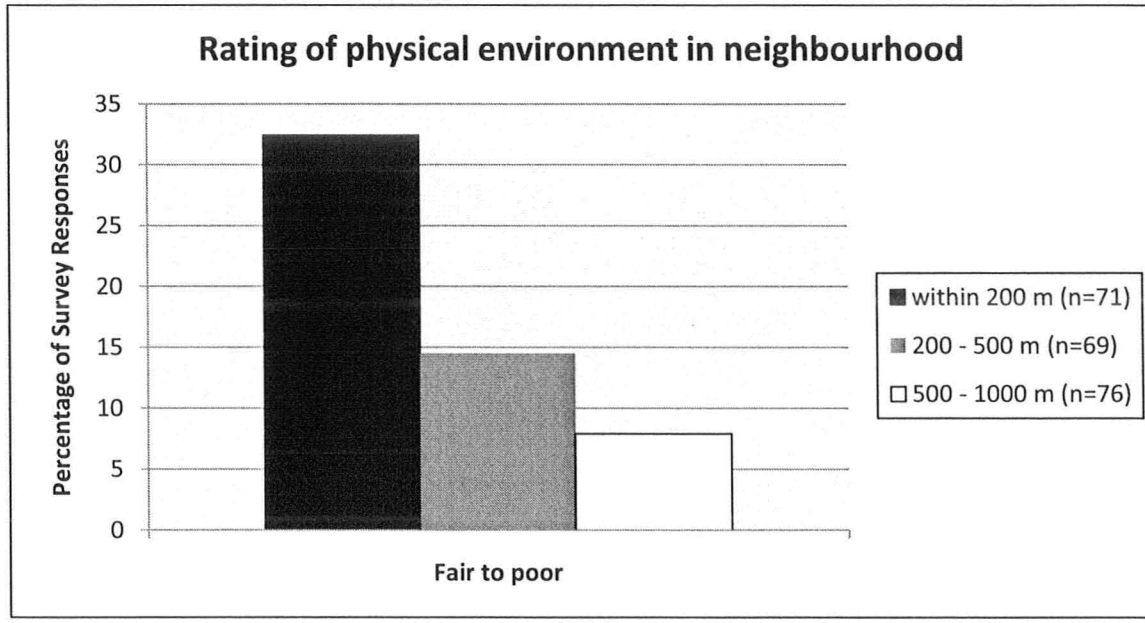


Figure 5.3: Residents reporting the physical environment as fair or poor



5.2.4 Road traffic annoyance

Residents were then asked to rate the impact of road traffic in terms of annoyance while at home. Figure 5.4 shows the results on annoyance caused by road traffic. This figure shows that there is roughly an equal proportion of residents reporting they are affected by road traffic while at home in study area one. Specifically, 16.9% of residents reported they were 'not at all' affected, 18.3% were slightly affected, 23.9% were moderately affected, 19.7% were very affected, and 21.1% of residents indicated they were extremely affected by road traffic while at home. For residents in study area two, the percentage of responses decrease from 43.5% indicating 'not at all' to 8.7% reporting they are extremely affected. The majority of residents in study area three reported they were either slightly or moderately affected by road traffic (36.8% and 34.2% respectively), while there were no respondents indicating they were extremely affected by road traffic. An important qualifying observation should be made about these results. According to studies, individuals residing closer to traffic feel a greater effect than those further away (Michaud et al., 2008; Ohrstrom, 2004), however these findings indicate the contrary, as the percentage of residents in study area three (between 500 to 1000 metres) indicating that road traffic affects them is higher than the percentage of residents in study area two (between 200 to 500 metres) (see Figure 5.5). Noise from other sources could have contributed to the annoyance as it has been shown that other more distant roads can contribute to noise levels (Ohrstrom, 2004). Within the current study area other busy roadways such as Nash Road, Queenston Road and King Street encircle the study neighbourhood. As well, due to the location of the houses within the second study area, surrounding homes may act as a barrier and mitigate some of the sounds of traffic. Therefore residents residing further from the parkway may be affected more than those closer to the parkway by traffic from these roadways.

Figure 5.4: Residents' reporting of annoyance to road traffic

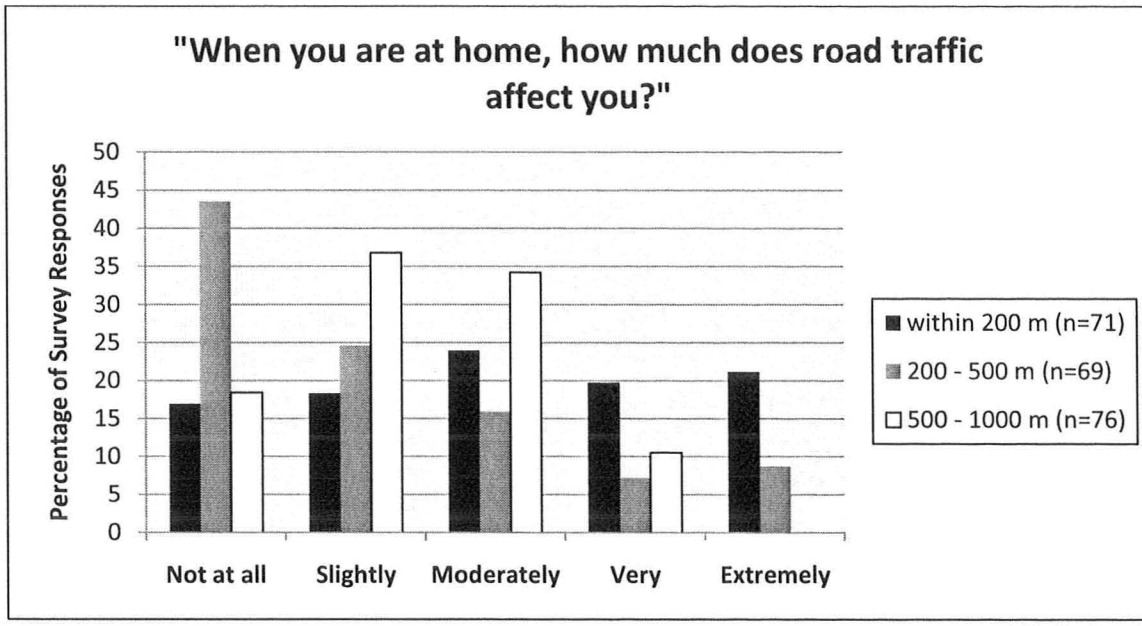
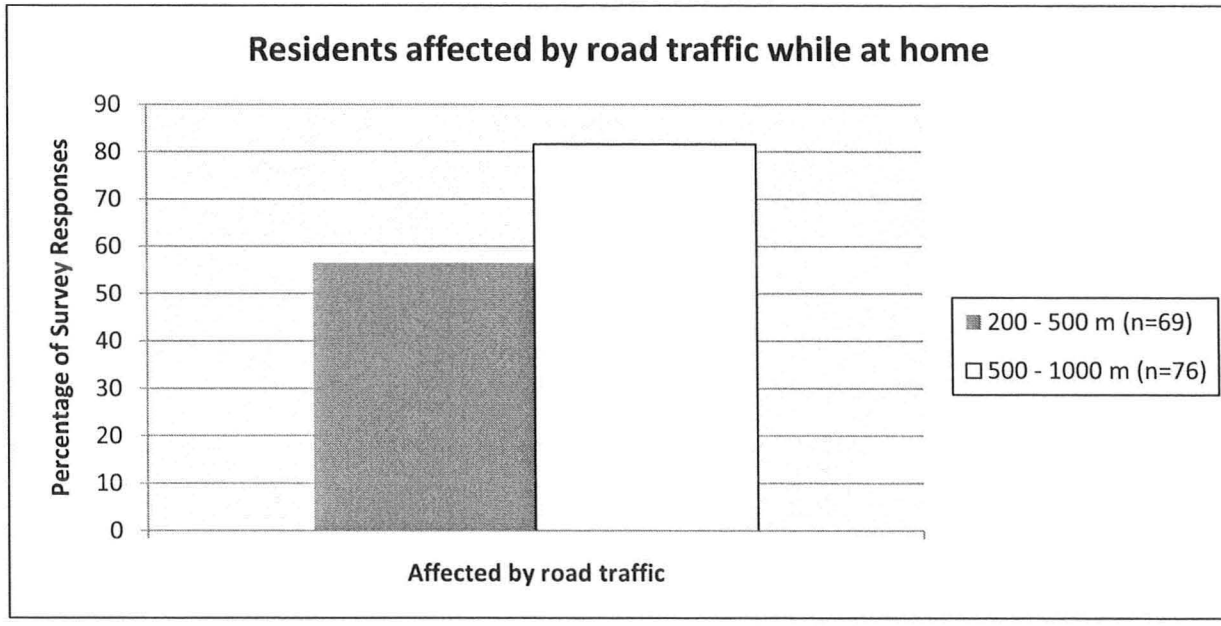


Figure 5.5: Residents in study areas 2 and 3 reporting they are affected by road traffic while at home



In a few responses, residents within 200 metres indicated that road traffic affects them differently when inside and outside their homes. Two residents mentioned that they are only slightly affected by road traffic when inside the house, but when they are outside their home, road traffic has an extreme effect on them. Two other respondents mentioned that when they are inside the house they are not affected at all by road traffic, however when outside it becomes very bothersome. In another case, one resident residing between 200 and 500 metres of the parkway indicated that road traffic affects them only slightly, "*especially/or more so when outside.*" There were no differences between outdoor and indoor annoyance for residents residing between 500 and 1000 metres of the parkway. Road traffic noise was also estimated by a few respondents to be more annoying during certain periods of the day and night. Again, a few participants indicated that the Red Hill Valley Parkway has an impact on how much road traffic affects them, as they feel they are more annoyed now than before.

5.3 Site-Specific Concerns

This section addresses the results of site-specific concerns. Specifically, it describes site concerns, effects and actions taken or intended to take regarding the site. As well, results will be presented on whether resident's satisfaction with the neighbourhood has changed as a result of the site; and whether residents felt there were any positive characteristics with the site in their neighbourhood.

5.3.1 Site concerns

When residents were asked if they had any concerns about the Red Hill Valley Parkway, 93 residents (43%) responded 'yes,' while 123 residents (57%) answered 'no.' There were a higher proportion of those living within close proximity (within 200 metres) that answered 'yes' as opposed to those in the other two areas. Specifically, concern was reported by a large majority of residents living within 200 metres of the parkway, as 70% of the residents surveyed answered 'yes.' Only 21 residents in the first study area did not have any concerns. Approximately 40% of respondents from study area two reported concerns, as 29 residents answered 'yes' and 40 residents had 'no' concerns; while in the third study area, only 14 of the residents mentioned they had concerns (see Table 5.5). It is worth noting that residents reporting concerns decreased the further they lived from the parkway (see Figure 5.5). In total, more females than males indicated they had concerns about the parkway (52.7% compared with 47.3%) and this was evident in study area one and three; whereas in study area two more males expressed concerns than females (55.2% vs. 44.8%). However, it should be noted that there were more female participants in the third study area, which could explain the higher proportion of females reporting concerns, and more male participants in the second study area, which could explain higher proportion of males reporting concerns. Table 5.6 displays results of respondents who expressed concerns and how long they have lived in the area. Approximately 50% of residents who expressed concerns have lived at their current address for over 21 years,

while only 14% have lived in the area between 1 to 5 years. However, when comparing those who expressed concern to those who did not, approximately 80% of residents who have lived in the area for over 20 years expressed concerns in study area one, while only 48% in study area two, and 18% in study area three expressed concerns and lived in the area longer than 20 years. For those who have lived in the area for 5 years or less, only 33% in study area one expressed concerns, compared to 27% in study area two, and 25% in study area three.

Table 5.5: Residents reporting concerns about the RHVP

	within 200 m (n=71)	200 - 500 m (n=69)	500 - 1000 m (n=76)	Total
Yes	50	29	14	93
No	21	40	62	123

Figure 5.6: Residents reporting concerns decrease the further from the site

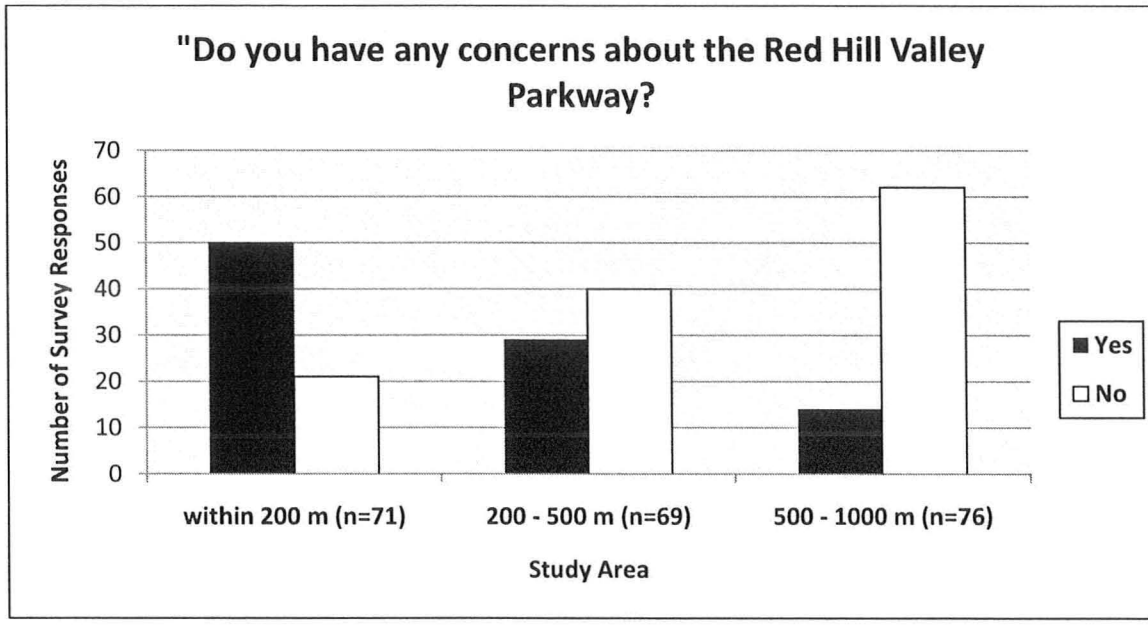


Table 5.6: Respondents reporting concerns compared with their length of residence

		Concerns about the RHVP			
		within 200 m (n=50)	200 - 500 m (n=29)	500 - 1000 m (n=14)	Total (n=93)
# of years at residence	Less than 1 year	0	0	0	0 (0%)
	1-5 years	3	5	5	13 (14%)
	6-10 years	10	2	2	14 (15%)
	11-15 years	6	4	0	10 (11)
	16-20 years	5	3	0	8 (9%)
	21-25 years	1	3	2	6 (6%)
	Over 25 years	25	12	4	41 (44%)
	N/A	0	0	1	1 (1%)

The next question asked respondents who expressed a concern with the parkway to specify the nature of their concerns. This question was open-ended, thereby allowing the participants to write a word, phrase or sentence(s) response. The responses from participants were coded to establish major themes; however some responses contained more than one idea or thought, therefore each idea was coded separate. As a result, the total number of responses may not equal the total number of respondents. The question, which was expressed in the form "If 'yes' what are these concerns," elicited 262 responses or concerns from the 93 participants that answered they had concerns. Overall, participants expressed several concerns they had with respect to the Red Hill Valley Parkway. As seen in Table 5.7, the dominant sources of concern (expressed as a percentage) mentioned by the total participants were related to road traffic: exhaust fumes/air pollution (23.3%) and noise (22.9%); followed by the destruction of the Red Hill Valley (18.3%); flooding (9.2%); traffic concerns (6.5%); and health (5.3%). These six concerns accounted for 86% of all concerns related to the Red Hill Valley Parkway. Even though the majority of the participants expressed similar concerns, between site variation occurred.

Table 5.7: Dominant sources of concern expressed by participants in the three study areas

Concerns	Number of Mentions[1]	% of the total (n=262)[2]
Pollution	61	23.3
Noise	60	22.9
Destruction of the RHV/nature	48	18.3
Flooding	24	9.2
Traffic	17	6.5
Health	14	5.3

[1]Responses from total population expressing concerns (n=93)
[2]Percentages derived from number of responses not participants.

Major concerns related to the parkway differed across the three study areas. In study area one, the dominant source of concern expressed by residents was exhaust or air pollution, as residents were concerned about the increase in vehicle exhaust increased traffic would bring into their neighbourhood (see Table 5.8). Specifically, concerns about exhaust/air pollution accounted for 27% of all the concerns mentioned. A few of the responses by residents that demonstrate their concern about the exhaust include:

"*Reduced air quality*"

"*The extra exposure to car exhaust fumes and pollution*"

"*Amount of traffic day and night causing pollution*"

"*Carbon monoxide emissions from vehicles travelling Red Hill Expressway – prevailing winds blow our way*"

"*I feel it (the parkway) may create more pollution because of where we are situated*"

"*Amount of exhaust fumes from all vehicles on the RHVP*"

"*Air pollution...how it affects health...so close to a highway*"

Noise was the next most frequently mentioned concern at 26%, as participants describe it as "*unbearable*" and are concerned about "*the extra exposure to noise pollution.*" Examples of responses made by participants that demonstrate their concerns about noise include:

> "*Noise, noise, noise*"
>
> "*Noise...used to be a quiet area and loved the ravine, that's why I bought here*"
>
> "*Noise from trucks gearing down to enter Barton Street ramp*"
>
> "*Increased traffic noise and speed in general, specifically on Lawrence Road*"
>
> "*Noise, used to be a quiet area...it's amazing the noise levels since trees were cut down*"

These findings are comparable to other studies on traffic especially for residents residing closest to the heavily trafficked road; for instance the study by Ohrstrom (2004) found residents in the exposed area reported noise was the dominant source of concern, followed closely by exhaust fumes.

Table 5.8: Concerns mentioned by residents residing within 200 metres of the parkway

Concerns (200m)	Number of Mentions	% of the total
Air pollution/exhaust	40	26.7
Noise	39	26
Environmental destruction/wildlife displaced	22	14.7
Flooding	8	5.3
Dust/dirt	8	5.3
Increased traffic volume	6	4
Health/quality of life	5	3.3
Other	5	3.3
Children	4	2.7
Mosquitoes	4	2.7
Backyard	3	2
City	2	1.33
Unable to open windows	2	1.33
Vibration	2	1.33
Total	**150**	**100**

Following exhaust and noise, the next major concerns reported by residents living within 200 metres of the parkway were about the environmental destruction of the valley (14.7%); flooding (5.3%); dirt and dust from traffic (5.3%); increased traffic volume (4%); and health (3.3%). Other concerns that were mentioned included concerns about mosquitoes from stagnant water; vibrations from the traffic; being out in the backyard; keeping windows closed; selling the house; "*the cost of maintaining the parkway*;" hiking in the Red Hill Valley; "*increased waterfowl*;" the Red Hill Valley becoming a dumping ground; and "*City Hall's deaf ears*." One resident who was worried about the mosquitoes commented they can no longer enjoy the ravine due to water that was blocked in a catch basin:

> "*Our kids here hate it that they have to come in as it's so pretty at the ravine and we love the Red Hill trails but our concern again is mosquitoes*."

Of the 29 residents who expressed concern in study area two, the major concerns included 23.7% mentioning noise, 18.4% reported concerns about exhaust/air pollution, 18.4% also reported concerns about the destruction to the environment, 13.2% were concerned about flooding, and 11.8% expressed concern about the potential health effects

of exposure to the traffic (see Table 5.9). As well, residents in study area two indicated concerns regarding children as "*kids won't be safe to play outside*;" water quality; dust/dirt; increase in dangerous traffic on the parkway; "*increased neighbourhood traffic as cars taking short cuts to the parkway*;" and an increase in traffic flow along surrounding streets.

Table 5.9: Concerns mentioned by residents residing between 200 and 500 metres of the parkway

Concerns (200-500m)	Number of Mentions	% of the total
Noise	18	23.68
Air pollution/exhaust	14	18.42
Destruction to RHV	14	18.42
Flooding	10	13.16
Health	9	11.84
Other	6	7.9
Traffic	5	6.58
Total	**76**	**100**

The top ranked concern in the third study area, those residing between 500 and 1000 metres from the parkway, was concern over the destruction of nature, as 36.1% indicated that the parkway "*has taken over nature*" and "*displaced animals*" which has caused "*an increase of wildlife moving out of the Red Hill Valley*;" as well residents mention "*the trails aren't as nice to walk anymore*" and "*the city haven't planted enough trees to replace what was taken away*." These concerns were followed by exhaust/air pollution with 19.4% concerned the "*volume of traffic on the parkway means an increase in air pollution*;" flooding with 16.7% concerned "*water backing up during heavy rain and covering the road*" and "*flooding our basement*;" and traffic as 16.7% of respondents mentioned "*traffic around our area has increased*." One respondent also reported being concerned about being in an accident while driving on the parkway (see Table 5.10).

Table 5.10: Concerns mentioned by residents residing between 500 and 1000 metres of the parkway

Concerns (500-1000m)	Number of Mentions	% of the total
Destruction of nature/RHV	13	36.1
Air pollution/exhaust	7	19.4
Flooding	6	16.7
Traffic	6	16.7
Noise	3	8.3
Accidents	1	2.8
Total	**36**	**100**

There were four notable observations about these results. First, noise was not reported as a major concern by residents in the third study area compared to the other two areas, which is consistent with the literature that the sound of noise diminishes the further away from the source (Michaud et al., 2008). Second, children have been known to be more vulnerable to exposure to highway pollutants (Brugge et al., 2007), however only 5 residents in the three study areas reported they were concerned about the health of children. Third, flooding was more of a concern in study areas two and three (as a percentage of the total) than study area one. Finally, within this study, reporting of health concerns may be underreported as concerns about air pollution and noise are connected to health (Dunn et al., 1994), therefore health might be more of a concern than was reported.

5.3.2 Site effects

5.3.2.1 Daily life

After residents specified the nature of their concerns, they were asked to report what effect these concerns had on their life, specifically, two effects were examined: impact on daily life and on health. The first question determined whether residents' concerns had an effect on their daily life. The question was open-ended and respondents were allowed multiple responses which were coded for similar themes. Again, the total number of responses may not equal the total number of respondents as some responses contained more than one idea or thought, and as a result each idea was coded separate. Overall, 92.3% of all survey respondents indicating concerns reported their daily life was affected by the parkway. Specifically, 95.3% of participants within 200 metres of the parkway reported an effect on their daily life; 89.6% of residents between 200 and 500 metres mentioned their daily life was affected; and 81.3% of those with concerns living between 500 and 1000 metres reported the parkway had an effect on their daily life.

In study area one, the six major effects the parkway had on residents' daily life were outdoor activities, sleep disturbances, unable to keep windows open, no longer peaceful, constant cleaning, and health/quality of life (see Table 5.11). These effects accounted for approximately 68% of the total mentions. For the residents living within 200 metres of the parkway, the use of their backyards has been impacted the most as residents said they "*don't go out back as often*" and spend as little time in their backyard as possible, especially when the "*backyard faces on/off ramp*." Residents also mentioned that they "*don't sit outside*" and "*can't relax in my own backyard*" because "*it's extremely distressing visually*;" the noise level "*is constant*" and "*truly unbearable*;" and the "*mosquitoes are really bad and the kids are getting bit all the time; [I] worry over the West Nile virus*." Other residents mention they no longer enjoy being outdoors as one resident explained "*we no longer enjoy our peaceful existence, we used to love and appreciate living here; during the summer months we used to live outside...entertained; we no longer do this*." As a result of the impact on outdoors, many residents "*go inside if too noisy*," "*spend more time indoors*," "*avoid going out at peak times*," or "*go further from home to find nature*."

Table 5.11: Residents living within 200 metres reporting how their daily life has been affected by the RHVP

Daily Life Affected (200m)	Number of Mentions	% of the total
Outdoor activities	28	21.9
Sleep disturbances	15	11.7
Unable to keep windows open	13	10.2
Peacefulness gone	11	8.6
Cleaning	10	7.8
Health/quality of life	10	7.8
Hear traffic	7	5.4
None/unsure	6	4.7
Increase use of A/C	5	3.9
Conversation	4	3.1
No longer use RHV for recreation	4	3.1
Other	4	3.1
Damage due to flooding	3	2.3
Rest/relaxation	2	1.6
Radio/TV	2	1.6
Constant concerns	2	1.6
Lost garden/backyard	2	1.6
Total	**128**	**100**

The next major effect residents report is disturbances to sleep: "*have not slept more than 2 – 4 hrs at most since the building of the R.H.E.*;" "*during the day we can live with the noise but at night we are often awakened*;" "*interrupts night sleep*;" "*we can no longer sleep with windows open*;" and "*due to noise levels it is difficult sleeping in summer with windows open.*" The loss of the peacefulness was the next major effect on residents' daily life as some mentioned "*the peace and restfulness, a constant in the neighbourhood have been destroyed*;" and one resident stated "*if you saw what a beautiful and serene place this was you would better understand the loss*." As a result, residents no longer use the valley or spend time outdoors in the neighbourhood as they did before:

> "*Queenston Road was always a peaceful scenic drive and when walking – I and my husband walked 2 hours daily down Queenston past Red Hill Valley and we daily saw deer with their young, salmon swimming upstream...we walked the trails in the valley, saw plants of all sorts...now, don't walk anymore, and don't see all species in the environment.*"

Other effects the parkway has had on daily life that residents report: "*wanting to move*;" "*use air conditioner more*;" "*required to shut windows due to noise*;" "*constant cleaning windows, siding and outdoor furniture; inside the house is also much dirtier than before*;" "*keep kids indoor*;" "*used to see all kinds of birds but there isn't as many*;" "*hiking down in the valley*;" and "*can't talk to neighbours, couldn't have conversation because it was too noisy from all the cars that went along the parkway*" (see Table 5.11).

In study area two, 89.6% of residents reporting concerns about the Red Hill Valley Parkway mentioned their concerns had an effect on their daily life (see Table 5.12). Only 8 participants mentioned their concerns have not affected their life in any way, as one resident stated: "*they don't really affect my daily life, I am just not happy that the expressway went through the valley and I don't dwell on something I cannot change.*" For the residents living between 200 and 500 metres of the parkway the major impact on their daily life is they no longer use the valley for recreation: "*less likely to use trails*;" "*used to hike and play in the valley since I was a child, the expressway has completely diminished that for me and others*;" and "*has affected 'sense of place'...not the same as it was before...I can't go bike riding, hiking or tobogganing.*" Second, the desire to be outdoors has been affected: "*the affects of emissions (especially trucks) when spending time outdoors*;" "*can't enjoy sitting in the backyard because all I hear is noise from the traffic*;" "*can no longer enjoy being outside, I don't enjoy reading outside especially at certain times of the day; as well I don't enjoy walking, rollerblading or biking through the neighbourhood*;" "*increased noise levels, especially when winds are westerly and south-westerly, as a result outdoor entertaining suffers due to noise*;" and "*backyard/outdoor living is notably less comfortable with increased traffic noise especially from motorcycles/muscle cars/sirens/buses.*" Other impacts residents stated include disturbances to sleep; "*windows not open as in the past*;" "*connection to nature*

lost;" increase in taxes to repair and maintain the parkway and increase in insurance rates as a result of flooding; and increase use of the air conditioner, especially "*at night*."

Table 5.12: Residents living between 200 and 500 metres reporting how their daily life has been affected by the RHVP

Daily Life Affected (200-500m)	Number of Mentions	% of the total
No longer use RHV for recreation	10	12.9
Outdoor activities	9	11.7
Not at all	8	10.4
Sleep disturbances	8	10.4
Health worries	8	10.4
Unable to keep windows open	8	10.4
Fresh air/peacefulness gone	8	10.4
Hear traffic	5	6.5
Do not see wildlife	4	5.2
Avoid RHVP	3	3.9
Other	2	2.6
Increase insurance/taxes	2	2.6
Increase use of A/C	2	2.6
Total	**77**	**100**

Residents living between 500 and 1000 metres also mentioned their concerns had an effect on their daily life (see Table 5.13). Only 3 participants mentioned "*no real affect on my daily life*" and "*I think about it but don't act on my concerns*." Those residents that indicated an impact, some of the responses include having an affect while outdoors as residents "*spend less time outdoors*." Some residents feel it "*affects going for walks*" and "*if my family and I want to go for a nice walk we drive to the Dundas Valley Conservation Area*." Others mention property damage as a result of the displaced wildlife and flooded basements; while a few residents feel the parkway causes them to be "*late for work*" as it is a "*slower commute*."

Table 5.13: Residents living between 500 and 1000 metres reporting how their daily life has been affected by the RHVP

Daily Life Affected (500-1000m)	Number of Mentions	% of the total
Not at all	3	18.75
Other	3	18.75
Outdoors	2	12.5
Commute	2	12.5
Use of the valley/walks	2	12.5
Unpleasant/constant reminder	2	12.5
House flooded	2	12.5
Total	**16**	**100**

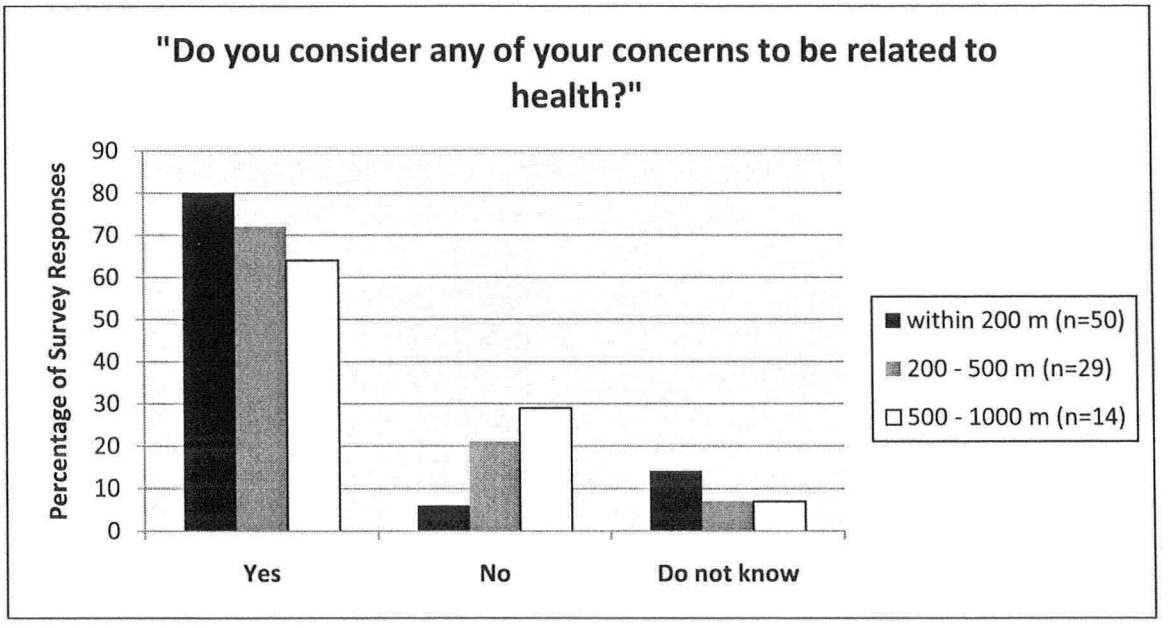
There were some similarities as well as differences that emerged among the study areas. First, within each of the study areas, residents' outdoor activities had been affected. However, for residents residing within the first two study areas, the parkway had a more direct impact on the outdoor life in their home environment, specifically their backyard or front yard living. While participants residing further than 500 metres reported their outdoor activities were disturbed, these activities related more to the use of the valley or the neighbourhood, for instance, not using the valley for walks. As well, residents residing in the third study area were more concerned about the impact of the parkway with respect to travel, for instance increasing commute times or flooding over, which was not a major impact on the lives for those living within 500 metres. It should also be noted, while health was a common theme reported by residents to how their life has been affected as a result of the parkway, these impacts were not discussed as they will be explored in detail in the next section.

5.3.2.2 Health

Residents reporting concerns about the parkway were asked if they considered their concerns to be health related. Overall, 75% of residents considered their concerns to be health related. Specifically, 80% (n=40) of the residents in study area one, 72% (n=21) of the residents in study area two, and 64% (n=9) of the residents in study area three responded 'yes' they felt their concerns were related to health (see Figure 5.7). In total, 13 residents mentioned they did not believe their concerns had any effect on their health. For residents living within 200 metres of the parkway, some mentioned they "*don't think it has currently affected [their] health*;" some have "*no evidence it has had any effect*;" and some mention there is "*nothing so far*" or it is "*too early to tell.*" Others feel "*it's a slow process*" and it will be "*a long term emissions concern*" where "*the*

quality of our lives in future years will be more interrupted due to air quality." Two residents mentioned that they were unsure about the health effects as there is no professional evidence to prove it does: "*no medical facts available to say it may affect us*." As for residents living between 200 and 500 metres some feel that their concerns are "*not at all*" related to health, while some have experienced "*nothing so far*" or "*it is too soon to tell; at this time we have not noticed any health effects*." One resident believes "*it could in the future*" as a result of "*more pollutants/gases in the air from cars*." For the residents residing between 500 and 1000 metres of the parkway, one resident believes it is "*too early to tell*" while another stated it is "*not evident yet*."

Figure 5.7: Percentage of residents who feel their concerns about the RHVP are health related



Residents who felt their concerns were health related were then asked in what way they thought the Red Hill Valley Parkway had affected their health or the health of any members of their household. Again, health concerns were coded and themes were developed. Tables 5.14, 5.15, and 5.16 display the health concerns associated with each study area. For residents within the sample, the most common theme expressed was how the parkway would affect residents' physical health. For example, residents commented "*the increased pollutants from cars on the expressway, and the decrease in trees affect the air we breathe*;" and other residents complained about "*allergic reactions to increased dust and dirt, constant sneezing, coughing and blowing nose especially*

outside;" "*at times, fumes can be smelt, therefore inhaled, therefore doesn't help current lung issues*;" and "*like I said, the dirt is blowing around and I have a lung disease so I can't stay outside very long*." In particular, residents referred to specific symptoms they have been experiencing since the parkway was built in their neighbourhood:

> "*My husband is presenting with breathing issues now...daughter's asthma symptoms have exasperated*"
>
> "*Having asthma I find I have to use my medication more*"
>
> "*It's amazing but my husband's hearing and my hearing is affected. My son lives with us and his hearing is affected*"
>
> "*I now have high blood pressure; I and my daughters experience breathing difficulties more frequently*"

Residents also expressed concern about the "*possible future health implications due to increased levels of car exhaust*" or the long-term effects of exposure to increased noise levels: "*there may be a long term effect by the pollution, but it may not manifest itself until years later. My husband has asthma and it could increase his condition*." As well, residents have questions regarding the impact reduced outdoor activities and the inability to open windows will have on long-term health. Residents expressed that they like fresh air coming into the house but now must keep windows closed, while other residents were concerned about the decrease in physical activity and what impact this would have on their health as one resident living within 200 metres mentioned they "*walk less, have gained weight*."

Table 5.14: Health concerns expressed by residents residing within 200 metres of the RHVP

Health Concerns (200m)	Number of Mentions	% of the total
Annoyed	17	12.1
Quality of life	15	10.6
Worried	15	10.6
No health concern/unsure	15	10.6
Stress	11	7.8
Asthma/allergies/sinus	10	7.1
Breathing difficulties	10	7.1
Angry/aggravated/agitated	10	7.1
Unhappy/depressed	9	6.4
Headaches	5	3.6
Long-term/future affects	5	3.6
Tired/sleep	5	3.6
Less physical activity	4	2.8
Other	4	2.8
Nervous/anxiety	3	2.1
Hearing difficulties	3	2.1
Total	**141**	**100**

Table 5.15: Health concerns expressed by residents residing between 200 and 500 metres of the RHVP

Health Concerns (200-500m)	Number of Mentions	% of the total
Breathing difficulties	14	18
Angry/unhappy/depressed	9	11.5
Tired	8	10.3
No health concerns	8	10.3
Worried	8	10.3
Long-term/future affects	6	7.7
Stress	5	6.4
Asthma/allergies/sinus	5	6.4
High blood pressure	4	5.1
Less physical activity	4	5.1
Anxiety	3	3.8
Quality of life	3	3.8
Accident	1	1.3
Total	**78**	**100**

Table 5.16: Health concerns expressed by residents residing between 500 and 1000 metres of the RHVP

Health Concerns (500-1000m)	Number of Mentions	% of the total
Air quality	4	23.5
Stress	3	17.6
Do not know/unsure/too early	3	17.6
Breathing difficulties	2	11.8
Less physical activities	2	11.8
None	2	11.8
Allergies	1	5.9
Total	**17**	**100**

Another common theme that was prevalent in the three study areas was an effect on residents' psychosocial health and well-being. One resident living within 200 metres feels the intrusion of the road into the valley and subsequently into the neighbourhood has caused him to feel distressed:

> "*I am worried about the air quality for future generations. These concerns are making me feel very uneasy and nervous, and the fact that I can't sit on my front porch anymore, because of the constant sound of the traffic. The serenity that we had before the construction of the highway gives away to anxiety and unhappiness.*"

Residents also reported "*noise levels increase person's 'agitation level'*;" feeling stressful "*not knowing health concerns and realities*" and "*stressed and tense every time I look out my kitchen window at the road*;" being worried about "*potential flooding of the house*," "*what the air will do to our breathing*," and "*about long-term health*;" feeling anxious "*about walking at exit points*;" feeling tired as sleep patterns affected which a "*lack of restful sleep heightens anxiety levels*;" feeling unhappy and depressed because "*can't enjoy the outdoors*" or the valley; experiencing "*headaches more frequently*;" and feeling frustrated because "*city planners guaranteed no increase in neighbourhood traffic.*"

5.3.3 Site actions

Finally, residents were asked how they cope with the parkway by indicating the actions taken or intended to take towards the site. Coping responses were measured two ways. First, residents were asked how they have dealt with their concerns about the Red Hill Valley Parkway. Participants were given a list of options and were asked to choose all that applied. The results for the three study areas are presented in Tables 5.17, 5.18, and 5.19. As seen in the tables, the majority of residents did not ignore their concerns and undertook some form of action, however between sites, some variation occurred. For residents residing within 200 metres of the parkway, the top action taken was shutting windows as 25.5% mentioned they keep their windows shut to cope with their concerns. Following keeping windows closed, 18.8% talked to others, 18.8% reduced outdoor activities, 15.4% complained to authorities, 13.4% accepted their concerns, and 4% ignored their concerns. Another 4% mentioned taking other actions such as "*put all new windows at my expense*;" "*installed a waterfall, stream and pond in backyard in the hope that the sound of running water would offset the highway noise*;" "*joined Friends of Red Hill Valley*;" "*joined the Red Hill Valley Neighbourhoods Association*;" "*made presentations at city council*;" "*voted*;" "*considered selling and relocating*;" and "*planted trees to reduce noise.*" One resident mentioned they complained to the authorities but "*to no avail.*" Other comments mentioned by residents include "*noise abatement walls not built as promised by city*;" "*it's a done deal, nothing can be done now*;" "*I wish I had been more active at meetings about the highway going through*;" and "*would like to see more trees to be planted alongside the Red Hill Valley Parkway.*"

Table 5.17: Actions taken by respondents within 200 metres of the RHVP

Actions (200 m)	Number of Mentions	% of the total
Shut windows	38	25.5
Talked to others	28	18.8
Reduced outdoor activities	28	18.8
Complained to authorities	23	15.4
Accepted concerns	20	13.4
Ignored concerns	6	4
Other	6	4
Total	**149**	**100**

Table 5.18: Actions taken by respondents 200 and 500 metres from the RHVP

Actions (200-500 m)	Number of Mentions	% of the total
Talked to others	15	22.4
Accepted concerns	14	20.9
Shut windows	13	19.4
Reduced outdoor activities	10	14.9
Complained to authorities	8	11.9
Other	4	6
Ignored concerns	3	4.5
Total	**67**	**100**

Table 5.19: Actions taken by respondents 500 and 1000 metres from the RHVP

Actions (500-1000 m)	Number of Mentions	% of the total
Accepted concerns	8	36.4
Talked to others	5	22.7
Reduced outdoor activities	3	13.7
Complained to authorities	2	9.1
Shut windows	2	9.1
Ignored concerns	1	4.5
Other	1	4.5
Total	**22**	**100**

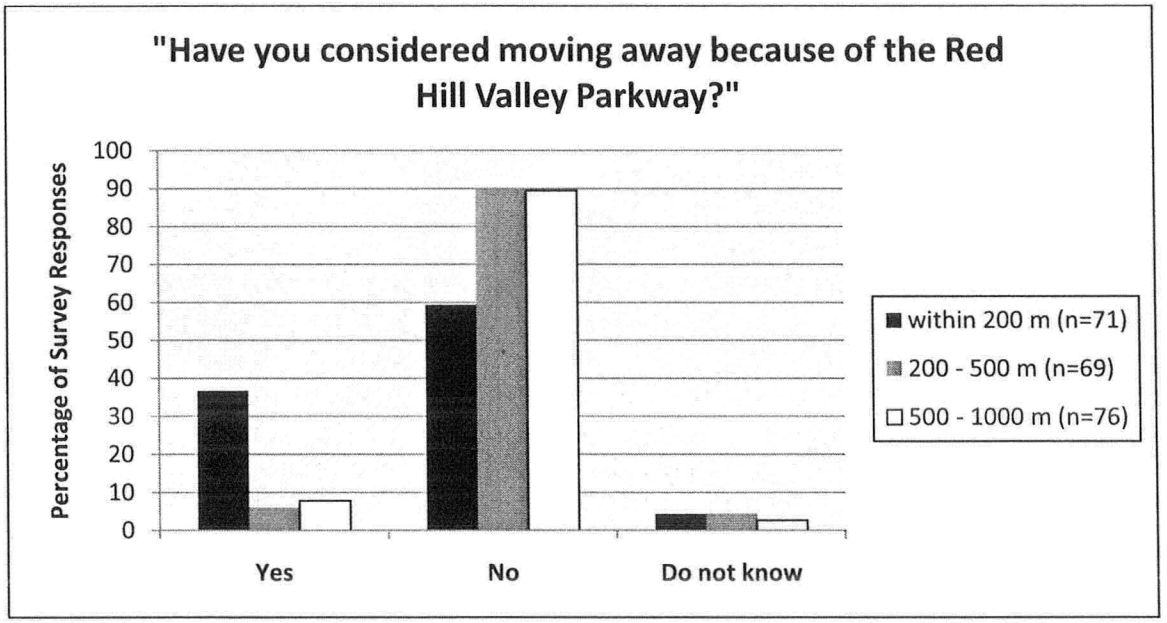
For residents residing between 200 and 500 metres of the parkway, 22.4% mentioned talking to others as the main form of coping with the site. This was followed by 20.9% who mentioned they accepted their concerns, 19.4% mentioned they shut their windows, 14.9% reduced outdoor activities, 11.9% complained to authorities, and 4.5% ignored their concerns. Other actions taken by these residents include "*went to meetings*;" "*play music while relaxing outdoors*;" "*fabricated/manufactured outside walls/curtains around patio*;" "*constant usage of mechanical H.V.A.C.*;" and "*constant exterior cleaning*." One resident mentioned they do not keep windows closed because of the Red Hill Valley Parkway, but when they are opened and they hear the noise they would prefer to keep them closed. As well, the same resident explained their outdoor activities have not been reduced because of the parkway, however they "*do not enjoy them like they used to*."

The majority of residents living between 500 and 1000 metres of the parkway accepted their concerns (36.4%). The major action taken by these residents was talking to others (22.7%); followed by reduction in outdoor activities (13.7%), complaining to authorities (9.1%), shutting windows (9.1%), and finally ignoring their concerns (4.5%). Only one resident mentioned they had taken different actions to help deal with their concerns, specifically the resident "*protested the construction*" of the parkway which they state "*obviously didn't work*."

The second variable that measured how residents cope with their concerns asked participants actions they intended to take. Residents were asked: "Have you considered moving away from this area because of the Red Hill Valley Parkway?" This was followed by, if they have considered it, whether they have taken any steps towards moving. In total, 17% (n=37) of the residents indicated that they have considered moving because of the Red Hill Valley Parkway. In particular, 36.6% (n=26) of participants in

study area one considered moving, 5.9% (n=4) of participants living in the second study area considered moving, and 7.9% (n=3) of residents in the third study area considered moving because of the parkway (see Figure 5.8). Of those who indicated they had concerns about the parkway, only one resident (within 200 metres) of the total, had not considered moving. Some of the residents, who indicated they have not considered moving, mentioned they are "*too comfortable*;" "*built own house*;" "*been here all of their adult life therefore they do not want to move*;" they are too old; or they feel the positives of the area outweigh the negatives. In one case, one resident, who lived between 200 and 500 metres, indicated that the Red Hill Valley Parkway actually aided in their decision to move to the area.

Figure 5.8: Percentage of residents who have considered moving away because of the RHVP



Overall, 31 (85%) of the residents who considered moving have taken steps towards moving, with the majority taking steps residing in the first study area (see table 5.20). Only 3 residents in both study area two and three have taken steps towards moving. Specifically, for residents in study area one, 10 have searched for a new house, 9 have contacted a real estate agent, and 1 has put their house up for sale. Other steps taken by residents in study area one includes expropriation, applying for an apartment, and getting the house ready to sell. As well, two residents indicated they have not taken any steps at the present time, but have in the past. For residents in study area two, 2 searched

for a new house, while the resident who indicated 'other', mentioned that they have not taken any steps now "*but when my children are grown up I will consider moving probably to the Dundas area, by the Dundas Conservation Area.*" In study area three, 1 resident contacted a real estate agent and 2 participants searched for a new house.

Table 5.20: Steps taken by residents who have considered moving because of the RHVP

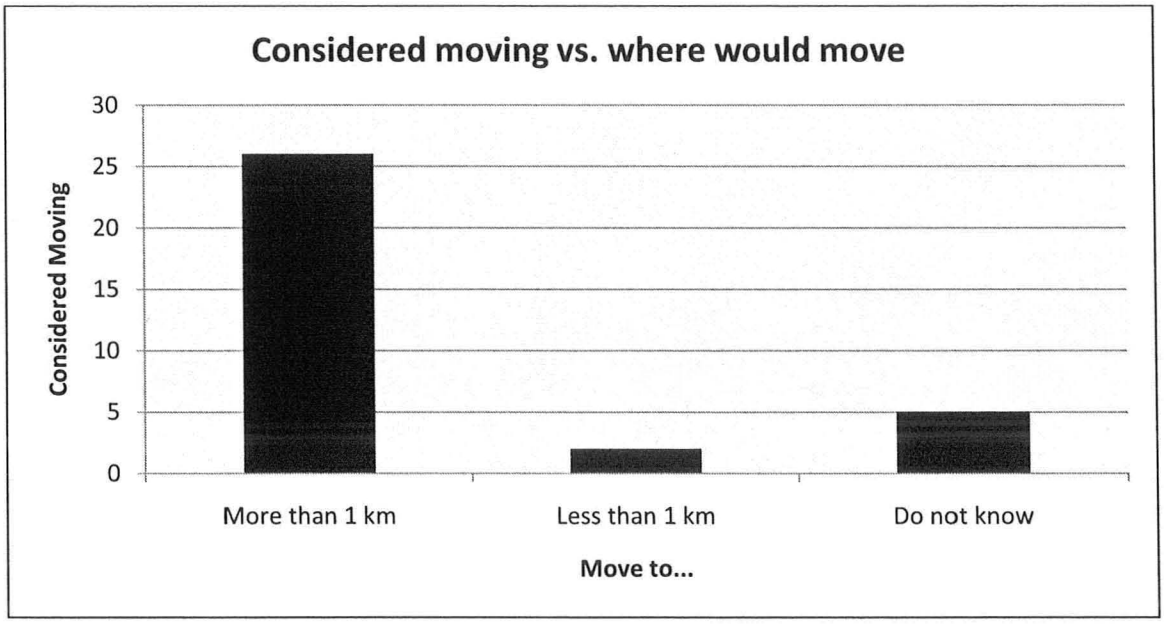
	Number of Mentions (% of total) 200m	Number of Mentions (% of total) 200-500m	Number of Mentions (% of total) 500-1000m	Total
Contacted real estate agent	9 (36)	0 (0)	1 (33.3)	9 (29)
Put house up for sale	1 (4)	0 (0)	0 (0)	1 (3.2)
Searched for new house	10 (40)	2 (66.7)	2 (66.7)	14 (45.2)
Other	5 (20)	1 (33.3)	0 (0)	7 (22.6)
Total	**25**	**3**	**3**	**31**

Approximately 50% (n=45) of the participants who expressed concern mentioned they would move more than 1 km from the present location (see Table 5.21). The majority of residents residing within 200 metres of the parkway would move more than 1 km from their present location, as some residents responded: "*far enough to get away from traffic noise*;" "*out of Hamilton*;" and "*more than 1 km from expressway or QEW.*" Roughly half of the participants between 200 and 500 metres would move more than 1 km from the present location with some responses as "*back up the mountain*;" "*we are country people*;" and "*I like the location, just don't like the road.*" Only 5 participants would move more than 1 km in the third study area. Only 2 of the residents, both residing within 200 metres, would move less than 1 km, while, 46 participants did not know where they would move. Of those participants who had considered moving because of the parkway, 79% (n=26) would move more than 1 km from the present location, 6% (n=2) would move less than 1 km, and 15% (n=5) indicated they do not know (see Figure 5.9).

Table 5.21: Where residents who mentioned they had concerns would move to

	within 200 m (n=50)	200 – 500 m (n=29)	500 – 1000 m (n=14)	Total
More than 1 km	27	13	5	45
Less than 1 km	2	0	0	2
Do not know	21	16	9	46

Figure 5.9: Where residents who considered moving because of the RHVP would move to



5.3.4 Satisfaction

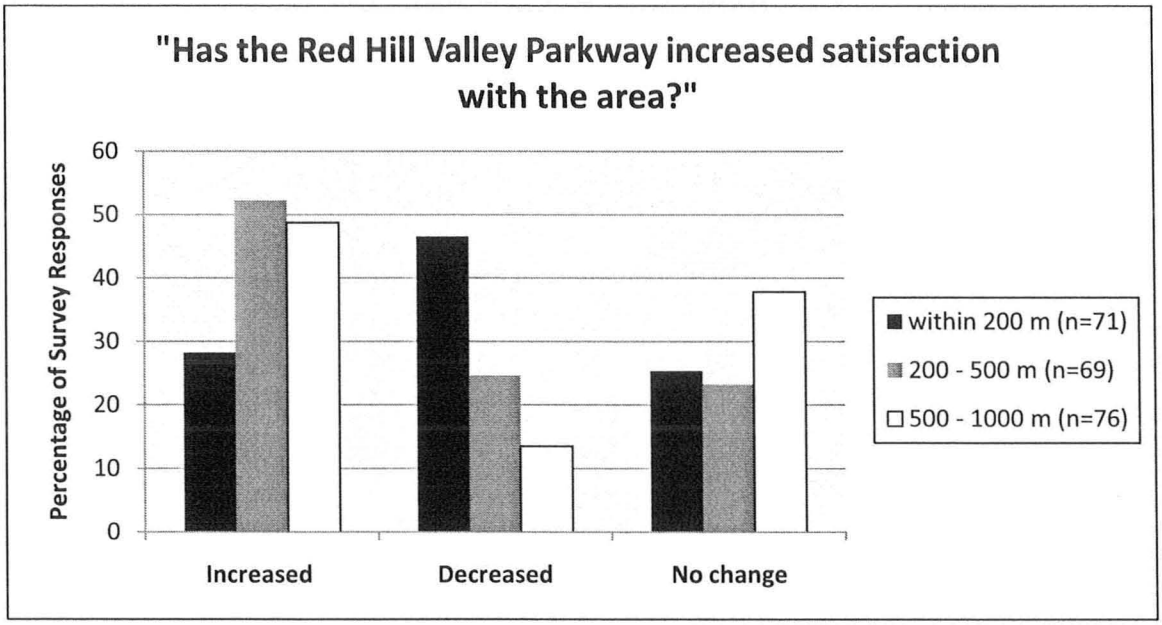
Residents were asked to indicate whether their satisfaction with the area as a place to live has changed as a result of the site. Residents were asked, "Has the Red Hill Valley Parkway increased or decreased your satisfaction with this area as a place to live?" Overall, 41.8% felt the parkway increased their satisfaction with the area, 31.1% indicated their satisfaction decreased, and 27.1% felt no change. The majority of residents (71%) living within 200 metres felt the parkway had not changed or decreased

their satisfaction with the area as a place to live; an explanation from one of the respondents who felt it decreased was:

> "*Our neighbourhood has deteriorated, dirty, noisy, good neighbours left – our houses have definitely been devalued. At one time people would drive up and down to our area.*"

Approximately 50% of residents between 200 and 500 metres felt the parkway increased their satisfaction of the area; and approximately 87% of residents living between 500 and 1000 metres felt the parkway either increased or had no change on their satisfaction of the area as a place to live (see Figure 5.10). From study area one, two respondents selected both 'Increased' and 'Decreased' in response to this question. For the one resident, the parkway increased her satisfaction because of "*access*" but decreased "*for pollution,*" while the explanation from the other resident who selected both was: "*as a commuter I like the RHVP but not as a truck route.*" As well, one resident in study area three did not respond to the question indicating it was "*too early to tell.*" Of the respondents who expressed concern about the site, 55% (n=51) indicated a decrease in satisfaction; specifically, in study area one, 32 participants felt it decreased, 15 participants selected decrease in study area two, and 4 residents felt it decreased their satisfaction in study area three.

Figure 5.10: Percentage of residents indicating the RHVP has increased their satisfaction with the area as a place to live



5.3.5 Positive characteristics

The final question on the survey asked participants whether there are any positive characteristics about the Red Hill Valley Parkway, and if so what these positives were. This question was intended to determine if residents felt there was anything positive about the site; specifically whether residents who expressed concerns thought there were positives about the parkway within their neighbourhood. In total, 80% of participants felt there were positive characteristics about the parkway; with 76.1% in study area one, 82.6% in study area two, and 84.2% in study area three mentioning positives (see Figure 5.11). For those residents who had concerns about the parkway, 67% of the residents residing within 200 metres mentioned there were positives, 37% living between 200 to 500 metres mentioned there were positives, and 38% living between 500 and 1000 metres mentioned the parkway had positive characteristics (see Table 5.22).

Figure 5.11: Percentage of residents indicating positive characteristics about the RHVP

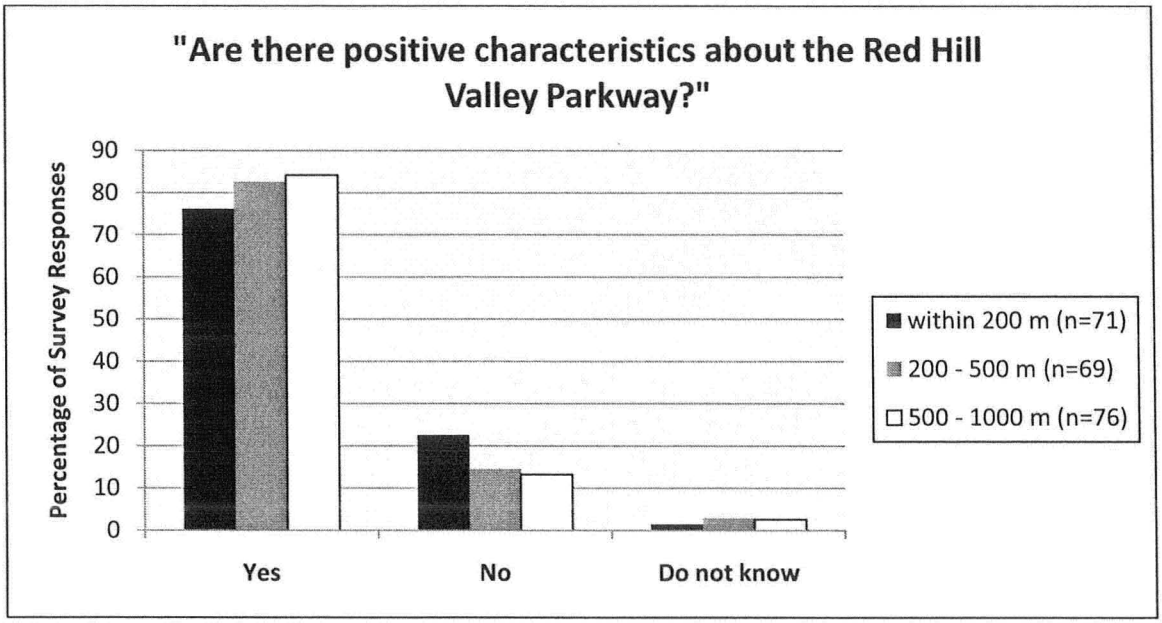


Table 5.22: Residents who reported they had concerns about the RHVP and whether they felt the RHVP had positive characteristics

		Concerns about the RHVP			
		within 200 m (n=50)	200 - 500 m (n=29)	500 - 1000 m (n=14)	Total
Positive characteristics of the RHVP	Yes	36 (67%)	21 (37%)	12 (38%)	69 (48%)
	No	13 (24%)	7 (12%)	2 (6%)	22 (15%)

Residents in each study area were asked what positive characteristics, if any, the parkway had. Table 5.23 presents the results of the positive characteristics mentioned by respondents in each site. The most common theme expressed was how the parkway has improved accessibility, for example access to the mountain, QEW, and west end, as well as the "*ease of commuting through the city.*" Residents also stated the parkway has had a direct benefit on them as it is convenient to travel to and along; it has increased property values; resulted in some residents receiving new windows and fences; and has led to quicker commutes. However, one resident who lived within 200 metres, expressed concern that during rush hour, the parkway was "*ridiculously slow for a new road artery.*" Residents also mentioned the parkway has improved traffic: "*completing ring around Hamilton provides excellent transportation around city,*" "*decreased stop and go traffic moving north and south,*" and "*less congestion throughout the city.*" Some residents believe it will improve the city economically as it "*opens up quicker trade corridor,*" "*attracting business and commerce,*" leading to "*huge growth for Hamilton because of access.*" Other residents commented that the city "*should have built the Red Hill 40 years ago;*" the road has benefitted the area by "*not contributing to air pollution in dense neighbourhoods;*" and it was the "*only positive thing about this area.*" As well, a few residents referred to the parkway improving the valley and creek:

> "*The creek has been cleaned and moved to the location it was when we moved here*"
>
> "*Positive use of green space*"
>
> "*We went hiking this past summer from Rosedale Arena all the way up to Mount Albion Falls and you wouldn't even know that the Red Hill Parkway was there. The trails are still there and it is very peaceful and quiet*"
>
> "*Clean up of Red Hill Valley – it was a pig sty*"

"*The trails; prior to the highway I considered them unusable and somewhat dangerous*"

"*I have known Red Hill Creek since I was a kid; before the expressway it was a dumping area for a lot of people...it was thick with mosquitoes and trash*"

There were also residents, the majority who expressed concerns about the road, stating that there was nothing positive about the road in the neighbourhood and the negatives of the parkway definitely outweigh the positives:

"*Should have been built further east where the ecosystem, wildlife and households would not have been so disrupted*"

"*Will people ever acknowledge the interconnectedness of our natural world and us? Dependency on cars will be the ruin of us*"

"*While there are few environmental concerns raised by the Red Hill Parkway, it has never the less had a huge social impact. We have traded a wonderful place to walk and bike through in the name of convenience*"

"*It is supposed to increase property values because a lot of people would find it advantageous to be close to the highway, but I liked the quietness and nature before the expressway came through and I did not find it was hard or time consuming to travel beforehand*"

Table 5.23: Comparison of positive characteristics of the RHVP by residents in each study area

Positive Characteristics	Number of Mentions 200m	Number of Mentions 200-500m	Number of Mentions 500-1000m	Total
Accessibility	23	26	19	68
Quicker travel/commute times	19	21	9	49
Convenience	13	10	3	26
Traffic improvements	10	11	15	36
Economic benefits	2	4	0	6
Improved RHV/clean up of RHV	3	6	0	9
Reduction in air pollution	3	4	2	9
Increase property value	2	1	1	4
Other	6	2	2	10
Total	**81**	**85**	**51**	**217**

5.4 Summary

This chapter presented a descriptive analysis of the results from the self-administered surveys. First, residents perceptions of their neighbourhood was measured by asking respondents how satisfied they were with the area as a place to live; how satisfied they were with the outdoor physical environment in their neighbourhood; and how annoyed they are with road traffic when at home. As well, participants were asked what they liked and disliked about the area, this was to determine whether the 'site' (the Red Hill Valley Parkway) was volunteered by residents as a like or dislike about their area. In total, the site was mentioned 37 times as a like and 132 times as a dislike.

Following residents' perceptions of their neighbourhood, residents were asked site-specific concerns, effects and actions. Overall, 93 respondents indicated they had concerns about the Red Hill Valley Parkway; specifically 50 residents within 200 metres, 29 residents between 200 and 500 metres, and 14 residents between 500 and 1000 metres of the parkway expressed concerns. The main concerns expressed by the respondents which accounted for 86% of the concerns were exhaust, noise, environmental destruction of the valley, flooding, traffic, and health; however between site variation occurred. Effects of the site were measured two ways: daily life and health. For effects on daily life, between site variation also occurred. The majority of residents residing in the first two study areas indicated direct effects on their home environment (no longer spend time

in front or backyard, sleep disturbances), whereas effects on residents residing beyond 500 metres was related to how they use the road (slower commute) and the valley. As well, residents in each study area mentioned they no longer use the valley and that the peacefulness, once a constant in the neighbourhood, is now gone. Overall, 75% of residents indicated their concerns were health related, with responses ranging from an increase in physical symptoms (asthma, allergies, and breathing difficulties) to psychosocial symptoms such as headaches, tired, worried, stressed, and depressed. Actions taken or intended to take towards the site varied between the three study areas. The majority in study area one and two took direct action compared to study area three where half of the respondents accepted their concerns.

Overall, residents satisfaction with the area differed between the study areas, with a higher percentage of respondents within 200 metres indicating the parkway decreased their satisfaction with the area as a place to live. Approximately 80% considered the parkway had some positive characteristics within the neighbourhood. However, 33% of participants in study area one, 63% in study area two, and 62% in study area three who expressed concern, believed there is nothing positive about the road, and the negatives outweigh the positives. In summary, through an analysis of the surveys, it has been determined that approximately half the sample expressed concerns about the Red Hill Valley Parkway and of these that expressed concern, a significant proportion perceive their concerns to affect their daily life and health. In the ensuing chapter, the results of the in-depth interviews will be analyzed, to examine in more detail the impacts the road has had on the lives of residents, and how these residents cope with the environmental nuisance.

CHAPTER 6: IN-DEPTH INTERVIEWS

6.1 Introduction

In-depth interviews were used to investigate how the Red Hill Valley Parkway affects the everyday lives of community residents. This chapter will present the analysis of the in-depth interviews, which were guided by the following research objectives:

1) To determine the prevalence of psychosocial impacts amongst people who reside within close proximity to transportation infrastructure and traffic;
2) To examine the impacts the new transportation infrastructure has on the lives of the residents;
3) To examine the coping mechanisms employed by individuals in the area faced with the impacts of increased traffic exposure;
4) To determine whether psychosocial effects are related to distance from the source and to length of residence.

While the survey focused on a descriptive analysis of the issue, the in-depth interviews allowed for the exploration of parkway-related experiences and concerns within the broader context of the lives of residents. Specifically, the chapter provides a better understanding of how the presence of the parkway affects the daily lives of residents living in the vicinity of the road.

This chapter will discuss the findings of the 21 in-depth interviews conducted with residents living within close proximity to the Red Hill Valley Parkway. It should be noted that the participants were members of the RHVNA and therefore may share similar or specific perspectives on the issue. After analyzing the textual data from the 21 interviews (16 within 200 metres, and 5 between 200 and 500 metres of the parkway), several major themes emerged. These themes will be outlined and explored further in this chapter. The first part of this chapter will discuss the residents' perceptions of their neighbourhood. This will be followed by an investigation into the impact the Red Hill Valley Parkway has on residents' daily lives by examining concerns expressed by the participants. Following a discussion on residents' concerns, the parkway's effects on daily life will be explored. The last section of this chapter will examine the coping mechanisms employed by these residents. What follows is a narrative of how the residents are living with the Red Hill Valley Parkway. Quotations, which appear in italics, are included to illustrate the residents' experiences with the parkway as "quotations serve to effectively immerse the reader in the narrative of the participant" (Haalboom, 2002, 90).

6.2 Perceptions of the Neighbourhood

A majority of residents expressed satisfaction with their outdoor environment. Many of these residents describe the area positively admitting the presence of the valley in their neighbourhood was like a "*little piece of paradise...the country within the city.*" The majority of the residents describe the area as being very peaceful and quiet as the "*forest acts as a shield;*" and it was "*nice and private with a huge valley, with all these trees.*" Others enjoyed living in the area because it provided one with a "*very large lot and home with a valley that is wrapped around us.*" In addition, the proximity to the valley made it feel like being out in the country and away from the busy life of the city: "*it's a great place to live...felt like the country but living in the city;*" "*it felt like a piece of country within the city;*" and "*it feels like being in the county with the city around the corner.*" Another positive attribute the residents described that made the area unique was the presence of wildlife: "*we used to see all kinds of wildlife such as deer, frogs, and pheasants in our backyard.*" Unfortunately, the parkway has caused the wildlife to be displaced as residents explained they "*do not see these animals anymore.*" However, for some residents, the parkway has caused wildlife, such as skunks and racoons which one resident likes to call "*vermin,*" to be driven out of the forest and find shelter in residents' backyards.

The peacefulness and quietness the Red Hill Valley neighbourhood provided was one of the main reasons for buying and moving into the area, as residents explained "*one of the reasons we moved into the neighbourhood was because of the valley;*" "*we bought the house because it was a quiet area to live and raise the kids;*" "*the valley is why we bought this house;*" and "*it is a great place to live, very private; felt like the country but living in the city.*" In one case, a participant explained that if they were constructing the expressway at the time he bought his house, he would not have bought it. Throughout the interviews, there was a sense among the residents that once you bought a house in the neighbourhood you did not want to let it go, living along this "*best kept secret*" was a privilege. As one resident stated who recently moved back into the area:

> "*The area was nice and quiet, very peaceful with an abundant of trees and rich forest...there were never any houses for sale. Once you got into the neighbourhood, you never left; the houses would be passed down from generation to generation.*"

Some long-time residents claim the area "*used to be excellent*" as "*before the expressway the area was like living in the country; it had a country feel to it with forest, trees and quietness.*" There was also a strong attachment to the valley as one resident claims "*it makes Hamilton and this area unique; it is the most beautiful and peaceful environment in Hamilton.*" Others describe the area as their own "*garden of Eden...a peaceful oasis to retire.*" Although many of the residents agree the neighbourhood is "*a great place to live*" because of its "*location in the city,*" "*park like setting*" and "*easy access to amenities,*" several residents insist the parkway "*does not belong here*" and

changed the landscape of the area with one resident commenting, "*with the expressway it now feels like the city.*" A significant number of residents, who were unsatisfied with the area, explained that their feelings about the area had changed as soon as the parkway was built. These residents acknowledged that the parkway caused the area to deteriorate. The participants also admit the parkway ruined the environmental benefits the trees and forest provided the neighbourhood as one resident explains:

> "*The environment is not as good as it was in terms of air quality and noise, it [the parkway] has a detrimental impact on green space, specifically the pollution, with the amount of trees that died; the diesel fumes are killing the green space.*"

Other residents mention the feeling of the neighbourhood is different, "*you used to be able to stand at the end of the street and all you would see is darkness but now you see the cars and the headlights.*" A few of the residents feel it is a shame that the valley was massacred especially after being here all those years, and they wish the area could go back to the way it was.

There were a few residents who have accepted that living here "*is not as good as it used to be;*" "*it was good until the expressway came in because it was quiet and peaceful; I knew what it was like before;*" and "*I lived here almost fifty years, huge change since it [the parkway] moved in.*" However, even though the parkway is becoming a part of everyday life, as some residents claim they "*live with it*" and "*since it is built nothing we can do;*" there are a those residents who have not or will not get used to it, "*every time my family comes over they ask whether I am used to it, and I always reply, no! I will never get used to it; they love it and enjoy it because they are not living with it.*"

Residents also commented on the parkway's benefits to the neighbourhood (see Table 6.1). Twelve of the residents mentioned the parkway provided benefits to the city as residents claim the road is "*good for the city, traffic, and business.*" Others describe the direct benefits the parkway has had on their travel, specifically providing a convenient route with more accessibility and quicker commute times. Some of the residents use the parkway "*to get up the mountain to visit family*" while others see it as providing greater accessibility to the QEW and places such as Limeridge Mall. Even though residents mentioned the parkway provided quicker commutes, most of them strongly felt that "*shouldn't be a factor to build.*" In one case, a resident mentioned he would rather add ten minutes to his route than have the parkway in his backyard. As well, every resident interviewed was in support of not building the parkway through the valley, however some did "*understand the need for the road*" as one resident commented "*we certainly needed something,*" however "*not in our valley.*" Nonetheless, these residents feel that the negative effects of the road definitely outweigh the positives as they are now stuck "*paying for a road we didn't want and have to deal with all the negative impacts.*" Seven of the participants see no positives with the parkway. They question what the road has brought in and whether the road has now caused people to bypass the city, with one

resident remarking "*they should name the road 'Hamilton bypass.*'" Overall, the majority of residents were satisfied with the area at one point, however, once the Red Hill Valley Parkway was built, many residents' opinions on the area changed as they felt the parkway ruined the area as a place to live.

Table 6.1: Positive characteristics of the RHVP as mentioned by the residents

Positive Characteristics	Number of Mentions
Convenience	4
Accessibility	3
Quicker travel/commute time	3
Economic benefits	1
Traffic improvements	1
Total	**12**

6.3 Concerns

6.3.1 Health concerns

When asked about concerns about the Red Hill Valley Parkway all 21 participants indicated they had concerns, with health concerns mentioned most frequently (see Table 6.2). All 21 participants felt that the Red Hill Valley Parkway had a negative impact on their health, and both physical and psychosocial health concerns were expressed. In terms of their physical health, participants spoke about a number of health problems that they have been experiencing now that were not present before: "*I never had sinus problems until now*;" "*my husband has high blood pressure all of a sudden, which was never the case before*;" and "*I have a sinus infection now, which I never had before.*" For those respondents who mentioned an increase in physical health problems, they attribute it to the opening of the Red Hill Valley Parkway: "*I haven't done anything else different in my life; it has become a problem the last two to three years since it [the parkway] opened*;" "*the only explanation I can think of is the expressway...since the parkway opened his blood pressure has increased*;" and "*I have had it the last three years, roughly the same time the expressway opened for traffic.*"

Table 6.2: Red Hill Valley Parkway Concerns

Concerns Associated with the RHVP	Number of Mentions
Health	21
Noise	16
Vehicle exhaust	12
Natural environment	6
Flooding	5
Mosquitoes	3
Wildlife	3
Children	2
City	1
Financial costs	1
Neighbourhood	1
Selling house	1
Total	**72**

Residents also spoke about problems with their respiratory health, "*I had asthma but it was not as bad until now...my asthma has been constant for a year.*" A number of residents also complained about coughing more because "*they were breathing in unhealthy air.*" Breathing in unhealthy air can cause "respiratory irritation in sensitive people during vigorous exercise; and people with heart and lung disorders are at a greater risk" (Air Quality Ontario, 2009). One resident commented on how their respirologist had told them they should not be in the area and spend as little time outdoors because of the effect the exhaust from cars would have on their asthma. The resident explained that if she spends too much time outside she starts wheezing. As cited in the literature, living close to highways increases the risk of asthma and other respiratory diseases (Brugge et al., 2007; Gordian, Haneuse, and Wakefield, 2006). Specifically, one study focused on the Hamilton area and found an increased risk of bronchitis and aggravated respiratory problems in patients living within 1000 metres of highways (Wallace, D'silva, Brannan, Hargreave, Kanaroglou, and Parameswaran, 2010). In many of the cases, residents were also concerned about the long-term impact the exhaust from the vehicles will have on their breathing, "*the air is bothering us right now, but what about twenty to thirty years down the road, how will the traffic and exhaust coming from the cars affect our breathing.*"

In addition to physical symptoms, the prevalence of psychosocial impacts related to the parkway was also mentioned by a majority of residents (see Table 6.3). Residents

described "*feeling more tired, depressed and angry*" since the parkway was built through their neighbourhood. In one case, a participant who was visibly stressed (grabbing her hair) with the issue, became extremely agitated talking about the parkway as her doctor had told her she was too tense and stressed. Another participant, who was very angry with the whole situation, did not realize it would be this bad and explains "*it keeps getting worse.*"

Table 6.3: Psychosocial symptoms associated with the Red Hill Valley Parkway

Psychosocial Symptoms Expressed	Number of Mentions
Worried	33
Angry/upset/annoyed	13
Stressed/tense	8
Tired	7
Depressed	7
Headaches	4
Frustration	1
Emotionally disturbing	1
Guilty	1
Total	**74**

The uncertainty about possible health effects of living near the parkway is also a source of anxiety for residents. In a few cases, residents reported being worried about the impact prolonged exposure to traffic exhaust would have on their health: "*pollution from the automobiles is coming into the neighbourhood and especially into my backyard, and now I have to worry about my health and the health of my children.*" Many residents also expressed a displeasure or unhappiness now because they "*have to worry about health as exhaust fumes make life shorter.*" As well, prolonged exposure to noise can have an impact on health as one resident explained he is "*worried about the potential health problems due to an increase in noise.*"

Many of the psychosocial symptoms reported by the participants related to the destruction of the Red Hill Valley as many view the parkway as a "*great sadness, especially after being here all these years.*" For some residents the situation is described as depressing, as one resident feels depressed "*to see a road through this peaceful valley*" especially when "*many people around the world would die to have a beautiful park in*

their backyard." Other residents explain they "*just want to scream*" whenever they think about the parkway and what it has done to "*their beautiful valley.*" Residents also expressed anger and resentment towards the parkway and the city for destroying part of their life, especially since the Red Hill Valley was where they grew up; it was part of their way of life, riding their bikes and playing in the creek when they were younger: "*we as kids used to play and build forts in the valley when we were younger, but now children can't experience this because it's all gone.*"

Feeling stressed and agitated was also expressed by a few residents as another psychosocial symptom connected to the parkway. In many of these cases, participants were constantly worried about trying to sell their house as they "*are concerned with how to make the house sellable*" and this is making them feel stressed. These residents explain that trying to make the house sellable is hard "*especially when part of your backyard has been eliminated, and noise and vibration can be heard and felt throughout the house.*" For others, just the thought of having to sell the house was stressful especially when thinking about downsizing, as one resident explains: "*it is very stressful to think about moving; it is the only thing I can do, but the thought of downsizing my house, I like the size of my house now to something smaller is too stressful to think about.*"

However, not all of the residents felt their psychosocial health was affected. In a few cases, respondents mentioned they try not to let the parkway affect their health since there was no point in worrying about something that could not be changed, "*I was stressed...not as much now because I try to live with it, I can't change it...I have to live with it; if I don't like it I have to move.*" In one case, one resident refused to over-react and put the situation in perspective:

> "*I bought the house from a guy who left because the city was putting the expressway in, however I got thirty years of peacefulness before the expressway moved in...it is emotionally disturbing...but I try to be more passive about the situation as it is better for my health.*"

6.3.2 Environmental concerns

After health, environmental nuisances such as noise, pollution and flooding were cited as the next frequent concerns related to the Red Hill Valley Parkway (see Table 6.2). Noise is one of the most common effects related to traffic and many complained about the noise and described it as unbearable: "*the noise from the highway is worse than railway tracks*;" "*there is now an increase in traffic and noise, which is causing a problem...I need to play music to not hear the sounds of traffic*;" and even a resident who "*...ha[s] lost a lot of hearing*," still can hear the noise from the traffic. As well, a few residents feel that the noise is much worse because "*the noise resonates off the escarpment*," while others believe the location of the road within the valley "*amplifies the noise*" and as a result "*the noise travels up and into the backyard.*"

According to some residents the noise is practically constant, "*all we hear is traffic*" and "*you hear the traffic all the time, twenty-four hours a day, seven days a week...it is a constant roar that doesn't stop*." However, only one participant indicated that noise was not a problem. The majority of residents explained the constant roar of traffic has taken away the serene and tranquillity that was once associated with the area. One resident expressed the desire to move back into the country as he "*miss[ed] the peacefulness and quietness when [he] lived further away*."

Although the majority of residents voiced concerns regarding the traffic noise, many opinions differed when describing certain times, conditions or location when the noise is most bothersome. For some, early in the morning between the hours of six and eight, traffic noise was unbearable. Others felt traffic noise to be annoying in the evenings during rush hour (four to six pm). Still, some residents felt the noise to be the most irritating during the night, as one resident stated: "*I wish you had been here between eleven and five last night, the noise was off the charts*." Sundays were considered the best day for quietness "*as there is no traffic on the road*." It was also determined that the effect traffic noise has on people depends on the season. Some residents claim that "*the noise is worse during the winter*" "*especially when leaves fall off*" as the "*trees act as minimal noise reduction*." While other residents feel the noise is worse in the summer, as they spend more time outdoors and therefore hear the traffic more. Participants also expressed differences with respect to their location to the noise. For example, two participants indicated they were not as bothered by noise when inside their house compared to when they were outdoors, in which they felt extremely bothered and annoyed. As well, one resident indicated that "*there is a big difference between the front and back of the house...the front of the house is better...it's still noisy in the front but it muffles the sound*." This difference can be attributed to the back of the property facing the parkway, and the front having the house acting as a barrier against the sound of traffic.

Annoyance due to the presence of the traffic noise is a common reaction among residents. Many residents claimed to be "*really annoyed by the road traffic*" "*no matter what you do*." To determine the level of annoyance, participants were asked to reply to a set of response categories on how much road traffic affects them when they are at home (see Table 6.4). As indicated in Table 6.4, over a third of the respondents (18 out of the 21) indicated they were very or extremely annoyed; one respondent indicated they were slightly annoyed, while only two respondents mentioned they were not at all annoyed by road traffic. Although noise annoyance is prevalent among residents living beside the Red Hill Valley Parkway, some acknowledge that they "*just live with it*" and "*it's not as bad as I thought*;" however others admit that "*if it becomes bad enough I will move*."

Table 6.4: Noise annoyance reported by residents

How much noise from road traffic affects you while at home	Annoyance Response (N=21)
Not at all	2
Slightly	1
Moderately	0
Very	3
Extremely	15

In addition to the annoyance caused by the noise from the traffic, several other undesirable aspects of the parkway were expressed by the participants. Concerns were voiced over an increase in exhaust from the cars travelling on the parkway and "*what it's doing to the air we breathe.*" Not only is the exhaust considered "*environmentally damaging*" but the exhaust emanating from the traffic was causing residents to be annoyed as one resident stated: "*the pollution is getting heavier and blowing towards us.*" Residents describe that cars and pollution was never a problem in the neighbourhood but now that "*Lawrence and Mount Albion Roads are closed, all that pollution is coming into our neighbourhood.*" Residents also describe smelling diesel exhaust fumes especially when windows are open: "*if I leave the windows open upstairs, when I go back into the room I can smell the exhaust.*" Residents acknowledged "*the fumes are an awful smell*" and point out that "*the exhaust is not a healthy thing*;" and as a result, complain they no longer have the luxury of "*smelling nice, fresh and clean air.*" For some, "*the fumes are pretty bad depending on the weather*" as it is "*worse when it is really hot.*"

In addition to odour from the vehicle exhaust, residents describe black soot and deposit everywhere, which according to one resident "*is a visual indicator of the filth of the parkway in the neighbourhood.*" As well, the annoyance caused by black deposit or dirt has had the undesirable effect of requiring constant cleaning as "*layers of settlement of dust and dirt*" can be found in the "*backyard, on the driveway, and on the windows*," as well as on the patio furniture, inside the pool, and inside the house. In one case, the black deposit ruined the fruit trees of one of the residents: "*too much pollution is ruining my fruit trees; I can't enjoy my fruit trees in the backyard because now the fruit is no good.*" As a result, to keep these objects clean required "*a major cleaning job.*" However, the constant cleaning has caused many residents to give up washing, as one resident explained there is "*no sense washing windows because it just keeps getting dirty.*" Another resident explained he used to vacuum the pool once a week but now has to do it every day; while another resident does not open his pool until mid-June because of the pollution. In one extreme case, a resident got rid of their pool because it kept getting too dirty.

Some residents also spoke about noticing red dust in and around the house during construction of the parkway. In one case, the participant did not open his pool during construction of the road because all the dust was getting into his pool; to him it just was not worth it. As well, some residents noticed cracks in the foundation of their home and property after construction was complete. Cracks were found in the tiles of the basement floor, which caused the floor to be uneven. In another case, one resident who expressed his displeasure with the city complained that his pool was damaged during construction: "*for thirty years there were no structural problems with the pool but when construction began we started getting problems and cracks in the pool and the city was sure the road was not causing the problems.*"

Many residents expressed a concern with flooding because "*the creek overflowed into many properties.*" As a result, residents are worried about future flooding especially after the major rainstorms the city experienced in less than a year caused flood damage in many homes. For some, "*the water from the flood came up twenty feet onto the property.*" Other residents described that the flooding "*damaged trees,*" "*destroyed their backyard,*" and caused some to have to renovate as "*four feet of water was found in the basement.*" The majority of the residents placed the blame on the building of a road through a flood plain, "*we never had any flooding before*" and "*we got flooded out last year as the Red Hill Valley Parkway affected drainage.*" Others placed the blame on faulty construction, "*construction of the creek is terrible...they did it the wrong way...the engineering is bad in terms of creek alignment.*" One resident, whose house did not get flooded, expressed sympathy for those that were not as fortunate: "*the flooding is very tragic...if our house were to get flooded, it didn't, I would definitely sell the house...I feel compassion and try to show support for those flooded.*" The only good that came out of the flooding incident as one resident explained was that "*there were no cars on the road, which was the best thing for us.*"

The site of the parkway in the neighbourhood is another undesirable effect mentioned as many of the residents can now see the expressway from their house which is "*not fun from a looks stand point*" (see Figure 6.1). This visual intrusion onto residents' property is "*devastating*" and aesthetically displeasing especially "*when there are no leaves on the trees in the backyard because we can see traffic jams between five o'clock and five-thirty in the evening.*" However, a few of the residents did mention the amount of greenery and trees in the area did compensate and provide some visual protection against the parkway: "*if I can't see the highway the area and street is beautiful;*" "*the environment is beautiful until I can see the road when there are no leaves on the trees;*" and "*the summer isn't bad because of the trees and the leaves on the trees, but once those leaves start falling that's when it looks the worst*" (see Figure 6.1). Other residents described ways to help cope with this visual intrusion. One resident planted cedar trees in his backyard to shut out the road and its undesirable effects from view, while another resident stated he needed to plant more trees to make his property look more attractive. The city also tried to mitigate the visual disturbance by providing fencing for some residents. When asked about the effect of a fence, one participant

responded "*if you can't see it, then you can't hear it*," implying that "*if you don't see it then it must not be there*." However, some residents believed that "*fencing wouldn't change or do anything*," while others found fencing provided privacy "*especially in the winter*." As well, two of the residents who lived in a court explained that the city also built a berm at the end of the court to mitigate the parkway. However, these berms were described as "*disgusting, a waste, and unappealing*" and "*it is very much an eyesore next to the home*" (see Figure 6.1).

Figure 6.1: View of the parkway from a house on Pottruff Road North (a); houses on east side of the parkway visible from the west side (b); parkway visible during the fall and winter due to lack of leaves on the trees (c); berm located at the end of Cherry Road, looking out onto the parkway (Source: Melfi, 2010).

6.3.3 Concerns relating to the city

A number of residents expressed concerns about the city and how the city had dealt with the parkway issue. Many of the residents expressed displeasure with the way the city treated residents as they felt the "*city didn't care about anything.*" Many also felt the city acted in an unprofessional manner and treated the residents unfairly:

> "*My concerns deal more with how the city treated the situation...the city staff were ridiculous and unprofessional and they did it for their benefit...it seemed like they didn't care about the people whose homes would be affected...they treated us like idiots...I feel insulted the way we were treated.*"

Other residents felt mistrusted, "*the city treats us like idiots, saying we don't know what we are talking about...why would we lie about it, they don't experience it.*" Some residents stated they would like the city to "*come and see how we are carrying on with this*" and "*want city officials to come live here and understand what it's like...wanting them to experience the full impact.*" Others expressed feelings of distrust towards the city at being misinformed, "*we were aware of it coming but not aware of the effects.*" This was especially prevalent when discussing concerns about noise. Many of the residents conducted their own noise tests which showed levels above what the city had forecasted, "*we paid to do our own testing in twenty-two areas and the results were over ministry standards.*" In one case, a resident set up a noise meter at the end of their house and the results were "*in the high sixties to low seventies.*" According to the Ontario Ministry of Transportation standards, noise for highways should be close to or lower than the objective level of 55 dB (Rowan Williams Davies and Irwin, 2003). As a result, these residents describe the noise as being "*a lot louder than what they predicted.*" Apparently, many of the residents were not informed "*on how loud it would be*" while others were told that the noise would not be a problem.

Negative thoughts towards the city were also expressed regarding the city's role in mitigation. Many of the residents feel the city did not do or had not done enough to mitigate the effects of the parkway as they were "*hoping the city would control the noise.*" The city had promised to plant trees as a mitigation effort; however, residents are still waiting: "*add trees? Not yet, I'm still waiting.*" For others, the trees the city did plant are inadequate, "*I believe the city could have done more to mitigate the noise...they didn't plant trees when they said they would and the trees they did plant are the size of a thumb!*" A sense of sarcasm was evident when a resident was explaining the planting of trees to mitigate the negative effects of noise: "*yes the city planted trees, however when I'm a hundred they might help.*" It was also mentioned by two residents that a noise barrier could not be built behind their backyards because "*the wall barrier would cut ten feet into the backyard*" which would not leave enough room between their house and the wall. This would not only cut through their property, specifically their gardens, but the wall would be visually displeasing, as one resident explained "*you would have an eight*

feet tall wall outside your window, instead of looking at trees and green scenery you have to look at a concrete wall."

Sixteen of the participants complained to the authorities about their concerns but felt their "*complaints fall on deaf ears*" and "*no matter what you tell the city, it is a lost cause.*" Many of the residents that complained "*got no response and are still waiting;*" and for some, the lack of a response by the city was aggravating: "*it aggravates me the lack of response by the city or the lack of concern or attention by politicians towards my concerns regarding the expressway.*" Many felt the "*city has done nothing about their concerns,*" and "*they (the city) are sure the Red Hill Expressway is not causing problems.*" As a result, the participants expressed a desire "*to be compensated somehow, such as tax breaks, to make it favourable to live here.*" However, some who were compensated felt cheated as one resident stated: "*what the city was willing to give me for my house was a joke.*" Others were compensated with new windows but "*the city promised sound proof windows only to houses facing the Red Hill Valley Parkway;*" and those who were compensated with windows believe the "*new windows do nothing.*" In general, many of the residents have "*been fighting since the beginning*" but expressed defeat because "*nothing came of it,*" and many feel they just "*don't have the resources to fight city hall*" and as a result have "*given up.*"

6.4 Effects on Daily Life

6.4.1 Outdoor activities

When residents were asked if they felt the Red Hill Valley Parkway affected their daily life, all 21 participants answered 'yes' (see Table 6.5). Some feelings expressed included one resident stating the parkway has affected their daily life incredibly, while another resident stated the parkway had a negative impact on his lifestyle. All the residents feel their personal daily lifestyle; specifically a part of their life has been destroyed. The most common response reported was the parkway interferes and spoiled their enjoyment of the outdoors, as it is "*not what it used to be.*" As a result, many residents "*avoid spending time outdoors as much as possible*" as many find it depressing to step outside knowing you cannot enjoy the beautiful gardens: "*you work all day and want to come home and relax outside or start the barbeque, however you can't now because the noise and sight of the traffic gets to you, you just don't want to be outside.*" Accordingly, many who attached a special meaning to their property see this as a "*change in lifestyle.*"

Table 6.5: Disturbances due to the Red Hill Valley Parkway on the daily life of residents

Disturbances to Daily Life
• Indoor Activities
○ Awakenings
○ Keep windows closed
○ Music/TV
○ Sleep quality
• Outdoor Activities
○ Conversation
○ Recreational use of backyard
○ Relaxation
○ Social activities
○ Use of the pool
○ Use of the valley

Another consequence of the parkway is that it has destroyed the residents' use of their backyard, especially in the summer as residents explain "*it's not peaceful and quiet anymore*," and "*I can't sit outside without any peace; it has destroyed a part of my life.*" One particular resident had nothing but open space in the backyard of his property that was peace and quiet, but now as a result of the parkway he stops using his backyard or very seldom does he sit outside. Many of the residents "*don't enjoy sitting in the backyard*" because "*you listen and all you hear is traffic*" while others "*can see the cars and expressway from the backyard.*" One resident maintains "*the expressway destroyed my backyard and leisure time outside, I can't use the backyard because of the expressway...I would say my outdoor leisure time is twenty percent less.*" This has caused many to spend less time sitting on their patio or the deck because it is too noisy, "*why do I want to go outside and listen to noise.*" In one case, a resident expressed a desire to build a patio in the front of the house because of how loud it gets in the backyard. Other participants explain they cannot relax in the backyard or "*take a nap outside*," while some "*can't listen to music unless it's full blast*" but then they get a headache. Residents also conveyed a dislike over the fact that they can no longer use their backyard for recreational purposes, "*our recreational use of the backyard is no more.*" This was particularly prevalent when residents discussed the inability to have social gatherings, especially when prior to the parkway, these gatherings in the backyard were a norm. For instance, a few participants explained that the constant noise from the traffic "*affects us socially*" and it interferes with their desire to "*entertain in the backyard.*" These residents explain that they "*can't entertain in the backyard because of how loud it gets*" and many "*don't use the backyard to entertain company because we can't sit and have a conversation.*"

Some residents also mentioned the use of their backyard has diminished as a result of stagnant water that has been "*left over from the original creek*" and now has become "*a breeding ground for mosquitoes*." As a result, these residents cannot enjoy their backyard as they worry about the mosquitoes and diseases they can catch such as West Nile, with one resident also mentioning that "*the mosquitoes from the water come inside the house*." Another resident expressed extreme disappointment with the city for not ridding the area of the stagnant water:

> "*I am disappointed with the stagnant water at the end of the backyard as now I am concerned for my kids when they are in the backyard during the summer because of the mosquitoes and West Nile, I can't enjoy the outdoors because now I have to worry about their safety and health.*"

In addition to spending less time in the backyard, residents mention they cannot enjoy the creek or valley like they did before, explaining they "*don't go into the valley anymore*" as they are "*concerned about hiking down there.*" These residents describe that "*the forest is a mess now*" and "*the trails are no longer the same.*" As well, walking the trails is "*no longer a calmness where you are able to listen to the birds*," now when walking it is noisy and "*you breathe in exhaust fumes*" (see Figure 6.2). One resident, who is an avid hiker, explained the parkway "*impacted the way I use the valley as I no longer hike in it as the lights from the expressway disturb my vision...I no longer like it, it's not what it used to be.*"

Figure 6.2: Walking the Red Hill Valley trail which is located beside the parkway

(Source: Melfi, 2010)

Several residents also owned a pool which they used on a regular basis, however now with the parkway they "*don't use the pool anymore*" and even the "*hot tub does not get used because of the traffic, it's just not peaceful anymore.*" For others who still use the pool, they "*don't use the pool as often*" or open the pool later in the summer. Furthermore, when outdoors many residents cannot have a conversation especially when talking to their neighbours because they "*have to talk loud or shout.*" During an interview with one of the residents, they mentioned how loud it can be outside and stated that "*we wouldn't have this conversation if we were outside.*" Only one of the residents mentioned they have not changed their outdoor activities a great deal, rather they just limit the time spent outdoors to certain times of the day: "*I don't like it but my outdoor physical activities have not changed, I just pick my times when I go out, such as I avoid going out during rush hours.*"

6.4.2 Sleep and sleep quality

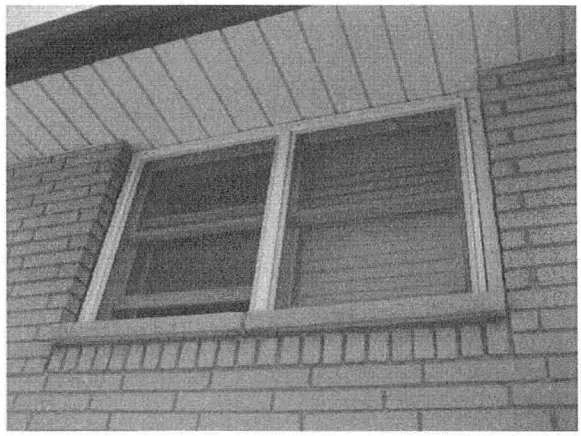
A number of residents mentioned that their sleep and sleep quality have been affected by the parkway. The majority of residents stated that their sleep had changed for the worse as their "*sleep patterns are being affected*" which is resulting in "*a lack of sleep.*" For example, many residents expressed a desire to sleep with their windows open at night to allow fresh air into the room, however now with the parkway many of these residents "*can no longer sleep with the windows open*" because they "*can't sleep with the noise*" from the traffic. As well, some residents complained about more awakenings "*from a deep sleep*" in the middle of the night "*between four o'clock and four-thirty;*" and as one resident explained, "*now two times in an eight hour sleep I am awakened by the vehicle noise, which never happened before.*" As a result of poor sleep quality and waking up in the middle of the night on a consistent basis, many of these residents "*can't go back to sleep and become tired during the day,*" while others "*feel tired and cranky in the morning.*" For one resident, the lack of sleep has an effect on how he feels during the day:

> "*I don't have energy during the day because I don't sleep properly; I don't have the energy to take on challenges such as cleaning up the yard. I give up faster because I feel too tired and then I feel guilty because nothing gets done.*"

Participants' sleep and sleeping habits also have been affected by the parkway. For instance, residents state that their "*sleep is disrupted*" as a result of more traffic. The majority of residents find it "*noisy when sleeping*" and one resident would like to know "*how this is fair?*" Noise was not the only affect on sleep, as in one case, a resident had to install shutters in the bedroom to block out light from "*vehicles coming down the expressway which shine into the bedroom and affect our sleep patterns*" (see Figure 6.3). Many also find it impossible to sleep with the vibrations as "*vibrations to the house are annoying especially at night...we can't sleep and they drive my dad nuts.*" For some, "*the trucks and motorcycles are the worst*" for ruining sleep, and one resident stated she gets awakened "*by the 'boom' of cars, especially the trucks and motorcycles at night.*" In one

case, a resident explained that "*heavy trucks are the worst nuisance, they are very loud, and the trucks gearing down from the LINC to the expressway at night can keep me up.*" Another resident explained that being a light sleeper, he is frequently awakened by trucks: "*I am a light sleeper and I don't sleep well, and the trucks at night wake me up. I get scared to death to hear a truck tire explode, wondering what it was...it feels like my bed lifted and dropped.*" Many residents also expressed concerns about the lack of sleep which they feel "*is taking away from our quality of life,*" and a few residents have felt sick more often as one resident explained "*my mom wakes up with headaches.*" There was only one case where members of the same household differed on their opinions on whether their sleep quality had been affected by the parkway: "*as long as I close the windows it's not as noisy and not as bad, however my wife finds it very noisy and she can't sleep, especially at night, to her it is a big deal, she is worried because she is losing sleep.*" The degree of coping with sleep disturbances range from minor actions such as "*sleeping with earplugs*" or "*use of a white noise machine to help drown out the noise,*" to more extreme as others have to "*sleep on the couch*" or "*move bedrooms to different parts of the house.*"

Figure 6.3: Shutters installed on bedroom window to block out light from traffic coming down the parkway



(Source: Melfi, 2010)

6.4.3 Activity disturbances

Other activity disturbances due to the parkway that residents expressed impacted their daily life included: having to turn up the television when watching; needing to play music to not hear the sounds of traffic; not being able to hear one think or focus properly; and relaxation being compromised as residents "*try to relax but can't because of the*

noise." Many residents feel they live inside their home now as a few residents stated "*the traffic only affects our outside living*," and for some they wonder "*what affect this will have on their health*."

6.5 Coping Mechanisms

How residents cope with the environmental nuisances differed. Some of the participants talked to other residents, however as one resident explained "*only if people had the same concerns*." The majority of participants revealed they keep their windows shut, "*the windows are never opened*," as a way to cope with the noise: "*I can't open my windows because of the noise*;" "*I haven't opened the window in the bedroom, which faces the back of the house and the Red Hill Parkway, since the road was built*;" and "*our windows were constantly opened all the time before the parkway was built, but now we open the windows less*." As well, keeping windows shut was a way to manage the exposure to exhaust fumes as one resident stated: "*my respirologist told me that the windows need to remain closed*." Other actions taken by residents to reduce the impact included using the air conditioner a lot more, "*I turn the air conditioner on a lot earlier*;" keeping doors closed, "*I cannot open my sliding door without the roar of traffic*;" moving the bedroom to different parts of the house, "*I had to move my bedroom to a different part of the house...it was facing the back of the house which faced the road, but I moved my bedroom to the front to avoid hearing the traffic*;" installing shutters on the windows to lessen the impact of the noise (see Figure 6.4); insulating the house, "*which compared to the way it was, it was not good*;" turning the volume up on the television, "*I have to have the TV very loud to drown out the traffic noise*;" and avoiding the area when possible, "*I get away from here...I spend more time away to get away from this parkway*." Although keeping windows shut was a way to mitigate exposure to traffic noise and exhaust, some residents were concerned about potential consequences as many residents "*would rather have cool, fresh air coming in*" from open windows, rather than keeping all the windows closed and "*worrying about what affect this would have*." Other residents were concerned about costs associated with an increased energy bill as some residents complained the parkway "*is costing me more money because I have to use my air conditioner and furnace more because I can't open the windows*."

Figure 6.4: Shutters installed on windows facing the parkway

(Source: Melfi, 2010)

An extreme form of coping would be to move away from the area. When residents were asked if they considered moving away from the area because of the Red Hill Valley Parkway, over half of the participants mentioned they have considered it. A few of the residents had considered moving at one time but explain that they "*don't have the energy*" or "*it's not worth it.*" Those residents who have no interest in selling the house explain they are "*too comfortable*" and they have lived in the area far too long and made "*a lot of friends.*" One resident, who likes the area because of its low crime rate questioned, "*what would you be giving up to gain?*" However, some thought if the situation did get worse they would consider moving: "*I live with it, but I ask my wife 'do you want to move?' I told her we either put up with it or we move.*" For the residents that have considered moving, only five have actually taken steps towards moving. These individuals searched for a new house or contacted a real estate agent. For other residents, "*it is on the list of things to do;*" while others have started to get ready to sell their house by "*making their home look nice.*" In one case, a resident who has actively been looking for a new place because he is "*so fed up with the noise and the air quality,*" wonders whether moving would be affordable: "*who will compensate me for the loss of value on my home? I will lose thirty thousand to forty thousand dollars with the move; I can't afford to take the loss.*" Many of the residents stated they have not taken any steps at the present time describing it as "*not as easy*" especially when it involves "*moving out of their home of over twenty years, which they built and their street is named after the family.*" For those who stated their desire to move, many explained they "*don't want to live near a highway*" and would like to move "*outside the city*" to be "*far enough away from the nuisance of traffic.*"

6.6 Summary

This chapter provided a qualitative analysis of the 21 in-depth interviews that were conducted with residents living in the vicinity of the Red Hill Valley Parkway and were members of the RHVNA (16 lived within 200 metres and 5 lived between 200 and 500 metres of the parkway). This chapter focused on investigating experiences and concerns associated with living within the vicinity of the parkway. Specifically attention was focused on: the residents' perceptions of their neighbourhood; their concerns relating to the parkway; how these concerns had affected their daily life; and what coping mechanisms were employed to deal with their concerns. Overall, the majority of residents were satisfied with their area as a place to live, as it was seen as peaceful and quiet, an ideal place to reside prior to the construction of the parkway. However, once the parkway was built, which all the residents who were interviewed were opposed to, their satisfaction with the neighbourhood changed. While many saw the potential benefits, the negative impacts of the road certainly outweighed the positives, as the majority of the interviewees believed the road should not have been built within the valley.

Health was cited as the dominant concern associated with the parkway, as residents mentioned their physical and psychosocial health was affected. Environmental concerns were the next major concerns cited by residents, with noise as the major concern connected to the parkway. Other environmental concerns mentioned include an increase in vehicle exhaust, the potential for flooding, and the visual intrusion of the parkway into their neighbourhood. Other concerns that were not related to the environment that were also raised by residents related to how the city dealt with the issue.

Effects on daily life as a result of the parkway included a lack of desire to be outdoors whether in their backyard or out on the trails. Many attached great importance to spending time in their backyard, however with the parkway the use of the backyard has diminished. As well, the parkway had an effect on the sleep and sleep quality of the residents, as many of the residents reported poorer sleep quality as there was more traffic to disturb sleep; it was now louder; there was more awakenings which led to feeling more tired during the day; and it was impossible to sleep with the vibration of traffic or with the windows open.

Coping measures were required by many residents in order to deal with their concerns. These measures required residents to take direct action such as closing windows, planting trees, or moving bedrooms to another part of the house. In more extreme circumstances, some residents expressed a desire to move away from their present location to avoid the negative impacts of the parkway. These residents have taken some steps towards moving including contacting a real estate agent, looking for a new house, or preparing their house to appear sellable. However, even though many residents did share their desire to move, ultimately they could not because they felt a strong attachment to this area as a place to live.

The following chapter will present the conclusions from the findings of both the surveys and interviews to provide a more complete discussion of the results, while making connections to the literature, and discussing the implications and directions for future research.

CHAPTER 7: DISCUSSION AND CONCLUSION

This final chapter presents the conclusions based on the findings from the surveys and interviews as they relate to the existing literature. As well, recommendations for future research will be discussed. This research represents an attempt to understand the impact transportation infrastructure and traffic has on residents who reside in close proximity to that traffic. Specifically, the research focused on how the alteration of a green space to make way for the traffic infrastructure has impacted the daily life of area residents. A case study approach was employed using the Red Hill Valley Parkway located in Hamilton, Ontario. These findings directly address each of the four main research objectives set out at the beginning of this thesis:

1) To determine the prevalence of psychosocial impacts amongst people who reside within close proximity to transportation infrastructure and traffic;
2) To examine the impacts the new transportation infrastructure has on the lives of the residents;
3) To examine the coping mechanisms employed by individuals in the area faced with the impacts of increased traffic exposure;
4) To determine whether psychosocial effects are related to distance from the source and to length of residence.

7.1 Findings

7.1.1 Do residents residing in close proximity to the parkway experience psychosocial impacts?

Findings regarding an individual's perceptions of the environment indicate that the site (the Red Hill Valley Parkway) was a major dislike in the neighbourhood. Many residents living in the vicinity of the Red Hill Valley Parkway expressed concerns about a variety of issues related to the road; however it was apparent that not all residents were concerned about the environmental and health risks posed by the parkway. Indeed, several residents living within 1000 metres of the road expressed no concerns related to the parkway. As well, due to potential bias as respondents more likely to be against the parkway will respond, concerns may be over-reported.

Those respondents from the surveys and residents who were interviewed that expressed concern agree that the major issues relating to the parkway were vehicle exhaust, traffic noise, destruction to the natural environment, flooding, and health. Differences occurred between the survey respondents and interviewees over what they felt was the major concern relating to the parkway. For residents who participated in the interviews the number one concern that was mentioned was health, as all the residents

were concerned the parkway had or will have an impact on their health. On the other hand, for the respondents of the survey, vehicle exhaust and traffic noise were the major concerns related to the parkway. However, it should be noted that although health was not mentioned as frequently as a concern in the surveys, health may be under-reported as concerns about vehicle exhaust and traffic noise are connected to health (Amundsen et al., 2008; Jacquemin et al., 2007; Michaud et al., 2008; Ohrstrom, Skanberg, Svensson, and Gidlof-Gunnarsson, 2006). Another difference between the survey responses and interviews included residents' concerns about flooding as residents in the interviews were more concerned about flooding. This could be explained by the limited amount of space to answer in the survey. Residents may have been more interested in expressing concerns about the chronic exposure of traffic that are a constant stress, such as the noise and vehicle exhaust, as opposed to the abrupt nature of the flooding event. Furthermore, participants in the interviews had more concerns relating to the city, especially how the city dealt with the issue as many of the residents felt mistrusted and misinformed. This was not a common theme among the surveys; however a few residents did mention the city's lack of response to their concerns.

Both physical and psychosocial health concerns were expressed by participants, while some residents indicated that physical symptoms had some effect on their psychosocial health as the stress, worry, anxiety and depression could lead to further physical illnesses (Elliott, 2008). Residents reported a range of physical symptoms, for example respiratory difficulties and allergies, which some residents directly link to the presence of the parkway in their neighbourhood. They explained that they never had such conditions before, especially when they have not done anything different in their life. Others were unsure as to the cause, and speculated that it could be the parkway, especially since their symptoms started or were exacerbated after the completion of the road. It could be the way the residents think about the parkway that may cause them to feel ill, rather than the parkway per se, and while no credible evidence exists to support their claims, one can only speculate that the reason for the illness is quite possibly the result of the parkway. Furthermore, residents concerned about their health would argue that scientific evidence is insufficient; rather their self-reported health is a much better indicator to confirm or reject health risks from the parkway.

While this study did not measure specific psychosocial symptoms as a result of exposure, residents did mention feeling a range of psychosocial effects when describing their concerns about the parkway and how it has affected their daily life and health. Symptoms reported by residents included feeling tired, worried, stressed, depressed, irritated, and angry with the road and the way the city had dealt with the issue. The majority of these symptoms were reported by residents living within 500 metres of the parkway, while only three residents living beyond 500 metres reported stress-related symptoms. However, for two of the residents living beyond 500 metres, their stress was related to traffic commutes as they expressed feeling stressed at being in traffic. On the other hand, residents within 500 metres experienced stress-related symptoms as a result of the potential impact the road has on their health, the impact the road had on their daily

life, and the destruction the road had on the Red Hill Valley. This relationship between traffic and psychosocial symptoms is supported by other studies as those who are exposed to heavy traffic experience psychosocial symptoms more frequently than residents living away from heavy traffic (Ohrstrom, 1991; Ohrstrom, 2004). As well, a few of the residents felt the parkway in their neighbourhood was causing stress-related symptoms as the mere sight of the road from one's backyard had caused them to feel stressed and tense every time they looked at the road. This finding is consistent with studies on viewing natural versus built environments, as views of built environments can lead to increased levels of stress (Velarde et al., 2007).

Children are considered a vulnerable population that is affected by poor air quality. Evidence has shown that children exposed to traffic pollution are at a greater risk of negative health outcomes (Brugge et al., 2007). However, very few of the residents interviewed or completing a survey expressed concerns regarding children, specifically only 5 residents in the three study areas reported they were concerned about the health of children, while those residents interviewed only mentioned concerns about children twice. This is striking especially when 50% of respondents who mentioned they had concerns reported children under the age of 18 living in the household.

Many of the residents also expressed fear and anxiety over the indirect effects the parkway will have on their health. Some residents who have lived in the neighbourhood for over 20 years claim the parkway has prevented them from being physically active. These residents mentioned they walked within the neighbourhood and hiked in the valley prior to the road, however now they no longer participate in such activities. As a result, these residents are worried about sedentary and indoor lifestyles. Studies have shown that physical activity helps people feel better; reduces the risk of becoming overweight; and lowers the risk of suffering adverse health outcomes such as heart disease, hypertension, diabetes, and cancer (Frumkin, 2002; Pretty et al., 2005). As well, to escape the noise and exhaust from the traffic, many of the residents are now spending more time indoors. As a result, many residents worry about what effect living indoors will have on their health as they have to contend with the long-term exposure to indoor pollutants. The exhaust and dust from outside now becomes part of the indoor air they breathe and a chronic irritation on the respiratory tract which can lead to adverse health effects. Additionally, odours from the exhaust, which some residents complained about, "affect the comfort level of those exposed, [thus] draw[ing] attention to the environment" (Oliver and Shackleton, 1998, 403).

7.1.2 What impact does the parkway have on the daily lives of residents?

Residents were concerned, and subsequently complained about the impacts of the parkway on their daily lives. Every participant interviewed mentioned the road had an impact on their daily life. In the surveys, 92.3% of respondents indicated that their daily life was affected, with the percentage reporting an effect decreasing as distance from the parkway increased. These residents were concerned but they lived far enough away that

these concerns did not have the same impact in comparison with those living closer to the parkway. It was also observed that more residents further from the road were unsure or felt it was too early to tell as to whether or not the parkway affected them. However, some residents in the first two study areas also mentioned the parkway had no effect on their daily life. This could be explained by the fact that the parkway has only been opened for the past three years, thus its possible effects on daily life have not yet been manifested. Both indoor and outdoor disturbances were noted, as residents explained that they have experienced a decrease in outdoor activities related to relaxing or being outdoors, walking in the neighbourhood, hiking down in the valley, or holding social gatherings in their yard. As these activities were common prior to the parkway, residents explain they no longer take part in or enjoy such activities, as it is not the same as it used to be.

For residents living within 500 metres, the parkway had more of a direct impact on their home environment. For example, residents indicated: it was hard to speak with one another outdoors because it was louder; it was impossible to enjoy being outdoors; they spend less time in their backyard, garden or patio; and they keep their windows closed or not open as often as before. For residents living beyond 500 metres from the parkway, concerns were reported as minor inconveniences as the impact of the parkway dealt more with the way they use the neighbourhood, e.g., they reduced walking or bike riding in the area. These findings are common in previous research on the effects of traffic on daily activities (Michaud et al., 2008; Ohrtsrom, 2004). Traffic has also been known to disrupt communication (Ohrtsrom, 2004) however this was not found to be a major disturbance in this study. While a few residents did mention that their conversation was disrupted when outdoors, only those living closest to the road mentioned any effect. This is consistent with Michaud et al. (2008) who found that as the distance to the heavily traveled road increased, there was a significant drop in the percentage of respondents reporting they found it difficult to hear people.

Disturbed relaxation and sleep were found to be a significant effect of exposure to the parkway, especially for residents residing within 500 metres. There were no residents living beyond 500 metres who felt their sleep and sleep quality was affected by the parkway in any way. This finding is consistent with other studies which have revealed proximity to a major road was related to traffic noise interfering with the respondents' sleep (Michaud et al., 2008; Ohrstrom et al., 2006). Residents believed their sleep disturbances were provoked by the traffic from the parkway. In particular, residents reported decreased sleep quality as there is more traffic to disturb sleep, it is now louder, there are more awakenings, it is impossible to sleep with the vibration of traffic, and it is impossible to sleep with the windows open. As well, due to a lack of sleep, residents would feel sick or tired the following day. This is consistent with previous studies indicating that nocturnal traffic noise has detrimental effects on daytime functioning (Ohrstrom, 1989; Ouis, 2001; Pirrera, De Valck, and Cluydts, 2010). However, some residents did mention that in order to improve their sleep quality, they needed to move

their bedroom to a different part of the house. This according to Ohrstrom et al. (2006) can provide the quietness needed for undisturbed sleep.

As well, a number of residents reported effects relating to the financial costs resulting from the road. Residents were concerned and complained about the financial burden of the parkway, as increased taxes are needed to pay for the road as well as pay for any maintenance costs. It was reported in 1997, that the city anticipated about $8 to 10 million per year in maintenance and debt costs as a result of the road (Plinte, 1997). In 2007, property taxes had increased in Hamilton, with the Red Hill Valley Parkway cited as one of the reasons for the hike (Macintyre, 2007b). As well, residents reported an increase in insurance rates especially after the flooding of the Red Hill Valley during 2009 – 2010. These residents assert that if the road was not built in the valley or had been built properly, they would not be as concerned. Third, residents are paying to mitigate the effects of the parkway, about which they feel upset and irritated since they believe it is the responsibility of the city to provide adequate mitigation efforts and to cover any costs incurred by the residents. For instance, residents explained they had to install new windows, air conditioners, and shutters at their own expense as they did not qualify for mitigation measures offered by the city. Of those who did qualify many felt the mitigation efforts were inadequate. As well, residents have had to pay for any renovations they needed to help reduce the impact the road has on their life; such measures included moving sleeping or living quarters to a different part of the house or building a patio in the front of the house. However, while some residents could afford to take measures, there were those who explained they were unable to do so because of the high costs involved. As a result, these residents feel they should be compensated in some way as they are affected the most.

7.1.3 How do residents cope with their concerns?

The majority of respondents in the three study areas reported they have taken some action to mitigate their concerns. However, differences occurred between sites in terms of how residents cope with the stressor. Those living within 500 metres were more likely to take direct action to deal with the stressor; residents felt they could do something about the stressor therefore they deal with it directly, for instance keeping the windows and doors shut; reducing outdoor activities; increase use of the air conditioner; moving sleeping quarters and patios to different parts of the house; and in more extreme situations willingness to move away from the area. Residents living beyond 500 metres took more of an emotion-focused coping approach as the majority have accepted their concerns. Here individuals live further away and feel the parkway does not have a direct effect on them on a daily basis, therefore they feel they do not need to worry about their concerns. The majority of residents in the study did mention they have not ignored their concerns, as they are not content with allowing things to happen as they do. While coping measures such as complaining to authorities was evident, it seemed to increase stress levels for some respondents as they felt such complaints were ineffective due to the lack of response and concern by the authorities towards their concerns.

7.1.4 Are psychosocial effects related to distance from the source and length of residence?

One of the objectives of the study was to assess whether concerns were related to proximity to the site. The findings from this research indicate that a distance decay effect occurs with the reporting of concerns as there were a large percentage of respondents from study area one reporting concerns compared to the other two study areas. Residents reporting concerns in the first study area (70%) almost doubled those in the second area (40%) and quadrupled those in the third area (18%). This finding is not surprising. Respondents reporting fewer concerns the further from the site are prevalent in other studies on traffic exposure and health (Finkelstein et al., 2004; Michaud et al., 2008; Ohrstrom, 2004). One resident even commented that proximity of the roadway to an individual's home was an important factor in expressing concerns as "*living one block further away would certainly alter the noise factor and change my opinions*." The findings of this research also confirmed that concerns were related to length of residence, as most of the residents who expressed the greatest concerns about the parkway had lived in the area prior to construction of the road. Residents who moved into the area after construction began or when it was complete may have purchased the home with knowledge of the road. As a result these residents may not report negative effects.

One issue this case study raises is the idea of self-selection in residential choice. Self-selection refers to the fact that "people make choices according to their preferences, attitudes and lifestyles" and this can exist in residential choice (Van Wee, 2007, 25). For example, people who are sensitive to noise or hate traffic are less likely to live near roads, and the same can be said of those who have health issues such as asthma or other lung problems, as they will avoid living near pollution sources (Van Wee, 2007). In the present situation, even though the road had been a planning issue for over 50 years before construction finally began, many of the residents in the neighbourhood predated the road. These residents chose to live in this neighbourhood prior to the parkway because it allowed them to get away from the traffic and noise of the city; as well the area provided benefits, as residents mentioned it was beautiful, quiet, and private; a great place to raise kids; and a peaceful oasis to retire. As a result, since these residents did not choose to live near the traffic, the concerns by these residents who have lived in the neighbourhood longer than the road are understandable.

7.1.5 Further analysis

Overall, people's perceptions of the area have changed as a result of the parkway. Many were satisfied with the area as a place to live prior to the construction of the road, however once the parkway was built, residents' satisfaction with the area changed. For many of the residents they had a strong attachment to the Red Hill Valley as it was a part of their life. Many felt the area was like living in the country, that it was a piece of paradise, and a perfect oasis to retire. Others liked the physical nature of the valley, as the valley acted as a barrier against the busy life of the city. Being away from the stress

of city life is commonly mentioned in studies with many enjoying the relaxed environment that nature provides as it is "a step away from the hectic rhythm of the city [allowing one] to forget the daily worries, breathe fresh air and relax, both mentally and physically" (Chiesura, 2004, 133). However, many residents are now worried they will no longer breathe in fresh and clean air due to traffic emissions along the parkway.

Overall, the negative outcomes associated with the parkway have contributed to a decrease in residents' quality of life. The increase in motor vehicle traffic worsens the air quality, increases traffic noise, and reduces residential quality. As a result, the parkway and the resulting increase in traffic in the neighbourhood is associated with negative reactions such as the inability to hear the sounds of nature, unable to have a peaceful conversation outdoors, and inability to enjoy the quiet and peaceful silence that existed prior to the parkway. It is clear from the responses made by the participants that the environment was perceived as more healthy and restorative, and the ability to be outdoors in their own backyards and gardens was seen as an important part of their quality of life. This quiet residential neighbourhood was once an attractive place to live. Now, however, residents feel the area has deteriorated, leading to an unhealthy living environment.

While the study was interested in the concerns associated with a stressor, positive aspects of the parkway were also reported. For instance, residents noted an improvement in traffic, access, and commute times which they felt were beneficial. As well, some respondents felt the parkway provided economic benefits to the city, as they explained there was the potential for growth for Hamilton in terms of business. Other residents believed the parkway was the only positive thing about the area, and the road significantly improved the Red Hill Valley. This was especially prevalent in the second study area as a few residents, who have lived in the neighbourhood for over 25 years, stated the road cleaned up the valley. As well, one resident, living between 200 and 500 metres of the parkway claimed that "*the trails prior to the highway [were] considered unusable and somewhat dangerous*." One of the purported benefits the road was expected to provide was a cleanup of the Red Hill Valley, as it was believed the Red Hill Valley was "in a state of pollution, and [would] be improved by building a road through it" (Von Appen, 1985, A1). Specifically, in 1985, when the Joint Board approved the expressway project, the panel stated "the construction of the proposed road will clean up the major points of pollution and will provide improved access to the valley" (Von Appen, 1985, A1). As a result, residents' positive perceptions towards the parkway can be linked to the belief that the parkway will directly benefit them.

However, while participants acknowledge that there are benefits with the parkway, many felt that these benefits should not have been a factor to build the road through the valley. It is evident that NIMBYism (Not In My Backyard) played a role in the issue. Local opposition to proposed planning developments within a community is common especially when the developments may result in perceived negative impacts (Hodge, 2003). The majority of the residents have lived in the area for over 25 years and knew about the potential for the parkway being built within the valley. Many of these

residents also voiced opposition to the road. While the majority of participants in the survey and roughly half the participants who were interviewed perceive the road to have benefits, most of these did not want the road in their backyard. One resident who had lived in the neighbourhood for over 25 years claimed that if he was "*three blocks over this wouldn't be a problem.*" This finding is consistent with other studies which indicate that developments that pose a threat to the quality of life in the neighbourhood receive very little support by residents whose place of residence is in close proximity (Devine-Wright, 2005). However, it was unclear if residents who expressed concerns about the parkway would also be against a road in another location within the city, perhaps it would be useful for future research to investigate this hypothesis.

In this study, surveys and interviews were employed to answer the research objectives. The surveys were utilized to provide a descriptive summary of the research, specifically describing the prevalence of psychosocial illness in the study area. The surveys were implemented using a drop-off/pick-up approach which is an alternative to mail questionnaires. This method had a number of benefits in this study that can be useful in future studies. First, the method allows the researcher to work directly in the neighbourhood and be exposed to the conditions and landscapes residents experience on a daily basis. For instance, within this study, I observed several houses that had shutters over their back windows that faced the parkway. In addition, the method allows the researcher to interact with the participants, where the researcher can motivate residents to respond to the survey. As well, the researcher is able to act as an interviewer and gain responses from some residents who are reluctant to respond to a survey or had not filled out a survey upon return. Finally, this method was beneficial as residents identified others within the neighbourhood who would be interested in participating in the study.

However, the drop-off/pick-up approach also had its disadvantages. First, the method requires a great deal of time and effort to cover the area thoroughly and to make multiple callbacks. Upon each visit there is the potential for residents to not be home or not want to answer the door. Therefore, to improve response rates for the technique, letters should be sent a few weeks before the survey is implemented explaining the nature of the study, and informing residents that a researcher will be coming by the house within a few weeks (Dillman, 2007). As well, if future studies are interested in a representative sample of the population, this method might not be the most feasible as it is more appropriate for studies where the population of interest is contained geographically.

The interviews on the other hand, provided a better understanding of how the parkway affects the daily lives of residents living in the vicinity of the road. Interviews are beneficial in studies where the focus of the research is to explore the meanings, perceptions, and experiences of a particular phenomenon. However, this study only interviewed the perceptions and experiences of residents living within close proximity who were affected by the parkway. Future studies should conduct interviews with residents within close proximity and are not affected by the parkway to gain an understanding of why the parkway does not affect them, or what they have done

differently that the parkway has not impacted their daily life. Overall, the benefit of this mixed-methods approach provided a more complete picture of the research problem bringing together the differing strengths of quantitative methods with those of qualitative methods. In addition, this mixed-method approach helped overcome the difficulties of obtaining response from participants who were reluctant to respond to a different method (Dillman, 2007).

7.2 Recommendations

The findings of this study contribute to existing research on psychosocial impacts as a result of exposure to an environmental stressor. This section presents recommendations to assist policy makers in eliminating and mitigating such impacts and identifies areas of future research.

- The findings have implications for future developments. As evidence showed, the presence of a natural environment, such as the Red Hill Valley, to the residents' quality of life was important. Therefore, it is important to maintain the quality of green spaces in urban environments. As research has shown the presence of green space in people's living environment has an important effect on health (Maas et al., 2006). Cities should strive to protect and preserve such natural environments (e.g., forests, parks, valleys, creeks, waterfronts) from being completely lost due to development. As well, any environment that promotes positive health should be preserved for their benefits on the individual and society as a whole.

- Furthermore, the development of green space should play a critical role in planning decisions and "policy makers should take the amount of green space in the living environment into account when endeavouring to improve the health situation of individuals, especially in urban environments" (Mass et al., 2006, 591). Not only was it evident that a connection to nature was lost with the building of the parkway through the Red Hill Valley, but many felt the city's efforts to offset the alteration to the valley were minimal and ineffective. Therefore, in the case of building a new transportation infrastructure through an existing natural environment, space for greenery should be allocated. As well, trees should be planted along the transportation infrastructure to improve the aesthetics along the road.

- As evidenced in the study, transportation infrastructure leads to an increase in air and noise pollution that negatively impacts residents' health. To avoid such negative impacts policy makers need to increase efforts to implement strategies that create opportunities for multiple travel modes, reduce automobile volume, and increase health and safety; "cities need to [realize] that they cannot build more highways...especially if they want to maintain and improve air quality" (Daniels, 2008, 18). Therefore, cities need to invest in and encourage alternative

transportation, such as public transit and cycling. Specifically, efforts should be made to improve transit infrastructure and service; improve existing transportation infrastructure and land use; and enhance or create infrastructure that promotes cycling and walking as a method of transportation. This will help reduce emissions, and support healthy and active lifestyles that are better for physical and psychological health and well-being.

- The city provided mitigation measures only to homes that were most affected by the road, however many residents felt these mitigation efforts were inadequate. As governments build major roadways through or between residential neighbourhoods they should strive to mitigate the negative impacts on residents regardless of the location of the home to the roadway. This can be achieved by building roads at a far enough distance away from the home; regulating vehicle pollutants; enforcing user fees on vehicles using such roadways (Lipfert and Wyzga, 2008); or constructing tunnels (Ohrstrom, 2004).

7.2.1 Future research

- Future studies could ask residents whether they experience specific psychosocial symptoms to determine residents' score of psychosocial well-being and if and how it is related to exposure to an environmental stressor.

- Conducting longitudinal studies to assess the long-term health effects of neighbourhoods exposed to increased traffic as a result of a change in transportation infrastructure. How has residents' health and well-being been affected after one year, three, five?

- Some residents in the study mentioned they no longer use the valley for recreational purposes. Further research could explore the relationship between the change in infrastructure and if and how people's activities have changed. Have individuals outside the study area changed their use of the valley since the completion of the road? How? If people still use the valley for recreation, have their recreational activities increased, decreased or stayed the same? For those that use the valley, do they avoid the valley at certain times of the day or year?

- Future studies should determine whether coping mechanisms employed by residents were effective in reducing the impact of the stressor on the individual. What types of coping mechanisms were used? Could they be beneficial for others to use? As well, studies should determine the impact mitigation strategies have on exposure. Are certain mitigation measures more effective than others?

- This study looked at the construction of transportation infrastructure through a natural area and its impact on the health of residents living close by. What impact would the construction of a different type of infrastructure such as housing,

commercial developments, entertainment facilities (e.g. stadia or arenas) and the associated loss of green space have on health and well-being of adjacent residents? How could new infrastructure incorporate its natural surroundings?

7.3 Concluding Remarks

In this study, both quantitative and qualitative methods were utilized to understand how the Red Hill Valley Parkway has affected the everyday lives of those living within close proximity to the road. Specifically, this study assessed site specific concerns, effects and actions taken or intended to be taken by residents towards the site. The sample consisted of 237 residents living within 1000 metres of the Red Hill Valley. It should be noted that the findings do not address specific characteristics of respondents who are more likely to report concerns with the parkway, as well the study may not represent the general population; nonetheless the findings provide us some insight into the lives of those who identify concerns with the parkway and how these concerns have affected their daily life.

Living in close vicinity to major roads does have an impact on the everyday lives of residents, which is seen most vividly in the sample living within close proximity to the Red Hill Valley Parkway. In general, residents located within 200 metres of the road were frequently annoyed by noise and exhaust; worried about the possible health effects of exposure; were more likely to take action; and feel there are no benefits of having the parkway in their neighbourhood. Those living between 200 and 500 metres express concerns about the parkway, especially the increase in noise and exhaust and take some action for their concerns. Those living beyond 500 metres believe the benefits of the parkway outweigh any concerns, rarely take any action and accept the road as part of the neighbourhood.

Green spaces within urban areas are a healthy environment for the city as well as the individual because of their potential benefits they provide. Specifically, studies have shown that green spaces promote physical, mental, and social well-being; increase property values; conserve energy; absorb harmful pollutants; provide habitat for wildlife; and help reduce water runoff. However, city expansion and intensification in recent decades has impacted green spaces, and the problem has led to an increase in exposure to negative stressors for many individuals. Therefore, cities should take measures to protect and preserve such spaces from the intrusion and intensification of urban living for the benefit of individuals and society as whole.

Bibliography

Abelson, P.W., and Hensher, D.A. (2001). Induced travel and user benefits: clarifying definitions and measurement for urban road infrastructure. In Button, K.J., and Hensher, D.A. (eds.), *Handbook of Transport Systems and Traffic Control*. (Vol 3). San Diego, CA: Elsevier Science Ltd, 125-142.

Abraham, A., Sommerhalder, K., and Abel, T. (2010). Landscape and well-being: a scoping study on the health-promoting impact of outdoor environments. *International Journal of Public Health*, 55, 59-69.

Agar, B. (2006). The valley fight is over, but Red Hill's friends keep on crusading. *The Hamilton Spectator*, March 6, A15.

Air Quality Ontario. (2009). *Air Quality for Ontario*. Retrieved June 13, 2010, from http://www.airqualityontario.com/reports/summary.cfm

Akbari, H., Pomerantz, M., and Taha, H. (2001). Cool surfaces and shade trees to reduce energy use and improve air quality in urban areas. *Solar Energy*, 70(3), 295-310.

Amundsen, A.H., Klaeboe, R., and Fyhri, A. (2008). Annoyance from vehicular air pollution: Exposure-response relationships for Norway. *Atmospheric Environment*, 42, 7679-7688.

Babbie, E. (2004). *The Practice of Social Research.* (10th ed.). Belmont, CA: Thomson-Wadsworth.

Bae, C,-H. C. (2004). Transportation and the environment. In Hanson, S., and Giuliano, G. (eds.), *The Geography of Urban Transportation*. (3rd ed.). New York: The Guilford Press, 356-381.

Balbus, J., and Triola, D.Y. (2005). Transportation and Health. In Frumkin, H. (ed.), *Environmental Health*. San Francisco: Jossey-Bass, 414-453.

Baum, A., Singer, J.E., and Baum, C.S. (1982). Stress and the environment. In Evans, G. (Ed.), *Environmental Stress*. New York: Cambridge University Press, 15-44.

Baum, A., Gatchel, R.J., and Schaeffer, M.A. (1983). Emotional, behavioural, and physiological effects of Chronic Stress at Three Mile Island. *Journal of Consulting and Clinical Psychology*, 51(4), 565-572.

Baxter, J.W. (1992). *The Psychosocial Impacts of Exposure to a Recently Approved Waste Site: The Experience of Residents Living Near the Milton Landfill*. Unpublished master's thesis, McMaster University.

Bertazzi, P. (1989). Industrial disasters and epidemiology: a review of recent experiences. *Scandinavian Journal of Work Environment and Health*, 15, 85-100.

Bolam, B., Murphy, S., and Gleeson, K. (2006). Place-identity and geographical inequalities in health: A qualitative study. *Psychology and Health*, 21(3), 399-420.

Bonita, R., Beaglehole, R., and Kjellstrom, T. (2006). *Basic Epidemiology*. India: World Health Organization.

Boone, C.G., and Modarres, A. (2006). *City and Environment*. Philadelphia: Temple University Press.

Bourque, L.B. and Fielder, E.P. (2003). *How to Conduct Self-Administered and Mail Surveys*. (2nd ed.). London: Sage Publications.

Bowling, A. (2005). Mode of questionnaire administration can have serious effects on data quality. *Journal of Public Health*, 27(3), 281-291.

Brody, A.J., and Pelton, M.R. (1989). Effects of roads on black bear movements in western North Carolina. *Wildlife Society Bulletin*, 17, 5-10.

Brugge, D., Durant, J.L., and Rioux, C. (2007). Near-highway pollutants in motor vehicle exhaust: A review of epidemiologic evidence of cardiac and pulmonary health risks. *Environmental Health*, 6(23).

Campbell, J.M. (1983). Ambient stressors. *Environment and Behaviour*, 15(3), 355-380.

Canadian Environmental Assessment Agency. (2009). *Red Hill Creek Expressway Project*. Retrieved June 7, 2010, from http://www.ceaa.gc.ca/default.asp?lang=En&xml=B2FFE120-9921-4E27-B28F-521F5245F7B9

CATCH. (2007). *Vehicles Main Air Pollution Threat in Hamilton*. Retrieved June 7, 2010, from http://www.hamiltoncatch.org/list_articles.php

Chen, W.Y., and Jim, C.Y. (2008). Assessment and valuation of the ecosystem services provided by urban forests. In Carreiro, M.M., Song, Y., and Wu, J. (eds.), *Ecology, Planning, and Management of Urban Forests: International Perspectives*. New York: Springer Science, 53-83.

Chiesura, A. (2004). The role of urban parks for the sustainable city. *Landscape and Urban Planning*, 68, 129-138.

City of Hamilton. (2003). *The Red Hill Valley Project Land Use Assessment Report*. Dillon Consulting.

City of Hamilton. (2010). *Midblock 2010 – RHVP (May 2-16).*

Coffin, A.W. (2007). From roadkill to road ecology: A review of the ecological effects of roads. *Journal of Transport Geography*, 15, 396-406.

Collier, M. (2003). *The Urban Growth Machine Vs. The Red Hill Valley: A Case Study.* Unpublished Paper, Department of Environmental Studies, York University.

Colligan, M.J. (1981). The psychological effects of indoor air pollution. *Bulletin of the New York Academy Medicine*, 57(10), 1014-1026.

Crabtree, B.F. and Miller, W.L. (eds.) (1999). *Doing Qualitative Research.* (2nd ed.). Thousand Oaks, CA: Sage Publications.

Creswell, J.W., and Plano Clark, V.L. (2007). *Designing and Conducting Mixed Methods Research.* Thousand Oaks, CA: Sage Publications.

Crighton, E.J. (2000). *Psychosocial Impacts of an Environmental Disaster in Karakalpakstan (Uzbekistan).* Unpublished master's thesis, McMaster University.

Daniels, T. (2008). Taking the initiative: why cities are greening now. In Birch, E.L., and Watcher, S.M. (eds.), *Growing Greener Cities: Urban Sustainability in the Twenty-First Century.* Philadelphia: University of Pennsylvania Press, 11-27.

De Almeida, J. (2005). City suing tree-sitters for cost of Red Hill security. *The Hamilton Spectator*, May 20, A01.

Deka, D. (2004). Social and environmental justice issues in urban transportation. In Hanson, S., and Giuliano, G. (eds.), *The Geography of Urban Transportation.* (3rd ed.). New York: The Guilford Press, 332-355.

Devine-Wright, P. (2005). Beyond NIMBYism: towards an integrated framework for understanding public perceptions of wind energy. *Wind Energy*, 8(2), 125-139.

de Vries, S., Verheij, R.A., Groenewegen, P.P., and Spreeuwenberg, P. (2003). Natural environments–healthy environments? An exploratory analysis of the relationship between greenspace and health. *Environment and Planning A*, 35, 1717-1731.

Dillman, D.A. (2007). *Mail and Internet Surveys: The Tailored Design Method.* (2nd ed.). New Jersey: John Wiley & Sons, Inc.

Dillman, D.A., Phelps, G., Tortora, R., Swift, K., Kohrell, J., Berck, J., and Messer, B.L.

(2008). Response rate and measurement differences in mixed-mode surveys using mail, telephone, interactive voice response (IVR) and the internet. *Social Science Research*, 38(1), 1-18.

Dodd Jr., C.K., Barichivich, W.J., and Smith, L.L. (2004). Effectiveness of a barrier wall and culverts in reducing wildlife mortality on a heavily traveled highway in Florida. *Biological Conservation*, 118, 619-631.

Donovan, G.H., and Butry, D.T. (2009). The value of shade: estimating the effect of urban trees on summertime electricity use. *Energy and Buildings*, 41, 662-668.

Dunn, J.R., Taylor, S.M., Elliott, S.J., and Walter, S.D. (1994). Psychosocial effects of PCB contamination and remediation: The case of Smithville, Ontario. *Social Science and Medicine*, 39(8), 1093-1104.

Elliott, S. (1992). *Psychosocial Impacts in Populations Exposed to Solid Waste Facilities*. Unpublished doctoral dissertation, McMaster University.

Elliott, S., Taylor, S.M., Walter, S., Stieb, D., Frank, J., and Eyles, J. (1993). Modelling psychosocial effects of exposure to solid waste facilities. *Social Science and Medicine*, 37(6), 791-804.

Evans, G.W., and Jacobs, S. (1981). Air Pollution and human behaviour. *Journal of Social Issues*, 37(1), 95-125.

Evans, G.W. (1982). General introduction. In Evans, G. (Ed.), *Environmental Stress*. New York: Cambridge University Press, 1-11.

Evans, G.W. (1994). The psychological costs of chronic exposure to ambient air pollution. In Isaacson, R.L., and Jensen, K.F. (Eds.), *The Vulnerable Brain and Environmental Risks* (Vol. 3). New York: Plenum Press, 167-182.

Fang, C., and Ling, D. (2003). Investigation of the noise reduction provided by tree belts. *Landscape and Urban Planning*, 63(4), 187-195.

Finkelstein, M.M., Jerrett, M., and Sears, M.R. (2004). Traffic air pollution and mortality rate advancement periods. *American Journal of Epidemiology*, 160(2), 173-177.

Fleming, R., Baum, A., Gisriel, M.M., and Gatchel, R.J. (1982). Mediating influences of social support on stress at Three Mile Island. *Journal of Human Stress*, 8(3), 14-23.

Foreman, R.T.T., and Alexander, L.E. (1998). Roads and their major ecological effects.

Annual Review Ecology and Systematics, 29, 207-231.

Forsberg, B., Stjernberg, N., and Wall, S. (1997). People can detect poor air quality well below guideline concentrations: A prevalence study of annoyance reactions and air pollution from traffic. *Occupational and Environmental Medicine*, 54(1), 44-48.

Fowler, F.J. (2002). *Survey Research Methods*. (3rd ed.). London: Sage Publications.

Friends of Red Hill Valley. (2005). *The Red Hill Valley*. Retrieved May 10, 2010, from http://www.hwcn.org/~forhv/valley/valley.htm

Frketich, J. (2010). Pneumonia linked to pollution. *The Hamilton Spectator*, December 23, A1.

Frumkin, H. (2001). Beyond toxicity: human health and the natural environment. *American Journal of Preventive Medicine*, 20(3), 234-240.

Frumkin, H. (2002). Urban sprawl and public health. *Public Health Reports*, 117(3), 201-117.

Frumkin, H. (2003). Healthy places: exploring the evidence. *American Journal of Public Health*, 93(9), 1451-1455.

Gatrell, J.D., and Jensen, R.R. (2002). Growth through greening: developing and assessing alternative economic development programmes. *Applied Geography*, 22(4), 331-350.

Gauderman, W.J., Avol, E., Lurmann, F., Kuenzil, N., Gilliland, F., Peters, J., and McConnell, R. (2005). Childhood asthma and exposure to traffic and nitrogen dioxide. *Epidemiology*, 16, 737-743.

Geist, H.J., and Lambin, E.F. (2002). Proximate causes and underlying driving forces of tropical deforestation. *Bioscience*, 52(2), 143-150.

Gidlof-Gunnarsson, A., and Ohrstrom, E. (2007). Noise and well-being in urban residential environments: the potential role of perveived availability to nearby green areas. *Landscape and Urban Planning*, 83, 115-126.

Godbey, G., Grafe, A., and James, W. (1992). *The Benefits of Local Recreation and Park Services: a Nationwide Study of the Perceptions of the American Public*. College of Health and Human development, Pennsylvania State University, Pennsylvania.

Goodwin, P.B. (2001). Traffic reduction. In Button, K.J., and Hensher, D.A. (eds.), *Handbook of Transport Systems and Traffic Control*. (Vol 3). San Diego, CA: Elsevier Science Ltd, 21-32.

Google Images. (2010). *Red Hill Valley Parkway*. Retrieved May 13, 2010, from http://maps.google.ca/maps?hl=en&tab=wl

Gordian, M.E., Haneuse, S., and Wakefield, J. (2006). An investigation of the association between traffic exposure and the diagnosis of asthma in children. *Journal of Exposure Science and Environmental Epidemiology*, 16. 49-55.

Gordon-Larsen, P., Nelson, M.C., Page, P., and Popkin, B.M. (2006). Inequality in the built environment underlies key health disparities in physical activity and obesity. *Pediatrics*, 17(2), 417-424.

Gower, S., Shortreed, J., and Chiotti, Q. (2005). Policy analysis tool for air quality and health. *Pollution Probe*, 1-46. Retrieved February 21, 2009, from http://www.pollutionprobe.org/Reports/policytoolsforAQ.pdf

Gray, B. (2007). A long road to Red Hill: will it be Hamilton's salvation - or its greatest mistake? *The Hamilton Spectator*, November 3, A01.

Groves, R.M., and Lyberg, L.E. (1988). An overview of nonresponse issues in telephone surveys. In Groves, R.M., Biemer, P.P., Lyber, L.E., Massey, J.T., Nicholls II, W.L., and Waksberg, J. (eds.), *Telephone survey methodology*. New York: John Wiley & Sons.

Haalboom, B. (2002). A Qualitative Study of the Reproductive and Psychosocial Health Concerns of Residents Living Near the Tar Ponds in Sydney, Nova Scotia. Unpublished master's thesis, McMaster University

Hartig, T., Evans, G.W., HJamner, L.D., Davis, D.S., and Garling, T. (2003). Tracking restoration in natural and urban field settings. *Journal of Environmental Psychology*, 23, 109-123.

Hartig, T. (2007). Congruence and conflict between car transportation and psychological restoration. In Garling, T., and Steg, L. (eds.), *Threats From Car Traffic to the Quality of Urban Life: Problems, Causes, and Solutions*. New York: Elsevier Ltd, 103-122.

Harvard Medical School. (2006). Importance of Sleep: Six reasons not to scrimp on sleep. *Harvard Women's Health Watch*. Retrieved April 21, 2009, from https://www.health.harvard.edu/press_releases/importance_of_sleep_and_health

Harvie, J. (1997). Duelling over Red Hill Expressway. *The Hamilton Spectator*, October 9, A13.

Havenaar, J.M., van den Brink, W., Kasyanenko, A.P., van den Bout, J., Iljina, L.I., Poelijoe, N.W., and Wohlfarth, T. (1996). Mental health problems in the Gomel region (Belarus): an analysis of risk factors in an area affected by the Chernobyl disaster. *Psychological Medicine*, 26, 845-855.

Havenaar, J.M, and van den Brink, W. (1997). Psychological factors affecting health after toxicological disasters. *Clinical Psychology Review*, 17(4), 359-374.

Hodge, G. (2003). *Planning Canadian Communities*. (4th ed.). Scarborough: Thomson Canada Ltd.

Honywill, L. (2005). Against all odds; started in 1950, projected to finish by 2007. *The Toronto Sun*, March 27, HS3.

Jim, C.Y. (2004). Green-space preservation and allocation for sustainable greening of compact cities. *Cities*, 21(4), 311-320.

Jim, C.Y., and Chen, W.Y. (2006). Perception and attitude of residents toward urban green spaces in Guangzhou (China). *Environmental Management*, 38(3), 338-349.

Jacquemin, B., Sunyer, J., Forsberg, B., Gotschi, T., Bayer-Oglesby, L., Ackermann-Liebrich, U., de Marco, R., Heinrich, J., Jarvis, D., Toren, K., and Kunzli, N. (2007). Annoyance due to air pollution in Europe. *International Journal of Epidemiology*, 36, 809-820.

Johnston, R.A. (2004). The urban transportation planning process. In Hanson, S., and Giuliano, G. (eds.), *The Geography of Urban Transportation*. (3rd ed.). New York: The Guilford Press, 115-140.

Kanaroglou, P., and Pengelly, D. (1998). Regional Air Quality and the Red Hill Creek Expressway. *Friends of Red Hill Valley*, Retrieved August 17, 2010, from http://www.hwcn.org/link/forhv/newsletter/news98jun/news98jun_air.htm

Kaplan, R., and Kaplan, S. (1989). *The Experience of Nature: a Psychological Perspective*. New York: Cambridge University Press.

Kaplan, R. (2001). The nature of the view from home – psychological benefits. *Environment and Behaviour*, 33, 507-542.

Krupat, E. (1985). *People in cities: The urban environment and its effects*. New York: Cambridge University Press.

Langdon, F.J. (1977). Noise nuisance caused by road traffic in residential areas: Part 1. *Journal of Sound and Vibrations*, 47, 243-263.

Langdon, F.J., and Buller, I.B. (1977). Road traffic noise and disturbance to sleep. *Journal of Sound and Vibrations*, 50, 13-28.

Lazarus, R.S., and Cohen, J.B. (1977). Environmental stress. In Altman, I., and Wohlwill, J.F. (Eds.), *Human Behaviour and Environment* (Vol. 1). New York: Plenum.

Lazarus, R.S., and Folkman, S. (1984). *Stress, appraisal, and coping*. New York: Springer.

Lercher, P., and Kofler, W.W. (1996). Behavioural and health responses associated with road traffic noise exposure along alpine through-traffic routes. *The Science of the Total Environment*, 189, 85-89.

Leyden, K.M. (2003). Social capital and the built environment: the importance of walkable neighbourhoods. *American Journal of Public Health*, 93,1546–1551.

Lipfert, F., and Wyzga, R. (2008). On exposure and response relationships for health effects associated with exposure to vehicular traffic. *Journal of Exposure Science and Environmental Epidemiology*, 18, 588-599.

Lundberg, A. (1996). Psychiatric aspects of air pollution. *Otolaryngology-Head and Neck Surgery*, 114(2), 227-231).

Luttik, J. (2000). The value of trees, water and open space as reflected by house prices in the Netherlands. *Landscape and Urban Planning*, 48, 161-167.

Lynch, J.W., and Kaplan, G.A. (2000). Socioeconomic factors. In Berkman, L.F. and Kawachi, I. (eds.), *Socio Epidemiology*. New York: Oxford University Press, 13-35.

Maas, J., Verheij, R.A., Groenewegen, P.P., de Vries, S., and Spreeuwenberg, P. (2006). Green space, urbanity, and health: how strong is the relation? *Journal of Epidemiology and Community Health*, 60(7), 587-592.

Macintyre, N. (2006). Ottawa not red-faced over Red Hill: filed statements deny any wrongdoing in environmental assessment order for controversial road. *The Hamilton Spectator*, February 10, A05.

Macintyre, N. (2007a). A long road to Red Hill; Will it be Hamilton's salvation -- or its greatest mistake? *The Hamilton Spectator*, November 3, A01.

Macintyre, N. (2007b). Property tax could jump 8 per cent, city staff say, *The Hamilton Spectator*, December 26, A01.

Maller, C., Townsend, M., Pryor, A., Brown, P., and St. Leger, L. (2005). Healthy nature healthy people: 'contact with nature' as an upstream health promotion intervention for populations. *Health Promotion International*, 21(1), 45-54.

McKay, R.B. (2000). Applying ethical principles to the decision to build the Red Hill Creek Expressway. *International Journal of Public Sector Management*, 13(1), 58-67.

McKay, R.B. (2001). Groupthink in municipal infrastructure planning: Decision making behind the proposed Red Hill Creek Expressway. *Environments*. 29(2), 1-20.

Melbye, J., Bourke, L., Luloff, A.E., Liao, P., Theodori, G.L., and Krannich, R.S. (2000). The drop-off/pick-up method for household survey research. *Institute for Policy Research and Evaluation*, 1-28.

Michaud, D.S., Keith, S.E., and McMurchy, D. (2005). Noise Annoyance in Canada. *Noise Health*, 7, 39-47.

Michaud, D.S., Keith, S.E., and McMurchy, D. (2008). Annoyance and disturbance of daily activities from road traffic noise in Canada. *Journal of Acoustical Society of America*, 123(2), 784-792.

Moore, E.O. (1981). A prison environment's effect on health care service demands. *Journal of Environmental Systems*, 2(11), 17-34.

Morgenstern, V., Zutavern, A., Cyrys, J., Brockow, I., Gehring, U., Koletzko, S., Bauer, C.P., Reinhardt, D., Wichmann, H.E., and Heinrich, J. (2007). Respiratory health and individual estimated exposure to traffic-related pollutants in a cohort of young children. *Journal of Occupational and Environmental Medicine*, 64, 8-16.

Ohrstrom, E. (1989). Sleep disturbance, psycho-social and medical symptoms-a pilot survey among persons exposed to high levels of road traffic noise. *Journal of Sound and Vibrations*, 133(1), 117-128.

Ohrstrom, E. (1991). Psychosocial effects of traffic noise exposure. *Journal of Sound and Vibration*, 151(3), 513-517.

Ohrstrom, E. (2004). Longitudinal surveys on effects of changes in road traffic noise-annoyance, activity disturbances, and psycho-social well-being. *Journal of Acoustical Society of America*, 115(2), 719-729.

Ohrstrom, E., Skanberg, A., Svensson, H., and Gidlöf-Gunnarsson, A. (2006). Effects of road traffic noise and the benefit of access to quietness. *Journal of Sound and Vibration*, 295(1-2), 40-59.

Oliver, L.C., and Shackleton, B.W. (1998). The indoor air we breathe: A public health problem of the '90s. *Association of Schools of Public Health*, 113(5), 398-409.

Ouis, D. (2001). Annoyance from road traffic noise: A review. *Journal of Environmental Psychology*, 21, 101-120.

Parsons, R., Tassinary, L.G., Ulrich, R.S., Hebl, M.R., and Grossman-Alexander, M. (1998). The view from the road: implications for stress recovery and immunization. *Journal of Environmental Psychology*, 18, 113-140.

Peace, W.G. (1998). *From Mountain to Lake: The Red Hill Creek Valley*. Hamilton: W.L. Griffin Printing Limited.

Pirrera, S., De Valck, E., and Cluydts, R. (2010). Nocturnal road traffic noise: a review on its assessment and consequences on sleep and health. *Environment International*, 36(5), 492-498.

Plinte, R. (1997). Expressway's fate is in citizen's hands. *The Hamilton Spectator*, April 9, A11.

Pretty, J., Peacock., J., Sellens, M., and Griffin, M. (2005). The mental and physical health outcomes of green exercise. *International Journal of Environmental Health Research*, 15(5), 319-337.

Roseland, M. (1992). *Towards Sustainable Communities*. National Round Table on the Environment and the Economy.

Ross, C.E., and Mirowsky, J. (2008). Neighbourhood Socioeconomic Status and Health: context or composition? *City and Community*, 7(2), 163-179.

Rotko, T., Oglesby, L., Kunzli, N., Carrer, P., Nieuwenhuijsen, M.J., and Jantunen, M. (2002). Determinants of perceived air pollution annoyance and association between annoyance scores and air pollution (PM2.5, NO2) concentrations in the European EXPOLIS study. *Atmospheric Environment*, 36, 4593-4602.

Rotton, J., Frey, T., Milligan, M., and Fitzpatrick, M. (1979). The air pollution experience and physical aggression. *Journal of Applied Social Psychology*, 9(5), 397-412.

Rowan Williams Davies and Irwin Inc. (2003). *Vehicle Air Emissions Inventory: North-*

South section Red Hill Creek Expressway. Guelph.

Schulz, A.J., Williams, D.R., Israel, B.A., and Lempert, L.B. (2002). Racial and spatial relations as fundamental determinants of health in Detroit. *Milbank Quarterly*, 80(4), 677-707.

Singh, K. (2007). *Quantitative Social Research Methods*. Los Angeles: Sage Publications.

Song, Y., Gee, G.C., Fan, Y., and Takeuchi, D.T. (2007). Do physical neighbourhood characteristics matter in predicting traffic stress and health outcomes? *Transportation Research Part F*, 10, 164-176.

Statistics Canada. (2006). *Census Tract Profiles, 2006 Census*. Retrieved May 13, 2010, from http://geodepot.statcan.ca/GeoSearch2006/GeoSearch2006.jsp?resolution=H&lang=E&otherLang=F

Steele, J., Bourke, L., Luloff, A.E., Liao, P., Theodori, G.L., and Krannich, R.S. (2001). The drop-off/pick-up method for household survey research. *Journal of the Community Development Society*, 32(2), 238-250.

Terpstra, N. (1985). Local Politics and Local Planning: A Case Study of Hamilton, Ontario, 1915–1930. *Urban History Review*, 19, 114-128.

The Hamilton Spectator. (2007a). Red Hill countdown: after more than 50 years of planning, the Red Hill Valley Parkway opens to traffic Saturday. *The Hamilton Spectator*, November 15, A04.

The Hamilton Spectator. (2007b). Red Hill the rubber finally meets the road: it has taken 54 years and $241 million, but at last the Red Hill Valley Parkway will open tomorrow morning. *The Hamilton Spectator*, November 16, A01.

The Hamilton Spectator. (2010). Code Red. The Hamilton Spectator, April 10.

The Red Hill Valley Neighbourhoods Association. (2010). *The Red Hill Valley Neighbourhoods Association*. Retrieved October 22, 2010, from http://www.rhvna.com/index.html

Tigas, L.A., Van Vuren, D.H., and Sauvajot, R.M. (2002). Behavioural responses of bobcats and coyotes to habitat fragmentation and corridors in an urban environment. *Biological Conservation* 108, 299-306.

Tyrvainen, L., and Miettinen, A. (2000). Property prices and urban forest amenities. *Journal of Environmental Economic and Management*, 39, 205-223.

Ulrich, R.S. (1984). View through a window may influence recovery from surgery. *Science*, 224, 420-421.

U.S. Environmental Protection Agency. (2008). *Persistent Bioaccumulative and Toxic (PBT) Chemical Program*. Retrieved March 23, 2009, from http://www.epa.gov/pbt/pubs/dioxins.htm

Van den Berg, A.E., Hartig, T., and Staats, H. (2007). Preference for nature in urbanized societies: stress, restoration, and the pursuit of sustainability. *Journal of Social Issues*, 63(1), 79-96.

Van Harten, P. (2005). Parkway neighbours fear more traffic; Concern about lower quality of life when Red Hill finished. *The Hamilton Spectator*, July 20, A07.

Van Wee, B. (2007). Environmental effects of urban traffic. In Garling, T., and Steg, L. (eds.), *Threats From Car Traffic to the Quality of Urban Life: Problems, Causes, and Solutions*. New York: Elsevier Ltd, 11-32.

Velarde, M.D., Fry, G., and Tveit, M. (2007). Health effects of viewing landscapes – landscape types in environmental psychology. *Urban Forestry and Urban Greening*, 6, 199-212.

Visser, O., van Wijnen, J.H., and Leeuwen, F.F. (2004). Residential traffic density and cancer incidence in Amersterdam, 1989-1997. *Cancer Causes Control*, 15, 331-339.

Von Appen, K. (1985). Red Hill gets green light. *The Hamilton Spectator*, October 24, A1.

Wallace, J., D'silva, L., Brannan, J., Hargreave, F.E., Kanaroglou, P., and Parameswaran, N. (2010). Association between proximity to major roads and sputum cell counts. *Canadian Respiratory Journal*, in press.

Ward, L., and Suedfeld, P. (1973). Human responses to highway noise. *Environmental Research*, 6, 306-326.

Wells, N.M., and Evans, G.W. (2003). Nearby nature: a buffer of life stress among rural children. *Environment and Behaviour,* 35(3), 311-330.

Wheeler, R. (1998). Study convinced a skeptic to build in Red Hill Valley. *The Hamilton Spectator*, May 5, A7.

Whitelegg, J. (1997). *Critical Mass: Transport, Environment and Society in the Twenty-First Century*. Illinois: Pluto Press.

Williams, I.D., and Bird, A. (2003). Public perceptions of air quality and quality of life in urban and suburban areas of London. *Journal of Environmental Monitoring*, 5, 253-259.

Woods, N.D., Konisky, D.M., and Bowman, A. (2008). You get what you pay for: environmental policy and public health. *The Journal of Federalism*, 39(1), 95-116.

World Health Organization (WHO). (2000). *Guidelines for community noise*, edited by Berglund, B., Lindvall, T., Schwela, D., and Goh, K.T. Retrieved April 21, 2009, from http://www.who.int/docstore/peh/noise/Comnoise-3.pdf

World Health Organization (WHO). (2003). *WHO definition of Health*. Retrieved April 21, 2009, from http://www.who.int/about/definition/en/print.html

Yin, R.K. (2009). *Case Study Research: Design and Methods*. (4th ed.). Los Angeles: Sage Publications.

Zeidner, M., and Shechter, M. (1988). Psychological responses to air pollution: some personality and demographic correlates. *Journal of Environmental Psychology*, 8, 191-208.

Appendices

Appendix 1 – Example of Cover Letter

McMaster University

February 2010

Letter of Information

Title: Neighbourhood Satisfaction and Quality of Life

Masters Student:
(Principal Investigator)
Roberto Melfi
Department of Geography and Earth Sciences
McMaster University 1280 Main Street West
Hamilton, Ontario, Canada

Supervisor:
Dr. Walter Peace
Department of Geography and Earth Sciences
McMaster University 1280 Main Street West
Hamilton, Ontario, Canada

Please read the following information carefully. Your household has been invited to participate in a study that I am conducting as part of my Master's degree in the School of Geography at McMaster University under the supervision of Dr. Walter Peace. The survey has been included with this information letter.

Purpose of the Study:
The study is concerned with neighbourhood quality and the effect one's neighbourhood has on their quality of life. The questionnaire asks about concerns regarding the area in which you live. Your opinions and experiences on this subject are valuable and will help to strengthen the overall quality of this research. Specifically, your participation will help increase our understanding of how one's environment affects their health.

Procedure:
Your participation would involve a self-administered questionnaire to be completed by a member of this household who is over 18 years of age. As a participant in this study you are asked to complete the attached questionnaire which deals with a range of questions about your feelings toward your local area and the environment, as well as general questions on your health. The questionnaire consists of 8 pages and should take approximately 10 – 15 minutes to complete. If you choose to participate, please fill out the attached survey and place it in the envelope provided for pickup when completed.

Potential Risks:
There are no known harms or anticipated risks to you as a participant of the study. You can choose not to answer questions you do not want to answer or that make you feel uncomfortable.

Potential Benefits:
The research will not benefit you directly. However, your participation will benefit the overall research, which will help increase our understanding of how one's environment affects their quality of life. As well, anticipated benefits to the academic community include further knowledge of the effect of traffic exposure on residents, specifically the effect exposure has on health.

Confidentiality:
All information will be kept confidential. I will not use your name or any information that would allow you to be identified. Your data will be compiled with other participant's data. However, with your permission by indicating at the beginning of the questionnaire, anonymous quotations may be used. Data collected during the study will be kept for 1 year in a locked desk and on a password protected computer, and only researchers associated with this project will have access.

Participation and Withdrawal:
Your participation in this study is voluntary. You have the option to withdraw from the study at any time, even partway through the study, without any consequences to you. In cases of withdrawal any information you provide will be destroyed unless you indicate otherwise.

Study Debriefing:
If you would like to receive a summary of the research results please contact me, Roberto Melfi, using the contact information provided.

Rights of Research Participant:
You can withdraw from the study at any time without any consequences. If you have any questions or require further information regarding the study, please contact me at [redacted] or by email [redacted].

This study has been reviewed by the McMaster University Research Ethics Board and received ethics clearance. If you have concerns or questions about your rights as a participant or about the way the study is conducted, please contact:

McMaster Research Ethics Secretariat
Telephone: (905) 525-9140 ext. 23142
c/o Office of Research Services
E-mail: ethicsoffice@mcmaster.ca

Appendix 2 – Example of Survey Questionnaire

Please answer all questions as best you can by checking the box or filling the blanks with answers that best reflects your opinion or experience. Remember, you do not need to answer questions you do not want to or that make you feel uncomfortable; however please be assured that all the information you provide is confidential and will not be traced back to you.

I agree to the use of anonymous quotations in this thesis. Yes □ No □

If you would like to receive a summary of the research results please contact me, Roberto Melfi, at [redacted] or by email at [redacted].

Thank you in advance for assisting in this research project!

SECTION A

The following questions deal with your general feelings about your neighbourhood.

1. In general, how satisfied are you with your area as a place to live?

Very satisfied . . . . . □
Somewhat satisfied . . . . . □
Neutral . . . . . □
Not too satisfied . . . . . □
Not at all satisfied . . . . . □

2. List the 3 MOST important things you LIKE about the area where you live? (List in order of importance)

1_____

2_____

3_____

3. List the 3 MOST important things you DISLIKE about the area where you live? (List in order of importance)

1_____

2_____

3_____

SECTION B

The following section will ask a general health question.

1. Compared to other people your age, would you say your health is...

Excellent . . . . . .□

Very good . . . . . .□

Good . . . . . .□

Fair . . . . . .□

Poor . . . . . .□

SECTION C

To help understand the quality of life in a community, the following section will ask specific concerns you have about the area you live in.

1. How would you rate the physical environment (outdoor) in your neighbourhood?

Excellent . . . . . .□

Very good . . . . . .□

Good . . . . . .□

Fair . . . . . .□

Poor . . . . . .□

2. When you are at home, how much does road traffic affect you?

Not at all . . . . . □
Slightly . . . . . □
Moderately . . . . . □
Very . . . . . □
Extremely . . . . . □

3. In general, do you have any concerns (things that cause anxiety or worry) about the Red Hill Valley Parkway?

Yes . . . . . □ ➡ (Go to question 3.A., **page 4**)
No . . . . . □ ➡ (Skip to question 4, **page 5**)

3.A. If 'yes', what are these concerns?

_____

_____

_____

3.B. How have these concerns affected your daily life?

_____

_____

_____

3.C. Do you consider any of these concerns you just mentioned to be HEALTH related?

Yes . . . . . □
No . . . . . □
Do Not Know . . . . . □

3.D. In what way do you think the Red Hill Valley Parkway has affected your health or the health of any members of your household?

_____

_____

_____

3.E. How have you dealt with your concerns about the Red Hill Valley Parkway?

CHECK ALL THAT APPLY

Ignored concerns . . . . . □

Accepted concerns . . . . . □

Shut windows . . . . . □

Talked to others . . . . . □

Complained to authorities . . . . . □

Reduced outdoor activities . . . . . □

Other (please specify) _____

4. Do you have any environmental concerns that are NOT related to the Red Hill Valley Parkway?

Yes . . . . . □

No . . . . . □ ➡ (Skip to question 5, page 6)

4.A. If 'yes', what are these concerns?

_____

_____

_____

4.B. How have these concerns affected your daily life?

_____

_____

_____

4.C. Do you consider any of these concerns you just mentioned to be HEALTH related?

Yes . . . . . □

No . . . . . □

Do Not Know . . . . . □

4.D. In what way do you think these concerns have affected your health or the health of any members of your household?

_____

_____

_____

5. Has the Red Hill Valley Parkway increased or decreased your satisfaction with this area as a place to live?

Increased . . . . . □

Decreased . . . . . □

No Change . . . . . □

6. Have you considered moving away from this area because of the Red Hill Valley Parkway?

Yes . . . . . □

No . . . . . □ ➡ (Skip to question 7)

Do Not Know . . . . . □ ➡ (Skip to question 7)

6.A. Have you taken any steps toward moving?

Contacted real estate agent . . . . . □
Put house up for sale . . . . . □
Searched for new house . . . . . □
Other, please specify _____

7. If you were to move, would you move...

Less than 1 km from present location . . . . . □
More than 1 km from present location . . . . . □
Do not know . . . . . □

8. In your opinion, are there positive characteristics about the Red Hill Valley Parkway?

Yes . . . . . □
No . . . . . □ ➡ (Skip to Section D, page 7)

8.A. If 'yes', what are the positive things?

_____

_____

_____

SECTION D

The final section will ask a few questions about your background. You do not need to provide answers to information you do not wish to disclose.

1. To what age category do you belong?

< 20 . . . . . □
20 – 30 . . . . . □
31 – 40 . . . . . □
41 – 50 . . . . . □
51 – 60 . . . . . □
> 60 . . . . . □

2. What is your gender?

Male . . . . . □ Female . . . . . □

3. How many years have you lived at your current address?

< 1 year . . . . . □ 16 – 20 years . . . . . □
1 – 5 years . . . . . □ 21 – 25 years . . . . . □
6 – 10 years . . . . . □ Over 25 years . . . . . □
11 – 15 years . . . . . □

4. What is the highest level of education you have completed?

Less than grade 9 . . . . . □
Some high school . . . . . □
High school diploma . . . . . □
Some trade, technical or vocational school, community college business college . . . . . □
Diploma or certificate from a trade, technical or vocational school, community college, business college . . . . . □
Some university . . . . . □
University graduate . . . . . □
University post-graduate . . . . . □

5. Into which of the following categories would your total HOUSEHOLD income fall, before taxes, in the past year?

Less than $20,000 . . . . . □

Between $20,000 and $29,999 . . . . . □

Between $30,000 and $39,999 . . . . . □

Between $40,000 and $49,999 . . . . . □

Between $50, 000 and $59,999 . . . . . □

More than $60,000 . . . . . □

6. Do you...

Own your home . . . . . □

Rent your home . . . . . □

Other, please specify_____

7. Do you have CHILDREN under the age of 18 living in your household?

Yes . . . . . □

No . . . . . □

8. Do you have any additional comments, concerns, or suggestions regarding this questionnaire?

_____

_____

_____

THANK YOU for filling out the questionnaire!