Understanding Environmental Exposures in Quinsigamond Village:

Phase 1 of a Community Based Risk Assessment

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Chapter 1: Introduction

America is a country with a history of rapidly advancing technology and strong industries. Since the industrial revolution, the country has strived to lead the world in nearly every business and industry conceivable. The appeal of such an economy has drawn people to the United States for generations, causing ever-increasing population statistics.

The economical advantages generated by such a situation do not come without a cost: the billions of tons of waste generated by businesses and thriving populations, amounting to nearly 1700 pounds of waste per person each year (Texas Environmental Profiles 2004). Some of this waste is harmless and not overly concerning, but much of the waste, especially that generated by industrial factories and business, creates serious health concerns. Any of this waste that is a threat to human or natural health is known as an environmental hazard (Molak 1997). Many of the environmental hazards brought about by years of industrial growth in industrial communities have not even been identified (Adamson 2002). Pollution may be seeping into drinking water or appearing in vegetables grown in back-yard soil. Identifying as many of these hazards as possible, and informing the people that may interact with them, is a first step in ensuring safe, healthy communities. While laws are in place to minimize these hazards, some communities are more susceptible to them and face a disproportionate amount (Byrne 2001).

A prime example of such a situation is occurring in a community of Worcester, Massachusetts known as Quinsigamond Village. Through the late 18th century and into the 19th century, the New England region was feeling the full force of the industrial revolution in America. Worcester could be found right in the middle of this revolution. Easy waterway access via the Blackstone River and a centralized location drew dozens of factories to the city (Southwick 1998). City officials, realizing the health concerns created by dumping waste around residential areas or floating it down the Blackstone, sought a solution to their waste problems. Quinsigamond Village was chosen as an ideal place to dispose of wastes (Worcester Magazine 2003). In later years, with the precedence for using the area already set, Quinsigamond became the home of sewage

treatment plants, wire factories, landfills, trucking routes, and a host of other environmental hazards.

Recently, the residents of Quinsigamond Village have expressed concern about how much more pollution the area and its residents can handle. Worcester is considering re-opening one of the local landfills, and in doing so, sparked enough interest in local environmental hazards to catch the attention of the Environmental Protection Agency and the Regional Environmental Council. These organizations then proposed a long-term goal of helping the Quinsigamond Village community learn about and respond to their environmental hazards.

The research described in this proposal will take the first step in achieving the goal of addressing environmental risk problems in Quinsigamond Village. First, the project will identify as many of the environmental hazards in Quinsigamond as possible. With a reasonable list of these hazards, research can be performed to discover how people interact with the hazards, and what the extent of this interaction is. This research will be done in a collaborative way. Residents of Quinsigamond will be invited to participate in the research as partners, giving the research increased accuracy while encouraging local involvement. This is important to help prevent similar pollution situations from arising in the future. This information will help determine whether environmental justice policies set forth to ensure that no person or community faces a disproportionate or unfair burden by pollution have been violated in Quinsigamond Village (EPA 2004). The culmination of all this information together will be presentation giving the Quinsigamond community the tools and data it needs to bring about environmental change.

By learning about the environmental risks to human health in Quinsigamond Village and igniting an interest in both cleanup and prevention in the local community, this project can significantly improve the quality of life for the 7300 residents (US Census 2004) of the area.

Chapter 2: Background

II.1 Introduction

The background portion of this report will provide a framework for understanding how key topics apply to the Quinsigamond Village project. To start, an examination of the area of Quinsigamond Village will be given. From here, the concept of risk will be explained. Insight into risk assessment will lead to the idea of environmental justice in Quinsigamond Village. Finally, the use of participatory research, the primary research method for this project, will be explored. Knowledge of each of these areas will be useful for forming the methods discussed in Chapter 3.

II.2 Quinsigamond Village Information

II.2.1 Socio-economic Demographics of Quinsigamond Village

Quinsigamond Village is a subdivision of The City of Worcester, an industrial city in central Massachusetts, as seen in Figure 2.1. It encompasses a small area of just a couple square miles, corresponding to zip code 01607.

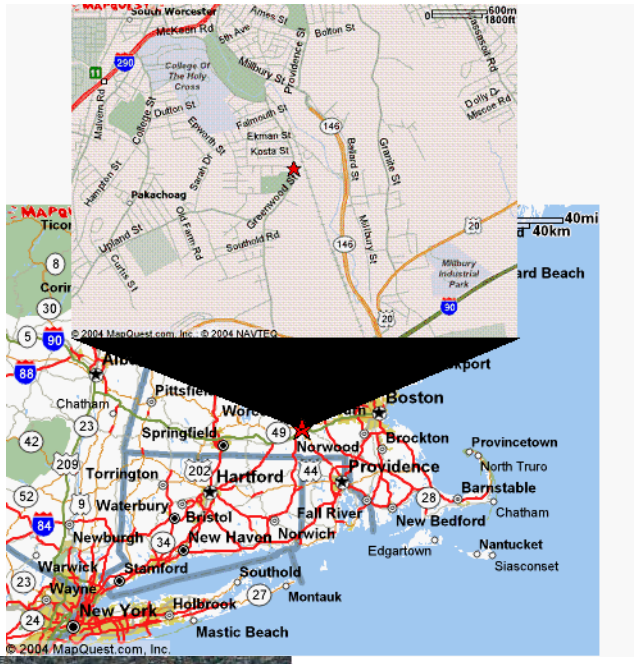

Figure 2.1
Quinsigamond Village is a subset of Worcester, a large city in central Massachusetts.

Shown in Figure 2.2, the area is densely populated. Approximately 7,300 people claim residency in Quinsigamond. Just fewer than 75% of these people are classified as "White", with the remainder fairly evenly split between Hispanic, Black, and Asian.

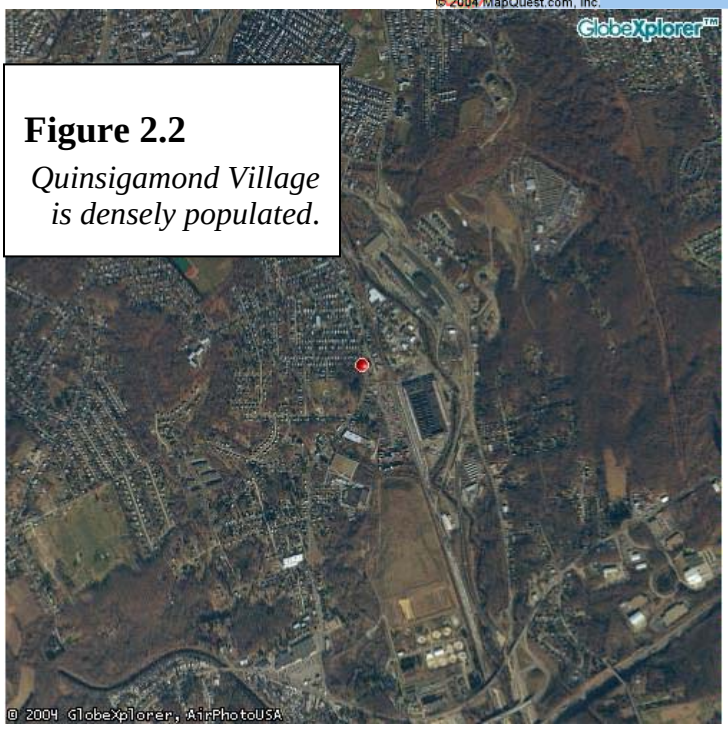

Figure 2.2
Quinsigamond Village is densely populated.

Quinsigamond's industrial history continues today with a low income, working class population. Poverty levels are 50% higher than national averages and nearly three times higher than the rest of Massachusetts. Most of the residents are working adults, though there is a

neighborhood school for the 1200 children. Many small businesses dot the community, and jobs in industrial and factory areas are also quite common. Exact statistics and further details are given in Appendix I (Census Bureau 2004).

II.2.2 Economic History and Current State of Quinsigamond Village

During the Industrial Revolution in America, Quinsigamond Village was a vital piece of Worcester's economy (Southwick 1998). Thousands of jobs in the factories built during the time period meant the area was always bustling. Wire factories, textile mills, and newspaper printing offices were commonplace. Although not originally a residential neighborhood, houses were built amid the businesses of Quinsigamond as other parts of Worcester became overcrowded.

As industrial growth in the area tapered off in favor of technological sectors in the mid-to-late 20th century, factories shut down, jobs were lost, and Quinsigamond Village gradually became a run down, poverty-stricken area (Worcester Magazine 2003). Cheap, tightly packed housing brought Worcester's unemployed to Quinsigamond and overcrowding became a problem. The effects of this decline could be seen in the empty streets and abandoned buildings. Today, the signs of decline still exist, but recently, an effort has been made by the Worcester government and several private organizations to revitalize Quinsigamond Village (Southwick 1998). Abandoned buildings have been converted to apartments, public gardens can be found around the area, and the local school has been restored by a new addition covering an entire city block (National Trust 2004).

Though the recent revitalization has fixed some of Quinsigamond's aesthetic problems, it has neglected another aspect of the legacy left behind by an industrial past. Many of the environmental hazards, defined here as pollution in the environment that is detrimental to human health (EPA 2004), in Quinsigamond are directly linked to its history. Chemical pollution has been found in the soil and groundwater of old factory sites, though the extent is still unknown. Trucking routes established when Quinsigamond was an industrial center still see heavy use and run through the center of the Village, causing air and noise pollution in the areas surrounding Greenwood Street

and Route 146. Perhaps most alarming to the local community, as can been seen in public outcry and town meeting attendance, is the area's reputation as a citywide dumping ground. When Quinsigamond was less residential it was chosen as an ideal spot for a landfill. Since this time, whenever Worcester has needed a place to dispose of waste, Quinsigamond is almost invariably considered (personal communication, P. Middaugh, November, 2004). Due to this trend, the Village now contains several landfills and a sewage treatment plant. One of the landfills, though closed, is leaking into the surrounding area due to improper capping. Worcester officials' talk of re-opening it has sparked nearby residents to wonder if their health is at risk, and if so, just how much more pollution they can handle (personal communication, P. Middaugh, October 2004). As a first step toward seeking an answer for the people of Quinsigamond Village, a map showing the currently known pollution sources was obtained from the EPA (Figure 2.3). This map combined with data this project will gather will give the Quinsigamond Community the beginnings of an answer to their concerns.

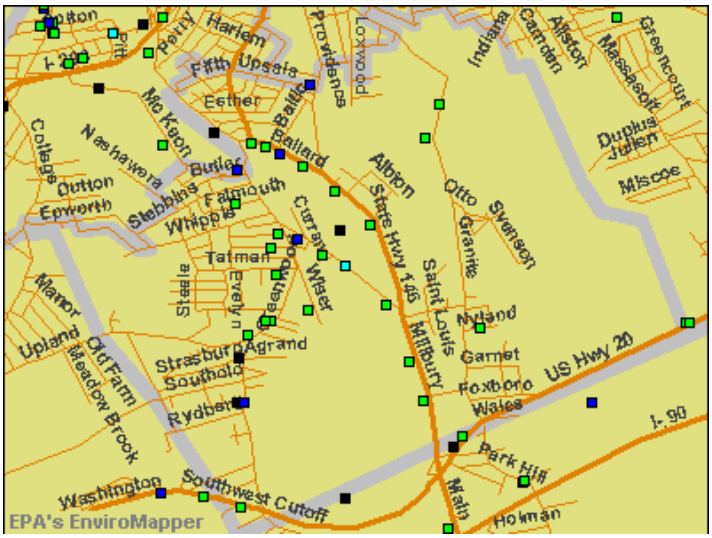

Figure 2.3
Known hazards in Quinsigamond Village.

0.2 miles

Water dischargers

Hazardous waste

Toxic releases

Air emissions

Multi-activities

II.3 Risk

For the purposes of this research, risk will be defined as a measure of the probability of the introduction of an industrial, residential, or business hazard to a residential area and the seriousness of such an outcome in the context of human health concerns (Molak 1997). A hazard, according to the Environmental Protection Agency (EPA) is a "Potential for radiation, a chemical or other pollutant to cause human illness or injury" (EPA 2004). Depending on the context, the outcomes of concern can change from application to application. For example, a person studying animals is concerned with risk to their lives and habitat, while to an engineer risk is what would cause safety hazards to the structure or device being studied (Molak, 1997). This study is concerned with the location of hazards in Quinsigamond Village and the risk they pose to the surrounding community.

Many researchers of the social sciences have agreed that one of the most straightforward ways to understand and evaluate risk is to put it into a visual model (Krimsky and Golding 1992; Kates, Hohenemser, and Kasperson 1985). One of the most common ways to do this is to represent the sequence of events that lead up to and result from a hazard. This is known as the Causal Model. This model organizes factors in a chronological format, which places the actual hazard at the center of a left to right sequence as seen below:

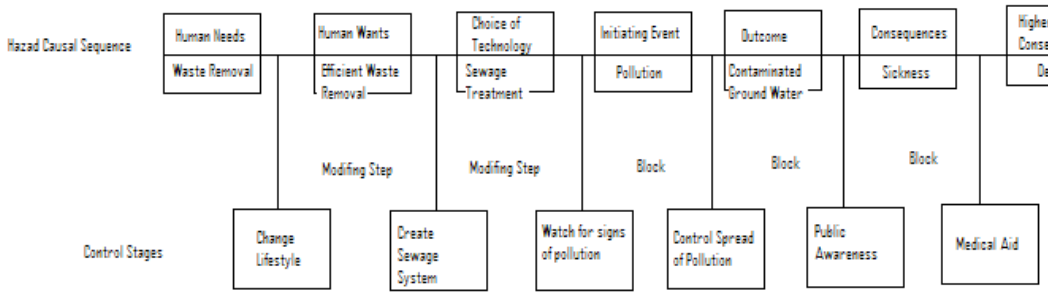

Figure 2.4 *Causal Model of Risk*

Events that cause the hazard are located to the left of the hazard and the consequences of the hazard are on the right side of the model. Between each step in the process there is an

opportunity to intervene and reduce the risk. This is important when looking to the future in order to reduce the consequences of the hazard (National Research Council 1989).

Understanding risk is an important step in working with the people of Quinsigamond Village and communicating information regarding the impact of the hazards around them. The purpose of the full study being conducted by the REC and WPI is to calculate the risk that all of the hazards pose to the Quinsigamond Community. In order to do this, there must be a clear understanding of what the three major aspects of risk are: risk characterization, risk analysis, and risk communication. As risk characterization and analysis are mostly interdependent, they will be discussed in one section. Risk characterization must be researched to evaluate and categorize the hazards in Quinsigamond. Risk analysis is important to increase understanding of the risk the hazards pose. Risk communication is vital so the researchers can inform the Quinsigamond community about the risks in their neighborhood. Each of these topics will be discussed in the following sections.

II.3.1 Risk Analysis and Characterization

The term risk analysis can be defined as a methodology that evaluates and derives the probability "…of an adverse effect of an agent, an industrial process, a technology, or a natural process" (Molak 1997). This analysis process is usually looked at in four major steps. The first step is hazard identification, followed by dose-response relationship, exposure analysis, and finally, by risk characterization (National Research Council 2003). The hazard identification step is the stage in which the danger to the environment or humans is located and identified as a hazard that could pose a risk them. The dose-response relationship is where the quantity, intensity, and concentration of a hazard are found and its adverse affects are calculated. Exposure analysis involves discovering just how many people were exposed to what and how much, and how long the exposure lasted. Risk characterization is the review of the previous steps to make a calculation based upon the data gathered as to create an accurate numerical portrait of the magnitude of the risk. This last step often leads to questions about how to gather more data and a

refinement of the methodology used. As can be seen from this explanation, the different aspects of risk are interdependent.

In this research endeavor, collaboration and communication between the researchers and the community is paramount. This is why, when looking at risk characterization, the definition brought from The Committee on Risk Characterization is the most applicable to this research. By their definition, risk characterization is "...the outcome of an analytic-deliberative process…" and always a "decision-driven activity that is directed toward informing choices and solving problems" (Stern, Harvey 2003). Keeping this relationship in mind, the committee also states that risk characterization is a synthesis and summary of information about a hazard that influences decision makers and other interested parties (Stern, Harvey 2003).

One way to look at risk analysis is as a blend of inductive and deductive reasoning and judgment that is comprised of risk assessment and risk management (Molak 1997). A problem with risk analysis is the constant presence of uncertainty. This can be brought about not having the proper amount of data before making a conclusion. Even when one does have enough data to make an informed decision, any change in the situation could have a large impact upon the analysis (Glickman and Gough, 1991). There is also the issue of the researchers not knowing all of the facts, even though they may perceive themselves to be fully informed decision-makers. This is not to say that risk analysis is useless. In fact, it is a very important tool in social research. Its purpose is to uncover the potential dangers and their probability of occurring. This information allows researchers to make an informed decision about how a hazard is a risk to humans before it escalates.

The risk analysis process can best be summarized by looking back at the causal model of risk. Beginning from the left of the model there are the root causes of the hazard. Proceeding to the right, a dose-response relationship is observed which identifies the quantities of exposure. The exposure analysis is to the right of the hazard and explains how the exposure affects people and their environment. The right side of the model is where the rest of the model comes into focus and the consequences of the previous events can be seen. Finally, in between each of these steps is, as mentioned before, the key of risk analysis. The overall goal of risk analysis is to gather enough

information to reduce risk. The area between the steps of the causal model is where this knowledge can be applied to affect the consequences farther down the model (Molak, 1997; NRC 1989). Taking a look at the sewage treatment example, one can see how modifying the causes of the hazard could prevent it. Also, by blocking consequences after the hazard has occurred, long-term or higher order consequences could be avoided. With these risks now identified and the ability to reduce them at hand, a way to effectively communicate this knowledge is risk communication.

II.3.2 Risk Communication

The final step of the risk process, risk communication includes the methods that are used to explain risk to the general public (Molak 1997). The difficulty with risk communication is that when it fails, the people being informed may feel that they are not taken seriously. This can also lead to the researchers thinking that the people do not understand the problem or that they are unwilling to cooperate (Glickman and Gough, 1991).

The importance of risk communication cannot be overlooked. It is not only a way to inform the public or the government about certain issues, but also a way to influence governmental policy. In Plough and Krimsky's "*The Emergence of risk communication studies: social and political context,*"(1987) it is said that the final control of political battles will rely upon the discourse on risk. When thinking about how to communicate to the public a technical issue, it is good to keep in mind two different rationalities: technical and cultural. For the most part, the researcher and the experts in the field are those that ascribe to the technical mentality, where the lay people are more readily categorized into the cultural mentality. The technical mentality trusts scientific methods, explanations, and evidence, and emphasizes statistical variation and probability. The cultural mindset trusts political culture and democratic processes and places emphasis upon the impacts of the risk upon family and community (Molak 1997).

Problems arise with communicating risk effectively. These usually occur when the researcher does not understand how to put risk into language that most people are

familiar with. When the proper language is used, a two-way relationship can occur and produce effective risk communication (NRC 2003). When executed properly, risk communication accomplishes the goal of informing the community about possible threats to their health and way of life.

There are two other relevant problems with risk communication: the institutional and political systems that are in place, and the relation between risk communicators and the recipients of that communication (NRC 1989). The problem with the institutions and political systems are that, in society, the democratic process creates a large number of bureaucracies that are constantly infighting. These institutions often use risk data to twist arguments for political gain. This causes distrust in the populace about how accurate risk data is and complicates the researchers' job of risk communication (NRC 1989). The second major problem is the relationship between risk communicators and their recipients. This situation is much easier to control because the problem between these two parties results from improper data through issues such as time constraints or poor language. These are sources of problems that can be consciously improved upon to create better risk communicator (Glickman and Gough, 1991).

Risk communication is an integral part of the risk analysis process that allows most people to understand the risks that they are exposed to in their everyday lives. Through conscious awareness of the language being used and the data referenced, researchers can effectively communicate risk to the general public in order to inform them and empower them to make changes for the better.

II.4 Environmental Justice

Environmental justice is an important concept to this project. The ideas of risk in the previous sections follow immediately into environmental justice. Policies of environmental justice exist to ensure that no given community, area, or group face an unfair amount of that risk (Adamson et al. 2002). The first step in understanding environmental justice impact is to set forth guidelines for determining if a community can be evaluated for environmental justice qualifications. These guidelines are independent of the concept of risk. If these guidelines are met, risk is introduced into the evaluation, and the idea of disproportionate impacts or exposures can be examined to determine environmental justice status (Fisher 2004).

According to the EPA, environmental justice is the "…fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies." (EPA 2004). Two terms that are vague are "fair treatment" and "meaningful involvement". These vague statements, evaluated independently, make up the guidelines mentioned above.

Fair treatment refers to how a community has been treated by local government and businesses. A community has the expectation of having its needs considered fairly and in an unbiased way regarding issues of pollution (Fisher 2004). Quinsigamond Village residents feel the Worcester government has not fairly considered the community's needs and pollution limits in the past. Proof of this comes in the form of hazardous site data of the area. Several landfills, a sewage treatment plant, trucking highways, and other hazards dot the area at a much greater frequency than in surrounding communities. As can be seen in Figure 2.4, Quinsigamond contains far more known

environmental hazard sites than neighboring residential areas (EPA EnviroMapper 2004).

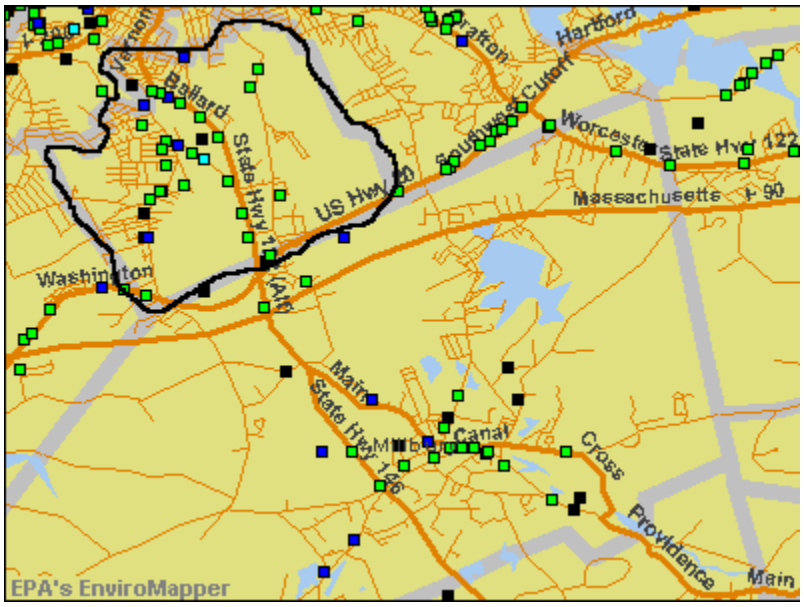

Figure 2.5
Quinsigamond Village is outlined in black. The area contains a higher frequency of known environmental hazards, the colored dots, than the surrounding residential communities.

From this information, the case can be made that officials did not fairly consider Quinsigamond's needs and limits when deciding to place further hazards sites within the boundaries of the community.

The second guideline to be considered is the statement about meaningful involvement. This statement refers to the rights of community members to have their opinions heard and justly considered by government officials. Quinsigamond residents claim that their outcries against opening further hazardous sites in their have been ignored (personal correspondence, several Quinsigamond residents, November 18, 2004).

Politics and expedience are blamed for Quinsigamond being considered whenever new hazardous sites are opened and not being considered when old sites are cleaned (person correspondence, P. Middaugh, November 2004).

With the two guidelines of unfair treatment and lack of meaningful involvement seemingly met, the concept of risk can be included in the evaluation of Quinsigamond Village as an environmental justice community. Such an evaluation is one of the main goals of this project. This evaluation revolves around the idea of disproportionate impacts and exposures. Even if Quinsigamond has been unfairly treated and ignored,

there is no status as an environmental justice community without proof of disproportionate impacts and exposures (Byrne et al. 2002).

"Disproportionate impacts" refers to the effects hazardous sites have on the surrounding community. Environmental justice policy has only been violated if it can be shown that the hazards have an overly negative impact compared to the hazards in other communities. This negative impact could have a number of sources. The hazards might be more dangerous than most, the community might not have the funding to deal with normally acceptable hazard levels, or the community may lack political influence to defend itself (Adamson 2004). Similarly, no matter how dangerous some of the hazards in Quinsigamond may be, there is no policy violation unless it can be shown that the community has enough interaction with the hazards to put them at risk. Risk assessment and methods discussed in Chapter 3 will be used in determining if Quinsigamond Village meets these criteria.

In terms of Quinsigamond Village, if the area meets the researchers' qualifications as an environmental justice community, environmental justice policy may be the residents' best argument against further pollution and for the help and funding needed to combat the current hazards. If proof can be offered that the town has been unfairly burdened by Worcester's waste and pollution problems, a substantial argument can be made in favor of aid. The problem is finding acceptable proof of wrongdoing. While a documented tradition of dumping waste in Quinsigamond would seem to be proof to the average person, city and EPA officials will require more substantial information regarding specific and imminent health risk. A positive consequence of this project could be, through using risk assessment and environmental justice policy, providing the community with the information and ammunition they need to make such a case.

II.5 Participatory Research

The main goal of participatory research is to involve the subjects in the research process as partners, rather than engaging in a more traditional subject-researcher relationship (Holkup, et al. 2004). Though the details of the use of participatory research in this project are discussed in the Methodology chapter, a general knowledge of the subject is important to plan its use. According to previous research, the two main advantages to using participatory research methods are more accurate results and subject stimulation (Holkup, et al. 2004, Toner 2003, Minklet, et al. 2003). Each of these advantages is worth a closer look.

Accurate, unbiased data are hard to obtain when dealing with human subjects (Kreuger 1994). Participatory research offers a potential answer to this problem in three ways. First, inaccuracies in data can be a result of humans being opinionated and having interests that differ from the researcher (secrets, personal goals, etc.), both of which may cause bias in responses. People are more likely to give accurate results if they feel the researchers honestly care about their input and can be trusted with any information. Participatory research develops such trust by encouraging involvement as partners and not subjects.

Secondly, by addressing accuracy concerns and encouraging interest, participatory research can also perform a specific type of data extraction more accurately than many other research methods. These data are local expertise. In Quinsigamond, there is no better way to identify the environmental hazards than to ask the people who deal with them in their daily lives. Some of the data can be gathered in no other way. This makes accurate responses especially important.

Inaccurate data can also be the result of researcher disruption. By performing research on a system, the system is often changed. If uncontrolled variables and change are introduced to a system, readings of that system are influenced. Participatory research seeks to prevent this problem by disturbing the surroundings less, allowing for more accurate results. “Community-based participatory research (CBPR), with its emphasis on partnering with communities, provides an alternative to traditional research approaches

that assume a phenomenon may be separated from its context for purposes of study." (Holkup, et al. 2004). The belief is that there is less disturbance by the small addition of the researchers entering the system than there is by outside researchers interrupting the system to gather data.

The second benefit of participatory research is known as stimulation for self-mobilization (Toner 2003). Put simply, participatory research inspires those involved to care about, and become active in, the field of research. For various reasons, people tend to not become active in issues, despite the fact that they may care about them. They may feel they lack the time or resources, they may feel their opinions are not respected, they may feel like they cannot make enough of a difference, or they may not even be aware the issue exists. Participatory research is a way of addressing these situations. By involving people in the research process, they are shown that their thoughts *are* worthwhile, and they *can* make a difference (Toner 2003).

Fostering such feelings helps in completing successful research in the short term, but there is a larger advantage. There is a hope that some of the participants in the research will become stimulated and inspired enough to continue their activity in the field or cause even after the research project has ended. In Quinsigamond Village, this is an especially important point. The environmental hazards in Quinsigamond are largely generated by the community and encountered by the community, so it logically follows that the hazards must be addressed by the community. Many of the residents have felt the hazards' effects and complained about them, but up to now, not enough action has been taken to produce change. Participatory research, by involving the community, will encourage them towards working together for the long-term goal of addressing their local pollution concerns.

Though scholars have not traditionally viewed participatory research as an effective research method, its use is becoming more widespread. As more uses for it are found, the tool is becoming more trusted, as can be seen in the *American Journal of Public Health* "In its recent, widely cited report…the Institute of Medicine included community-based participatory research as one of 8 new areas in which schools of public health should be supplementing their traditional curricula." (Minklet, et al. 2003). Because of its two main advantages, accurate data and community stimulation,

participatory research is a very good fit for the Quinsigamond Village project. With widespread approval of participatory research methods just beginning to appear, this project has a unique opportunity to test and document its use.

Chapter 3: Methodology

III.1 Introduction

This project's main objective is to identify the hazards in Quinsigamond Village and observe how the residents of Quinsigamond interact with them. This is the first step of a larger goal to characterize the various hazards and assess their impact on the Quinsigamond community. In order to accomplish the objective, several research techniques will be used to answer the main questions of interest. These questions are:

- What are the environmental hazards in Quinsigamond Village?
- What are the ways in which the hazards affect the people in the Quinsigamond Village?
- How are the hazards distributed among those in Quinsigamond community?

In this research, the information gathered will come directly from the people and businesses of Quinsigamond Village. Focus groups will be the main method of gathering data. The data will also be gathered through interviews with several community members and walks through the community that will be a collaborative effort to give and receive information. The project will also be working with the Quinsigamond school system to understand how the children feel and interact with the hazards. This is a way to give back to the community by educating the students in how to better live in and interact with their environment. In this chapter, methods to answer the previously stated research questions will be described along with their rationale.

III.2 How do the villagers perceive how land use, both in the past and today, affects Quinsigamond Village?

Answering the first research question will be based on two methods in concert. The project will discover, through the following methods, if the land in the Village was always mismanaged, or if acceptable policies of the past are now causing the communities current environmental problems. First, focus groups will be implemented in order to gain a better understanding of the community's perceptions of the land in Quinsigamond Village and how it has been mismanaged. The second method that will be used is the face-to-face interview. The purpose of interviews will be to allow for gathering of information from those that could not make it to the scheduled focus group times, and to allow those that may be influenced by others at the focus groups to more clearly express their opinions. They also will allow the researchers to garner data from exceptionally well-informed sources around the community. Each of these methods will be discussed in more detail in the following sections.

III.2.1 Focus Groups

A focus group is basically an interview that is done with many participants at once. Focus groups will be used as a research method because they are one of the best ways to gain, through discussion, the conscious and unconscious psychological and cultural aspects among varying groups (Berg 2004). It is also imperative, since the research grant for this project provides a deadline, that this deadline is met. Focus groups are a relatively fast way to gain information from a diverse group in order to provide the most accurate results possible.

In forming the focus groups that will be used for this research, a pool of applicants was gained from the populace of Quinsigamond Village. This was

accomplished by holding a meeting in which community members were invited to learn about this research project and become a participant. Through a survey and word-of-mouth, people who were interested in participating in these focus groups became involved in this research. Possible participants for the focus groups were also gathered from a list of names that was compiled for the petition against the Leaf Composting Project in Quinsigamond Village. The purpose of gathering this data is to understand how the people of Quinsigamond Village see their neighborhood and the environmental hazards within it. The project will be gathering the resident's complaints, concerns, and beliefs about the hazards that they perceive in their community.

From the pool of applicants gathered, approximately 20 people will be selected to participate in the focus groups. These 20 people will be divided into three groups of five to eight people. This size is chosen because many researchers believe that a smaller size is better suited to allow the participants of the focus group to feel more comfortable and provide for interactions that are more meaningful. This in turn provides for better information sharing among those in the focus group (Berg, 2004; Krueger 1988; Morgan 1997). Should there be more than 20 interested parties, the size and number of the focus groups will be increased until the total number of participants is 30. If more than 30 people are interested in participating in the focus groups, they will be screened by the meeting times and their length of residence in Quinsigamond. The main assignment criteria to a specific focus group will be date and time. It will not be possible to get to know the participants well enough to be able to assign them to a focus group by personality type.

The Regional Environmental Council will contact the people chosen to attend the focus groups, along with those who attended the informational meeting about this research. REC personnel will use a phone script when making the phone calls to possible participants in the focus groups. (As seen in Appendix II)

The main purpose of these phone calls is to discover which dates and times people are available to attend the focus groups. A secondary purpose is to obtain referral names, enlarging the pool of potential participants to ensure satisfactory numbers. Information gathered from these phone calls will be placed in a tracking form (As seen in Appendix III). The name and phone number column of the tracking form will be populated by the

researchers and passed on to the REC, who will fill out the rest of the form with each phone call.

This form can easily be distributed among the research group. Two weeks prior to the focus groups a reminder card will be sent to each of the participants so they can make sure that the scheduled time is acceptable (Appendix IV). The last step in confirmation will take place within 48 hours of the focus group and will just be a short phone call reminder. These focus groups will be held at the Quinsigamond Community Center in Quinsigamond Village and will take place in mid-February.

Once each group is gathered together, the moderator of the focus group will pose a series of questions. The moderator's role is difficult in that he/she must keep a balance between being involved enough to gain the information needed, but maintaining a natural enough discussion for information to be properly gained about the participants' feelings. In this study, Dr. Seth Tuler will be moderating the focus groups. The research assistants will be both electronically recording the focus group proceedings and taking detailed notes in order to provide for an accurate analysis post-focus group. The Regional Environmental Council will have a representative present to observe the proceedings and ensure the integrity of both the questions and the researchers.

The process of the focus group will begin with an opening statement by the moderator stating the project and the intent of the focus group. Once the group is settled and any questions they have about the process have been answered, they will be asked to sign a consent form saying that they allow the researchers to record the responses they give. The questions asked will be of three main categories. The first questions will work to determine the environmental hazards in Quinsigamond Village. The second questions will work to determine the interaction the community has with these hazards. The final questions will gauge the political and social opinions of Quinsigamond residents regarding the current pollution problems

With the information gathered from the focus group, an analysis of the data will commence. From the focus groups, a list of the perceived hazards will be compiled. This list will be compared to a previously established list of hazards that has been compiled by the EPA. With these two lists combined, a comprehensive list of hazards in Quinsigamond Village will be established. Using the final hazard list, the researchers

may be able to use a Global Positioning System (GPS) device to map the hazards and supply a more detailed hazard map than the EPA currently provides. With this map, it will be easier to see just how the risk in the village of Quinsigamond is distributed. In addition to the quantitative data gathered about the hazards located around Quinsigamond Village, the information gathered from the focus groups will provide a great deal of qualitative data. The participants in the focus groups will provide their opinions and feelings of not only these hazards, but also of the overall treatment of Quinsigamond Village by the town and city governments.

III.2.2 Interviews

The second method that will be used in order to answer the first research question will be a face-to-face interview. There are three main reasons for using the face-to-face interview method. The first is because there may be people who cannot make the meeting times established for the focus groups. The second reason is that there are some community members that are either very outspoken and would speak very strongly about their opinions, or they are quiet and would not be heard over the voice of the group. The third reason to use the face-to-face method is that, as stated before, there may be questions for people who participated in the focus groups that did not get answered. Therefore, people would be asked to come to another meeting to further discover their ideas and concerns about the hazards in the Quinsigamond community. The people singled out for interviews will not be known until after the focus groups have been conducted.

The interviews will be located at a neutral place that the interviewees will feel comfortable in. For this project, this is the Quinsigamond Community Center. The two research assistants will conduct the interviews. As one researcher interviews the community member, the other will be working the recording equipment and taking notes on what is being said. As in the focus group, a consent form will be signed by each of the participants in order to electronically record each of the interviews. Once the participant

has agreed to be recorded, the interviewer will describe the project and the goals of the interview. The interview will then proceed with the a set of questions that will have to be determined based on focus group results. These questions, as in the focus group, are intended to get the general opinion of the community member at first, and then narrow down the focus to more specific questions concerning certain sites that they have mentioned or have been identified by the EPA's list of hazards.

If there is any information that is not gathered during the interview that is needed for the research to be more complete, the researchers will take one of two options. These are to either make a phone interview with the participant if the question is important, or to ask that question to another interviewee. If this last choice is not an option, the question can be posed during the site walks and one or more people will be free to answer. The decision of one option over the other will depend upon the availability of those to be called and the nature of the question. If the question would be best answered by one more knowledgeable in the history of Quinsigamond, the interview would be the best choice. If the question was of a general nature or only required basic knowledge to form an opinion, then asking those participating in the site walks would be sufficient.

III.2.3 Student Involvement in Quinsigamond Village

The final method of this project has two main objectives: to gather more information about how the residents of Quinsigamond Village view the hazards that they interact with, and to give back to the community. This project will reach out to the children of Quinsigamond to gain their view of their community, and to educate them to be more environmentally conscious.

Beginning with a grade, yet to be determined, between 4^{th} and 8^{th}, the researchers will create a unit that introduces the students to the environmental issues in their community, and how they can become part of the effort to address these issues. The first step to do this is to obtain permission from the principal and teachers. The unit of instruction will also have to be passed by the administration before it is deemed ready for use. The general format of the unit will start with a simplified explanation of the project

and some background information about environmental risks that will help the students to understand the project. Once the presentation is compete, the students will be provided with blank maps of their neighborhood to show what land they use and what land they believe contains environmental hazards. Upon leaving the class, the researchers will provide notices of the site walks that will be occurring in the community and invite the parents and children to participate in the walks.

The goal of this work is twofold. By receiving maps about where the children play and live, and where they believe hazards to be, the project will be obtaining more information for answering the first two research questions; in addition to providing for more community involvement through the site walks. The second goal is to give information to the community so that they can become empowered to make changes in their neighborhood.

III.2.4 Data Analysis

The data gathered from the three research methods will be coded as the focus group information was. The primary data source to be analyzed will be recordings and notes. These data sets will be compared for discrepancies and then compiled in order to make the most accurate list of hazard sites possible. This list will then be cross-referenced with the list made by the EPA. To maintain a high level of validity the project will:

1) Hold an unbiased view of the facts and people studied.
2) Avoid influencing those being studied with leading questions, pejorative statements, and influential tone of voice.
3) Provide an accurate and concise representation of the data gathered.

This will be ensured through cross-referencing researched material with established facts and using the experience of professionals to provide expert guidance in the research

process. These experts cover the range of talents from professional risk assessment to years of experience with participatory research. People who have worked many years side by side with the residents of Quinsigamond Village will also be able to provide guidance for the research. With the information gathered from the focus groups, interviews, and students, there will be sufficient data in order to identify the majority of the hazards in Quinsigamond Village.

III.3 What are the ways in which the hazards affect the people in the Quinsigamond Village?

To answer the question "What are the ways in which the hazards affect the people in the Quinsigamond Village?", the researchers will primarily be using the input from the community members during site walks through Quinsigamond Village. These site walks will be held in late March of 2005. Researchers will visit the sites on foot to see first hand how the community members use the land that contains the hazardous sites. This will also provide an opportunity for the community members to give more opinions and feelings about how both the project is progressing and their role in the process.
The site walks will consist of a small group of community members and the researchers. The group will walk around sections of Quinsigamond Village and see the hazards firsthand to identify just how the community uses the land on or nearby the hazard areas. The participants for the site walks will come not only from those that participated in the focus groups and the interviews, but also other community members who wish to become involved. The project will conduct outreach to find additional people through the previously established list of people contacted for the focus groups and interviews, as well as advertising through the local paper. Once a population of 30 participants is reached, they will be divided into 3 site walks by times that are convenient to those participating. These 30 people will be determined by their prior involvement in the research in addition to their job, income, and area of residence. This will provide for a strong cross section of society in Quinsigamond Village.

Each of these site walks will follow a route through Quinsigamond Village that starts where Millbury St. meets with Ballard St. The group will walk north along Ballard St. until they reach Butler St. From this point, the walk will go south along Butler St., through where it merges with Greenwood St. until Greenwood St. ends. Due to logistical difficulties, different groups may cover different areas of Quinsigamond. The three main sections of Quinsigamond Village that ought to be covered are Ballard St., Greenwood St., and the Northeast section of Qinsigamond near I-290. This is where the highest

concentration of hazardous sites are, according to the EPA, but this may be changed depending on what is discovered during the focus groups and interviews.

The researchers will be leading these walks and taking notes either in a digital or analog media that will allow for quoting of the community. The timing of these site walks will provide for a broad-spectrum people to attend and provide input. With one during midday, one during the afternoon, and one on the weekend; parents, laborers, and businessmen from across the spectrum will have the opportunity to provide data to the research project.

The questions that the research team will pose to the people participating in the site walks will follow some of the focus group questions, but will be modified pending the outcome of the focus groups. More specifically, the researchers will try to obtain information regarding sites or subjects that are not fully covered in the focus groups. There may also be material from the focus groups that is more appreciable in person than in conversation. The data gathered will be analyzed in much the same way that the focus groups, interviews, and school research was. This data will be used in conjunction with the data previously acquired from the focus groups and interviews to make a clearer image of where the hazards are located around Quinsigamond Village, thus producing a very accurate map of the area's environmental hazards.

III.4 How are the hazards distributed among those in the Quinsigamond Community?

The third important question that will be asked in this research project is "How are the hazards distributed among those in the Quinsigamond Community?" To effectively answer this question, all of the previously gathered data must be analyzed with this question in mind to discover if Quinsigamond Village is receiving a disproportionate amount of environmental hazards compared to other local communities in Massachusetts. Where these hazards are located holds not only a local impact on the people who live in the area, but also a more widespread impact to the surrounding communities. With the Blackstone River being a major waterway through the entire city of Worcester, its pollution affects everyone in its path. Other issues are the landfills that are used by the entire Worcester community. Whether or not these hazards are unfairly distributed is what the researchers are attempting to discover.

In Quinsigamond, since the population is primarily whites of European descent, the researchers will be looking at how the environmental hazards are distributed based upon the State of Massachusetts' definition of what constitutes an Environmental Justice community. Massachusetts environmental policy states that a community can be characterized as an environmental justice community if a neighborhood has an annual median household income of less than 65 percent of the statewide median or the population is made up of 25 percent "…Minority, Foreign Born, or Lacking English Language Proficiency" (EOEA, 2004). If, using economic status as a gauge, environmental justice ideals are being violated, it is the researchers' responsibility to bring this information to the community and authorities. In order to assure that the information is as accurate as possible, the project team will wait until after the site walks. This will allow for a further data source in the distribution of hazards around Quinsigamond Village.

III.5 Feedback for the Community

The information that is gathered through this research is intended to empower the community to become more environmentally aware. They will also, as a result of this study, have the data necessary to show government officials just what is going on in Quinsigamond community. To provide this information to the community, the researchers will have a report for the REC and a meeting to summarize findings for the community in an open forum. The report will also be used by the REC as a data source for their report to the EPA. This final report could provide the community with monetary support to clean up the hazards in their neighborhood. Should the EPA not find sufficient evidence to aid the community, the residents of Quinsigamond still have a powerful tool. This report, should it find that Quinsigamond is an environmental justice community, would meet the requirements for aid through the state. With this report as political leverage, the residents of Quinsigamond Village will have the ability to create environmental change for the better throughout the community.

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Appendix I Census Data

From the Census 2000 Demographic Profiles:

General Characteristics	Number	Percent	U.S.
Total population	7,273	100.0	100%
Male	3,508	48.2	49.1%
Female	3,765	51.8	50.9%
Median age (years)	33.3	(X)	35.3
Under 5 years	535	7.4	6.8%
18 years and over	5,460	75.1	74.3%
65 years and over	923	12.7	12.4%
One race	6,923	95.2	97.6%
White	5,398	74.2	75.1%
Black or African American	618	8.5	12.3%
American Indian and Alaska Native	34	0.5	0.9%
Asian	399	5.5	3.6%
Native Hawaiian and Other Pacific Islander	4	0.1	0.1%
Some other race	470	6.5	5.5%
Two or more races	350	4.8	2.4%
Hispanic or Latino (of any race)	932	12.8	12.5%
Average household size	2.25	(X)	2.59
Average family size	2.98	(X)	3.14
Total housing units	3,429	100.0	100.0%
Occupied housing units	3,230	94.2	91.0%
Owner-occupied housing units	1,175	36.4	66.2%
Renter-occupied housing units	2,055	63.6	33.8%
Vacant housing units	199	5.8	9.0%
Social Characteristics	**Number**	**Percent**	**U.S.**
Population 25 years and over	4,812	100.0	
High school graduate or higher	3,544	73.6	80.4%
Bachelor's degree or higher	500	10.4	24.4%
Foreign born	1,088	14.7	11.1%
Economic Characteristics	**Number**	**Percent**	**U.S.**
In labor force (population 16 years and over)	3,480	61.9	63.9%
Mean travel time to work in minutes (population 16 years and older)	23.6	(X)	25.5
Median household income (dollars)	30,707	(X)	41,994
Median family income (dollars)	33,535	(X)	50,046
Per capita income (dollars)	16,333	(X)	21,587
Families below poverty level	313	16.6	9.2%
Individuals below poverty level	1,333	18.0	12.4%
Housing Characteristics	**Number**	**Percent**	**U.S.**
Single-family owner-occupied homes	689	100.0	
Median value (dollars)	100,100	(X)	119,600

(X) Not applicable.
Source: U.S. Census Bureau, 2004

Appendix II Phone Script

Hello. My name is _____, and I'm calling on behalf of a research team from the Regional Environmental Council and WPI. You gave us your name at a meeting in the Quinsigamond Community Center on November 18th. We're conducting a study about the local environmental hazards and how they affect your everyday lives in Quinsigamond Village.

Our study involves uncovering the environmental hazards in Quinsigamond Village by speaking to the community using several discussion groups or so-called focus groups with different members of the community about their opinions regarding your concerns about the community.

The focus group discussion will last about an hour and a half and will involve talking with around 6-10 other community members about people's opinions about their concerns about the environmental hazards in your neighborhood. A moderator will lead the discussion and you do not need to do anything to prepare. It will be held at the Quinsigamond Community Center. There will be refreshments for everyone.

Are you generally interested? If no you can end the call right now…

Now, I'd like to check on your availability. As I said, the focus group will last not more than an hour and a half. We'd like to hold it on January 29th, February 1st or 2nd – that's a Friday, Saturday, or a Sunday.

So, are you available On January 29th from ?-? pm?
On February 1st from ?-? pm?
On February 2nd from ?-? pm?

We'll get in touch with you once we finalize the date and time for you to participate. In early January you will be receiving an information card or phone call with the date and time of the focus group to confirm the best time for you. Thank you for your help, and we look forward to speaking with you. Have a good day/evening.

Appendix III Phone Call Tracking Form

Name	Phone	Preferred Attendance Times	Referrals

Appendix IV Reminder Card

Reminder

We look forward to your participation
In the focus group being held by the REC and WPI on

_____

At

_____

No more than 90 minutes should be required. Refreshments will be available.
Should you be unable to attend at this time, or have any further questions:
Please contact Peggy Middaugh at:
Phone: (508) 799-9139
Email: pmiddaugh@recworcester.org

Appendix V Focus Group Script

Hello. I'm Dr. Seth Tuler, you can call me Seth of course, and I'll be facilitating this focus group. This is Max Stinehour and Walter Holmes, our student researchers. First of all, we want to thank you all for coming today. Your help is very important to us. To start, I'd like to give a brief overview of why you're here and what we intend to accomplish. These focus groups are part of a project between the Regional Environmental Council and the Worcester Project Center of Worcester Polytechnic Institute with two end goals: to identify sources of environmental health hazards in Quinsigamond Village, and to discover how much interaction people are having with those hazards. That information is going to come from the people living in Quinsigamond, which is your part in this project. We also have the hope that, by encouraging discussion and getting those of you who are concerned about this issue together, the Quinsigamond community will begin to help itself address its pollution problems.

We have several specific questions to get through, so I'm going to try to keep everyone on task and limit off-topic discussion. During this time, the student researchers will be taking notes. We will also have a tape recorder running. If you are uncomfortable with this, please let us know. Otherwise, we ask that you sign the consent forms being passed around.

We should have a bit of time left after my questions, at which point we plan on opening the forum up for general discussion. We know most of you have your own very specific concerns you would like to talk about, and we would like to hear what you have to say. So unless there are any questions, we can get started.

<Questions>

These questions will be of three main categories. The first line of questions will work toward determining what environmental hazards are in Quinsigamond Village. The second line of questions will work toward determining the community's interaction with those hazards. The final line of questioning will try to discover the political and social opinions of the Quinsigamond residents regarding the pollution situation.

Well that's about all the questions we have for you. I'll open the floor now, and we can discuss the issues you all feel most strongly about.

<Discussion>

It's about time we wrap things up now. I just have a couple points I'd like to close with. The information you've given us will be included in a final report that has a target date of late April. Project updates up until that time, and then the final report, will be available in the Quinsigamond Community Center. You are all welcome to check

them out. We also have something called site walks planned for late March. Basically, we will be walking through Quinsigamond to view many of the sources of pollution that you have helped us identify. We would like to recruit any interested parties to join us as guides for this. So, if you think you may be interested, please sign the list being passed around and we will contact you when dates and times are more exact.

That's about everything. We thank you very much for your time today and hope you will continue to take an interest in both this project and the issues it is addressing. We will be around for a short while if any of you have individual questions or would like to speak privately. Thank you again, and feel free to snatch up the rest of the refreshments before you leave.

Appendix VI Task Chart

Task					Deadline			
	1/10 -1/24	1/25-2/7	2/8-2/21	2/22-3/1	3/1-3/14	3/15-4/4	4/5-4/18	4/18-5/2
Plan Local School Process								
Plan Focus Groups								
Hold Focus Groups								
Hold Interviews								
Presentations in Local School								
Report on Focus Group Findings								
Conclude Local School Process								
Plan Site Walks								
Hold Site Walks								
Final Report								

Table 1.1
Quinsigamond Village Project Task Chart