What is the public's perception of tornado risks in the City of London and to what extent does it affect planning in the City?

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INDEPENDENT GEOGRAPHICAL STUDY

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Table of Contents

List of Figures

Figure 17. Response to Question 34: Do you think more education-information is needed to improve the public's knowledge on tornadoes?

List of Tables

Abstract

Risk perceptions are important in evaluating natural disasters as it examines the opinions people express towards them which can potentially affect risk analysis, risk planning and societal decision making. In particular for this research project the natural disaster being evaluating of its risk perceptions is tornadoes in the United Kingdom within the metropolis of the City of London. The aim of this research is to discover the way in which the public responds to tornado risks in the City of London according to their perceptions of the risks tornadoes pose and to the extent it effects planning within the city. The results show that by experiencing a tornado in the Kensal Rise, area the tornado has had some effect on those respondents risk perceptions when comparing it to the respondents in the Camden area where no tornado has occurred. Although for some peoples risk perceptions there are minimal differences between the two areas. Furthermore, the effect that the public's tornado risk perceptions in the City of London have over the planning in the City is very minimal.

Chapter 1

Introduction

On December 7th, 2006 a tornado hit the streets of north-west London, England in the Kensal Rise area located in the Borough of Brent. One hundred and fifty houses were damaged with thirty four of them designated as uninhabitable, resulting in nine families being relocated to different homes. The Brent Council within the area put together respite centres for those residents who were temporarily homeless. Not only was there damage to the surrounding buildings but five people suffered minor injuries and one man suffered a serious head injury (London Evening Standard, 2006). The tornado only touched the ground for less than a minute, yet according to the Association of British Insurers the damage at the time was estimated to be millions of pounds (BBC, 2006). The City of London had not experienced a tornado since December, 1954. This tornado came as a complete shock to the residents in the area, consequently leaving them completely ill prepared for tornado risks. Yet shockingly, the United Kingdom experiences the most tornados within Europe, with 33 tornadoes estimated to touch the ground each year (Rowe *et al*, 2005). To some people in the City of London, tornados may seem completely unimaginable yet to others such as British Broadcasting System (BBC) Meteorologist Susan Powell a tornado occurring may not be as much of a 'freak' accident as it appears to others:

> "To see a tornado is not that unusual - but the magnitude of the damage due to the one in north-west London is" (BBC, 2006).

Significance and General Study Aims

The reason why tornado risk perception was chosen in particular for this research project was because there has been little research done in the United Kingdom. The research that has been conducted has been poorly communicated which has resulted in the public being completely ill prepared for when a tornado does happen. Therefore, it is important to increase our understanding of tornadoes in the United Kingdom so that the public can be ensured that they will be safe if a tornado were to occur in the future. To increase the public's safety it

comes down to understanding what a person's perception is on tornado risks in the City of London. Research conducted over the past decade has established there is a difference in how the general public and experts perceive risks. The general public have concerns that are stemmed from beliefs, values and attitudes. Whereas experts usually assess and manage risk concerns by measuring the probability and severity of a natural hazard occurring according to expert judgments, scientific assessments or a combination of both (Morgan *et al,* 2002). Individual's risk perceptions are affected by a number of influences; societal reactions to risk (Kasperson *et al*, 2003), the cultural environment they inhabit (Douglas, 1992) and features of the risk itself (Slovic, 1987). When forming risk perceptions, all of these influence's affect an individual's emotive and cognitive processing (Slovic and Peters, 2006). In order to form conclusions for this research paper, understanding the difference in opinion between a layperson and an expert on tornado risks in the City of London must be identified. The aim of this research paper will be discovered through the way in which the public perceives tornado risks in the City of London according to their perceptions of the risks tornadoes pose and the extent to which this affects planning within the City. A better understanding as to how and why the general public perceives tornado risks compared to experts is significant as it could facilitate better management of planning in the City and risk communication.

Chapter 2

Literature Review

1. Risk and Risk Perception

In order to understand this research project, we must understand the origins and definitions of risk and risk perception. Risk is a multifaceted subject that can be conceptualized from many different angles. The technical sciences believe risk is a functional relationship between undesirable affects and probabilities, with everyday risks having different implications. According to the research of sociologists and psychologists, risk has different meanings depending on the context in which it is utilized in (Renn, 2008). For this research project, risk will be defined as:

> "the possibility that an undesirable state of reality (adverse effects) may occur as a result of natural events or human activities" (Kates *et al*, 1985).

In particular, risks are when an entity of human value is put at stake and the outcome is uncertain from an activity, situation or event that has occurred (Jaeger *et al*, 2001).

When considering different concepts of risk, a wide range of affected social and political actors from different systems within our society need to be take into account (Covello, 1983). In particular, these four systems (**Figure 1**) that provide this input include: scientific experts, economic markets, social values of the general public (lay people) and political institutions (Van Schomberg, 1995). Scientific experts, economic markets and political institutions are driven by interest and experience; whereas the general public is driven by their own risk constructs and images (Rohrmann and Renn, 2000). These risk constructs and images have been defined by social and psychological scientists since the 1970s as perceptions and are important for risk managers to utilize as contextual aspects when considering if a risk is worth taking or not, as well as for risk reduction strategies (Slovic, 1987).

In general, there are two major steps that determine an individual's risk perception. Firstly, an individual must process information or physical signals about potentially dangerous activities. What human senses directly observe are physical signals. Information refers to the

verbal exchange of communication between individuals about uncertain consequences of situations or events. Secondly, once this information has been processed, that individual must determine an opinion on if that dangerous activity is likely to happen, if serious actions need to be taken or if they even accept it as a risk at all. With the combination of these two steps a risk perception can be formed (Slovic *et al*, 1980). Therefore, risk perception is defined within the social sciences as a process where people`s judgements about various activities, events or situations can potentially lead to negative consequences (Slovic, 1992).

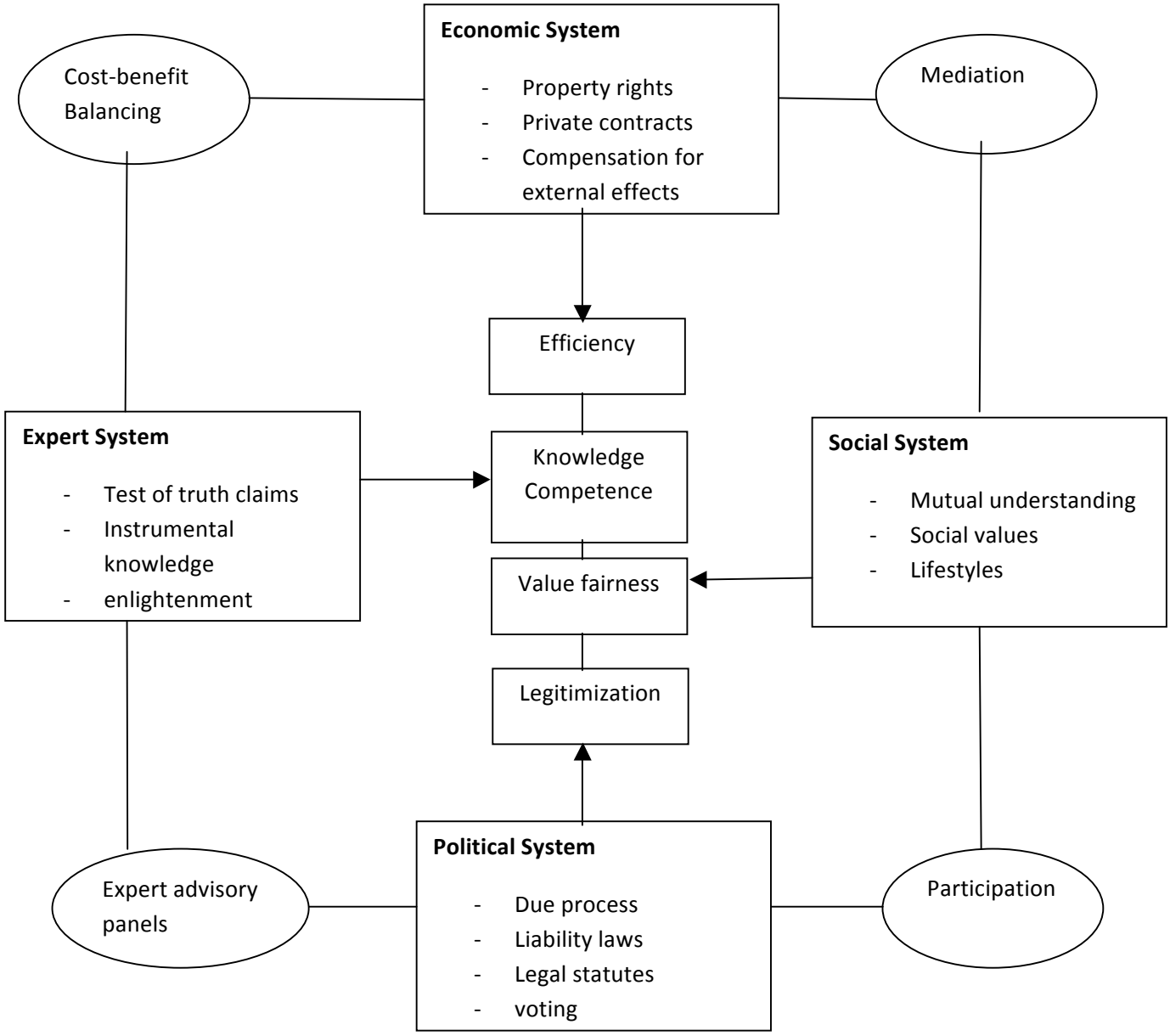

Figure 1. Four systems that provide input for risk policy decisions (Renn, 2008).

2. Factors that Shape Risk Perception

Now that risk and risk perception has been defined, it is important to understand the factors that are associated with shaping risk perception from a social science perspective. As mentioned above, different bodies of the population involved in different disciplines within natural and social sciences have different perspectives on risk perception (Covello, 1983). Here, it is important to note the approaches within these disciplines as they are initially what influence, affect and shape the resultant risk perception created. There are two approaches that researchers have recognized which are the realists and constructivist views. The realist view towards risks can be quantified as the more information one gains the more knowledge one will possess. Whereas the constructivist view takes a subjective viewpoint and believes risks are more socially constructed (Brehmer, 1987). This debate over whether human societal behaviour is centrally driven by perceptions or if it is factual information, has been studied by many scholars and continues to be debated today (Renn, 2008). Scholars like Renn (2008) believe the former, as the likelihood of a disaster occurring and its magnitude is rarely taken into account when individuals make judgements about perceived risk levels.

With this being said, people are influenced by values, judgements, knowledge and feelings of others when making judgements about the acceptability and seriousness of certain risks (Renn, 2008). These judgements can be analyzed by different methodological approaches. The methodological approaches presently utilized in risk perception are mental models and psychological mechanisms. Cultural and social learning internalize these methodological approaches and communication processes like media reports and peer influences, constantly moderate people's perception of risk. It has also been discovered by many authors that technical and solely quantitative approaches are not sufficient when reflecting upon the characterization of risks and the complex patterns of individual risk perceptions (Fischhoff *et al*, 1984). This is why the methodological approaches utilized by scholars like Renn (2008) give more research and direction as to what factors we should be focusing on when evaluating risk perception. The information from these methodological approaches will be outlined and will help increase our understanding of risk perceptions so that risk managers can decide how big that risk poses to society and if risk management plans should be implemented (Renn, 2008).

A. Psychometric Factors

As a result of cultural evolution, and augmented by cultural patterns, humans, as an immediate reaction to imminent risks, use four strategies: ***flight, fight, play dead or experimentation***. These strategies have been an evolutionary pattern of perception that has been relatively consistent over time (Marks and Nesse, 1994). These strategies can best be described by an example of a critical threat; a lion suddenly appearing. Here, as there is not enough time to do a risk analysis of the situation, humans will firstly react by fleeing from the lion hoping they are faster (flight); secondly, believe his or her own strength is enough to fight against the lion (fight); or thirdly, play dead, in hopes that the lion will believe him or her. Finally, experimentation is the last option but is completely up to the lion if it feels like doing anything to the person or not (Renn, 2005).

Qualitative evaluation characteristics can describe these cultural patterns and are measured by **psychometric numerical scaling techniques** (Renn, 2008). This technique of risk research was developed by the Oregon Group (Fischhoff *et al,* 1978) and later used by a number of researchers, most notably Paul Slovic (Renn, 2008). Qualitative evaluation techniques describe different risk properties that go further than simply the degree of possible harm and the level of probability of risk. This technique of risk analysis expands the sphere of subjective judgement. It rules out the individuals that base their risk judgements on subjective expected utilities (costs) and focuses on **risk-related patterns** and **situation-related patterns** (Fischhoff *et al,* 1978). Subjective expected utilities developed by Savage (1954) are when faced with several decision options within a risk, one needs to consider the expected benefits and utilities in regards to each decision option. This must be done in order to choose the option with the highest expected value. The expected utility chosen then needs to consider the subjective probability of its occurrence in order to establish the negative or positive consequences from this risk. After this assessment happens, many times the decision maker chooses to act with the highest expected utility (Kim, 1990). However, as stated above subjective expected utilities are not utilized because as according to Dietz and Stern (1995) it is not a rational mode of thinking and is too complex for the general public to understand.

Risk-related patterns refer to the characteristics of the source of the risk (Fischhoff *et al*, 1978). A risk-related pattern that is relevant to this research project is the **familiarity** with the risk. Familiarity means the affected person actually recognizes the risk. From experience in risk perception research, Renn (2005) has learned that humans deal better with risks when they are greatly aware of them and they can prepare themselves to deal with the threats they pose. The main knowledge researchers have taken from familiarity perception is that humankind longs for clearer, simpler, unambiguous descriptions of what risks are safe or dangerous (Renn, 2008).

Situation-related patterns are qualitative characteristics that refer to quirks of the risky circumstances (Fischhoff *et al*, 1978). An example of a situation-related pattern would be **voluntariness**. This describes a person's capability to implement **personal control** over particular situations. Many times the perception that an individual is able to control a certain risk, lessens the degree to which they take that risk seriously (Renn, 2008). Other situation-related patterns include the possibility to **blame** an institution or person for the formation of a risk situation (Slovic *et al*, 1982). Scholars like Kasperson (1983), have additionally discovered, that equity needs to be considered in blame situations as the more a risk is viewed as unfair the more they are perceived as unacceptable and severe.

Other psychometric numerical scaling techniques that are relevant to this research project also include the ***emotional responses***. Emotional responses have only been recently discovered by some as a legitimate source of risk perception (Peters and Slovic, 1996). Negative emotional responses include disgust, anger and fear whereas positive emotional responses include immediacy, identification and admiration. More importantly, affective variables are able to shape individuals judgment about good or bad emotions experienced, thus distinguishing a good or bad quality stimulus for that specific action or situation (Slovic *et al*, 2002). However, Bouyer's *et al* (2001) studies found that the affects only interact with a few hazards and Sjoberg (2004) could not find any significant correlations between risk perception and affects. Therefore, the emotional

responses concept remains a highly debatable idea in the risk perception community today.

B. Attention and Selection

The attention and selection process is an important information processing procedure that shapes people's perceptions on risk. Social communication according to Luhmann (1986) is a direct result of risk perception. With this abundance of information easily accessible, it is not possible for one individual person to digest and know it all. According to Miller's (1956) findings most of the information humans are exposed to will be disregarded. This is of absolute importance and necessary so that humans information processing can be done in a short amount of time. Humans are lucky to intuitively have the tool of selecting information that is important from the abundance of frivolous information one is exposed to every day. This has also been proven for risk information (Renn, 2008).

In order to achieve selection within the process, the attention part of the process needs to be completed. This can only be achieved by understanding the ability and motivation of risks. Ability is the capability an individual has in order to process information without being distracted by outside sources. Motivation refers to how readily an individual can process information and the level of interest they have for this information (Chaiken and Stangor, 1987). **Table 1** displays the conditions that need to be met in order for ability and motivation to be achieved.

Table 1. Requirements and conditions for selection information (Renn, 2008).

Conditions	Elements of conditions
Ability	1. Time to process information 2. Physical access to information 3. Absence of sources to distraction
Motivation	1. Reference to personal interests, salient values or self-esteem 2. Inducement of personal involvement with the issue, the content or source

Once the ability and motivation criteria are both met, an individual has achieved the attention part of the process and therefore, is ready to absorb the information. After the initial attention-drawing stimulus has been acknowledged, the complex selection process with multiple steps must now occur in order for the information processing procedure to be complete (**Table 2**).

Table 2. Information processing steps in the selection process (Renn, 1992).

Steps	Description
1. Information passes through selection filters	Select and further process signals coming from the environment or from other social actors
2. Decode signals information	Decipher the meaning of the signals (investigate factual content, sources of information, value statements, overt and hidden intention of sources and transmitters)
3. Draw one's own inferences	Come to conclusions about the intentions of the source and the transmitter in order to employ intuitive heuristics (common sense-reasoning) to make generalizations about the information received and to use symbolic cues for judging the seriousness of the information
4. Compare the decoded message with encoded messages stored in memory	Analyse the meaning of the message in the light of related messages from other sources of previous attitudes or beliefs
5. Evaluate messages	Rate the importance, persuasiveness and potential for personal involvement on the basis of the accuracy of the message, the potential effect on one's personal life, the perceived consistency with existing beliefs (to avoid cognitive dissonance), reference group judgements (to avoid social alienation) and personal value commitments
6. Form specific beliefs	Generate or change beliefs about the subject of the message or reaffirm previously held beliefs
7. Propensity to take corresponding actions	Generate intentions for future actions that are in keeping with newly formed beliefs

As much of our society is driven by capitalism, economizing information processing is important within the attention and selection process. As such, individuals will make a decision based on if they should evaluate the subject matter of the information in detail (central route of information processing) or if they will simply just trust the salient cues and make a fast judgement about the information received (peripheral route) (Petty and Cacioppo, 1986). The peripheral route is chosen when the individual who obtains the information is not as inclined to deal with arguments surrounding the information and instead forms an opinion based on heuristics and simple cues. Whereas the central route of information processing is chosen when the individual who obtains the information is stimulated by these arguments and therefore, studies the situation more carefully. In the central route the evaluation depends on the probability of whether the argument about the information is true and the content within each argument. In order to form credibility in the central route it can be evaluated based on plausibility, knowledge, personal experience, and perceived intentions of the communicator. On the other hand, in the peripheral mode each argument is not dealt with separately; instead the most accessible route to answers is taken in hopes of making a judgement on the entire situation (Breakwell, 2007).

C. Cognitive Heuristics

Upon receiving information, **intuitive heuristic** and **judgemental processes** can help the receiver to draw inferences. Intuitive heuristics are innately built in humans, and use common-sense mechanisms to process information. Heuristics subjectively evaluates perception based on mental strategies that people use every day when thinking about risk. They are used to reach generalizations and conclusions, and are one of the most important factors in either rejecting or downplaying information on risks (Kraus *et al*, 1992). Most importantly in regards to risk perception, intuitive heuristics are associated with the mechanisms that process probabilistic information.
Earlier on in psychological research, a number of studies (Renn, 1990; Pollatsek and Tversky, 1970) focused on understanding how risk perceptions were based on different arrangements of probabilities and their outcomes (risk proneness and aversion) as a

result of personal preferences, instead of calculating expected values (Lopes, 1983). These studies realized that there was a systematic pattern of probabilistic reasoning that humans could use in everyday situations. The Kahneman and Tversky (1979) study discovered people are susceptible to be risk-prone if the chance for gaining benefits are high and are risk-averse if the chance for losing benefits are high. To balance risk-taking behaviour people have followed optimal risk strategies. These strategies do not maximize their benefits, but instead enable people to avoid major disasters and guarantees acceptable rewards (Luce and Weber, 1986). These empirical studies along with numerous other studies have shown that using intuitive heuristics rather than calculating expected values is more valuable when assessing how people perceive risks (Boholm, 1998).

An example of intuitive heuristic information processing can be seen in the public's understanding of ***uncertainty***. It is important to note that the uncertainty factor is not recognized the same in the "experts" community. Uncertainty to experts includes conducting risk assessments to distinguish between probability risk distributions and their associated levels of remaining uncertainties (Bartle, 2008). The expert's definition of the uncertainty factor is not reiterated in risk perception studies (Frewer *et al*, 2002). There is a common feeling amongst the public that the use of mental models to distinguish different levels of certainty proves to be the best judgement as to whether a situation is either safe or unsafe. Instead of probability distributions which experts use, the risk perception community perceives uncertainties as one-dimensional indications of knowledge spaces between what is safe and unsafe. Generally, the public believes in order to gain more confidence these knowledge spaces need to be filled via knowledge improvement. Although, the more people link uncertainties with specific risks, the increased likelihood they believe the only solution to reduce these uncertainties is too invest more money and time into science and research (Sparks *et al*, 1994).

According to many specific risk perception and psychological studies, a number of bias patterns in people's ability to process the probability of risks have been identified

(Renn, 2008). People need to be aware of these biases as they have been found to potentially be one of the underlying causes of discrepancy between expert assessments and laypersons judgement (Miller, 2006). The bias that is relevant to this research project is **availability bias**. ***Availability bias*** refers to the speed at which a risk can be identified. The faster and more accessible a risk is identified, the more aware individuals are of that risk and thus, the greater likelihood that overestimation of that risks probability can occur (Tversky and Kahneman, 1974).

D. Semantic Images

Semantic images are perception patterns established by information from, as described above, qualitative evaluation characteristics, the study of intuitive heuristics and the psychological methods used for processing uncertainty. Semantic images are based on the communication of information that concerns the source of a risk and are subdivided into risk perception classes (Renn, 2004). The five distinct classes of semantic risk images are outline in **Table 3**. Semantic images are created into classes of similar phenomena as to reduce the complexity of information overload, and uncertainty and at the same time rid individuals of contradictory information (Renn, 1990).

Table 3. The Five Semantic Images of Risk Perception (Renn, 1990).

Image	Description
1. Emerging danger (fatal threat)	A. Artificial risk source - Ie. technology B. Depends on: random nature of the event, time span for risk control measures to be taken and expected maximum impact C. People feel threatened when there is a perception of randomness D. Unbalanced benefit-risk distribution E. Big catastrophic potential
2. Stroke of Fate	A. Natural risk source - Acts of God - Humans are exposed to but cannot control (Luhmann, 1990) B. Belief in cycles, not distinguished as a random event C. Belief in personal control D. Accessible through human senses E. The rarer the event the more likely people will deny or suppress it
3. Challenge to one's own strength	A. Personal control over degree of risk B. Personal skills necessary to master danger C. Voluntary Activity D. Non-catastrophic consequences
4. Gamble	A. Confined to monetary gain and losses B. Orientation towards variance of distribution rather than expected value C. Asymmetry between risks and gains D. Dominance of probabilistic thinking
5. Indicator of insidious danger (slow killer)	A. Artificial ingredient in food, water or air B. Delayed effects; non-catastrophic C. Contingent upon information rather than experience D. Quest for deterministic risk management E. Strong incentive for blame

E. Institutional Trust and Credibility

Institutional trust and credibility is very important in shaping risk responses. ***Trust*** to most analysts is thought to be a multidimensional concept. Yet to others empirical studies have shown that only one indicator is needed (Blackburn, 1998). There is not one specific consensus on the characteristics of trust. However, some scholars learned from other literature and have designed their own descriptions (**Table 4**). In this description, trust relies on all of the characteristics. If one is not met then it is substituted by achieving results in another characteristic. Trust can be denoted on a personal and aggregate level. On a personal level trust is entrusted in the person or institution. Here, refraining from behavioural options that may harm them is their top priority (Luhmann, 1973). Whereas on an aggregate level trust refers to the division of labour and differentiation of societal functions (Parsons, 1960).

Table 4. Characteristics of trust (Renn and Levine, 1991).

Characteristics	Description
Perceived competence	Degree of technical expertise in meeting an institutional mandate
Objectivity	Lack of bias in information and performance as perceived by others
Fairness	Acknowledgement and adequate representation of all relevant points of view
Consistency	Predictability of arguments and behaviour based on past experience and previous communication efforts
Sincerity	Honesty and openness
Faith	Perception of goodwill in performance and communication
Empathy	Ability to understand the feelings and expectations of others and to be responsive to them

Most of the information that a person receives is through `second-hand` learning, not from personal experience. Therefore, people have become more reliant on the trust and credibility of those they receive the risk information from. Hence why trust

in institutional risk management for risk information is very important as it provides a lot of risk information to the general public (Beck, 1992). However, according to empirical studies the trust and credibility in public institutions has varied over time (Lipset and Schneider, 1983). The past three decades Loftsted's (2005) research has shown that public institutional trust and credibility has decreased in the political system, some government agencies and industry. In regards to science, trust has remained relatively steady. Some scholars contribute the decline in support of public institutions to the fact that the general public is becoming better educated and the complexity of social issues has increased in modern day societies (Katz *et al*, 1975). Evidence also shows that if the general public believes risks are not properly handled or they are given misguided information, the more likely people will be less inclined to cooperate with risk management institutions (Bord and O'Connor, 1992). Many empirical studies have shown that there is no positive relationship between trust in risk management institutions and risk perception (Sjorberg, 2001). The public`s attitude towards trust in risk management institutions is a topic that still seems to have a lot of unanswered questions. Therefore, it needs to be researched more thoroughly in order to form legitimate conclusions (Renn, 2008).

F. Media Influence

As mentioned before most information is received from second-hand learning, which is usually provided by the ***media***. Media is a means of communication through television, internet, radio, newspapers and magazines. Media plays two roles in the communication process. Firstly, it collects information from primary sources and processes this information via rules set out by institutions and professionals. Secondly, the information they obtain is sent out to the final receivers (general public). Sometimes the original information is consciously or unconsciously changed, thereby producing a new message. With this being said, there is much research that has been conducted focusing on whether journalists are being biased towards their own social convictions or if the media is creating new messages or whether they reflect existing ones. It has been

concluded from various studies that both of these queries have not yet found a definitive answer (Mazur, 1984).

Many times risks are shaped from information and evaluations transmitted from the media. Anecdotal evidence provided by eyewitnesses of hazardous events and systematic evidence provided by risk management institutions are both collected and used in media (Renn, 1991). However, these pieces of evidence contrast each other, which many times contributes to the loss of trust in experts, as journalists do not have the time or qualifications to find out what person is correct in the scientific debate (Peltu, 1989). Furthermore, many studies have shown journalists are more interested in what and how institutions handle risks instead of their magnitude and nature (Renn, 2008).

Risk perception has its own set of problems that are not easily definable. The factors that shape risk perception are very complex. The complexity issue for risk perception problems is largely due to the difficulties that individuals experience when deducing low probabilities of risk when formulating decisions. There is even evidence that people may not want data on risk probability in terms of the likelihood of events occurring (Kunreuther *et al*, 2001). However, if people do not think in terms of probability, the main point of contention becomes what they do base their decisions on.

Overall the most important factors that constitute risk perception are not overestimation and underestimation of loss expectations but instead the qualitative risk-evaluation characteristics, the stigma effects, semantic images, cognitive heuristics and, as seen in recent studies people`s emotions and affect (Slovic *et al*, 2002). According to Terrence Meaden, (one of the founders of TORRO in the United Kingdom) there have been no studies done on risk perception and tornadoes in the United Kingdom and more specifically the City of London (Thompson, 2012). Therefore, this research project is identifying information that has not been studied in the United Kingdom in detail before. More research is needed on this topic, especially if factors like climate change affect the United Kingdom's climate causing more tornadoes. This research could provide more information as to how to deal with natural

hazards that are rare, where we have little time to prepare for their affects. And in particular it will present more solid conclusions on how we should deal with people's perception of tornadoes and the risks associated with them.

3. Tornados in the UK

According to the Tornado and Storm Research Organization (TORRO) (2012) tornadoes are:

"A violent rotating column of air that reaches to the ground from a storm cloud in the shape of a condensation funnel created and maintained by strong inflowing winds."

Over the last 30 years, on average in the United Kingdom 33 tornadoes occur each year (around 15 days of the year) if the synoptic situation and meteorological conditions are appropriate (Rowe *et al*, 2005). During these days either a single tornado will form or on some occasions the outbreak of multiple tornadoes is possible (Rowe et al, 1985). The common trend as to how the tornadoes form in the UK is outlined in **Table 5**. However, many times the formation of a tornado does not form from these and this is why scientists do not completely understand how tornadoes work to this day. More research is needed (Malamud, 2012).

Table 5. Tornado formation (TORRO, 2012).

Formation Type	Characteristics
1. From well-developed thunderstorm cells on cold fronts	- Gust-front boundary where an advancing mass of cold air overruns and displaces pre-existing warmer humid air. Within a cell a strong persistent updraft of warm moist air is maintained as air enters the forward right flank at low altitude. As the air ascends it is forced to turn due to the variation of wind speed with height (known as vertical wind shear) and due to its proximity to a downdraft of drier cold air. By this means, the buoyant warm updraft acquires rotation in an anticlockwise sense as it undergoes local stretching in the vertical. The spinning, spiralling effect gradually extends along the length of the updraft, and the speed of rotation or 'twisting' increases as the effective column diameter diminishes.
2. Tornadoes form from out to sea strong waterspouts	- the twisting funnel of wind (waterspout) hits the land and may transform into a tornado

Tornadoes in the United Kingdom are seen by many as an uncommon problem. The occurrence of tornadoes in the City of London is commonly known as being rare and stochastic, allowing for little time for risk control measures to be taken (Renn, 2008). However, as more sightings of tornadoes occurred in the United Kingdom, Terence Meaden in 1972 founded and devised the Tornado Intensity Scale (TIS) (**Table 6**). The TIS allows wind speeds of tornadoes to be classified on a scale from T0-T10 (but may be higher as the scale is open-ended); it is an extension of the Beaufort wind scale. By utilizing this scale people have been able to make estimations as to the statistical return periods of varying intensities of UK tornadoes (Bolton *et al*, 2003).

Table 6. TORRO tornado intensity scale and its characteristic damage for each level. (TORRO, 2012).

Tornado Intensity	Description Of Tornado & Windspeeds	Description Of Damage (for guidance only)
T0	Light Tornado 17 - 24 m s-1 (39 - 54 mi h-1)	• Loose light litter raised from ground level in spirals. • Tents, marquees, awnings seriously disturbed. • Some exposed tiles, slates on roofs dislodged. Twigs snapped; trail visible through crops. • Wheelie bins tipped and rolled. • Garden furniture & pots disturbed.
T1	Mild Tornado 25 - 32 m s-1 (55 - 72 mi h-1)	• Deck chairs, small plants, heavy litter becomes airborne. • Minor damage to sheds. • More serious dislodging of tiles, slates. • Chimney pots dislodged. Wooden fences flattened. • Slight damage to hedges and trees. • Some windows already ajar blown open breaking latches.
T2	Moderate Tornado 33 - 41 m s-1 (73 - 92 mi h-1)	• Heavy mobile homes displaced. Light caravans blown over. • Garden sheds destroyed. Garage roofs torn away and doors imploded. • Much damage to tiled roofs and chimneys. Ridge tiles missing. • General damage to trees, some big branches twisted or snapped off, small trees uprooted. • Bonnets blown open on cars. • Weak or old brick walls toppled. • Windows blown open or glazing sucked out of frames.
T3	Strong Tornado 42 - 51 m s-1 (93 - 114 mi h-1)	• Mobile homes overturned / badly damaged. Light caravans destroyed. Garages and weak outbuildings destroyed. • House roof timbers considerably exposed. Some of the bigger trees snapped or uprooted. • Some heavier debris becomes airborne causing secondary damage breaking windows and impaling softer objects. • Debris carried considerable distances. Garden walls blown over. • Eyewitness reports of buildings physically shaking. • Mud sprayed up the side of buildings
		• Motorcars levitated. Mobile homes airborne / destroyed. • Sheds airborne for considerable distances. Entire roofs removed from some houses.

Tornado Intensity	Description Of Tornado & Windspeeds	Description Of Damage (for guidance only)
T4	Severe Tornado 52 - 61 m s-1 (115 - 136 mi h-1)	• Roof timbers of stronger brick or stone houses completely exposed. Gable ends torn away. • Numerous trees uprooted or snapped. Traffic Signs folded or twisted. • Some large trees uprooted and carried several yards. • Debris carried up to 2km leaving an obvious trail.
T5	Intense Tornado 62 - 72 m s-1 (137 - 160 mi h-1)	• Heavier motor vehicles (4x4, 4 Tonne Trucks) levitated. • Wall plates, entire roofs and several rows of bricks on top floors removed. • Items sucked out from inside house including partition walls and furniture. • Older, weaker buildings collapse completely. • Utility poles snapped.
T6	Moderately-Devastating Tornado 73 - 83 m s-1 (161 - 186 mi h-1)	• Strongly built houses suffer major damage or are demolished completely. • Bricks and blocks etc. become dangerous airborne debris. • National grid pylons are damaged or twisted. • Exceptional or unusual damage found, e.g. objects embedded in walls or small structures elevated and landed with no obvious damage.
T7	Strongly-Devastating Tornado 84 - 95 m s-1 (187 - 212 mi h-1)	• Brick and Wooden-frame houses wholly demolished. • Steel-framed warehouse-type constructions destroyed or seriously damaged. • Locomotives thrown over. • Noticeable de-barking of trees by flying debris.
T8	Severely-Devastating Tornado 96 - 107 m s-1 (213 - 240 mi h-1)	• Motorcars carried great distances. • Some steel framed factory units severely damaged or destroyed. • Steel and other heavy debris strewn over a great distances. • A high level of damage within the periphery of the damage path.
T9	Intensely-Devastating Tornado	• Many steel-framed buildings demolished • Locomotives or trains hurled some distances. • Complete debarking of any standing tree-trunks.

Tornado Intensity	Description Of Tornado & Windspeeds	Description Of Damage (for guidance only)
	108 - 120 m s-1 (241 - 269 mi h-1)	• Inhabitants survival reliant on shelter below ground level.
T10	Super Tornado 121 - 134 m s-1 (270 - 299 mi h-1)	• Entire frame houses and similar buildings lifted bodily from foundations and carried some distances. • Destruction of a severe nature, rendering a broad linear track largely devoid of vegetation, trees and man made structures.

Meaden (1976) quickly realised that if he wanted to be able to determine realistic temporal, intensity and spatial distributions of tornadoes, he needed to set up an organization in order to quantify this information. This prompted him to create in 1974, the Tornado and Storm Research Organization (TORRO). TORRO is a self-funded research body serving the national public interest (Thompson, 2012). The TORRO organization, initially used for primarily British tornadoes, is now used throughout Europe and includes monitoring thunderstorms, lightning, heavy snowstorms and hailstorms. TORRO collaborates with the Journal of Meteorology, where it publishes monthly summaries of tornadoes (this includes intensity, path length, path width and direction tornado travelled with synoptic situation and meteorological conditions) and other natural hazards from reports given in by observers. If a tornado occurs TORRO also hands out questionnaires to eyewitnesses in order to gain more information about the event (Elsom et al, 2001). Today, in the United Kingdom, TORRO has a database with a total of over 2720 tornadoes (Thompson, 2012). Most of the tornadoes throughout the UK are categorized as weak (T3-T0) (Elsom et al, 2001).

Within the UK, TORRO is aiming to develop a better understanding as to how tornadoes develop so they can ultimately forecast tornadoes. This has been done through tornado watches. A “tornado watch” is when the conditions are such that a tornado could possibly occur but has not developed yet (this can be calculated 6 hours ahead). On November 12th 1991, Reynolds (1992) issued the UK's first tornado watch. The tornado watch was a success. However, at the moment TORRO's tornado watches are only distributed to the TORRO

observer's network and not to the general public. With Rowe *et al* (2005) being the latest annual review for tornadoes that is published and now available to the public. Also, a lot of the information is not published yet because the quantity of information is so vast that according to Terrence Meaden, there are no existing magazines that can publish everything (Thompson, 2012). Still these improvements and experiences with tornado watches have provided more research for TORRO investigators which has increased the time emergency services can instigate their procedures. With the initiation of TORRO, more people within the UK have recognized that tornadoes are a risk that is part of the UK climate and needs to be taken seriously. The need now is for adjacent European countries to cooperate and coordinate forecasts of tornado outbreaks in order to provide more information to allow for more successful issuing of tornado warnings in the UK (Elsom et al, 2001).

Meaden (1976) also discovered through analysis of 700 property-damaging tornadoes within England and, Wales that population density does in fact strongly influence the distribution of tornadoes. In particular, Elsom and Meaden (1982a) did a study on the distribution of tornadoes in Greater London and its surrounding area during the period of 1961-1980. Between the inner metropolis and the outer areas of the metropolis, it was determined that the highest contrast depicted was weak tornadoes (T3 or less) and therefore they focused on those. Within the inner metropolis, weak tornadoes are less frequent than in the outer areas of the metropolis and the surrounding countryside. Elsom and Meadon (1982b) suggest the cause of this is due to urban factors like the urban heat island and the increased surface roughness of the urban fabric. This being said, this only applies to tornadoes that are categorized as weak. More research on other types of tornados needs to be conducted. More films, detailed investigations and Doppler radar observations of severe and weak tornadoes over metropolitan areas are essential in order to analyze storm response to the aforesaid causal problems. These theories need more evidence to prove there validity. Also, current research conducted and collected by the TORRO organisation needs to be more readily available for the public, so that people can be more informed about tornado risks to this present day.

Chapter 3

Methodology

In order to analyze the public's perception on tornado risks in the City of London a questionnaire was handed out to residents living in the area where a tornado did occur and in an area where no tornado has been present. The questionnaire was collected over the months August to October, 2011. The questionnaires included 35 questions, including open and closed questions in order to get a wide range of data (**Table 7**). A questionnaire was used as the sample size and geographic area being focused on was very large, so it was easier to collect more data from more residents. Also by using a questionnaire, my opinion would have no influence on the respondents answer to questions in a certain matter.

In total, four hundred questionnaires were handed out in the two different areas. Two hundred individuals received questionnaires that live within the residences of the streets of north-west London in the Kensal Rise area, where a tornado has occurred in the recent past. With a further two hundred questionnaires handed out within central London in Camden, where no tornadoes have occurred. The questionnaires were completed face-to-face. However, many times residents were not home and in this case the questionnaire along with a stamped letter with my address on it was left for completion by the resident of that household. The two areas were visited five times each, in order to increase the number of face-to-face questionnaires I could conduct. Each residence address was recorded so I knew which houses were done face-to-face and which residences had a letter left in their mailbox. However in the end, only one hundred questionnaires were able to be collected from each area. Where no tornadoes occurred, data was collected on Greenland Road, Carol Street, Georgiana Street, St. Martins Close, Camden Street, Lyme Terrace and Royal College Street. Where the tornado did occur, data was collected on Whitmore Gardens Street, Chamberlayne Road, and Liddell Gardens. These two different areas were used because they both are residential areas. The two areas offer different perspectives on the perceptions of tornado risks in the City of London, which could allow for more insight for city planners to understand where the problems exist in

the public's perceptions. By utilizing this knowledge city planners can understand how they can communicate and handle tornado risks more efficiently.

Table 7. Questionnaire questions for individuals with residences in Kensal Rise and Camden areas.

Question	**Answer**
Gender	Female ☐ Male ☐
Marital Status	Single ☐ Married ☐
Place of Residence	
Occupational Field	
Age	18-30 ☐ 31-50 ☐ 51+ ☐
Educational Level	GCSE/ Equivalent ☐ A-Levels/ Equivalent ☐ Under graduate degree ☐ Post-Graduate degree ☐ Other:_____ ☐
1. Do you know how many tornadoes happen in the UK per year?	Yes ☐ No ☐
2. If yes to question 1, how many?	
3. Do you know how many tornadoes happen in London per year?	Yes ☐ No ☐
4. If yes to question 3, how many?	
5. Do you know the meaning of tornado risks in London?	Yes ☐ No ☐

6. Do you think there is a risk of tornadoes in the city of London?	Yes ☐ No ☐
7. If yes to question 6, how big of a risk?	High risk ☐ Medium risk ☐ Low risk ☐
8. What would you consider tornado risks to be in London?	Fatal Threat ☐ Stroke of Fate ☐ Personal Thrill ☐ Gamble ☐ Insidiuous danger (slow killer) ☐ Other: _____ ☐
9. If yes to question 6, what category of risk do you perceive for tornadoes in London?	Concerned and think urgent actions are necessary to reduce risk in city of London ☐ Fatalist and hope for the best in the future ☐ Trust in local institutions and think that everything will be okay ☐ Consider yourself as self-sufficient ☐
10. List the following effects of tornadoes from what you perceive as the most dangerous to the least dangerous (from1-5, with 1 being most dangerous).	(__) Death (__) Property damage (__) Damage to assets (belongings) (__) Damage to vehicles (__) Sever Injury (__) Minor Injury
11. Do you know of any tornadoes that happened in London in the past?	Yes ☐ No ☐
12. If yes to question 11, do you know what previous damage and injuries that have occurred due to tornadoes in London in the past?	Yes ☐ No ☐
13. Do you personally know anyone that has been hurt by a tornado in the past?	Yes ☐ No ☐

14. If yes to question 13, did this make you become more aware of tornado risks?	Yes ☐ No ☐
15. Have you ever experienced a tornado before?	Yes ☐ No ☐
16. Would you return to the area in which you live if a tornado were to hit it?	Yes ☐ No ☐
17. Do you know whether a warning system for tornadoes in London exists?	Yes ☐ No ☐
18. Are you aware of the emergency procedures you need to follow if a warning system is issued?	Yes ☐ No ☐
19. If yes to question 18, what would you do if the warning system for tornadoes in London was issued?	
20. If yes to question 18, where did you learn this information from?	
21. Who do you think you could trust the most to provide the best information on tornado warnings?	Scientific authorities ☐ Mass media ☐ Civil Protection ☐ City planners ☐
22. What are your feelings towards the likelihood of future tornadoes occurring in London?	Feel Panic ☐ Inability to act ☐ Feel anxiety ☐ Feel fear ☐ Feel indifferent ☐ Other: _____ ☐
23. Do you think tornadoes should be taken into account when planning the layout of cities?	Yes ☐ No ☐
24. If yes to question 23, to what extent?	High ☐ Medium ☐ Low ☐
25. How safe do you feel within London if a tornado were to happen?	Very safe ☐ Relatively safe ☐

	Not safe ☐ Other: _____ ☐
26. Do you think the city of London buildings would withstand a tornado?	Yes ☐ No ☐
27. Do you think all buildings in the city of London should be kept to a certain standard regarding tornadoes?	Yes ☐ No ☐
28. Do you feel that you as an individual have any say in the buildings ordinances?	Yes ☐ No ☐
29. Do you think the public's perceptions of tornadoes is important when making building codes for planning?	Yes ☐ No ☐
30. Do you think policy makers communicate the hazard risks to the city of London very well?	Yes ☐ No ☐
31. If yes to question 30, how have they communicated hazard risks?	
32. If no to question 30, how could the policy makers communicate hazard risks better?	
33. Do you think the public should be more involved in the decision making process for city planning?	Yes ☐ No ☐
34. Do you think more education-information is needed to improve the public's knowledge on tornadoes?	Yes ☐ No ☐
35. If yes to question 34, how do you think this can be achieved?	

For this research project in order to assess the extent that the public's perception of tornado risks affects planning in the city I recruited six individuals involved in the city planning sectors within London, England for face-to-face interviews. The interviews were conducted during the period of August to November 2011. Three interviews were done with individuals that worked in the Borough of Brent and the other three were done with individuals working in the Borough of the City of London. The interviewees were contacted via email through the Borough of Brent and City of London council websites. The Borough of Camden council website was also contacted via email but unfortunately with no response. This may affect the results as the Borough of City of London is less residential than the boroughs of Camden and Brent.

Interviews were done in order to gain insights from individuals that are experts in city planning and who work in boroughs where the tornado actually occurred and in an area where the tornado did not occur. By using face-to-face interviews further knowledge can be assessed as to how much the general public influences the decisions that the city planners make and how the city planners view the general public's opinion. Each interview asked the exact same 27 questions (**Table 8**) and took up to forty five minutes long to complete. The questions were aimed at understanding how the city planners use and manage the public's risk perception on tornadoes and how or if they implement it into their plans. The interviews are recorded with a Sony TCM-150 Cassette-Corder along with recorded hand written notes. The interviews were transcribed upon completion of the interview.

Table 8. Interview questions asked of individuals in the city planning sectors of London, England.

Question	Answer
1. What is your current occupation?	
2. What does this job entail?	
3. Would you say that tornadoes are a huge risk in the City of London?	
4. Do you know about the tornado that happened in 2006 in the Kensal Rise area?	
5. Are you aware of the damage that it caused to the area?	
6. Do you think the City of London buildings would be able to withstand a tornado?	
7. Is there a building code that incorporates tornadoes in the City of London?	
8. What is the building code and how is it implemented? (YES) / Do you think there is a need to incorporate tornadoes into building codes? (NO)	
9. Do you think that these building codes should be extended to residential areas? (YES)	
10. If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes (ex. fire etc.)?(NO)	
11. Is there a warning system for tornadoes in the City of London?	
12. Could you describe this warning system? / Do you think there is a need for a tornado warning system?	
13. Do you take what the public thinks about natural hazards very seriously?	
14. What do you do when you need the public's perception on a natural hazard in London like a tornado?	
15. Since not many tornadoes occur in the City of London very frequently do you tend to not take them as seriously as other natural hazards?	
16. How frequently does a natural hazard have to occur in order for the City of London planners to take it seriously?	

17. How do you communicate the risks of hazards like tornadoes to the public?	
18. Do you think the public should be more involved in the decision making process for city planning?	
19. Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?	
20. If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?	
21. How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?	
22. How are contingency plans for natural hazards implemented when planning the City of London?	
23. How do you monitor progress of natural hazard plans?	
24. Does the public have any say in what happens in these plans?	
25. Where does your funding come from to implement city planning?	
26. Do you think more attention needs to be made to natural hazard city planning?	
27. What can be improved about the natural hazards part of city planning (YES)?	

Chapter 4

Results and Analysis

Questionnaire

For each site (Kensal Rise and Camden) one hundred questionnaires were collected, giving a total of two hundred questionnaires to be analyzed. In order to form firm conclusions about the public's tornado risk perception in the City of London from these questionnaires the data was compiled and then analyzed, discussed and fully interpreted. This was done by inputting the data collected from the two different areas via questionnaires into two separate excel spreadsheets. Manipulation of the data was done in the excel spreadsheets by calculating the frequencies (how many times certain answers have occurred) for each question at the Kensal Rise and Camden sites along with their corresponding percentages. Interpretation via bar graphs has been utilized as it gives a clear and concise representation of the difference between the two sites results. Each graph visually represents the percentage of respondents (whom in this research project is the sample size representing the general public) and their equivalent answer to each question in Kensal Rise compared to Camden. Doing it this way will display the differences among the two sites. Occupation will not be recognized as the majority of the respondents to the questionnaires failed to answer this question and when the respondents who did there was too wide a range of occupations for it to have any significance. Age was not seen to have much, if any relevance to the research project as no studies had been identified for tornado risk perceptions where age stood out as a major factor. So age along with educational level was not tested for its significance with the results to the other questions.

Understanding the origins of the public's tornado risk perception is important to understand what factors are shaping the respondents perceptions. It was discovered that the percentage of people who know about tornadoes in the City of London is fairly similar in both the Kensal Rise and Camden areas **(Figure 2).** However, in the City of London, 43% of the respondents in the Kensal Rise area know how many tornados occur per year in comparison to 18%, of the respondents in Camden.

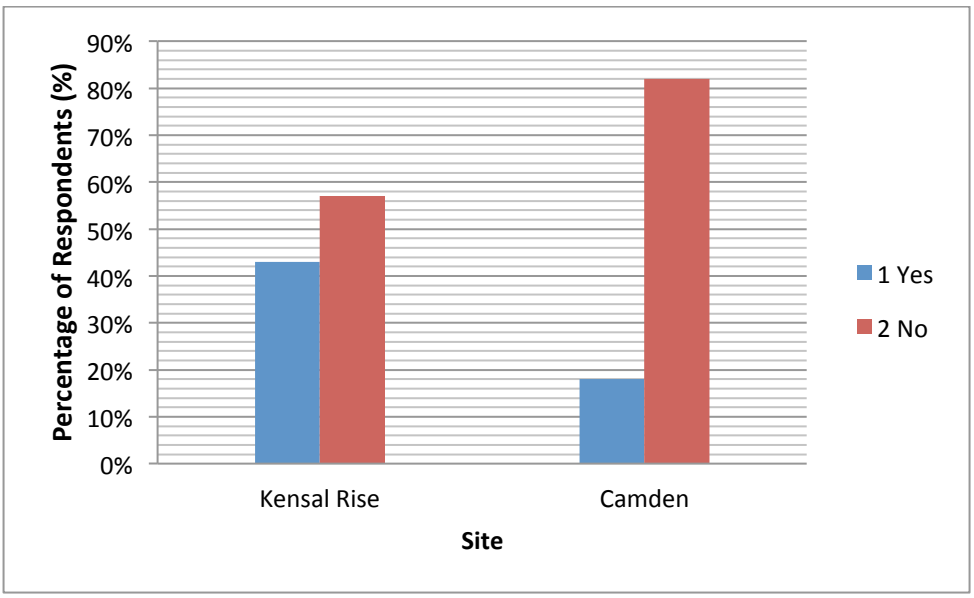

Figure 2. Response to Question 3: Do you know how many tornadoes happen in London per year?

Figures 3, 4, 5 and 6 provide data for risk perception factors, risk-related patterns and semantic images; which allow for analysis of how the respondents consider tornadoes to be a risk to their livelihoods in the two areas. **Figure 3** displays that 77% of the respondents in the Kensal Rise area believe there is a risk of tornadoes in the City of London. In comparison to Camden there are more respondents, 59%, whom believe there are no tornado risks in the City of London. Of the 77% in the Kensal Rise area, 73% believe it is a medium risk. In the Camden area of the 41% who believe in tornado risks, 55% of the respondents believe it is a low risk **(Figure 4)**. For both areas what the respondents considered to be the most prevalent semantic image of tornado risks in the City of London is that tornados are a stroke of fate, with Camden's respondents at 55% and Kensal Rise at 68% **(Figure 5)**. The respondents in both the Kensal Rise and Camden area feel that putting trust in local institutions in hopes that everything will be okay is the best option when considering tornado risks; with 56% thinking this in the Camden area and 45% thinking this in the Kensal Rise area **(Figure 6).**

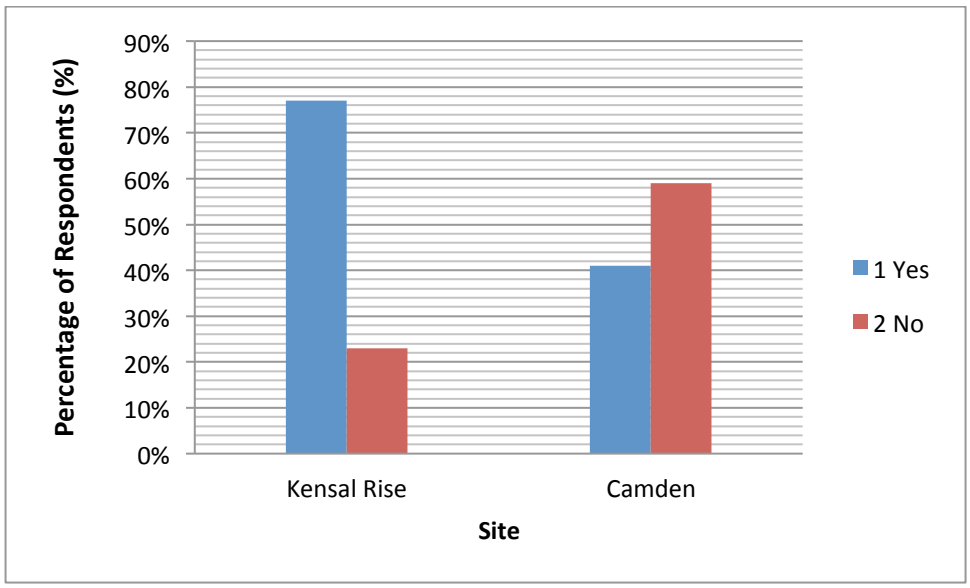

Figure 3. Response to question 6: Do you think there is a risk of tornadoes in the City of London?

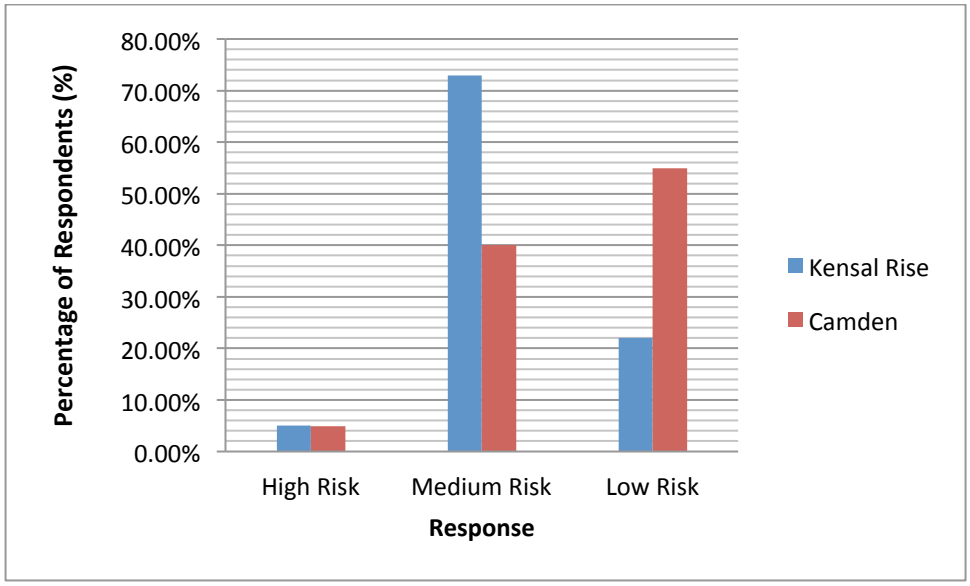

Figure 4. Response to Question 7: If yes to question 6, how big of a risk?

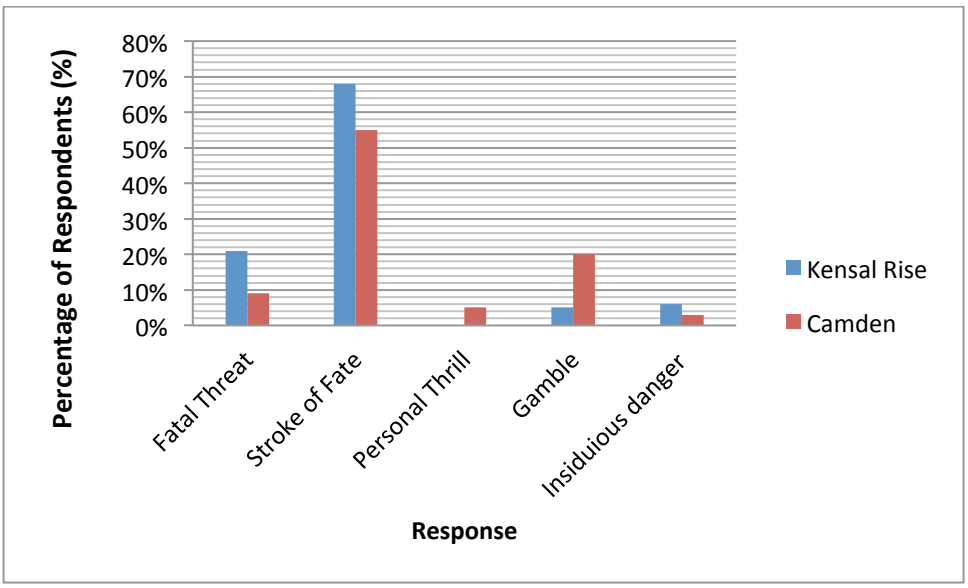

Figure 5. Response to Question 8: What would you consider tornado risks to be in London?

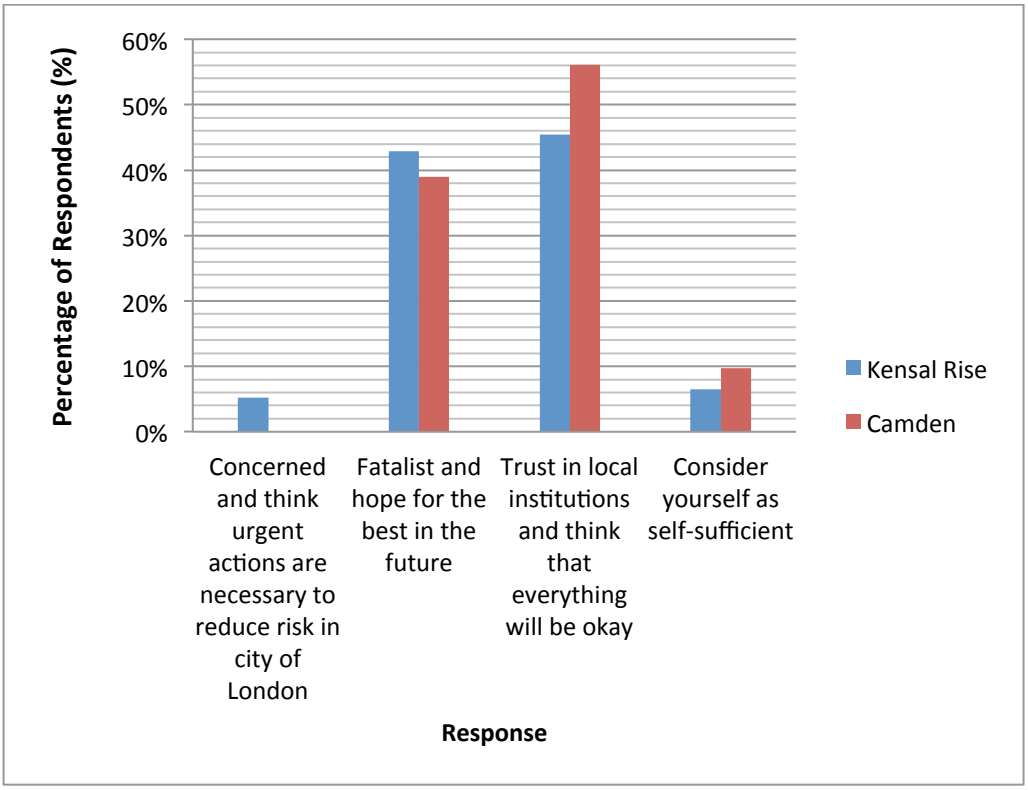

Figure 6. Response to Question 9: If yes to question 6, what category of risk do you perceive for tornadoes in London?

Figure 7, 8 and 10 focus more specifically on how people's perceptions have changed after the occurrence of the tornado in the Kensal Rise area in 2006 by evaluating cognitive heuristics (uncertainty) and risk-related patterns (familiarity). This was done by asking a question firstly about whether the respondents had ever experienced a tornado before; the familiarity they had with tornados. Out of the respondents in the Kensal Rise area 53% of the respondents had experienced a tornado before while 90% of the respondents in the Camden area had not experienced a tornado before **(Figure 7).** This may prove why 53% of the respondents in Camden feel very safe if a tornado were to hit London whereas 74% of the respondents feel relatively safe in Kensal Rise **(Figure 8).** Surprisingly, the respondents in both the Kensal Rise and Camden area proved that regardless of a tornado hitting their respective areas, 92% of the Kensal Rise area the respondents would return to the area along with 88% of the respondents in the Camden area **(Figure 9)**.

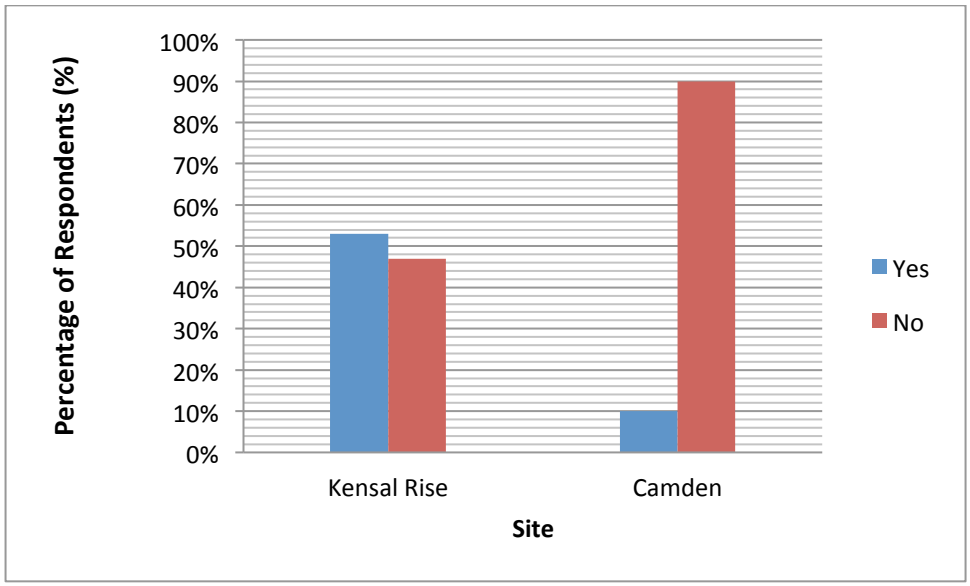

Figure 7. Response to Question 15: Have you ever experienced a tornado before?

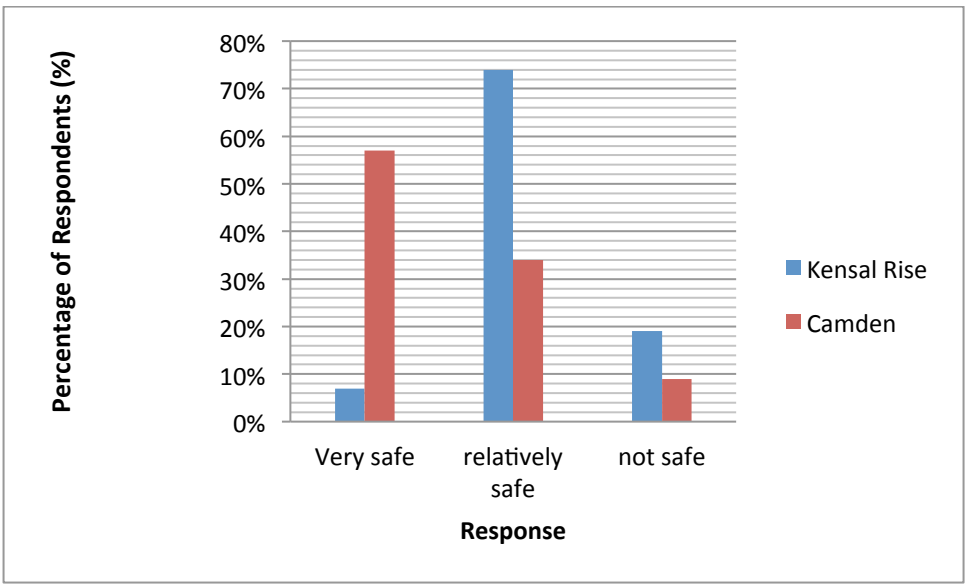

Figure 8. Response to Question 25: How safe do you feel within London if a tornado were to happen?

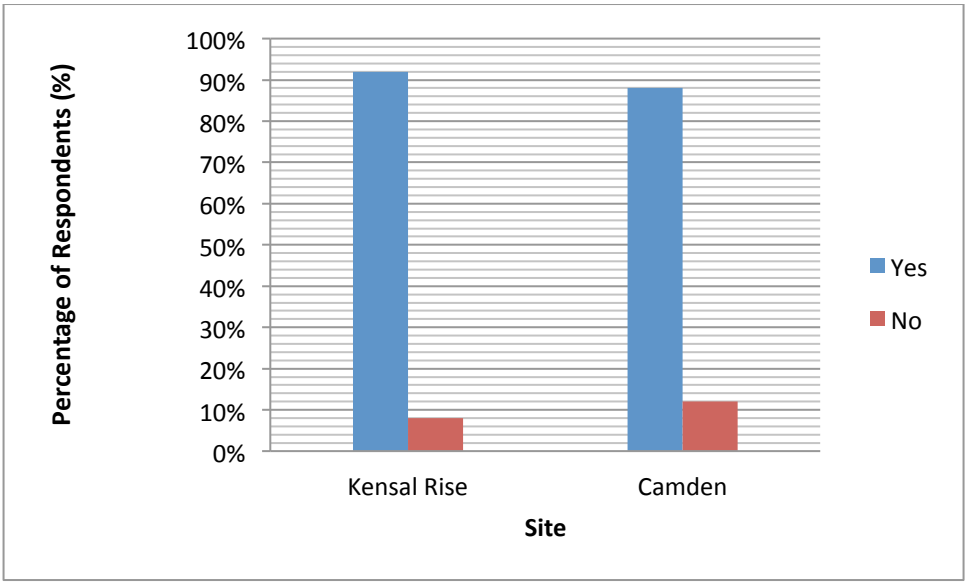

Figure 9. Response to Question 16: Would you return to the area in which you live if a tornado were to hit it?

The data collected from **Figure 10** aims to understand if by experiencing a tornado it has further enhanced the public's knowledge about current tornado research in the United Kingdom, particularly in the City of London. It was discovered that regardless of the warning system and tornado website set up by TORRO in the United Kingdom, the respondents in both the Kensal Rise area with 81% and in the Camden area with an even greater percentage, 97%, had no awareness of any warning system for tornados in the City of London. In both areas it was synonymous, with 68% **(Figure 11),** that the respondents would choose to trust the scientific authorities the most in regards to tornado warnings.

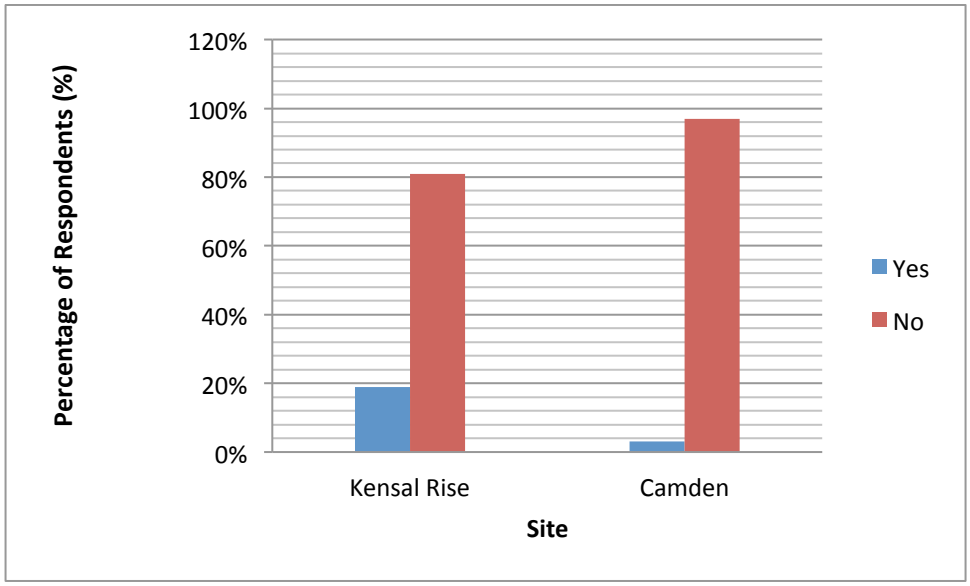

Figure 10. Response to Question 17: Do you know whether a warning system for tornadoes in London exists?

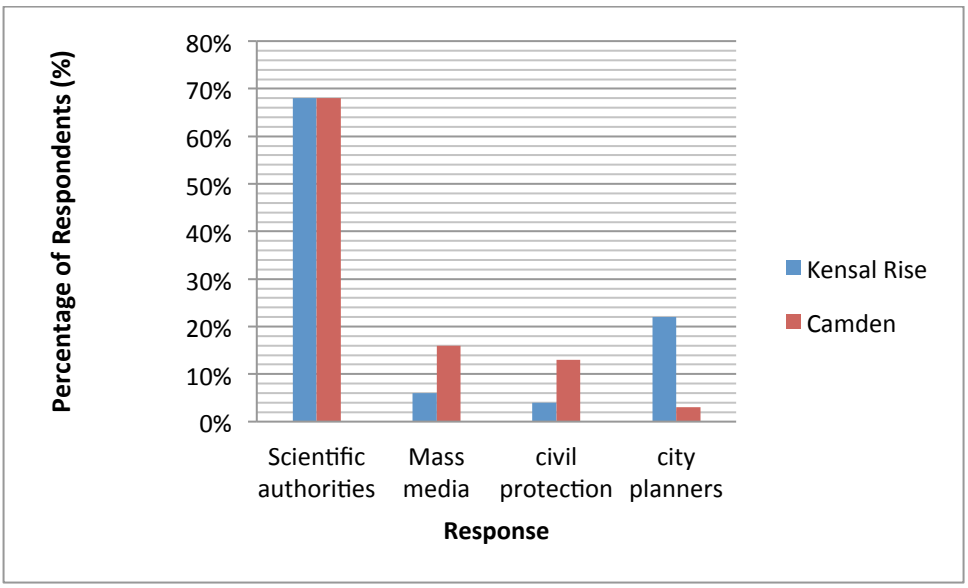

Figure 11. Response to Question 21: Who do you think you could trust the most to provide the best information on tornado warnings?

The questionnaire questions in **Figures 12, 13, and 14** are directed to the respondents in order to analyze if the public feels that city planners take into consideration tornado risks and to what extent. 70% of the respondents believe in the Kensal Rise area that tornadoes should be taken into account when planning the layout of cities whereas no more than 35% of the respondents in the Camden area agree with this statement **(Figure 12)**. Of those respondents who believe that tornadoes should be taken into consideration when planning the layout of the cities, both the Kensal Rise area with 49% and the Camden area with 54%, believe it is of medium importance to consider **(Figure 13)**. Both the Kensal Rise and Camden area respondents believe that the public perceptions of tornadoes is important when making building codes for planning, with 74% in the former and 63% in the latter **(Figure 14)**.

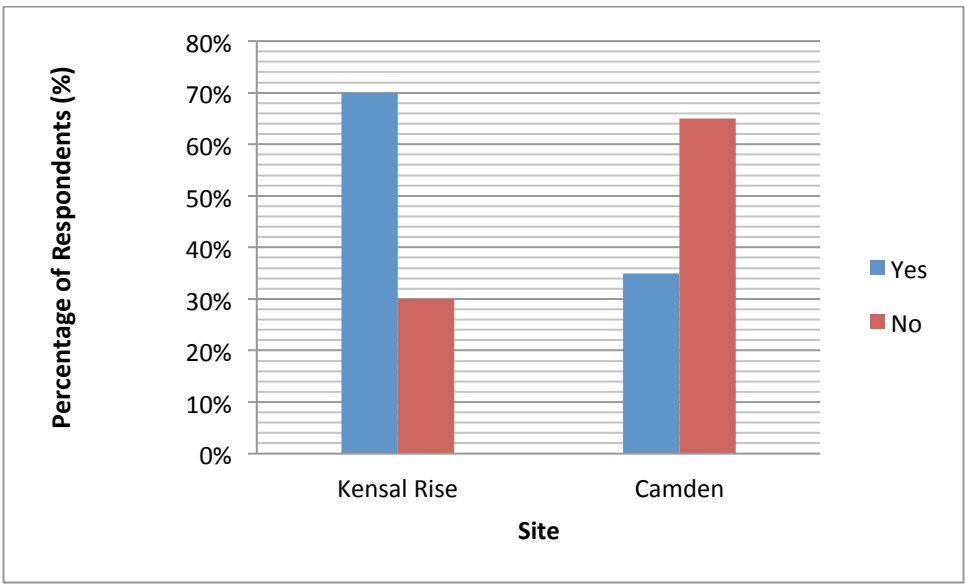

Figure 12. Response to Question 23: Do you think tornadoes should be taken into account when planning the layout of cities?

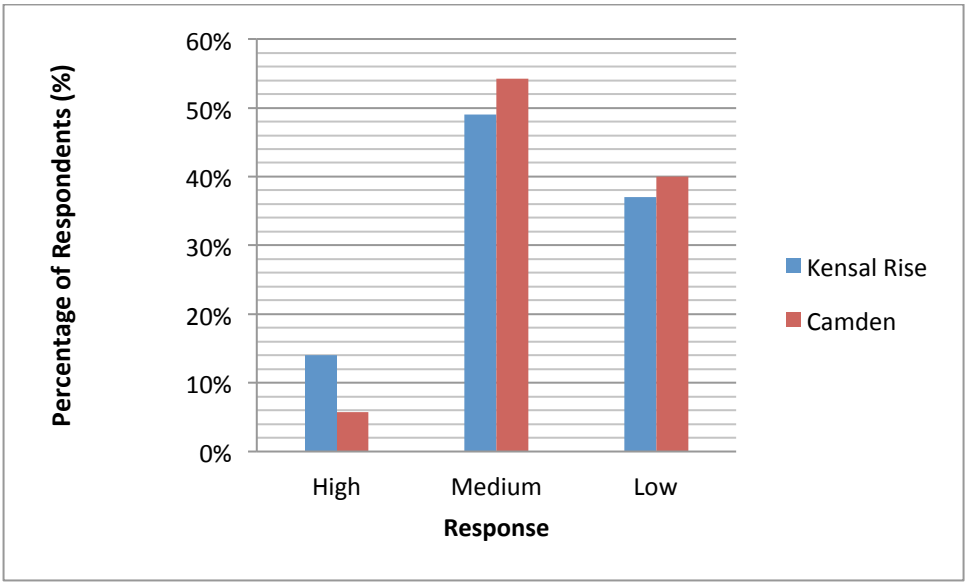

Figure 13. Response to Question 24: If yes to question 23, to what extent?

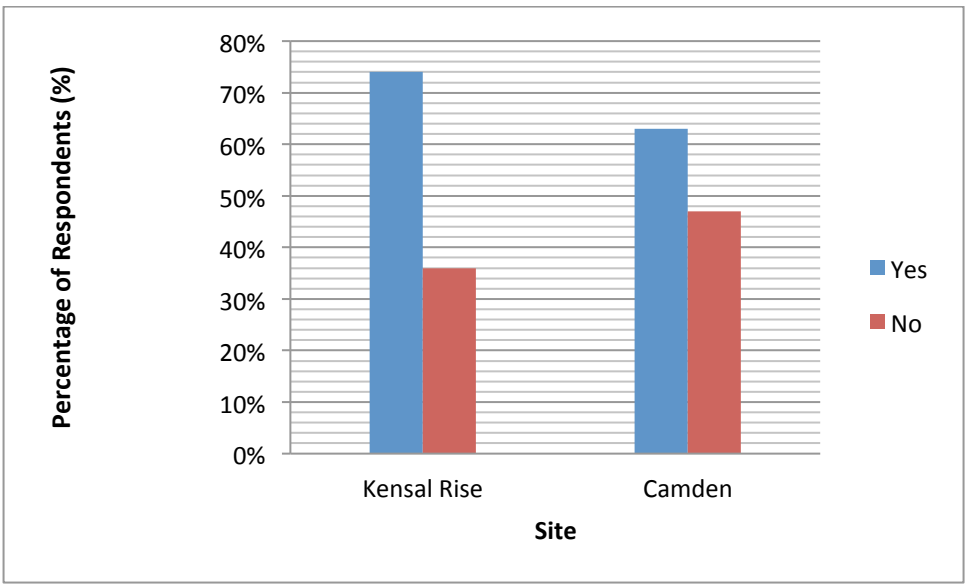

Figure 14. Response to Question 29: Do you think the public's perceptions of tornadoes is important when making building codes for planning?

Finally questions in **Figures 15, 16 and 17** are used to analyze how much the public feels their opinion is recognized in the city planning and if their needs to see improvements to the system in order for tornado risks to be better known and understood. 74% of the respondents in the Kensal Rise area and 70% in the Camden area believe that the public should be more involved in the decision making process for city planning **(Figure 15).** Results were also very similar in the Kensal Rise area with 96% and Camden area with 94%, where respondents in both areas do not feel the policy makers communicate hazard risks in the City of London to the public very well **(Figure 16)**. 87% of the respondents in the Kensal Rise area believe that improvements in communication via education-information on tornados is needed whereas the respondents in the Camden area, 57%, believe the opposite **(Figure 17)**. Several respondents felt that the media and leaflets would be the best form of communicating tornado hazard risks to the public.

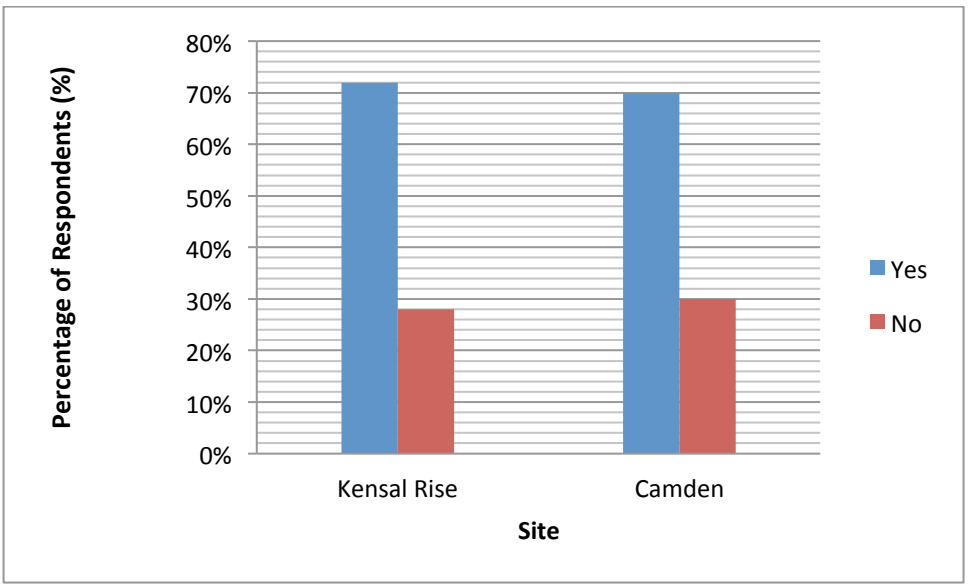

Figure 15. Response to Question 33: Do you think the public should be more involved in the decision making process for city planning?

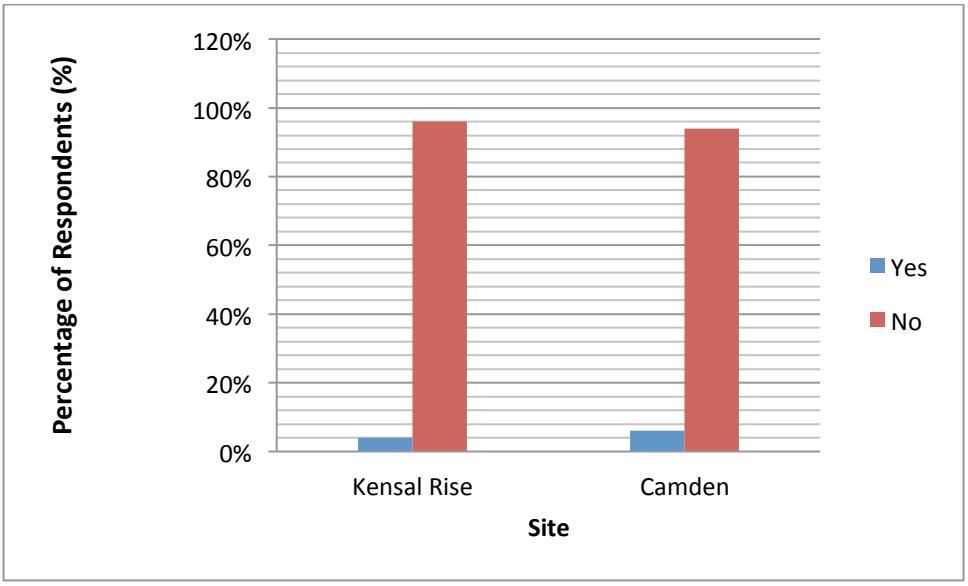

Figure 16. Response to Question 30: Do you think policy makers communicate the hazard risks to the city of London very well?

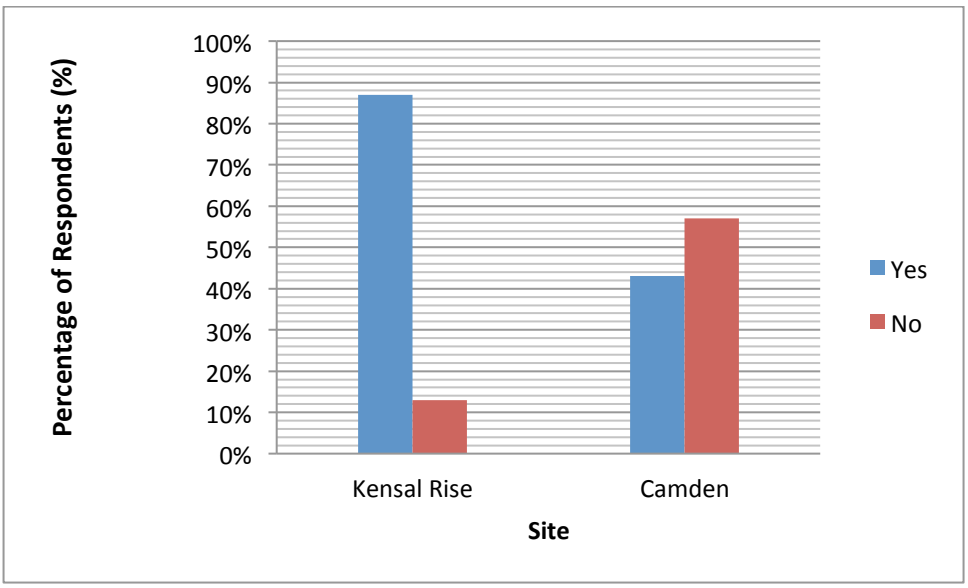

Figure 17. Response to Question 34: Do you think more education-information is needed to improve the public's knowledge on tornadoes?

Interviews

Six interviews were conducted and transcribed in order for analysis on the extent that city planners take into consideration the public's perception in regards to tornado risks. Analysis of the results was completed by comparing the responses each interviewee gave and distinguishing the similarities and differences in their responses.

All of the interviewees knew of the tornado that occurred in the Kensal Rise area in 2006 and two interviewees actually worked on it after the tornado hit. None of the interviewees believe that tornado risks are a huge risk in the City of London. It was a unanimous answer from all of the interviewees that they would definitely take what the public's perception of hazard risks are very seriously. When the interviewees were asked about if they would take in particular tornado risks seriously the answers again were unanimously yes. However, there was a greater variation of answers here. Some interviewees felt that it was necessary to take tornado risks as seriously as other hazard risks due to things like climate change; they felt that you need to be prepared as you never know what the future weather patterns might be as seen in natural disasters like the snow storm that hit London two years ago. On the other hand one interviewee felt that tornado risks definitely need to be taken seriously but dwelling on them

and producing further research would not be necessary as there are more important natural hazards that should be dealt with first. Similar to this opinion one interviewee believed the city planners would only take tornado risks more seriously if they had more evidence to prove they occurred more frequently. They felt that they needed to see the probabilities of the chance that a tornado would occur before they could make a legitimate decision.

The interviewees were asked if they felt the public should be more involved in the decision making process for city planning and all interviewees except for one generally felt that the question could be debatable. However, the interviewees agreed that at the moment they felt the public was already involved enough at a reasonable level. The interviewee, who disagreed, felt that the public should not be involved and it should be purely up to experts as the public does not have enough knowledge in those areas to contribute. The interviewees that felt the public already were involved at a reasonable level argued that the public is considered sufficiently as they are welcome to come to council meetings and write to city planners about their queries via the council websites. One interviewee felt that the public should definitely be listened to and considered when dealing with concerns that revolve around their immediate needs after a natural disaster has occurred like a tornado but in general the public should not be the dictating factor for city planners decisions.

Discussion

Now that the results have been presented, analyzed and interpreted for this research project it is fair to say that by experiencing a tornado in the Kensal Rise area the research indicates that the tornado has had some effect on those respondents risk perceptions when comparing it to the respondents in the Camden area where no tornado has occurred. Although for some risk perceptions, there are minimal differences between the two areas. Furthermore, the effect that the public's tornado risk perceptions in the City of London have over the planning in the city is very minimal. This section will discuss why these results could potentially be this way.

By analyzing at the results, it was shown that a proportion of the respondents in both the Kensal Rise and Camden area recognized and accepted that tornadoes pose a risk in the City

of London. However, a sufficiently larger percentage of the respondents in the Kensal Rise area recognized tornado risks in the City of London compared to the Camden area respondents. This prominent risk perception in the Kensal Rise area could have been shaped by a cognitive heuristic method, availability biases, as there was also an increased percentage in the Kensal Rise area respondents who had experienced a tornado before. The experience the respondents have of the tornados in the Kensal Rise area means that tornado risk information is easier to recall as it has been made more readily available for the respondents to make judgements (Kahneman and Tversky 1979). Therefore, potentially the Kensal Rise respondent's have a stronger availability bias which allows for them to have a higher awareness of tornado risks than the Camden area respondents (Miller, 2006). This could also explain why more respondents in the Kensal Rise area felt it was necessary that tornados should be considered while planning the layout of the City of London. The availability of information prompted Kensal Rise respondents to feel it was more necessary. However, experts could argue that tornado occurrence must be considered as it is so infrequent in both of these areas that the availability bias may not be significant enough to make much, if any, of a difference to the respondents risk perceptions and therefore, more research should be conducted in order to compare findings with this research project.

As more of the respondents in the Kensal Rise area have experienced a tornado than the respondents in the Camden area this may be why the Kensal Rise respondents feel less safe if a tornado were to happen as their familiarity to tornado risks is slightly stronger than the Camden area. Usually familiarity would be a positive risk perception shaping factor, as according to the literature review the more familiar the general public is the more they would perceive tornadoes as less dangerous, as they would be more aware of the threats tornado risks posed (Renn, 2005). However, for this research project the familiarity factor present in the Kensal Rise area is deceiving as it only depicts the reactions the respondents had to what we can assume is one tornado; habituation (getting used to a risk) has not been achieved to tornado risks yet in the Kensal Rise or Camden areas. Therefore, the familiarity of tornado risks to the respondents in the Kensal Rise area at the moment may bring about negative emotional responses as the respondents are not fully habituated to tornado risks. However, even though

the Kensal Rise respondents are more familiar with the tornado risks the majority of the respondents felt along with Camden respondents that tornados should be considered as a stroke of fate or in other words an act of god which cannot be improved by humans. Since tornados in the City of London are not very frequent this risk perception suggests that more respondents could be influenced to either deny or suppress tornadoes existence. This could be potentially why the results displayed that respondents in both areas would return to the area in which they lived in even if a tornado has already hit. Their perception of the situation is that tornadoes do not exist and there is no other alternative route they can take as it is out of their personal control (Luhmann, 1990).

As noted in the literature review, it has been suggested that the level of safety the respondents feel reflects the amount of uncertainty (knowledge spaces) the public considers there to be towards risks. The public's suggestion to gain more confidence towards understanding uncertainties in risk is via knowledge improvement (Sparks *et al*, 1994). This suggestion was proven to be consistent with the results collected as the majority of the respondents in the Kensal Rise area believed that education-information is needed in order to improve the public's knowledge on tornadoes as there are great uncertainties in regards to tornado risks in the City of London. Although in both the Kensal Rise and Camden areas the respondents felt communication from policy makers has been poorly executed. Therefore, the type of knowledge and means of communication needs to be carefully selected as you do not want the public to have emotions and beliefs that instead of alleviating concerns increase concerns via negative feelings, like fear, avoidance and anxiety towards tornado risks, when it is completely unnecessary (Covello *et al*, 1987). Most respondents felt the best way to gain more knowledge about tornados is through the media or leaflets. The media accessibility is so convenient for the general public that they use it as a daily source of information (Renn, 1991). However, the media must be used vigilantly as journalists could be biased towards their own social convictions (Mazur, 1984).

The results displayed that the majority of the respondents in both the Kensal Rise area and in the Camden area when perceiving tornado risks felt they should place their trust in local

institutions and everything will be okay. By allocating the control to trusted local institutions, the respondents in both areas can perceive tornado risks with higher personal control in the situation as they voluntarily chose whom to trust (Renn, 2008). These similar results in both of the areas could potentially be as a result that the past occurrence of tornados in both the areas is extremely low; with the Borough of Camden not experiencing a tornado before and the Borough of Kensal Rise only having experienced one tornado. This means that both of the two areas local institutions (their councils) have had not much, if any, experience in implementing tornado plans. Therefore, the institutions have not had the ability to produce many mistakes suggesting little evidence as to why the respondents in both areas should not trust their local institutions. This could suggest that local institutions, in particular in the Kensal Rise borough as it has more recently experienced a tornado, have done a good job when it comes to handling tornado risks. Evidence has shown that when the general public believe risks are not properly handled or they are given misguided information, it is more likely people will be less inclined to cooperate with risk management institutions (Bord and O'Connor, 1992).

The effect the public's tornado risk perceptions have over city planning has proven to be very minimal according to the results presented in the interviews. One reason that can be suggested why this is apparent is because the respondents in this research projects attention and selection filters are not strong enough to take a significant interest in the topic to provide the evidence to the city planners for them to take the tornado risk more seriously. It was discovered that among the city planners interviewed it was unanimous that they would not completely disregard tornado risks. They said they take all risks very seriously, as it is their job to ensure the general public feels safe and is aware of the consequences. However, many of the city planners felt that the tornado risks were not large enough to make new amendments to the plans that are already in place; to them it seemed very unnecessary. This could potentially be because the public's risk perception towards tornadoes has not been vocalized or there have not been any queries from the general public at all about changing the city planning schemes in regards to tornados. Another reason that could be suggested is most of the city planners choose to economize most of the information they receive on the public's risk perception towards tornadoes. Therefore, they use the peripheral route in the attention and selection

process where they make fast judgements about information received as they think it is less important and do not study the public's perception carefully enough (Petty and Cacioppo, 1986). However, this selection process the city planners potentially use on the public's risk perceptions on tornados may be important and justifiable as some tornado risk perceptions may be completely irrational. As the city planners are experts in their respective sections they potentially have more experience than the public to recognize that focusing on risks other than tornadoes is more important (Renn, 2008).

In both the Kensal Rise area and Camden areas the respondents felt that the public's perceptions should have more of an importance when planning the layout of cities. On the other hand the city planners felt that this was debatable as they felt the general public at the moment had a reasonable level of participation in the city planning. This result could be explained possibly because some of the city planners felt that expertise is needed in order to make decisions that are legitimate and evidence displaying probabilities and frequencies of the tornado hazards is necessary.

Chapter 5

Conclusion

The results of this study show that the tornado experienced by those living in the Kensal Rise area had an effect on those residents' tornado risk perception when comparing their results with the results of the respondents in the Camden area where no tornado occurred. Minimal effects to city planning have been noticed from the public's tornado risk perceptions. The results of the public's risk perceptions on tornados showed that they slightly affected the planning measures in the city. The results are not concrete enough to justify changing the planning measures that the city planners currently use and follow. Much more analysis and in-depth investigation needs to be conducted in order to confirm the findings from this research project.

Some recommendations can be offered as a result of this research project. More information should be disseminated to the public on tornados as monthly newsletters to the public including such information like the time and place city planners hold their monthly meetings. Another suggestion would be to encourage organizations like TORRO to initiate education programs for the public and to even incorporate such information in grade school education programs. This way more people would be aware and interested in tornadoes in the United Kingdom. Universities and government could promote and fund more research on tornados so that such topics like risk perception on tornados could be more fully understood. Weather patterns have the potential to produce rare natural disasters. More research needs to be done so that people can be as prepared as possible when a tornado does develop.

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Appendix 1

Assignment 3: IGS Proposal
5SSG2053 Geographical Concepts, Skills and Methods 2
Due by 12:30 pm, 21th, March, 2011

Research Question

Assessing the affects of a tsunami: perceptions and advantages of an early warning system. A comparison between the 2011 Japanese tsunami and the 2004 Indian Ocean tsunami in Thailand.

Significance

Tsunamis are massive tidal waves caused by a sudden upward displacement of an enormous quantity of water, unrelated to ocean tides. This displacement of water can be caused by either volcanic and/or earthquake eruptions in the ocean, falling meteorites, decomposition of gas hydrate or submarine landslides. Along the coastal regions tsunamis have been a constant source of threat and since 1850 alone have been responsible for the loss of 420 000 lives (Bernard *et al*, 2006). In the case of the 2011 Japanese and 2004 Indian Ocean tsunamis, worrying levels of destruction of civilization have occurred. Yet for countries located in the Pacific like Japan tsunami's are not surprises. Japan has evolved comprehensive early warning systems to detect tsunamis, which notify their citizens of the dangers to ensure their safety. However, the tsunami that occurred in the Indian Ocean on 26 December 2004 hit an area that had not suffered from a tsunami in a long time. A death toll of over 200 000 people was recorded and billions of property was destroyed. The implementation of an early warning system could have potentially saved more lives. The Indian Ocean tsunami made one message clear that if one lives near an ocean, they are potentially subject to the havoc caused by a tsunami. This has lead to a heightened interest in tsunami's and the establishment of tsunami warning systems in the Indian Ocean regions (AIT, 2005). Yet even with early warning systems in place lives have continually been lost as seen in the case of the 2011 Japanese tsunami where the death count is estimated at over 8000 people at this point in time (Adam, 2011). The need for increasing our understanding of tsunamis in all regions of the world is extremely important as the global population in the world is continually increasing, placing more people at risk. The effects of a tsunami can not only be seen at a local scale but also a global one. The Indian Ocean 2004 tsunami and the 2011 Japanese tsunami have made it clear that funds need to be dedicated to continual research in creating new and more effective technologies for

tsunami early warning systems in order to mitigate against the effects of tsunamis. The greatest challenge facing practitioners of tsunami research and mitigation is changing the 'perception' that tsunamis are rare events.

Cause of 2011 Japanese and 2004 Indian Ocean Tsunami's

As mentioned above there are many different things that can cause the displacement of an enormous quantity of water for a tsunami to occur. In this particular research project the 2011 Japanese tsunami and the 2004 Indian Ocean tsunamis were caused by undersea mega-thrust earthquakes. The magnitude of the undersea mega-thrust earthquakes to create a tsunami must be higher than 7.0 on the Richter scale and must have a shallow focus of less than 30 km beneath the surface (AIT, 2005). The 2004 Indian Ocean tsunami was caused by a 9.3 magnitude earthquake off the Coast of Sumatra Island whereas Japan was hit by an 8.9 magnitude earthquake 80 miles off the coast of Japan (Adam, 2011). These both are tectonic earthquakes which deform the sea surface temporarily or permanently. The vertical uplift of the seabed from the dense oceanic plates sliding under the lighter continental plates lifts the overlying ocean water up transferring potential energy from the solid earth to the ocean water. Once the earthquake stops trembling, the surface elevation created by seismic energy starts to spread over the surface and the tsunami then begins its journey towards the coastal regions (AIT, 2005).

Characteristics of Tsunamis

Tsunami's travel in all different directions away from their source. Since each earthquake is unique each tsunami has unique wavelengths, directionality and wave heights. Although, a characteristic all tsunami waves have in common is that they all travel at a speed proportional to the square root of the water depth (Bernard *et al*, 2006). During a tsunami the entire column of water from the free surface to the bottom is in motion which results in Tsunami's having a very long wavelength compared to the depth of the ocean basin where they propagate. Therefore tsunamis have long waves and are usually modelled mathematically by the shallow-water wave theory. Once the tsunami becomes local with ocean depths at approximately 200 meters (m) the analysis uses techniques like the linear long-wave theory. At shallower water

levels of the ocean, the velocity of the tsunami wave decreases. The wave height increases due to the shoaling effect as the rate of energy transmission in the wave remains constant (not including the loss of energy as a result of friction at the sea-bottom). The shoaling effect is what makes the wave height destructively high along the coastline. In deep ocean water the tsunami wave height can be around 30 to 60 centimetres traveling at very high speeds (500 to 1000 km/hr) whereas at the coastlines with shallower water the tsunami slows down to only tens of kilometres per hour but in doing so the wave height devastatingly increases. In the 2004 Indian Ocean the movement of the seafloor produced a tsunami with wave heights with amplitude of 30 meters in some areas along the coastline whereas Japans maximum wave height recorded was 10 meters (AIT, 2005). Another important property of tsunami's which is a method used in their detection is its time period. Regularly the longest swell waves have their periods in seconds, with a time period of tide waves being one. While tsunami's have periods occurring most frequently between 10 - 40 minutes and a time period of anywhere from 2 to 90 minutes. From the tsunami's source to the shore the time period of the wave remains constant. The wavelength (spatial period) is higher in the deep ocean and as the tsunami approaches the coastline the spatial period deceases, troughs and crusts become closer together. Upon approaching the coastline the energy is progressively concentrated in a smaller volume of water and to conserve energy the height and current speed increase dramatically. The result is an amplified tsunami wave that hits the coastline with flow velocities as high as 40 miles per hour with enough energy to destroy everything in its path. Within major tsunami's 6-12 large waves repeatedly attack the coastline. The tsunami hit Thailand two hours after the initial earthquake (AIT, 2005) and just over an hour in Japan in 2011 (TAH, 2011).

Early Warning Systems

As a result of the tsunami's that occurred in the past the international effort to mitigate the impacts of tsunamis began over 40 years ago. After the 1946 Alaskan generated tsunami, the Pacific Tsunami Warning Centre (PTWC) was established in Hawaii. At first the PTWC was a warning system for tsunamis only in the United States but later became the operation centre for the entire Pacific Basin. After the 1960 Chilean tsunami the international community came

together to create the Tsunami Commission and the United Nations Education Scientific and Cultural Organization (UNESCO) created the Intergovernmental Coordinating Group for Tsunami Warnings in the Pacific (ITSU) (Bernard *et al*, 2006). These warning centres were only useful for areas that were located on the Pacific Ocean like Japan as tsunamis were much more frequent here because of the earthquakes along the "Ring of Fire" (AIT, 2005).

In Japan the meteorological service was initiated in 1875 by the Tokyo Meteorological Observatory. It became known as the Japan Meteorological Agency (JMA) in 1956 and now serves as one of the most advanced National Meteorological Services in the world and has both national and international responsibilities. JMA includes Japan's earthquake and ocean-based tsunami warning systems. Throughout Japan JMA has made a computer system that continuously monitors the seismic activities around the clock and if an earthquake is to occur the magnitude and its hypocenter are calculated quickly. If the calculations show a tsunami has the potential to be generated than a tsunami forecast is issued immediately to warn the population. 66 individual coastal regions which cover the coastal areas of Japan have been defined each with their own Warning or Advisory by the JMA. Also JMA issues tsunami forecast and information to the PTWC. The tsunami information is disseminated rapidly to the public by disaster management authorities, local governments and mass media online on the computer network across the country. The JMA operates a seismic network that has 180 seismometers located on land and in the water and it collects seismic waveform data in real-time around the clock. An important tsunami monitoring network that JMA operates is 80 tidal gauge stations and from about 100 stations real-time sea level data is also collected by organizations such as the Japan Coast Guard (JMA, 2011).

Unfortunately there were no early warning systems put in place in the Indian Ocean to detect tsunamis or to warn the general populace living around the ocean. Only after the 2004 Indian Ocean tsunami occurred organizations like the Intergovernmental Oceanographic Commission of UNESCO expanded their global coverage of tsunami warning systems to the Indian Ocean (IOC and UNESCO, 2009). By 2005 the Intergovernmental Coordination Group for the Indian Ocean Tsunami Warning and Mitigation System was formed to establish a system to

reduce damages caused by tsunamis. However this system will take years for it to become fully established and operational so in the mean time the JMA continues to provide tsunami watch information (JMA, 2011).

Methodology for Collection of Research

Primary Data Collection

Firstly in order to collect primary data a questionnaire would be given out to 50 randomly selected individuals in the city of London. This would be done over a week time period. The questionnaires purpose would be to find out people's perceptions of tsunami's and their feelings towards the Japanese tsunami in 2011 and the Indian Ocean Tsunami in Thailand 2004. It would include 13 closed questions with 5 open ended questions (Table 1).

Table 1. Questionnaire.

Question	Answer
1. Has the 2011 Japanese tsunami changed your opinion of Japan?	Yes / No
2. In what way has this changed your opinion of Japan?	
3. Given the opportunity would you travel to Japan now?	Yes / No
4. If no to question 3 what would it take for you to travel to Japan?	
5. Before the 2011 Japanese tsunami would you have visited the country?	Yes / No
6. Would you donate to a tsunami charity in Japan?	Yes / No
7. Has the 2004 Indian Ocean tsunami changed your opinion of Thailand?	Yes / No
8. In what way has this changed your opinion of Thailand?	
9. Given the opportunity would you travel to Thailand now?	Yes / No
10. If no to question 9 what would it take for you to travel to Thailand?	
11. Before the 2004 Indian Ocean tsunami in Thailand would you have visited the country?	Yes / No
12. Would you donate to a tsunami charity in Thailand?	Yes / No
13. Do you feel like tsunami's need more recognition for future research?	Yes / No
14. Do you know what an early warning system is?	Yes / No
15. If yes to question 14 what level do you think early warning systems help to prepare citizens for tsunamis?	1- Not at all 2- Not very big 3- Substantial 4- Quite a lot 5- Very big
16. How big of a threat would you say a tsunami is to coastal communities?	1- Not at all 2- Not very big 3- Substantial 4- Quite a lot 5- Very big
17. Does the existence or threat of tsunamis affect the way you view a place?	Yes / No
18. If yes to question 17 how?	

Secondary Data Collection

Aside from collecting primary data through use of a questionnaire for the perceptions part of the assessment I will also be collecting secondary data in order to fully assess the overall affects of a tsunami between Japan and Thailand which can then be used to evaluate the effectiveness of an early warning system. Amongst the secondary data I will collect from both countries are the death tolls, economic impacts, area of land affected, funding or aid provided to the areas, destruction levels of buildings, land areas, roads, and impacts on the fishery sectors. The majority of my secondary data I will get from government bodies as they are the most reliable. The Japanese Ministry of Internal Affairs and Communications is keeping a tally of the deaths and destruction caused by the 2011 Japanese tsunami (TAH, 2011). The National Oceanic and Atmospheric Administration (NOAA, 2011) provides the information for the death toll in Thailand in the 2004 Indian Ocean tsunami (Menig *et al*, 2005). The UNESCO also provides information on both the 2011 Japanese and 2004 Indian Ocean tsunami's. Another good source I will be using is United Nations Environment Programmes (TTS, 2006)) that provides data on Thailand (Franklin, 2005). High resolution images provided by NASA will also give clear evidence of the destruction that occurred in each country (NASA, 2004). Once the data is compiled a set of correlation tests will be performed that will provide statistical analysis comparing the two countries. In order to get a justifiable data for the 2011 Japanese tsunami I will collect secondary data in October because six months will give the government bodies enough time to determine the death tolls and damage done.

Expected findings

The results are likely to show that people's perceptions of a place following a natural disaster like a tsunami are more negative in terms of losing the desire to visit. For the overall assessment it is likely that the data between the two countries will have some level of variance regardless of the similar magnitude of tsunami, suggesting that an early warning system though it cannot fully prepare a country for such a catastrophe it certainly can help to reduce the negative impacts somewhat.

Word count- 1989

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Appendix 2

The original IGS proposal question was:

Assessing the affects of a tsunami: perceptions and advantages of an early warning system. A comparison between the 2011 Japanese tsunami and the 2004 Indian Ocean tsunami in Thailand.

There are a number of reasons why this original IGS proposal question was not a research project that could be successfully conducted. One of the main reasons was that the question at the centre of the research was missing. It was not made fully aware as to what the research's aim was. It was not clear if it was how people react to tsunami warnings or if it was the effectiveness of an early warning system. Although the content of tsunami's in general was made very clear and was correct the major issue still remained in the aim of the research project.

Secondly, the connection as to why a questionnaire was going to be conducted in London about a hazard that was located in a different country did not make any sense, as it was a tsunami that occurred in Japan in 2011. It was not clear why London respondents would be the best choice for the location of the questionnaire to take place. Also the questions located within the questionnaire were not structured with much thought towards the factors that shape the public's risk perception. Although primary data would have been collected from the questionnaire, secondary data would also be needed. However, collection of secondary data would also pose problems as by the time I would have needed to conduct my research there was a potential for research to not be available as at the time the proposal was submitted the tsunami had occurred days before. Therefore, it looked like it would be either extremely hard or impossible to find any statistical significance from the questionnaire and secondary data that the research project aimed to get. It was too risky to rely on hoping that the data would be made available by the time the IGS would have needed to be handed in.

By analyzing these problems and taking into consideration if the original IGS proposal could work it was decided that the IGS research project should be changed. The new IGS

research project remained to be fairly similar in the area of study in geography, as it along the original IGS proposal deal with perceptions from the public. However, the type of hazard changed from Tsunami's in Thailand and Japan to tornados in the United Kingdom and more specifically in the City of London. The new IGS topic that was approved was:

What is the public's perception of tornado risks in the City of London and to what extent does it affect planning in the city.

This new question was agreed upon for a number of reasons. The aim of the research project was clear and the location of where the research was to be conducted and who was used to collect data from made sense. The aim of this research is to discover the way in which the public responds to tornado risks in the city of London, England according to their perceptions of the risks tornadoes pose and to the extent it effects planning within the city. The aim of the research project also allowed me to collect more primary data. I recruited individuals for questionnaires **(Table 1)** living within the Northwest part of London, the Kensal Rise area located in the Borough of Brent as a tornado has occurred in the past here and in central London, Camden, where no tornadoes have occurred. The number of questionnaires handed out changed from 40 in the original IGS proposal to 400 in the current IGS research project. The type of questions were also changed in the questionnaire so that I could analyze the public's perceptions more thoroughly and accurately in regards to risk perception research. Additionally for this research project I recruited individuals involved in the city planning sectors within London England for interviews **(Table 2).** Three individuals were recruited from the Borough of Brent and three other individuals were recruited from the Borough in the City of London.

Table 1. Questionnaire questions for individuals with residences in Kensal Rise and Camden areas.

Question	**Answer**
Gender	Female ☐ Male ☐
Marital Status	Single ☐ Married ☐
Place of Residence	

Occupational Field	
Age	18-30 ☐ 31-50 ☐ 51+ ☐
Educational Level	GCSE/ Equivalent ☐ A-Levels/ Equivalent ☐ Under graduate degree ☐ Post-Graduate degree ☐ Other:_____ ☐
1. Do you know how many tornadoes happen in the UK per year?	Yes ☐ No ☐
2. If yes to question 1, how many?	
3. Do you know how many tornadoes happen in London per year?	Yes ☐ No ☐
4. If yes to question 3, how many?	
5. Do you know the meaning of tornado risks in London?	Yes ☐ No ☐
6. Do you think there is a risk of tornadoes in the city of London?	Yes ☐ No ☐
7. If yes to question 6, how big of a risk?	High risk ☐ Medium risk ☐ Low risk ☐
8. What would you consider tornado risks to be in London?	Fatal Threat ☐ Stroke of Fate ☐ Personal Thrill ☐ Gamble ☐ Insidiuous danger (slow killer) ☐ Other: _____ ☐
9. If yes to question 6, what category of risk do	Concerned and think urgent

you perceive for tornadoes in London?	actions are necessary to reduce risk in city of London ☐ Fatalist and hope for the best in the future ☐ Trust in local institutions and think that everything will be okay ☐ Consider yourself as self-sufficient ☐
10. List the following effects of tornadoes from what you perceive as the most dangerous to the least dangerous (from1-5, with 1 being most dangerous).	(__) Death (__) Property damage (__) Damage to assets (belongings) (__) Damage to vehicles (__) Sever Injury (__) Minor Injury
11. Do you know of any tornadoes that happened in London in the past?	Yes ☐ No ☐
12. If yes to question 11, do you know what previous damage and injuries that have occurred due to tornadoes in London in the past?	Yes ☐ No ☐
13. Do you personally know anyone that has been hurt by a tornado in the past?	Yes ☐ No ☐
14. If yes to question 13, did this make you become more aware of tornado risks?	Yes ☐ No ☐
15. Have you ever experienced a tornado before?	Yes ☐ No ☐
16. Would you return to the area in which you live if a tornado were to hit it?	Yes ☐ No ☐
17. Do you know whether a warning system for tornadoes in London exists?	Yes ☐ No ☐
18. Are you aware of the emergency procedures	Yes ☐ No ☐

you need to follow if a warning system is issued?	
19. If yes to question 18, what would you do if the warning system for tornadoes in London was issued?	
20. If yes to question 18, where did you learn this information from?	
21. Who do you think you could trust the most to provide the best information on tornado warnings?	Scientific authorities ☐ Mass media ☐ Civil Protection ☐ City planners ☐
22. What are your feelings towards the likelihood of future tornadoes occurring in London?	Feel Panic ☐ Inability to act ☐ Feel anxiety ☐ Feel fear ☐ Feel indifferent ☐ Other: _____ ☐
23. Do you think tornadoes should be taken into account when planning the layout of cities?	Yes ☐ No ☐
24. If yes to question 23, to what extent?	High ☐ Medium ☐ Low ☐
25. How safe do you feel within London if a tornado were to happen?	Very safe ☐ Relatively safe ☐ Not safe ☐ Other: _____ ☐
26. Do you think the city of London buildings would withstand a tornado?	Yes ☐ No ☐
27. Do you think all buildings in the city of London should be kept to a certain standard regarding tornadoes?	Yes ☐ No ☐
28. Do you feel that you as an individual have any say in the buildings ordinances?	Yes ☐ No ☐
29. Do you think the public's perceptions of	Yes ☐ No ☐

tornadoes is important when making building codes for planning?	
30. Do you think policy makers communicate the hazard risks to the city of London very well?	Yes ☐ No ☐
31. If yes to question 30, how have they communicated hazard risks?	
32. If no to question 30, how could the policy makers communicate hazard risks better?	
33. Do you think the public should be more involved in the decision making process for city planning?	Yes ☐ No ☐
34. Do you think more education-information is needed to improve the public's knowledge on tornadoes?	Yes ☐ No ☐
35. If yes to question 34, how do you think this can be achieved?	

Table 2. Interview questions asked of individuals in the city planning sectors of London, England.

Question	Answer
1. What is your current occupation?	
2. What does this job entail?	
3. Would you say that tornadoes are a huge risk in the City of London?	
4. Do you know about the tornado that happened in 2006 in the Kensal Rise area?	
5. Are you aware of the damage that it caused to the area?	
6. Do you think the City of London buildings would be able to withstand a tornado?	
7. Is there a building code that incorporates tornadoes in the City of London?	
8. What is the building code and how is it implemented? (YES) / Do you think there is a need to incorporate tornadoes into building	

codes? (NO)	
9. Do you think that these building codes should be extended to residential areas? (YES)	
10. If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes (ex. fire etc.)?(NO)	
11. Is there a warning system for tornadoes in the City of London?	
12. Could you describe this warning system? / Do you think there is a need for a tornado warning system?	
13. Do you take what the public thinks about natural hazards very seriously?	
14. What do you do when you need the public's perception on a natural hazard in London like a tornado?	
15. Since not many tornadoes occur in the City of London very frequently do you tend to not take them as seriously as other natural hazards?	
16. How frequently does a natural hazard have to occur in order for the City of London planners to take it seriously?	
17. How do you communicate the risks of hazards like tornadoes to the public?	
18. Do you think the public should be more involved in the decision making process for city planning?	
19. Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?	
20. If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?	
21. How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?	
22. How are contingency plans for natural hazards implemented when planning the City of London?	
23. How do you monitor progress of natural hazard plans?	

24. Does the public have any say in what happens in these plans?	
25. Where does your funding come from to implement city planning?	
26. Do you think more attention needs to be made to natural hazard city planning?	
27. What can be improved about the natural hazards part of city planning (YES)?	

Appendix 3

Ethics Approval Notification

From: sshl@kcl.ac.uk [sshl@kcl.ac.uk]
Sent: Friday, July 15, 2011 1:16 PM
To: Thompson, Allison
Cc: Rothstein, Henry
Subject: Online Submission of Application for Ethical Approval

Dear Allison Thompson,

KCL/10-11_1498 What are the public's perception of tornadoe risks in the city of London and to what extent does it affect planning in the city?

I am pleased to inform you that full approval for your project has been granted by the GGS Research Ethics Panel. Any specific conditions of approval are laid out at the end of this email which should be followed in addition to the standard terms and conditions of approval:

- Ethical approval is granted for a period of one year from the date of this email. You will not receive a reminder that your approval is about to lapse so it is your responsibility to apply for an extension prior to the project lapsing if you need one (see below for instructions).
- You should report any untoward events or unforeseen ethical problems arising from the project to the panel Chairman within a week of the occurrence. Information about the panel may be accessed at: http://www.kcl.ac.uk/research/ethics/applicants/sshl/panels/.
- If you wish to change your project or request an extension of approval you will need to submit a new application with an attachment indicating the changes you want to make (a proforma document to help you with this is available at: http://www.kcl.ac.uk/research/ethics/applicants/modifications.html).
- All research should be conducted in accordance with the King's College London Guidelines on Good Practice in Academic Research available at: http://www.kcl.ac.uk/college/policyzone/index.php?id=247&searched=good+practice&advsearch=allwords&highlight=ajaxSearch_highlight+ajaxSearch_highlight1+ajaxSearch_highlight2

If you require signed confirmation of your approval please forward this email to sshl@kcl.ac.uk indicating why it is required and the address you would like it to be sent to.

Please would you also note that we may, for the purposes of audit, contact you from time to time to ascertain the status of your research.

We wish you every success with this work.

With best wishes

Yours Sincerely,
GGS Reviewer

Conditions of approval (if blank there are no specific conditions):

Appendix 4

Martyn Horne. (2011). *Interview on What is the publics perception of tornado risk in the City of London and to what extent does it affect planning in the city*. Interview by Allison Thompson. [Face-to-face interview]. Town Hall, Forty Lane, Wembley Middlesex, HA9 9HD; 18 November 2011, 2:30 pm.

Martyn Horne = M, Allison Thompson= A

A- What is your current occupation?

M- I am the head of the of the emergency planning and civil protection for the London borough of brent

A- Umm...What does this job entail?

M- Primarily this involves making sure the council forfills its requirements of the civil contengiencies act which involves emergency planning, risk assessment and business continuity ummm... but there are other duties but those are the primary ones

A- Need to writ this down just incase th recorder does not work out

A- Would you say that tornadoes are a huge risk in the city of London?

M- No

A- Do you know about the tornado that happened in 2006 in the Kensal Rise area?

M- Yes, I dealt with it
A-Must have been pretty intense
M- Yes, I am sure you know all about it

A- Are you aware of the damage that it caused to the area?

M- Yes, all of it

A- Do you think the city of London buildings would be able to withstand a tornado?

M- The structures yes depending on intensity. major problems would come from glass, and in the suburbs it would be um... roofs being ripped off and garden furniture being dragged around. I will show you the powerpoint later of what I mean... But we had loads to repair in Kensal rise

A- Is there a building code that incorporates tornadoes in the city of London?

M- Not that i am aware of you would have to speak to the building planning department

A- Uuumm...Do you think there is a need to incorporate tornadoes into building codes?

M- I don't know, you need to speak to building planning to get this information

A- UUUmm...If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes like fire and stuff

M- Ya i mean they will be built to fire safety because the fire safety department would build them to the building planning control standards. Again I do not know the details but I am aware they are there. Uuum... Certainly in terms of commercial and retail properties. They will built with this standard. Uuum... It would be quite an event when they would put the buildings up

A- Is there a warning system for tornadoes in the city of London?

M- No

A- Could you describe... Oh... Do you think there is a need for a tornado warning system?

M- I think it would be very difficult, uuumm... to establish a warning system without any expert knowledge. Uuum... I am aware that Britain gets more tornadoes per square mile than the States. But they tend to be very low key

A-Ya... I read about that and I thought it was very interesting...

M- Ya, I mean i was very surprised to find that out.

A- Yeah...

M- The two major ones were in down here, one Birmingham... sometime before the Kensal Green... Kensal Green Area one. There have been a couple of minor other ones.

A- Ya that is what I have been saying to people.... that yup it is true!

M- Ya

A- Do you take what the public thinks about natural hazards very seriously?

M- Yes, we have to handle the perception. (stops abruptly)

A- Uuumm.. What do you do when you need the public's perception on a natural hazard in London like a tornado?

M- I cant speak for London in general. But um what we would do in terms of the response and that is what we are trying to manage people's fears by um... by putting the information out through the council internet, uuumm local radio if they offer to put the messages out, local media and certainly during the actual event there is a lot ... a lot of uuum... of media interest ummm again I must stress a lot of the messages would go out through the press.

A- Umm... Since not many tornadoes occur in the city of London very frequently do you tend to not take them as seriously as other natural hazards?

M- It is not the case that we do not take them seriously. We have got... we have got plans put in place and we did not put a tornado plan in place but we used the generic emergency plan to deal with that particular response... So the question does not fit the planning arrangements that we got .

A- How frequently does a natural hazard have to occur in order for the city of London planners to take it seriously?

M- Once hahaha

A- Once, ya, one big mess up then it's like...

M- Ya, I mean then what happens is there is a review afterwards. Umm I mean the tornado we did one afterwards and we were happy that the generic planning arrangements worked effectively in managing a response to that. However, you get the floods... things like floods which were affecting this country four or five years ago...

A- Yes

M- that resulted in a major uumm review which uuumm was called the PITT review, PI double T, it was a review of all the flooding arrangements. So it was recognized that the that the council counting arrangements did not really work effectively because widespread flooding and a major review undertake to try and bring things together. Um i cant recall how that went

A- Uuum... How do you communicate the risks of hazards like tornadoes to the public?

M- Umm. We have got a risk register which is ah which is published in west London. It is non accessible which umm

A- hahaha

A- Do you think the public should be more involved in the decision making process for city planning?

M- Pause (15 secs).... I have got mixed views on that ummm

A- Yeah

M- uuuumm... You can get very useful feedback from them in terms of what their requirements are umm and how you can better manage their immediate um needs for an emergency such as that and also for their longer term needs... uumm alternatively planning for the event itself their views are usually worthwhile but they should not be dictating uuuumm as to what should be actually decided upon

A- Okay...

M- but, but they should be taken into account.

A- Do you like, like train professionals for that?

M- Ya to deal with the data. It is not to say sometimes the professionals overlook things that are so evident that really you want to see. So really the lay mans input sometimes can be very useful. Particularly it comes down to the welfare needs, uumm their, their requirements uum to make the post event experience sorry to use that expression to be more available and more desired to meet their needs.

A- Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?

M- If we could do it, it would be wonderful.

A- Umm... If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?

M- They could phone my office, the contact number is on the on the councils internet site. There is also um London fire brigade emergency planning which uuum it coordinates with uummm emergency planning in London, they have a very good website. There are other sites such as like London Resillience and London Prepared which are very good as well.

A- Umm.. How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?

M- If I am speaking from the experience we had, the umm the surveyors go in and access the structural integrity of all of the buildings that have been affected uumm whether or not they

are safe to be re entered. The surveyors went around with the fire brigade team in making this assessment... It took about four to five days to make this assessment... uuumm... if it were to be flooding for example then there would be more extensive and more agencies would be involved.. the health protection agency would be involved, the environment agency would be involved, because you would get issues such as dead carcasses, animal carcasses whatever lieing around which could contaminate, sewage lieing and therefore health assessment would have to be made before an area could be opened up to the public.

A- uhuh

- **A- How are contingency plans for natural hazards implemented when planning the city of London?**

M- Let me speak for Brent. We have a major emergency plan which coped well with the Tornado. In terms of flooding we have got a specific flood plan that would be implemented. And that again is a multi-agency plan that is drawn up with the police, the environment way, environment agency, British water ways, health and protection agency that is put through.

A- okay...

- **A- How do you monitor progress of natural hazard plans?**

M- We do the plan, handy haha

A- Yeah!

M- But the flood plan um that got sent off to the environment planning agency to be validated.

A- okay...

M- And again that followed a national plan that was actually worth to make a plan and that arose from the PITT review which I mentioned earlier.

- **A- Does the public have any say in what happens in these plans?**

M- Not to any great extent, I have to say

A- Ya

M- But we do get the occasional pressure group that have come up in the past so we have to be acomodating. But on the flood plan we had a local guy who uum was very well versed in the flood risks in brent, so he was spoken to as he had wealth of historical knowledge on floods in that area.

A- Has there been any like uuh... protests against any of the plans implemented in the past?

M- No

A- No!?

M- I am not aware of any ever in London. But in the past we have had events that are not so much natural but need to be assessed again are for example like the London bombings where the whole emergency response had to be looked at again. Um I would envisage a review would need to be done if we would have something that is very serious.

A- Ya...

M- For example the Thames flooding over, flooding central London, which would probably be the biggest natural hazard that London has got.

A- Ya...

M- We would not be affected here to any great extent but if the Thames went over whole load of London boroughs would be affected and I would have little doubt that following an event such as that, there would be a major um review of the arrangements of how they could put it together. That's the time public pressure groups um and full scale or large scale consultation would be likely to take place.

A- Where does your funding come from to implement city planning?

M- It comes from the council funding, we do not get any central funding at all. We used to, we used to get umm a direct government grant which catered for about one third to a half of the costs but that grant was withdrawn about six ... six to seven years ago. And now we have to use council funds...

A- ya....

M- as well as council taxes...

A- Do you think more attention needs to be made to natural hazard city planning?

M- Now again I am going to speak from the perspective of Brent

A- Okay...

M- The natural hazard Thames quite clearly needs to be looked at, no doubt about that whatsoever. If you are including the natural hazards severe weather um well both knowing the standard expense of the continent we have not had too much severe weather over here,

climate change um has certainly impacted um on London. We remember southeast over the past four to five winters um where we were experienced more snow on a regular basis than we have previously been used to and that has caused a new vision of Britain's arrangements of Britain's supplies and things like that and eventually including that as an actual hazard. Uumm changes have been made over the past couple of years.

A- What can be improved about the natural hazards part of city planning

M- Um what you need is a more coordinated approach across London in terms of the emergency response. London currently is done by borough by borough with the London fire brigade emergency planner, planning and trying to exercise some degree of coordination over it. My view, it would be far better if emergency planning wereto be taken over by the mayor's office and a representative in each of the boroughs because that way you could get more direction and and what is the word o ya consistency of approach, you would get economy of scale and eventually a capatible communication system. While the system of the moment works very well a centralized emergency planning would work a lot better. But that is a guess because we are not there. We have not done it.

A- Okay we are done with the interview...

M- Right... what we will do now is go through the presentation I did. After the tornado came about we had to go out and give presentations to the public. I came here 20th of November 2006...

A- O! Basically right before all of this happened

M- Yes, two weeks before. On the 23rd i went to see the chief executive here and i said what do we need to do for emergency planning and I said I think we need to raise the profile about emergency planning to the council. On December 7th i hit the target, so that was on the 7th of December and it touched down in 11 in the morning, it was ¾ of a square mile area, winds were. It was over in a minute.... going through the presentation...

A- Were you down in the area most of the time

M- No i was in the control room area, lamp posts were damaged, damages to garden, roof tiles were embedded in pianos, if it happened at night people would have been killed no doubt about it.... a roof tile went throught the bed, someone would have definitely been hurt

A- yup

M- the wind just sucked a side out of the house, very interesting situation

A- ya i bet

M- extensive damage over quite a wide area, you can see this in the fences, some of them were dumped in the middle of the road, it was in a fairly small area, 8-9 roads affected... there was a special needs school within the area, a emergency area services was established in that school, fire brigade declared the incident, they got different calls and did not realize it was the same incident and thought more incidents were happening but it was just one

A- How far away did people call from?

M- I do not know. Continues with presentation.... Found out 20 minutes after it happened, started to organize. Media management was a big issue, it started at clearance. Parking things that people do not think about. Emergency parking plans needed to be put in effect. Roads were closed, parking permits tend to be for a certain number of roads, if you park in another area than parking permits do permit. Little things that piss people off, so we needed to think about little things like that. Managers from street care, housing, surveyors were on the scene. Did an assessment. Reception centre fire brigade set one up that was too close to the incident, had to reset it up. Help line was set up... umm...

M- We had intense media coverage, some people were trying to pose as residents or evacuaes so that they could get into the rescue centre

A- ya that it crazy!

M- ya so that caused some problems

A- ya that is scary

M- continues with the presentation.... There were 8-9 tv crews that tried to get in, but we only allow one crew to get. So they get in and then come out and share their footage with the other tv crews. Politicians, residents, local police were interviewed and this was done over several days. Newsletter were put through the doors so that residents could be kept up to date. Kept a close eye on the area for four weeks, building advice. Clean up took four weeks and fast tracked people that needed planning clearance.

A- People that had no insurance what did they have to do?

M- They would have to go and speak to the building society. We were not legally bound to help the residents of cost free stuff.

A- So like what happens to all of the stuff you are working at that time, does it get pushed back and stuff

M- Ya it gets put on the back burner. Seen awareness training is required. They need some guidance as to what to look for. Cordon access, as always was difficult. Media interfered with getting the rest centre set up

A- ya

M- Media want it quarter to the hour but we did it on the hour at 2:00.

A- Was there a lot of pressure on you guys?

M- You have to appreciate where they are coming from, because they put their news stuff out on the hour. Continues presentation.... JESCC is the coordination centre at the scene... Confusion over the surveyors terminology which made it difficult because residents did not understand. We got it more or less all right. We only got one complaint

A- That is pretty good

M- That is more than just pretty good.

A- Ya

M- we only had the one complaint from a person who lived four blocks away and he was complaining because he did not receive a leaflet in the mail. That was the only complaint we got. So thats it. Would you like a copy of that?

A- Yes, please.

M- Alright.

A- Thank-you so much for your time.

M- Not a problem. I need some paper Victoria.

A- DO you continue going back to the area to see how it is doing?

M- Not anymore. We stopped going back about two weeks after once the major stuff was done. Emergency planners stop going down there we are more or less finished after the response phase. There comes a point where the recovery part becomes more than just business. Thank-you Victoria for the paper

A- Did you get any thank you notes from people

M- O ya definitely, 8-9 thank you notes

A- Did you know if anyone had to, after the event go to any sort of counselling because they were traumatized from the event? Do you know of anyone?

M- No

A- It was really lucky it was during the day.

M- If it was at night there probably would be fatalities

Appendix 5

Claire Whatley. (2011). *Interview on What is the publics perception of tornado risk in the City of London and to what extent does it affect planning in the city*. Interview by Allison Thompson. [Face-to-face interview]. Guildhall, London EC2V 7HH; 19 November 2011; 2:30 pm.

Claire Whatley = C, Allison Thompson= A

A- What is your current occupation?

C-I am a contingency planning officer.

A- Uuum...What does this job entail?

C- Um, okay, um let me think... it is to ensure that the City of London can respond to major incidents and...

A- sorry can you say that again...

C- O ya sorry it is so the City of London can respond to major incidents and that it is able to continue business at the same time by providing services etc.

A- Uuumm.. Would you say that tornadoes are a huge risk in the city of London?

C- Ah, well haha what I have brought for you that you can take away with you is the London Risk Register

A- Thank-you!

C- Ya, and the community risk register... the community is basically, there is a picture of London there... all of the boroughs, all 33 boroughs of them are grouped into different resilience forums and we are grouped in the central London resilience forum. Soo... umm.. I think that the central boroughs is ourselves, Southwick, West Minister, etc. Um and so thats our umm thats the London one. Obviously there is quite a lot of stuff on severe weather, as you can see there.

A- Okay...

C- Um ya so it is obviously identified as a high risk. Not necessarily a tornado but severe weather is identified as a severe risk in London. I have not really looked to see if we have identified tornadoes but I will look after. I do not think it is mentioned. But one thing that is

important to remember is that the plans put in place umm we emergency plans we have in place in London are generic plans that are put in place to respond to any incident. So whether that incident be severe weather, snow, terrorist bomb the plans are there and we try to keep them generic so that it would work for each individual incident.

A- Uuumm... Do you know about the tornado that happened in 2006 in the Kensal Rise area?

C- Yes I do.. Yes

A- Are you aware of the damage that it caused to the area?

C- Yes.

A- Do you think the city of London buildings would be able to withstand a tornado?

C- Oooooo I have no idea... I have no idea. But I can put you in touch with one of our structural engineers... I know someone, my colleague David who could um help you

A- That would be amazing!

C- Yup... that would mean a trip back to the Guild hall haha!

A- Ya...

C- Ya so i know someone... My colleague David... He would be able to... He would be the person ... he is on call so if there was a fire for example in the city and the fire brigade was not sure if it was safe for them to go in. Uuumm He would go in and assess the structural damage and make sure that you could go in or if you cant. So um he knows a lot about that.

A- Ya..

A- Is there a building code that incorporates tornadoes in the city of London?

C- Ya definitely. David would probably know.

A- Umm... What is the building code and how is it implemented?

C- No idea

A- Do you think that these building codes should be extended to residential areas?

C- No idea

A- If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes (ex. fire etc.)?

C- There are things put in place for all of them

A- Umm... Is there a warning system for tornadoes in the city of London?

C- Not tornado specific but we do have plans in place to warn and inform the community of well we call it warning and informing. So basically what we do at the moment is that we provide when I say community I am talking about businesses and the residents... we actually only have 8000 residents here...but um we have a duty to warn and inform people as to how to respond to incidents. So basically um we have an email system that people can register for on the website, so that I can email all of those people in one go. Um... obviously we have Twitter

A- Twitter!?

C- Haha um ya! Twitter!

A- Twitter!?

C- umm ya i know!!

A- I guess that is the new way of doing things these days

C- Ya... right! Ya i know! Uuumm we also through the police have loud speakers on all corners, we are able to use them in the event of a major emergency ummm our website is obviously the best place for people to look for advice. So um that is how we treat all incidents so if there was a for example if we would get umm a weather warning that is severe that could cause a heat wave we can start preparing and informing our residents etc. So if it was a warning for example severe weather ie a tornado we can start warning and informing the public of what to do for that particular incident. So we do not have any put in place for specifically for a tornado but we have something in place to warn and inform residents.

A- Okay...

C- yup...

A- Umm ... Okay... So.. Do you think there is a need for a tornado warning system?

C- Um i think the warning system that we have in place here in the city will probably suffice

A- Ya

C- Yeah...

A- Umm.. Do you take what the public thinks about natural hazards very seriously?

C- Yes, we do, umm yes hence the um

A- Ya i was going to say...

C- Ya the risk register. Ya absolutely ya

A- Uumm... What do you do when you need the public's perception on a natural hazard in London like a tornado?

C- Umm... oooo... we (pause) we have uummm okay I will split these into two because um we have we have two communities i think here in the city because we have so few residents because I think we are mainly business orientated but obviously our residents are just as important to us umm we have residents meetings, publications that go out to residents

A- Yeah..

C – So if there was, umm if I needed to find out the perception of a natural hazard I could always put something out in one of the publications or mention it at one of the residence meetings

A- Ya that is what Janet was saying too

C- Ya, as far as businesses are concerned we also do a publication for businesses.

A- Ya because that is what everyone does in this area

C- Ya mainly... ya

A- Ya businesses

C- And also I have a group called the City Emergency Liason team which i call CELT which is made up of representatives from um city businesses, representatives from the insurance industry, representatives from the banking industry, for example. Umm and i host a meeting every three months on um something we done more recently is turned it into more of a working group and we are actually looking at risks and hazards within the city of London. So um I would say that, that work is actually probably going on so it is not what I would do, it is what we actually have been doing almost around. When i say risks you know i am talking ... mean all risks and hazards but obviously severe weather is important. We are already working on that with the business community. As far as the residents community um if i was asked to find out there perception of a risk it would be quite easy to do so and I think that there response would be quite good... there quite good at communicating with us

A- Ya, because there is not many... because i ... i ... is New Bridge Street part of this borough

C- New Bridge... umm i am not sure where is that?

A- it is like st pauls is over here, and fleet street is right here and new bridge street is like do you know where blackfriars is because ya i live on that street

C- O really!? Janet probably knows that area because of flood risks

A- ya she showed my flood risks and stuff there...

A- Uumm... Since not many tornadoes occur in the city of London very frequently do you tend to not take them as seriously as other natural hazards?

C- I think we would take them as seriously as other natural hazards ... completely especially after... funnily i cant believe but i just walked straight past the person who was the emergency planning officer for Brent at the time who is here for another meeting...

A- that is so funny because I had a meeting with him yesterday!

C- o really ya well Rob Whalley is here today but he used to be at brent

A- o not him! I need to get into contact with him

C- o ya definetly... so ya what happened to them we would take it as seriously

A- Ya

C- I think another thing as well, that umm... if somebody said to me that... I have been doing this for 14 ... nearly 14 years now... If someone said to me ummm... nearly like five years ago that we needed to have a plan in place for the volcano erupting in Iceland i don't think i would have taken that 100 percent seriously because I would have thought that a volcano in Iceland would never have any impact on the city of London... however it did... it had a huge impact.. because people were trapped abroad for so long that we know we are here to provide key services like collect bills, cleaning the streets, collecting rubbish, uumm social care and it you know we had key, key staff trapped abroad that could not get back... it would have had a huge impact... and you know the bank of England staff may have been ummm so i think all hazards and risks should be taken seriously as if

A- As big or small it may be

C- ya absolutely

A- ya

C- You cannot predict the weather these days... you know in New York i went from heat wave to raining back to heat wave again

A- o my god how was New York?

C- it was amazing... ya it was very fun! Where are you from

A- um i am from Canada

C- where exactly

A- Alberta, which is on the west side

C- so what are you over here doing studying?

A- ya, i got to Kings College so ya!

C- excellent!

A- How frequently does a natural hazard have to occur in order for the city of London planners to take it seriously?

C- umm

A- as you were saying about the volcanoes you were saying it is one big incident sort of thing

C- Ya I don't think something has to happen necessarily very frequently... um I think we do take all hazards seriously. Again when you take a look through the risk register you will see you know severe weather appears so many times, droughts, coastal flooding, urban flooding.

A- So you guys cover all areas?

C- Ya we have bridge collapse, ummm complex built environments so that is probably very interesting for you as well. Bridge collapse etc.. Land movement, landslides ummm so ya we take in lots of comments yaa...

A- o ya i bet

C- but not anything specifically on tornados maybe I should mention to the guy that tornados should be taken into consideration... I think it would be under severe wind or

A- ya i think it just depends on what area you are in, in London. Because I think down here there maybe not as much severe weather but maybe on the outskirts and stuff there is more because it is further out?

C- ya, even in central London i would say it is taken as a high risk even if it happens on the outskirts...

A- Uumm... How do you communicate the risks of hazards like tornadoes to the public?

C- uumm i do not know we have a duty to inform and warn anyway... um i bet if there is a specific risk that we knew was on its way like heat wave, flood risk, over flooding of the Thames barrier...

A- ya...

C- or you know if the weather forecast says there is a risk of intense wind gales or if a tornado was heading this way then we do as we said before we have the email alert system and we also have system called VOCAL which is a um text messaging system which the police actually run so we contact the police to tell them to send messages on our behalf... so there are already ummm twitter, text messaging, emailing, the websites, loud speaker systems which we try not to use as it would scare everyone

A- haha ya...

C- but they are in place to be used at any time.

A- do you contact the media and stuff?

C- yup... yup we have our own media department here called public relations office. Um and if there was a major incident they would be with me and my team um... to assist us with the part time communications during an incident

A- ya thats cool!

C- ya...

A- Umm...Do you think the public should be more involved in the decision making process for city planning?

C- ummm well obviously i just deal with emergency planning. SO um Janet dealing with planning and building regulations, planning permission etc... mine is i just plan for emergency so we work in different departments. What question are we on again sorry?

A- we are on question 18

C- (reads out question again) sorry... i mean as far as janet as the actually planning ummm or building in the city etc but as far as emergency planning ya... i mean the public ummm obviously...

A- its hard Because ..

C- ya i mean we do not want to sound like experts preaching because we are not because we are always open to people coming around. We involve them in different ways. For example i last Christmas but the Christmas before i designed a calendar for our residents which had a really nice picture of somewhere in the city... umm.. underneath it was... it was about this size... and I left spaces for them to write on and then on each month i put a very important emergency planning message... like for example if something happened with a tornado i would say something about evacuation... do you have a grab bag ready in your house?

A- smart idea! I mean it is like the little things like that you know that actually keep you prepared for emergency

C- ya you know just having your children's school phone number handy and having a family emergency plan ready so you know if everyone is in different places you would know where to meet, if the mobile phones are not working how you are going to contact and just like more people have started considering these things now... so i think we involve them more within the warning and informing. But obviously yes, if somebody... we do get phone calls from residents if around if this would happen and if this would happen if this happen and we attend residents meetings.

A- ya because you can only do it to a certain extent... they are people that take things more seriously than others

C- ya we actually work under something that is called the Civil Contingency Act which is an Act that was passed by the parliament in 2005, so it might be worth looking at as well and that basically gives local authorities a statutory duty to provide emergency planning services to the public and to businesses that work in the jurisdiction. So um... it is my and my team it is our duty to do this work on behalf of the tax payers they pay their taxes and is a service that should be provided with and is the same as how tax payers pay to pick up rubbish on the street. It is a service that has to be provided so... ya.

A- Umm... Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?

C- Umm... do you know from a personal perspective i think because the weather has become so bizarre in the last couple of years from a personal perspective i would say yes. From a professional perspective i think the plans that we have in place to deal with different hazards and risks are sufficient to deal with things like a tornado. I know the damage from the tornado can be similar to the damage caused by a terrorist bomb so...

A- Ya...

C- Ya so we have plans in place... we have plans to clear away rubble you know plans to clear the place of evidence or bodies...

A- you know we have plans for everything...

C- you never know what the instance is going to be... it will always be something you have never thought of... so we have these plans that we keep quite generic so it could work for any particular instance. I mean I know from a professional point of view but as far as me myself being a member of the public where i live umm ya... ya it would probably be good to know a little bit more actually

A- ya, ya

C- more and more severe weather, i mean you would have never thought a five years ago or i mean well in 2006 that a tornado in London would have never been heard of or a volcano from Iceland affecting London. But now I mean anything can happen it can snow tomorrow...

A- ya exactly!

C- You know you have to be prepared for anything!

A- True... haha

A- If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?

C- Okay they would um... if the council were the people they would want to contact then they would probably go through our contact centre who answer the phone who would put them in touch with someone on my team or Janets team. And anything they want to know about it I would answer or Janet would answer.

A- Ya you guys are really good with getting in touch.

C- Ya me and Janet have done a lot of that stuff, and we get on really well so..

A- Ya she was like you should definitely speak to Claire.

C- Ya she is great!

A- How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?

C- Um okay... that is probably two different answers. From a structural view point I could get you in touch with David but umm and from a kind of recovery point of view in the community

we do have a recovery plan, London has a London recovery protocol. Um i mean i use the City recovery plan. Again that recovery plan works for any incident... so if there has been a terrorist attack in the area.. umm i don't know... um a train crash... so we have a plan in place and we would listen to what the community wanted, we would have community meetings, community cohesion, make sure there was no racists actions going on, monitoring that. We would listen to what the community wanted and then let the local authority deal with the rest of the recovery plan i would say.

A- ya i guess each one of them are all different so just go from there and listen to the public's needs once they say something...

C- ya, listen to their needs... i think the public are quite good at um realizing and understanding the word natural... it is natural so could happen to them again if it happen to them once... so ya it just listening to their needs and going from there

A- How are contingency plans for natural hazards implemented when planning the city of London?

C- same as any other plan would be implemented, ya absolutely

A- How do you monitor progress of natural hazard plans?

C- Okay we um each plan um once should once it has been written should then be validated... the way we validate our plan is by doing exercises with them. Whether this be a table top exercise, which means the agency sitting around a table and saying imagine this happening or imagine this happening or an actual live real time exercise which could obviously be hugely labour intensive to run but have been done in the past. Umm... one of them was done on a tube train. But um each plan will be exercised eventually so um we then call it validated.

A- ya...

C- And then obviously training as well...

A- ya i was going to say...

C- training so um training around staff being able to record, help us with logging decisions, communicating... but mainly exercising and training.

A- ya is that what you had to do when you got a job here did you have to go through different scenarios!?

C- ya i did actually, ya for my training i had to go through four different incidents in the past and yes i had to go through case studies. ya you had to pick two scenarios to figure out. But definitely very different to the real life ones

A- ya i bet!

A- Does the public have any say in what happens in these plans?

C- umm... no reason why not, no reason why not. We publish them well the City of London is developing a new website at the moment, the ultimate aim to have all of these plans. Yes absolutely... it is our ultimate aim to have all of these plans published obviously not our restricted plans on the website and obviously if a member of the public had a issue with these plans we would obviously listen to them.

A- ya...

A- Where does your funding come from to implement city planning?

C- Umm emergency planning ... ya sort of just within.... services of London gives my manager a budget but ya i do not really know the answer to this one...

A- Do you think more attention needs to be made to natural hazard city planning?

C- No I think as long as you can identify that is a risk that should be planned for and there are plans in place to respond.

A- ya if something did need to happen

C- ya, the funding one don't mention anything because i really don't know! I could find out but i do not really know

A- do not worry i wont.

C- another thing about the attention to natural hazard planning would be PAN London, we have got a mass shelter group who looks at mass evacuation planning and mass sheltering for London. Which is quite interesting because I arrived in Washington like four hours before hurricane Irie hit recently.

A- ya

C-so having seen that huge area that was evacuated and stuff. So we are planning in London...

A- o yes, i totally forgot you got there right when it happened!

C- i arrived in like five in the afternoon and it hit at nine in the evening...

A- o my god , ya you were like alright just arrived from work now i am back on the job already!

C- ya it was unbelievable...

A- crazy!

C- It was crazy I was going to study a major incident in America and then I walked right into one so umm

A- Ya wow!

C- Again so PAN London we are looking at mass sheltering. So obviously if there was a small gas leak at the barbican and we had to evacuate two hundred people that would be a local response and we would be down to myself and one of my other colleagues. Um however if there was something huge like a massive tornado or a hurricane were to hit and we would have to evacuate lots of people then that work would be done by PAN London so we are looking at how many shelters do local authorities have, how big are they, how long could they be run for, what resources do you need to run for certain amounts of time. So um.. that work is being done on a huge scale and I am actually deputy chair of this group and we are meeting tomorrow. So ya the small localized stuff we deal with here but if there is a huge instance than as far as sheltering and evacuating those people it has happened in the past that we are revisiting the plans in light of risks changing all of the time.

A- ya...

A- What can be improved about the natural hazards part of city planning (YES)?

C- umm... i am not sure of anything we could improve.... obviously we can always improve but i am very happy with what we have at the moment. So umm... another example I could actually give you is that we are doing a big exercise next year in conjunction with the City of London police and my manager was looking for a scenario where the police would have to respond and we would have to respond so that we could put the exercise together. And um I actually chose severe weather as the scenario and my manager accepted it while I was away and it was actually approved. So there is going to be a large scale exercise

A- on severe weather?

C- ya! and if you want you can come and be an observer...

A- i would love to do that, that would be very cool!

C- ya so its going to be on severe weather and ya I can even use the words tornado in which case they can do a response to tornadoes or hurricanes in which case the exercise would be in response to tornadoes. It is actually happening in March next year. There is a guy that works for the environment

agency and he phoned me the other day and he has all of the information about the hurricane that happened in 1986. So we are exercising on a huge level on natural hazards in March next year surrounding this scenario. We have the chance to do this exercise and we have chosen to do natural hazards instead of a terrorist attack so natural hazards is huge for us this year.

A- that sounds amazing! Well that is all of the questions i have to ask you!

C- amazing well thank you so much!

A- no thank you for your time I really appreciate it!

Appendix 6

Janet Laban. (2011). *Interview on What is the publics perception of tornado risk in the City of London and to what extent does it affect planning in the city*. Interview by Allison Thompson. [Face-to-face interview]. Guildhall, London EC2V 7HH; 10 August 2011; 2:00 pm.

Janet Laban= J, Allison Thompson= A

A- What is your current occupation?

J- I am a Senior Planning Policy Officer responsible for the sustainability related aspects of the Local Development Framework

A- What does this job entail?

J- My job deals with planning and building regulations, planning permission and development.

A- Would you say that tornadoes are a huge risk in the city of London?

J- Not that I am aware of.

A- Do you know about the tornado that happened in 2006 in the Kensal Rise area?

J- Um yes i think I do vaguely remember something happening.

B- Are you aware of the damage that it caused to the area?

J- No I am not.

A- Do you think the city of London buildings would be able to withstand a tornado?

J- Yes I would presume so. The cooridoors between tall buildings whether a tornadoe would be a worse problem. Say Kensal rise is all terraced houses. But i do not know whether there would be a different impact on these tall buildings in places in America.

A- Ya America has the most tornados in the world

J- my brother lives in florida. And they probably have tornadoes i do not know for sure i know they have hurricanes

A- I am pretty sure oklama has the most.

A- Is there a building code that incorporates tornadoes in the city of London?

J- I very much doubht it but um whether there is something that you know I do not know whether there is anything that would incorporate those kind of forces

A- ya and the buildings are very solid, cement buildings, they must be pretty strong

J- the steel and glass ones though, whether the glass is sufficiently resilient. And most of the newer buildings are built out of glass. And then bviously you have all of the historic buildings as well.

A- i would say the historic buildings could withstand it more

J- They might not though! The forces are very different than before. You would say St. Pauls cathedral!?

A- Do you think there is a need to incorporate tornadoes into building codes?

J- I think at this stage probably not, but obviously one of the areas I do work in is climate change. We are seeing different patterns of climate. If looking much further in the future it could be something we might need to consider. At the moment i think it is a one off freak type experience. In some ways it would be over kill to incorporate those kind of things in building design.

A- Does it cost a lot of money when putting in new building codes?

J- I would imagine it would. At the moment we are trying to encourage green roofs... in order ... we are seeing different patterns in the weather, heavy down pours.. if we could get more green roofs and landscaping to absorb this water it will reduce the flood risk. If we started to see a pattern where we saw more tornadoes that hit other parts of the country more then we may consider it more. If we started to see this pattern more with climate change of tornado type weather patterns then we would have to start looking. I would imagine it would be very expensive to test and retro fit to test things that buildings have not had to deal with before.

A- If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes (ex. fire etc.)?

J- Ya so with tornadoes i guess there would not be anything you could predict. You would just have to have the resilience in all of your buildings. Some buildings i would imagine that it would be similar to a terrorist attack, the secondary impact. Everyone in the city is aware of this impact and have tried to design security measures and designs that are more resilient. You cannot predict a tornado or prevent.

A- Yup and hope for the best.

J- I think when I was last speaking to my brother he said they had these hurricanes but they could figure out when they would touch down. Whereas Tornados he said just touchdown randomly and they are difficult because you do not know they are coming because they are a complete shock.

A- Is there a warning system for tornadoes in the city of London?

J- No but we do have um an emergency planning um...

A- Sorry, do you have an extra pen just in case this does not record thank you

J- hahaha um yes there is a emergency contingency planning group. Who their approach is to have a emergency plan for whatever the emergency is whether it is a flood or whether it is a bomb or you know whatever emergency... whether it is a riot... you know thinking topically

A- yeah...

J- the emergency plan is a generic plan that they would apply for whatever the emergency was. So it is either you know you ask people to stay where they are or you ask them to evacuate

A- yeah...

J- It is those kind of things that whatever it is you make that decision

A- do you notify people on the radio and stuff?

J- yes that is one of those pieces of advice, yes there is a little section on the website there if you look up and if you go onto our website you can go onto emergency planning, it has a section about all of the different kinds of advice and one of the things is to you keep tuned to the radio and to wait and listen as to whether or not you should evacuate. There is also advice as to how to put together some of your belongings.

A- that is very smart, because I am sure like if a tornado were to happen I do not know if anyone would know what to do.

J- No that is right. You know some kind of unforeseen emergency like that hopefully they would be able to apply the emergency plan that they got rather than it being a tornado plan or a flood plan. They will react to whatever the emergency is... with the plan that they have got

A- yeah...

A- Do you think there is a need for a tornado warning system?

J- I do not think so. Ummm i think there are other warning systems already in place that could sufficiently notify someone of a tornado. And and... my understanding is that it is very hard to predict tornadoes anyway so a warning would be quite difficult.

A- Yeah it would be a freak accident... yeah it would just be not even yeah worth it, other than like knowing that there is wind and stuff prior to it but it you would probably not have enough time I think

J- uhum, and you would not know where exactly it was going to hit. And you might you know end up panicking people that really do not need to be.

A- Exactly and that could cause a whole new area of problems.

J- Yeah. Again thinking of flood risks, that is one thing they want to try and avoid. Is is um making too many people worried about a flood because actually the city is quite resilient to floods. You know other than these areas or these areas... However most of the city is not at risk to flooding. Really when you look at it in more detail it is mostly this area (points to map) or this area around the river. Mostly sort of little pockets are more likely to be pooling and puddling whereas if you go south of the river the whole of the south of the river is at risk of flooding because it used to be a marsh.

A- Crazy! And then they morphed it into... thats crazy...

J- So so, what I am saying about the you know you want to avoid making people panic about something that they do not really need to panic about. And I think having some kind of tornado warning would make people panic more than they need or make them anxious more than they need to be. So you have got to have a balance between being making sure people are safe and making sure that they don't sort of become more anxious than they need to be.

A- Uumm... Do you take what the public thinks about natural hazards very seriously?

J- Uh yes I think so. Um... I mean... just thinking probably one of our emergency planners would be a better person to ask. I am sure they do, they certainly have a system of warning people and sort of getting people prepared and I know that the last time they sent something out to residents they did have a few queries about flood risk and they took them seriously the actually queries that came in.

A- okay...

J- I think what we try to do is to have factual information for people so that you know so that you can um so that you can reassure people.

A- yeah just to make sure everyone is okay...

J- Yeah... Just anecdotally we had one lady a few years ago now. She lived down in Surrey somewhere, and she got into her head that all of these tall buildings in the city were causing a wind problem throughout the whole of the South of England. And and she you know she had this she wrote into us in one of our consultations and we did bring ... you know we invited her to come in and we chatted to her and we presented to her the evidence that actually you know it was very, very unlikely that there was or could be any impact. So what we would try to do if people are concerned about natural um... weather phenomena like that is to try and have the actual facts available so that we can assess as to whether their... whether their concerns are real or not.

A- Yeah because it is so psychological...

J- And... and with climate change none of us know what is going to happen. So you know you do have to take people's concerns seriously.

A- O yeah..

A- Um... What do you do when you need the public's perception on a natural hazard in London like a tornado?

J- Well.... i am trying... probably the thing we have done most work on is our climate change. We did, we have got a climate change adaptation strategy. Which um.... we looked at you know what would the impact be of various scenarios of climate change.

A- okay...

J- And the way that we got people involved with that was through um... sort of inviting people to workshops and we have some residents and some businesses and you know the people from our own open spaces department you know what would the impact be on the parks and urban spaces sort of be that sort of thing. And, and put scenarios to them of you know what if the weather was hotter or drier in the summer and warmer and wetter in the winter? what would be the potentially impacts.

A- okay...

J- So you know that would be the way and then we published the um the climate change adaptation strategy on the website. So anyone that wants to make a comment on it, can. I don't think we actually had a consultation on it we didn't specifically send it out and invite peoples comments. But if people wanted to they could make a comment on it. Umm.. So again I guess if the.. if the weather patterns made us think that it was likely that we would likely be hit by a tornado then we would use the same sort of approach that we would look at trying to work out what the facts are, what the likelihood is and ...

A- That is really cool, yeah... because some people's perceptions are completely out of whack you know they get too...

J- Yeah some people get very anxious, like this lady who lived down in Surrey. She got completely out of or our view was she completely got out of proportion the potential danger. Um... But we did take it seriously you know because you never know somebody who comes up with one of these, these perceptions. They might be a head of the ... of the science.

A- haha ya you are like o oops!

J- haha ya she told me that six years ago and... Haha

A- Umm...Since not many tornadoes occur in the city of London very frequently do you tend to not take them as seriously as other natural hazards?

J- I would say that we probably would not put a lot of effort into uuuh looking... but as I was saying you know particularly with climate change you know we do not know what the future weather patterns will be. So it would be something that if there seemed to be some evidence we would take it seriously.

A- Um... How frequently does a natural hazard have to occur in order for the city of London planners to take it seriously?

J- O gosh. Umm hahaha I think it is more looking at probabilities.

A- Yeah, probabilities

J- Um... some of these flood risk maps, there are different levels of probability.

A- ya like how often does a flood happen in London?

J- Well it is all based on probability... so this is 1/200 chance. But there are other maps here that give it a 20/30 chance. This one is 1/100 chance, it looks similar but if you look at the details there might be different areas affected.

A- Yeah...

J- So it is based on the probability of it happening um... because you can't really measure just frequency.. you know it is you can have a flood today and there is a 1/200 chance that it could happen again tomorrow

A- Yeah... because it is hard to predict...

J- You know I think that would be umm... in terms whether it is something that has ever appeared in the UK, you know like for instance .... because initially you were going to look at earthquakes as well weren't you?

A- Yeah

J- Umm yea you know Yeah we do not have experience with earthquakes we have seen earthquakes else where, we are not... we are not geared up for that kind of thing and we do not feel there is a need for us to make our buildings you know earthquake resistant. But... but if the trends changed for whatever reason umm... then you know we would have to start looking at it. I think it is very difficult to say... if we look at long term trends.

A- Yeah, especially different types of hazards... yeah exactly what you were just saying

J- Uhum... yeah probably until this week, you probably would not have thought people rioting and looting in shops was not an issue in London.

A- ya, no I mean i have lived here for two years and compared to Canada like since i have been here there have been so many riots, especially London because it is such a huge city, I was amazed.

J- But you know until a couple of years ago you probably would not have thought this was an issue haha!

A- i know seriously i would never have thought about that! I have never experienced anything like it. I mean i had three people stay at my house because they could not go home.

J- Where are you from in Canada?

A- Calgary, Alberta

J- O right, we just came back from Montreal and Quebec.

A- It is beautiful there.

J- I have not been to Calgary.

A- oo you should go, you need to go to the rocky mountains because they are beautiful if you like skiing and doing outdoorsy stuff it is great.

J- O it must be a big change from here to there then!

A- O ya, a big change!! Very different.

A- How do you communicate the risks of hazards like tornadoes to the public?

J- um I think through our emergency planning section they have periodic newsletters and um they have um business meetings where you know they pull together groups of businesses and do and promote contingency planning to businesses. So if there was a new perceived risk that would be the forum that they would use to let me people know. And um again with the flood risk certainly when i started working on it in 2006 in the city, the perceived... the response I got from everybody was that the city is on a hill, the area we were working in, St Pauls was on a hill so it will be fine

A- ya like you would not have to worry about it...

J- ya don't worry about it. And gradually I got the point across that with climate change you are getting different weather patterns.

A- Ya like it doesn't matter.

J- Yeah, so it does take a little bit of time when it is something new that people do not expect for it to be an issue. Um so then it you know you have to be persistent and keep on telling them and you know just gently, not panicking them.... but keep on telling them that actually this is a risk and that it is something you need to you know to start to take it seriously. And if you know start to take it seriously over a long period than you are much more prepared when it happens in ten years time.

A- Do you think the public should be more involved in the decision making process for city planning?

J- Um I think they are reasonably well involved. We do um we have quite frequent consultations when we are developing a planning policy. We do involve anyone that is interested. And we try um engage with people through having particularly themed meetings rather than just sending something out and giving them the web link. We try to invite them to come in and you know have a conversation.

A- ya you guys are very approachable about all of your issues. If you need to discuss something you are very

J- Ya we do try to be accessible. And try and um you know make sure anybody that wants to have a say has a say. On the other hand when something um is approved through the planning system that somebody does not like then they will think that we haven't listen to them.

A- Ya not everyone can be pleased...

J- Nope... Yeah so you have got to balance the benefits with you know the upside and the downside. We have recently approved an office block right next to the barbican residential

estate. The barbican residents are not happy about it... um... but you know for the benefit of the city which is mainly a commercial district they have to understand that

A- Yeah... some people might not be happy but it might be for the better

A- Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?

J- Um yes I think as I say it has to be in proportion to what the risk is. If it is a real risk then you do need to inform people. Coming back to the flood risk, the environment agency does have a good warning system. That is the kind of thing that if people are interested they can sign up to it. If they really don't want to be worried about it then they don't have to.

A- It makes people sleep better at night if they don't know all of that

J- Yeah some people might want it, they might want the text and everything but then again some people might not

A- Exactly...

J- I think the important thing is, is to give people the knowledge so that they can make informed choices for themselves. So its to you know to make this kind of information available. So if for instance you live or your business is in that particular area, um these actually haven't been published yet umm... but at some stage once there is more detailed analysis or once we have done more detail in this area about what can we do about it and what are the precautions if need be. Then we probably will have a communications plan and... and make sure the people that need to know are actually informed.

A- Ya exactly, the people that would be most affected if something were to happen.

J- Yes, definitely.

A- If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?

J- Um... I would think... I mean initially they would use the normal communication channels. Umm... the normal communication channels and hopefully I mean I think the city corporation is quite good at getting messages through to the right person. I mean I do not know how you found it

A- I mean it was very easy, I was very surprised and i just had to send one email. And i was so surprised to get an email right away

J- good, good!

A- yeah!

J- and have you got any other planning authorities!?

A- no you are the only one so far, so I need more interviews!

J- I do not know because at the moment flood risk is the biggest one but i can get you into contact with some people!

A- okay thank you so much!

J- it is a very interesting topic!

A- ya i think it is a very interesting topic as well! I am surprised that I stumbled upon it but i am happy with it.

A- How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?

J- Ooo... I think we would rely on the emergency services. They would make sure that a place is safe and i suppose building control. Buiding control officers who deal with structures they would be involved with that. I do not really know because I am not involved with it. I would say initially emergency services and then building control.

A- yeah... yeah...

J- and city surveyors would be involved, civil engineers they would assess whether the building is sound or not.

A- that is very cool

A- How are contingency plans for natural hazards implemented when planning the city of London?

J- Umm.... again you see it would probably be one of our contingency planners which would be better to ask. One woman that I will suggest to you is very shortly going to New York to do a kind of two month project. Ten years on from 9/11. She is looking at ten years on and i know she is going for emergency stuff and she is very busy so i doubt you will get to see her before she goes. But i will pass your details along.

A- That would be very nice! Thank you so much.

J- umm they are things certainly in the planning policy for safety and security and we encourage sort of things like collective security. So instead of every single building having guards outside it, we try to have guards in more protective areas, like for example car bombs. It is those kind of things that we try to prepare for these things on a wider scale then just the building. We try to make the environment safe from any kind of emergency and disaster. Same with flood risk we would be looking at, if there was an area that we have identified as a particular risk then we would look at doing rain harvesting and rain gardens.

A- wow that is so cool!

J- ya rather than just doing is from building to building basis we look at it on a wider scale.

A- Umm... How do you monitor progress of natural hazard plans?

J- Umm we do have an annual monthly report that goes out that is um... that monitors our policies. I am trying to think.... it uses indicators like whether we have allowed any development in a risk in an area against the advice of the environment agency. That would not go down well. We would hope that we would never allow if the environment agency said this area is a place where you should not be building. Because of the risk you should not have development there. We would have indicators that would pick up if we were applying our policy properly and if that policy approach is working.

A- okay...

A- Does the public have any say in what happens in these plans?

J- They may have say in the emergency plans. I think with the emergency plans as you say they have these forums where they would be discussing different scenarios with representatives from businesses and residents... And they would obviously take into account advice and information that other people have. Particularly emergency services there is always multi-agency approaches.

A- Ya if someone said you guys should do something differently you would take there...

J- Ya you would listen to the people that have the expertise in that particular field and certainly there are all sorts of meetings that go on between the different emergency services, local authorities and there contingency planners. I would imagine they would have had meetings in the last few days to talk about what if people started smashing the windows in the city.

A- ya!!

A- Where does your funding come from to implement city planning?

J- The emergency planning or the planning... I think probably both of them come from central government funding. But with development planning some of it is um through planning application fees. So if someone wants to build a new building they would ... uh... need to submit a planning application fee with quite a substantial fee with us to deal with. That pays for some of the staff time and work we have got to do.

A- Do you think more attention needs to be made to natural hazard city planning?

J- I hope not. I hope we are covering it sufficiently to the level that we need to. As I said it has taken a while to take some risks seriously like floods, but i think they are now. It is making sure that the evidence is there and that people do need to take it seriously and they need to do some planning.

A- What can be improved about the natural hazards part of city planning?

J- Umm... what can be improved.... let me try to think....if i had a magic wand what would i... i think um... possibly more, additionally funding to implement solutions. I think um i am trying to think if there is anything else that um... I think as a local authority we are quite fortunate that we do have sufficient funding generally to do the research work. I think other authorities might not have the money to do the research to acquire the evidence.

A- uhum....

J- I think that is probably the main issue

A- well thank you very much!

Appendix 7

John Humphries. (2011). *Interview on What is the publics perception of tornado risk in the City of London and to what extent does it affect planning in the city*. Interview by Allison Thompson. [Face-to-face interview]. Town Hall, Forty Lane, Wembley Middlesex, HA9 9HD; 20 November 2011, 11:00 am.

John Humphries- J, Allison Thompson- A

A- Yeah.. What is your current occupation?

J- Head of building control at the Brent Council

A- I am just going to write this down just in case this does not work... What does this job entail?

J- I have a team of building control surveyors and structural engineers. Do you want a copy of this to see what is their.

A- That is okay, I will just see it after.

J- Okay, ya I have a team of building control surveyors and structural engineers. Principally the job is to ensure that development in the Brent borough goes to regulations. Um... we are in competition so people do not have to come to the local authority so people can go elsewhere. Um... but we have ... other parts of the job involved um... dangerous structures and investigating them. We operate at a 24/7 standby. The council has a responsibility to deal with public safety.

A- Would you say that tornadoes are a huge risk in the city of London?

J- No. Um.. no they are not a huge risk. Clearly when they do occur in any city they have the potential to cause an enormous amount of damage very quickly. Um... there have been very few tornadoes in London... The Kensal Rise one I don't believe we have had one since.

A- no the last one was in 1954

J- yeah the 1950s so...they obviously... you have got to balance umm... the affect of the frequency with the severity. If you were doing a risk assessment you would say it has a very rare occurrence and therefore it actually does not pose a huge risk to London.

A- Yeah but crazily enough apparently it is the most in Europe, tornadoes, in the UK

J- Yeah most of those are in open areas, we had a couple in Birmingham so further north there is more damage
A- Were you working when the tornado happened?

J- Yeah, we we... Obviously we got a phone call from a worried resident saying that there was a roof in the way and then within two minutes with a similar situation... then we realized something was going on but we did not know what it was exactly. But therefore my boss and myself at the time immediately went down there and found out what was happening. From within a minute we got a call from the fire brigade and they responded with calls from local police and from all over the area and they responded individually to all of those calls.

A- yeah...

J- Then they realized that this was not a normal occurrence umm... so ya it was quite exciting in some ways but quite daunting in others to see the extent of the damage.. um... so effectively we you obviously have seen photos of the damage and videos from Sky news... hopefully you have seen those videos and things

A- yeah i have...

J- so ya it was quite a significant thing... local authorities have a function and role to actually assist in these actual sort of events not just in terms of dealing with dangerous structures but they make sure that the people are provided and taken care of and in some cases this is re-housing. There were a number of people who needed re-housing or they could not go back. From our point of view, it really was about making sure the buildings are safe um... to allow other people into the... into the... vicinity. You know...people want to get back into their homes, they want tractors to get in to obviously start repair works. Obviously emergency care is making sure the emergency services were safe in that sense. Even down to things that people could safely enter the premises so that they could safely have access to their things. Um...

A- Do you know about the tornado that happened in 2006 in the Kensal Rise area?

J- Yes

A- Are you aware of the damage that it caused to the area?

J- Definetly... Yeah i was there for four days. I say four days, the initial part was 2-3 days. While we arrange for tractors to clear debris, roads was done by street care. But also tiles and chimney stacks and whole roofs off of buildings trying to make them secure we put up guards to keep people away from these areas. It was a lot of work...

A- yeah I bet... just looking at pictures... it was good that it was during the day because less people were hurt.

J- Yeah i think there was only one person who was slightly injured... a head injury... very lucky there was not that many people inside the area.

A- Yeah like walking on the street or anything...

J- Yeah, it would have been very frightening to be in the middle of that... exciting at first i am sure but then very scary

A- Yeah

J- But everyone survived and the buildings survived and everything was okay

A- Yeah, it was crazy when I did my questionnaire walking through the area, you would never know...

J- There was a lot of work done in terms of re roofing and chimney stacks and um... many of the occupants took it as an opportunity to extensively refurbish their properties through insurance claims and things like that. But part of the damage was additional work. In many instances made the best of it and took the opportunity.

A- Um...Do you think the city of London buildings would be able to withstand a tornado?

J- Debatable really. Depends on what you mean by the city of London, most of the large commercial buildings could deal with wind forces and things like that but clearly a lot of London umm and deep within the city can't really deal with tornadoes umm... because they are built with the same construction, timber and brick work and tiles. They are... They are not solid rigid things they actually do bend and buckle under extreme loads. Umm... Consequently if there was a tornado here with similar properties they would react in the same way.

A- So more like residential areas

J- Yeah residential areas would definitely be affected. Um... hopefully it is another fifty years before we do it.

A- Is there a building code that incorporates tornadoes in the city of London?

J- No, generally speaking um... buildings have to comply with what we have got as national buildings regulations. Um... Part of that is structure stability, part of that deals with wind loading and snow loading... you know stuff like that. Um... and all buildings are affected by heavy gusts, storm damage you know strong winds, tornados really end up being a combination of pressure and suction.

A- Yeah

J- Yeah, so buildings do take into account these things but with tornadoes you just get extremes, very quick and very fast. Essentially what you have got is British standards that are on all buildings and designs that you have to take into account. There is nothing specifically for tornadoes. It is our job, obviously certain designs are checked and specific materials and we check the inside to make sure designers and building regulations are how they should be. Essentially that is um where we come in so to speak.

A- Do you think there is a need to incorporate tornadoes into building codes?

J- No...

A- If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes for example fire etc?

J- Well... the secondary effects that we had, well not secondary effects but essentially when you get a tornado you obviously get a large amount of debris flying, lose material being picked up off of buildings... generally poorly maintained buildings... umm chimney stacks... it depends on you know suction effects... the famous picture Kensal rise tornado is the one building with the flank roof torn out and bricks strained throughout the road. That is obviously an extreme... that same building had chimney stacks knocked over through the roof and adjoined properties had roofs taken off and so on umm... windows taken in, flying debris bands through windows... you know... things that you did not necessarily anticipate... umm... tiles from one side of the road being thrown through a window on the property opposite side of the road.. Clearly if this hit someone on their travels it would have killed them...

A- Yeah, wow...

J- Um... in terms of secondary stuff, there was a lot of garden walls, boundary walls, sheds, furniture disappear knocked down. We had no fires um at all in Kensal rise... we did have a couple of gas leaks but nothing else. Obviously power was out in some places... um trees onto buildings... things like that... It is all about the probability of going and likelihood of these occurring and how buildings are designed and what they normally would anticipate forces in there normal life.

A- it is not ...

J- no you cannot design a ultimate building that can withstand everything. The designers and the building code you know... building regulation people who... who set the building regulations down try to anticipate obviously the affects of severe storms. If you say for instance through climate change we end up with more frequent more um... robust storms, stronger winds things like that then clearly that will have an effect on the future building regulations.

A- uhum...

J- In general building regulations are born out of disasters. You know back in the 60s obviously caused them to review the legislation and start look at progressive cuts... So all of these events will actually will most certainly go back to the research establishment and they will keep a record of these types of things... and at some point they might decide that they need to strengthen this particular thing to reduce the potential damage from storms. Generally speaking tornadoes have not come up very much

A- Um...Is there a warning system for tornadoes in the city of London?

J- I don't think we even have one in London, as far as i am aware there isn't one.... um... i do not know if there is one in the states where they are more frequent but then you end up with much bigger storms coming through.. ours tend to be storms... tornadoes obviously are more instantaneous that they you know they land and it is a combination affects like you are doing physical geography so you must know more than i do... but you know they land and they are there for a minute or two and then they are gone. I do not see how you can possibly give any warning that has any meaning...

A- Yeah because it is so quick...

J- Ya i mean if you got tropical storms, hurricanes coming off the atlantic then you can track them and deal with that. Americans are much more used to the extreme weather

A- Umm...Do you think there is a need for a tornado warning system?

J- no... no

A- Do you take what the public thinks about natural hazards very seriously?

J- That is quite a difficult question because ummm they do convey their thoughts to us umm in terms of natural hazards... they probably are not thinking about extreme weather... they deal with it as it happens and then sort of they get back to normal... I think there are a lot of people obviously concerned with climate change and the effects that could happen... in particular probably flooding above everything else.. I think the things that are more likely...

A- I guess if you are more interested in it... then...

J- What you do get obviously is things like when these extremes happen you get the media stir up a frenzy because of they say is it because of climate change

A- Yeah something to talk about

J- Yeah it sort of sets up a debate um in generally people soon forget it. It will go into folklore... you know if you ask people after a couple of years o ya do you remember the tornado in 2006... you know and that will carry on because people will always remember it because it was such a event. It actually brought the community very close together, they were all in the same boat so to speak... it brought all sorts of fractions of the community into a sharing community. You know...

A- What do you do when you need the public's perception on a natural hazard in London like a tornado?

J- umm bababaum I have to think about this one... Ultimately there is not a lot we can necessarily do.. clearly if there is a large outcry from the public then it will come through local authorities and councils and possibly it will end up changing the services. Again this depends on the extent and frequency of events. If you suddenly got two or three more tornadoes after ten years then clearly something would probably need to be consider. There may not be anything you could do, more than what we have in place in terms of emergency planning and people with any you know whatever it might be.

A- yeah...

J- Umm... but you know you could have a major fire within London that actually provides the exclusion zone... you know as far as local authorities are concerned they will still make sure the public are safed and prepared for in the same way as having an exclusion zone for a tornado.

A- Uhum... yeah... it is more about the here and now..

J- I don't think really tornadoes... this is personal... i don't think tornadoes would be too much on the public's minds...

A- Umm...Since not many tornadoes occur in the city of London very frequently do you tend to not take them as seriously as other natural hazards?

J- Um... We take them seriously obviously when they occur, we do not dwell on them and we do not think another one is necessarily going to happen... Surely...But I think you know people umm organizations and local authorities are prepared for potential disasters however they may arise. So in a sense they are considered but we would probably consider strong winds and

storms and things like that with a greater degree of concern because they are more likely to happen. Not always do they touch down as tornadoes, a strong storm could be just as devastating possibly over a wider area.

A- ya that winter storm that happened last year and how it shut down everything in London

J- yeah with only two inches of snow, ridiculous!

A- yeah because i am from Canada so i am like what are you crazy English people doing!

J- haha ya you guys actually know what snow is!

A- haha yeah...

A- How frequently does a natural hazard have to occur in order for the city of London planners to take it seriously?

J- Again that is a difficult question because essentially for building regulations to change it is not a local authority issue it is i suppose i guess if London if the mayor thought it was a special case for a particular natural disaster or hazard then they would take that into account.

A- yeah..

J- things like flooding obviously the Thames, the barrier, stuff like that would be taken very seriously um... i don't think particularly tornadoes and strong storms are on everybodies immediate radar. They are aware that they happen and they are prepared for those sort of circumstances. But i don't think that um you would necessarily get a change in building codes. But htey are obviously doing a lot of work on other natural hazards in particular rainfall. The population and properties are obviously of concern if the natural hazard gets out of control.

A- How do you communicate the risks of hazards like tornadoes to the public?

J- Generally you don't. But obviously we had quite a communication issue when the tornado occurred. Both in terms of advice and guidance um... telling what people could and couldn't do, trying to get people's minds at rest that we were taking actions and we would not let people leave until it the place was safe. Finding advice for what to do... people were concerned as they did not know whether it would be covered by insurance, explaining why tractors were coming in, what they needed to do in terms of complying with the regulations when putting roofs back on and stuff like that. So there was a big communication issue around the tornado where it actually occurred. Where to go for housing you know... how to sort that all out. You know there was still storms before and after that period and therefore there was a risk that further damage could be caused to all of the damaged properties um...

A- Umm.. Do you think the public should be more involved in the decision making process for city planning?

J- Um... this is questionable... debatable... um... it depends on what you knew about the planning side... it has already proposed that there should be localism and to give members of the public and areas a great say in the planning process. Um but obviously local authorities and planning authorities need to decide what things are needed for society as a whole. Majority of the cases a lot of consultation occurs with the public and clearly in some cases some decisions are made that they don't necessarily agree with.

A- you cant please everyone...

J- um...ya you cant please everyone all of the time, some group will want this some group will want that you know stuff like that... umm. But clearly public planning process obviously decides that we need things like schools, infrastructure you know... and recreation areas and work areas and businesses and so on and so there is .... and effectively people do have impact into that. Umm.. many cases they really are involved because a lot of decisions are made by the committee... the planning committee and those are made up of lay person representatives, so they have access and obviously in terms of planning applications effective residents in the community are consulted anyways. So ya already have a reasonable input into the process.

A- Umm..Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?

J- The answer to this question I think is usually always yes.. I am not too sure specifically about tornadoes. But I think the public is much more aware of natural events things like we mentioned earlier tsunami, you know the media informs us of things far away... umm.. ya so the public are much more aware of things when they actually happen... by reading the newspaper or whatever it may be.. this obviously opens up there interest and um... they want to find out what causes a tsunami or a tornado. This shouldn't worry them too much unless they are in a zone where you are likely to get a tsunami in a low lieing area, then you should be worried.

A- yeah haah!

A- If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?

J- I have no idea... Um.. what happened with our tornado haha i own it now ahha... what happened then clearly we had people to answer queries not specifically how a tornado you know the geography but you know the consequences of it and what to do in terms of that.

Um... i suppose if you have got, or come down a scale into flooding, there are flooding risk assessments carried out and plans put in place to tell you what happened and what to do. Um and clearly the council has got situations in terms of risk by areas and stuff like that set up. But um... do you need to tell people about tornadoes in fifty years? Probably not...

A- ya i guess its like the snow storm it just doesn't happen here very often at all...

J- ya i mean everything gets called out once it happens, it is very difficult to plan for something that happens rarely

A- exactly or to spend the time and money on it...

J- say for instance the building codes, because they had one tornado here and in Birmingham causing quite a lot of damage... but if that ... if those two events made it so that all houses had to be built to tornado regulations then the cost of that so far when we hadn't had a tornado since would far out strip losing the 150 homes in total. Now that probably doesn't take account of the health and safety and life risk or lost of property and those types of things purely financial terms. But you can't design all buildings for something that is a extreme. Um you know the twin towers you didn't think that was going to happen. If you thought that was going to happen then you would design them to be able to be built to handle that. But um... the risk the likelihood of it happening since then has changed, our perception of that has changed.

A- one little well huge thing changes the world forever

A- How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?

J- again its... people soon forget events um... in terms of the Kensal Rise area obviously we had to have press releases in terms of saying that we could never be 100 percent guaranteed that the place has got everything. Our responsibility technically is to ensure the safety of the public, so comparatively minor dangers within their own premises you know people are responsible for their own premises. But you know we make sure that we have got professional help and advice and its available to people for them to be called and contacted, with press releases we send letters around to people

A- yeah...

J- basically tell them what the council is doing, what stage we have reached. Ultimately until people are safe to re-enter their homes apart from at one point 6 or 7 properties.

A- How are contingency plans for natural hazards implemented when planning the city of London?

J- Really it is dealt with by emergency planning by Martyn. Plans are in place for individual boroughs or events that spread across boroughs or nation wide...

A- How do you monitor progress of natural hazard plans?

J- Again that is Martyn. To be honest the responsibility to have a emergency plan in place for Brent is huge. I am sure Martyn showed you that. It covers all sorts of situations from fires, floods, all sorts of natural hazards.

A- Where does your funding come from to implement city planning?

J- Good question. Um... effectively the employees have a responsibility to have these plans in place. I am sure some of it comes from our own funds, council tax and incomes in various varieties. Um but also there are government funds as well. But obviously at these times those are all scratched off. Your question is slightly different... now we can talk about emergency planning but if you are talking about generally planning like planning permissions and generally deciding various things in residential plans then clearly it comes from fees and charges.

A- Yeah...

J- Yeah... But there are also some grants available and things like what they call section 106 now, where people get development approved from the council they have to pay a levee to help support the infrastructure for schools, hospitals and things like that. You cant just plunk three houses down and not have a agreement with the rest of community or society.

A- section 106 you say?

J- Ya section 106 is what it was and what it is still. It is under a planning act which basically is ... its not quite a charge... but it is a contribution to the cost of what the cost that development will have on society as a whole... the developer goes in and builds 300 houses then they will get a profit out of that... they sell those houses they get a profit but they also have to recognize that it is not just throwing these houses down its that you may need an extension to have a school in the area or a hospital. It is obviously more important in towns.

A- Do you think more attention needs to be made to natural hazard city planning?

J- Again it is perhaps a debatable question. In some instances yes, but probably more in respect to micro climate type of thing... between tall buildings... i can’t say plan against natural hazards and stuff like that.. it is things you can for see... you know sea level rising, like in flood risk areas they need to put things in place to reduce that risk. I can’t see how you can design for in this case tornadoes or tsunamis... if you are not in those sort of areas obviously if you were you would need to take that into account

A- uhum

J- you say you are from Canada. I have a friend you lives in nova scotia. You know the snow you get there is unbelievable you know fi you had that snow in the UK things would collapse, residential hosues would collapse. They are not designed for you know 2 meters of snow they are designed for you know 200 millimetres of snow, that is probably as much as we get. That is a sprinkling for you!

A- hahah ya!

J- ya so obviously different countries are planned for different things and buildings are designed for the natural environment and weather patterns that are normal for that area. If that perhaps changes over time then eventually designs will change..

A- uhum..

A- What can be improved about the natural hazards part of city planning (YES)?

J- Um i don't really know, other than what i have already said. There are probably certain aspects that could change in terms of things like flood risk assessments. But i don't think there is much that has changed structurally over the past ten years or more. We are still working to bring standard codes. Clearly if you have got things like specific buildings in a particular area and they will be designed to take known risks at that time. It is now necessarily built into the buildings regulations. Building regulations themselves are minimum standards they are not super deep, they are the minimum standard that you should design too.

A- Yeah...

J- Various buildings might be built to a much better standard if you take apart individual site specific events or risks. I don't know what else you could put in terms of natural hazard city planning.

Appendix 8

David Clements. (2011). *Interview on What is the publics perception of tornado risk in the City of London and to what extent does it affect planning in the city*. Interview by Allison Thompson. [Face-to-face interview]. Guildhall, London EC2V 7HH; 19 November 2011; 3:30 pm

David Clements- D, Allison Thompson- A

A- What is your current occupation?

D- I am a district surveyor for the City of London borough.

A- What does this job entail?

D- Hmm well let me see here generally I oversee what goes on in the City of London borough and um... I hold monthly meetings that deal with dangerous structures which includes preparing buildings for bomb explosions and mainly umm... we have a huge responsibility to protect the public against these kind of things you know... Many times we will have a stack of issues at once that have a wide range of queries... umm currently there is 26 different issues that we are dealing with at the moment... some of it is keeping the public away from these areas and you know sometimes our things work at the time sometimes they don't...

A- Would you say that tornadoes are a huge risk in the city of London?

D- No, not that I am aware of anyways...

A- Do you know about the tornado that happened in 2006 in the Kensal Rise area?

D- Yes i do...

A- Are you aware of the damage that it caused to the area?

D- Umm you know I have a rough idea of what tornadoes can do and um... the potentially effects... but umm specifically for the Kensal Rise area i remember hearing about what happened but I am sure you could inform me of more specific damages..

A- Yes definitely... there was roofs ripped off, fences destroyed, debris flying from one house across the street to the other side

D- Wow it really is impressive the effects tornadoes can do...

A- Yeah in such a short amount of time as well...

A- Do you think the city of London buildings would be able to withstand a tornado?

D- Ummm thats an interesting question um what i would personally think is that they would have a few incidents that would effect things like glass but the buildings are very different structures around here so i don't think it would be as bad as the borough of Brent... you know because we have more concrete structures around here i mean we certainly would have damage, but um no where as bad. Because Brent is more of a residential area they have to deal with things like scaffolding... and they would be more subject to wind i would think but what it ultimately comes down to is the nature of the construction.

A- Is there a building code that incorporates tornadoes in the city of London?

D- No... Actually there isn't one anywhere in the country. However wind has been a local issue for us... you definitely need to consider it when designing a structure. Umm positive or negative pressures and um you know effects of wind depends on the gust and the way ... the way um it gets funnelled. We don't design for extreme things like earthquakes or you know tornadoes.

A- Do you think there is a need to incorporate tornadoes into building codes?

D- umm... no well i mean before saying this what we would do is go through a risk assessment of when a tornado occurred the last time. But if there is no evidence from these risk assessments and from doing our own research then it probably is not needed. It wouldn't even cost that much umm money to you know do the initial research it would just cost more of you know our time... in the long run...

A- okay...

D- yeah... um this is because they would have to incorporate tornado building codes into not just London but the whole country, it would have to be a national code not just a local one.. so thats why it would take a long time to get it passed...

A- o wow i did not know that

D- yeah, so it needs to be quite a frequent event for it to be taken very seriously to change codes etc

A- If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes (ex. fire etc.)?(NO)

D- I mean the buildings are designed to deal with severe weather maybe not in particular a tornado. Primarily if a tornado were to happen we obviously would deal with human life protection first... and then i think the buildings would stand but you would not be able to go within them as there would be glass damage and debris.

A- Is there a warning system for tornadoes in the city of London?

D- Not that I know of, but I know these is a system in place operated by the fire brigade that is used for you know in particular things umm like floods for the Thames as you probably know this is one of Londons largest natural hazard issues.

A- yeah that is what Claire was saying...

D- yeah and Claire gave you the risk register right?

A- yup and i think the PITT review? I need to double check

D- okay good, ya you should definitely go through that it has lots of stuff on severe weather

A- yeah definitely...

A- Do you think there is a need for a tornado warning system?

D- Umm.. no just on the basis as there is so few and i wouldn't know what to do... instead i would i guess just if anyone were to have queries we could stiffen up the scaffolds and tell people to put lose materials away... other than that i don't think it is really necessary to have a full warning system as this could frighten people in a way that is not necessary. I mean if it were to be something like flooding... i feel like people would be more aware about flooding than tornadoes as a bigger threat, I mean do you know about the risks for flooding?

A- um to be honest with you, yes I do know that the Thames is a big issue as we have learned a lot about it in class but i didn't really know much about it before i saw another co-worker of yours Janet Laban who specializes in it and informed me of umm some of the places it occurs and um how to mitigate and stuff...

D- O you spoke to Janet... okay good ya well flooding definitely is a huge risk that building structures definitely have been attempting to incorporate in the planning schemes...

A- yeah for sure...

A- Umm...Do you take what the public thinks about natural hazards very seriously?

D- O yes for sure... maybe not to the extent that some people would like but we definitely take the time to listen to any queries the public has.

A- What do you do when you need the public's perception on a natural hazard in London like a tornado?

D- Umm.. let me see well use public relations and our website... After big events occur like as you are doing the Kensal Rise tornado I am sure they had a press release saying it was a safe place and everything is done to make it safe... So ya going back to the question umm... we do actively use the website, post things up on it and umm ya communicate to the public through that way.. and umm as you probably have done yourself emailing and sending your queries in... we um you know check it daily and try to get back to everyone as soon as possible...

A- ya you guys did a very good job at getting back to me right away and luckily Claire was nice enough to get me in contact with you

D- ya we try to do our best to make the public aware and part of the process..

A- Since not many tornadoes occur in the city of London very frequently do you tend to not take them as seriously as other natural hazards?

D- Um i would say yes just on the basis of risk... and just debating on what the biggest risk would be... you need to prioritize on that. But i am sure if it were to change and tornadoes became more frequent we would obviously put more time and effort into understanding and getting research done about them... but we need to see the probabilities of tornados occurring first.

A- How frequently does a natural hazard have to occur in order for the city of London planners to take it seriously?

D- Um I mean it only takes one big event to trip the balance, its hard to say um... because we do take all natural hazards seriously i guess.... but in order for them to take it even more seriously it wouldn't just be the City of London borough it would have to be done more at a national scale in order for buildings codes to change.. but um we do take all natural hazards seriously.

A- How do you communicate the risks of hazards like tornadoes to the public?

D- um as said before there are a variety of different mediums that we use particularly our public relations, the website... sorry I have a meeting in fifteen minutes so some of my answers may not be as in depth but i am happy to go through them again if you need better answers later on...

A- o i am sorry i will try to do this faster

D- o no worries just if we run out of time you may have to book another appointment with me to finish it or emailing is good too..

A- o okay thank you so much!

A- Alright um... Do you think the public should be more involved in the decision making process for city planning?

D- No... um I don't believe that they have the expert knowledge to know enough about different building codes...

A- Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?

D- Um yes, i think that educating our youths is very important as they are going to be the ones that are potentially going to have to deal with new hazards in the future... umm generally i think we are probably doing a good job right now but there is always room for new information...

A- If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?

D- Again public relations

A- Umm.. How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?

D- Um we carry out surveys or give them a report, newsletters something that is equivalent to our surveys but that is easy for them to understand and acknowledge

A- How are contingency plans for natural hazards implemented when planning the city of London?

D- Um usually through emergency planning coordination... ummm these plans are you know tried and tested and everyone from the organization plays a part and you know all of the local authorities must have this plan so we can all be on the same page and be up to date with you know new things in our departments...

A- Okay...How do you monitor progress of natural hazard plans?

D- Umm through regular meetings and assessments... these umm you know include things like dry runs and drills... we make sure that we don't just keep it to ourselves so we let other

boroughs know as well as the police and the fire brigade.. just to you know make again that everyone is informed and knows how we are handling situations so that if something were to occur like a tornado we would know the steps and procedures that need to be done and executed.

A- Does the public have any say in what happens in these plans?

D- um I don't think they do have much say... no... but these plans are not hidden away... umm... so if someone from the public were to have a query they could you know contact us through the website and we would read it and get back to them... So um generally there is a lot of responsibility placed on local authorities to get back to the public on their queries...

A- Where does your funding come from to implement city planning?

D-Um... haha always a big question isn't it?

A-haha yeah!

D- umm well generally our funds come from residents or general local funding...

A- Do you think more attention needs to be made to natural hazard city planning?

D- Nope, i think we do very well...

A- What can be improved about the natural hazards part of city planning?

D- O i see this is the last question!

A- haha yeah!

D- Good timing because I have to leave in two minutes! But again um if you need any sort of help you can just email me and i will see what i can do...

A- o okay thank you so much!!

D- sorry what was the question again?

A- o that is okay... um... let me see... what can be improved about the natural hazards part of city planning?

D- o right um ya well i think personally it is not about improving but it is more about reviewing the city planning. This would include constantly monitoring and being aware of um you know changing trends and particularly i think flooding is the big one of the moment that we need to be aware of.

A- alright thats it! Thanks so much for you time.

Appendix 9

Paul Johnson. (2011). *Interview on What is the publics perception of tornado risk in the City of London and to what extent does it affect planning in the city*. Interview by Allison Thompson. [Face-to-face interview]. Town Hall, Forty Lane, Wembley Middlesex, HA9 9HD; 3 November 2011, 10:30 am.

Paul Johnson- P, Allison Thompson- A

A- What is your current occupation?

P- Well obviously you know I work in the borough of Brent and I am a building control surveyor.

A- What does this job entail?

P- Umm... well you see basically i am involved in the minimum standards of health and safety in and around the buildings that I am designated to work on. Also it includes the legislation of dangerous structure.

A- Would you say that tornadoes are a huge risk in the city of London?

P- No

A- Do you know about the tornado that happened in 2006 in the Kensal Rise area?

P- Yes

A- Umm...Are you aware of the damage that it caused to the area?

P- Yes

A- Do you think the city of London buildings would be able to withstand a tornado?

P- Umm well I would suspect there are lots of answers to this question.... um... I think it greatly depends on the magnitude of the tornado... I think that we would be able to survive but it would depend on how the buildings were structured... you know scaffolding or cement or you know bricks etc... you know if there was a lot of glass in the building I think that would greatly affect a persons chance of survival because especially for tornadoes i would think that glass would be a huge issue as it is one of the things that breaks more easily...

A- yeah definitely...

P- yeah especially nowadays where many new modern buildings in London are being built with less bricks and more glass windows... i think this could be a big issue in terms of withstanding things like tornadoes

A- Is there a building code that incorporates tornadoes in the city of London?

P- Um not that i know of... i would say it is very unlikely but you never know... I mean they could have codes in various places in London but i don't know that there is to be quite frank with you...

A- Do you think there is a need to incorporate tornadoes into building codes?

P- Um i would say probably not, especially since it is a very rare occurrence

A- If there are not building codes put in place for tornadoes do you think the buildings will be able to withstand secondary affects caused by tornadoes (ex. fire etc.)?

P- No, they won't. Especially this became evident from the tornado from umm Kensal rise where we saw chimneys being thrown everywhere, there were chip marks, um roofs collapsed... i mean the buildings that were not in the immediate path of the tornado obviously did not get as destroyed but once the actual tornado comes close enough there is nothing that you know you can do...

A- ya that it very true...

P- yeah and even being a couple blocks away buildings or yards were affected.... so no i don't think they would.

A- Okay...Is there a warning system for tornadoes in the city of London?

P- Um.. again not that i know of...

A- Do you think there is a need for a tornado warning system?

P- Um I wouldn't have thought that they should spend money on something like that unless it is necessary... no they wouldn't... umm... if this were to happen more often then maybe.. so umm yeah if this happened they would email all of the staff on that basis and then yeah... i believe that yes it would be something convenient to put a warning system into place... but if it did not happen regularly it would be too over the top otherwise...

A- Do you take what the public thinks about natural hazards very seriously?

P- Yes we do... but natural disasters that don't affect buildings no... ummm well i mean if something did happen from a tornado and if the fire brigade was called then maybe yes they would...

A- What do you do when you need the public's perception on a natural hazard in London like a tornado?

P- I don't know what or how to answer this

A- Okay... Since not many tornadoes occur in the city of London very frequently do you tend to not take them as seriously as other natural hazards?

P- Ummm let me think... umm i cant think of other natural hazards that occur other than lighting or thunder... ummm I mean with tornadoes we wouldn't treat them with greater amount of concern then other natural hazards but we wouldn't treat them with less concern either... it would be equal to any other natural hazard as big or small as it may be... you know like any weather event we would take it seriously...

A- okay...

P- However... Um we wouldn't do anything locally unless it happened more frequently. This is because the building control department across the country cant change the legslitation ... um because they don't have the power to do so...

A- How frequently does a natural hazard have to occur in order for the city of London planners to take it seriously?

P- I think that compared to the public or some of the public planners would take it less seriously than the public would depending on the frequency... but you know when saying this you never know... there is a chance that anything can occur... so we need to consider this chance if something did occur because we want to ensure everyone's safety...

A- yup...

P- i mean if a tornado were to occur three to four times a year then it would be more likely that building regulations would do something about it...

A- Umm....How do you communicate the risks of hazards like tornadoes to the public?

P- Um well it is not my job to do this, so i would say building control planners don't at all... i mean unless asked to do so...

A- Do you think the public should be more involved in the decision making process for city planning?

P- Ya i would say thats probably the case... i mean i would say it is probably best to leave it as it is for the moment... But i mean if people id want to sway the city planners opinions they would have to create a cost-benefit analysis which would require a lot of work in order to change regulations... this is usually easier with high profile events but government regulations for new stuff usually is hard to do and a lot of the time they put it on the back burner ... but i mean if it is life threatening they are more inclined to do something about it.

A- Do you think more education-information is needed to improve the public's knowledge on natural hazards like tornadoes?

P- Probably yes... especially for what to do and where to go during certain natural hazard events... like if people need to run outside of a building or stay in it etc...

A- If someone has a query about a natural hazard like a tornado how are they able to contact someone about it?

P- They cant really... you i mean could phone various departments and you probably wouldn't get anywhere for building control... i would say you should do your own research on the internet.

A- Umm...How do you ensure the public that an area that was hit by a natural hazard is safe to live in again?

P- Well i mean my section got called out to deal with the tornado... we spent around 4-5 days on site to remove tiles, chimneys, roofs and progressively we created an exclusion zone... but it is important to listen to what the homeowner says and plans to remove themselves and in the case of the Kensal rise situation we notified them as to when they could return back to their homes minus some of the houses that were completely uninhabitable...

A- alright...

P- if it were lets say a bomb explosion or too much snow the building control deals with it under dangerous structures legislation so that... so that we don't leave it to homeowners to pick up afterwards

A- How are contingency plans for natural hazards implemented when planning the city of London?

P- Umm... lets see... each local authority has a natural disaster contingency plan... which is lead by a local authority liaison officer... you know all different agencies have people to clean things

up by giving people money... but these plans are not put in place for each specific natural hazard prior to when it happens... so it is a new plan every time... obviously you do work off of the old contingency plans but each one is slightly different from the next because each natural hazard is different...

A- okay... that makes sense...

A- Umm... How do you monitor progress of natural hazard plans?

P- We don't specifically do it but the emergency planning department officer does... They make plans for rehousing... feeding the people... helping them wash there cloths... you know its a professional association

A- Does the public have any say in what happens in these plans?

P- No i don't think so... it is left to the officers in the council, whos job it is daily to do this. Primarily it is by the head of all local authorities... the chief executive meets the media because the public wants answers immediately...

A- Where does your funding come from to implement city planning?

P- Well 85 perent of it is from building regulation compliance... it is not subsidized by the public but dealing with dangerous structures is... i believe we are not given enough funding from local authorities... there needs to be more slack in the system.

A- Do you think more attention needs to be made to natural hazard city planning?

P- Yes, absolutely it does. There is a need to deal with these problems... people think the funds will always be there but they wont, our roll is not appreciated enough. For example lets just say we close the roads and not deal with it... i mean you know if we don't put in the time and attention to deal with our problems then nothing will get done... we are lucky that we don't have this problem at Brent... we will make sure there are no cuts to our services and this is because of our good relationship here in the building control section...

A- thats really good...

P- yeah.. you know like when the rebuilding of London occurred after the great fire... this is one time when there was more attention placed to natural hazard city planning ... standards were put in place when the natural disasters asked agencies authorities for help... you know its when good professional heads of services do a good job... but i am not saying that local authorities don't pay enough attention to natural disasters at the moment...

A- Okay umm... What can be improved about the natural hazards part of city planning

P- hmmm well i think the only thing that needs to be improved is how people are heard at the building control advisory centre... the only thing you can do is lobby at the building control advisory centre... this is a significant issue that needs to be addressed... i think there needs to be more structure to how people make recommendations to increase the standards in the building control department