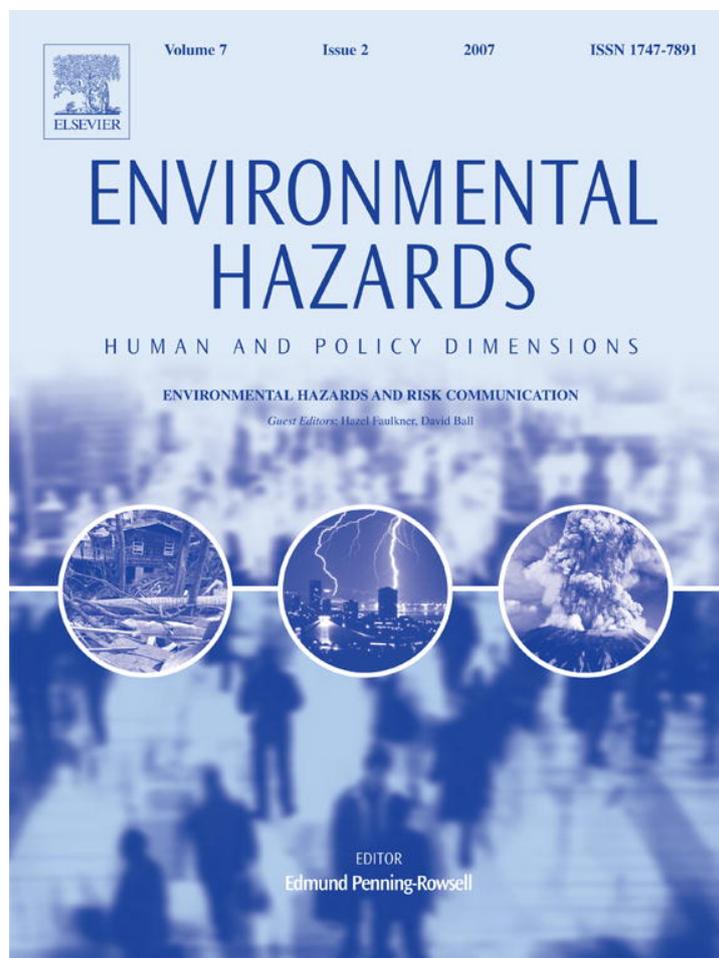


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## Papers

# Risk perception and trust in the context of urban brownfields

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**Abstract**

Data are reported from a postal questionnaire completed by 747 residents of two urban local authority areas within which there were sites of brownfield land with significant levels of contamination. Respondents rated their perceptions of the extent to which their neighbourhood and own home were relatively vulnerable to contamination, their concern about possible effects of contamination, their satisfaction with their council in terms of consultation with residents on housing and development issues, and their trust in their council with respect to contaminated land risks. Satisfaction with, and trust in, the council was generally low in both areas, and especially so among those who perceived themselves to be more vulnerable to contamination. Nonetheless, dissatisfaction was less marked in the area where the local authority, according to background information, had pursued a more open and proactive style of risk communication and consultation with residents. The main predictors of trust, across both areas, were perceptions that the council was openly prepared to tell residents what they knew, and that the council had residents' interests at heart. Implications are discussed for the impact of different modes of risk communication on trust.

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*Keywords:* Risk perception; Trust; Communication; Contamination

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## 1. Introduction

The present research has been conducted within the context of the UK government policy that most new housing and other development should take place on 'brownfield' land. While the term 'brownfield' technically refers to any land previously used for development of any kind,<sup>1</sup> the main thrust of the policy is to limit, as far as

possible, the spread of urban centres into the countryside. Hence, the primary focus is on urban brownfield sites and their potential for redevelopment for housing, commercial or industrial purposes, or accessible open spaces. While this policy defines national priorities, putting it into practice depends on local authorities with responsibility for land use planning as well as for managing health/environmental risks. The issue of risk arises especially because much urban brownfield land may be contaminated<sup>2</sup> by residues from previous industrial processes, waste disposal and such like

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<sup>1</sup>The official definition of 'brownfield land' under UK Planning Guidance is as follows: 'Previously developed land is that which is or was occupied by a permanent structure (excluding agricultural or forestry buildings), and associated fixed surface infrastructure. The definition covers the curtilage of the development. Previously developed land may occur in both built-up and rural settings. The definition includes defence buildings and land used for mineral extraction and waste disposal where provision for restoration has not been made through development control procedures. The definition excludes land and buildings that are currently in use for agricultural or forestry purposes, and land in built-up areas which has not been developed previously (e.g. parks, recreation grounds, and allotments—even though these areas may contain certain urban features such as paths, pavilions and other buildings). Also excluded is land that was previously developed but where the remains of any structure or activity have blended into the landscape in the process of time (to the

(*footnote continued*)

extent that it can reasonably be considered as part of the natural surroundings), and where there is a clear reason that could outweigh the re-use of the site—such as its contribution to nature conservation—or it has subsequently been put to an amenity use and cannot be regarded as requiring redevelopment.'

<sup>2</sup>The UK government formally defines contaminated land in Section 78A(2) of Annex A to Part IIA of the Environmental Protection Act 1990 as:

'Any land which appears to the local authority in whose area it is situated to be in such a condition, by reason of substances in, on or under the land, that: (a) significant harm is being caused or there is a significant possibility of such harm being caused; or (b) pollution of controlled waters is being, or is likely to be, caused.'

activities, sometimes stretching back several decades to a time of less regulation and/or awareness of the hazards involved. Often those responsible for the original contamination can no longer be identified or traced. Contamination adds to the cost of, and limits the options for, remediation and/or redevelopment and therefore has economic as well as health/environmental implications. A new legal framework extant from April 2000 (Department of the Environment, Transport and the Regions, 2000) imposes responsibilities on local authorities for risk-based identification and remediation of contaminated land (for a discussion of UK policies relating to brownfield and contaminated land, see Catney et al., 2006).

This paper is concerned specifically with how any such health/environmental risks are perceived by residents of communities living adjacent to, or somewhat further away from, brownfield sites with significant levels of contamination. To this end, we report survey data obtained from residents living in two local authority areas within the wider regions of Greater Manchester and East London (Thames Gateway). To honour assurances of confidentiality given to respondents, we refer to these simply as Areas A and B. These areas were chosen in the light of contrasting histories of dealing with problems with respect to contamination and patterns of communication between the local authorities and local residents (as described in interviews with both residents and council officers). The major question addressed here is how any differences in actual or perceived communication strategies of the respective local authorities impacted on residents' trust and perception of risk relating to contaminated land.

The key events that characterise the recent histories of these two areas are as follows:

### 1.1. Area A

When the local council in this area first had to deal with a contaminated site (close to a housing estate) under the new legislation, they decided that they "wanted to be as open as possible with residents and the wider public". However, their strategy misfired. They started by issuing a press release and talking to the local media. When an article appeared in the local paper, this was the first many residents had heard about the potential problem, leading to considerable anger which erupted at a public meeting some weeks later. This led to a breakdown in trust between the council and local media (who were blamed by the council for treating the story in an alarmist way), and to a consensus within the council that people or the press would be given information *if they requested it*. In the words of one council officer "Now we work on the basis of public reassurance as a core element of our communication strategy. We are careful about where the information goes to outside local residents." Other evidence from confidential meetings suggests that this reactive, even reluctant, style of communication generalises to issues around other

contaminated sites within the remit of the same local authority (Catney et al., 2007).

### 1.2. Area B

The local authority for Area B has considerable experience with dealing with contaminated sites. On one of their sites, two deaths were attributed to historical contamination and exposure to asbestos. Contact was made directly with local residents and a settlement was agreed between the council's insurance company and the victims' families. On another site, a valuer misleadingly reported that the land on which a large housing estate had been built had been officially designated as contaminated. This led to banks refusing mortgages on houses on the estate, until the council intervened. Nonetheless, when the council first received reports on the potential contamination of the site, they created a focus group and held regular meetings with residents to inform them of the findings and their intention to carry out on-site investigations. This created a context in which residents felt that they could express their concerns and that they were being kept in the picture. As one council officer commented: "It's worked quite well because they can see that we're being up-front and straight forward, and also trying to listen to what their concerns are."

At least as far as the stated intentions of the respective council officers are concerned, then, the contrast is between a style of keeping residents at a distance and not sharing information (Area A) and one of actively engaging residents in dialogue about potential risks (Area B). The question for our present study was how these expressed differences in styles of risk communication related to residents' perceptions of hazards and their attitudes towards, and trust in, their local council.

In addressing this question, however, it is important to examine at a more conceptual level how risk perception, attitudes and trust might relate to each other in terms of their underlying psychological processes. A difficulty with the phrase 'risk perception' is that it can lead us to think of risks as objects 'out there' to be 'perceived' rather than as complex interactions between physical hazards and human decisions. This has tended to lead to an emphasis in the literature on factors that can lead to over- or under-estimation of specific event probabilities, while relatively neglecting the human decision processes that can lead such events to occur, and/or produce adverse consequences if they do. This is particularly true of hazardous substances, such as those found on contaminated sites. The main reason why hydrocarbons, asbestos, heavy metals and so on can constitute a risk is because, if improperly managed, they can come into contact with people who may inhale or ingest them. So the risk arises at least as much from any improper management as from the physical properties of the contamination itself. The implication of this is simple, but important: if risk arises in large part from human decision-making, risk *perception* involves, explicitly or

implicitly, an evaluation of the quality of such decision-making.

In attempting to define the quality of decision-making, we draw on a classic psychological theory, originally developed to account for perceptual discriminations under conditions of 'noise' or uncertainty, known as Signal Detection Theory (SDT; Swets, 1973). In the present context, the question is how well a decision-maker could tell whether a possibly (or somewhat) contaminated site is dangerous or safe. The theory distinguishes two parameters of decision quality: sensitivity (in this context the ability to differentiate greater from lesser degrees of risk) and response bias, or criterion (the level of risk at which one decides that a hazard is dangerous rather than safe). The first parameter reflects the decision-maker's knowledge, competence or expertise, whereas the second can reflect the relative costs and benefits of making different correct or incorrect choices, and so may be affected by the decision-maker's personal interests or motives.

Our interest here is less with the quality of the *actual* performance of decision-makers than with how their performance is perceived; that is, how the council's performance is *perceived* by residents. (For fuller discussions of the applicability of SDT concepts to risk perception and trust, see Eiser, 1990; White and Eiser, 2006.) *Trust* should be higher if the council is seen as making better quality decisions; that is, those characterised by higher expertise, and a lack of inappropriate bias in interpreting evidence as indicative of danger or safety. However, decision-makers who are expert and use an appropriate cut-off point for *interpreting* signs of danger for themselves may not necessarily be trusted when *communicating* risk. Some might be (perceived as) being either too ready or too reluctant to tell the public about possible dangers, regardless of their own interpretation of the level of risk. In other words, trust could be undermined by a *communication bias*, over and above a bias in *interpretation* of the evidence. More generally, trust is likely to be undermined by a perceived lack of *openness* in risk communication (see also: Mayer et al., 1995; Peters et al., 1997).

Whereas these aspects of trust deal very much with perceptions of risk communicators (here, the council) as sources of *information*, issues of bias and openness may be seen as tied into a perception of *motives*. Other research indicates that decision-makers and communicators are trusted more to the extent that perceivers see them as sharing their values, that is, essentially being 'on the same side' (Earle and Cvetkovich, 1995). However, knowledgeable decision-makers or communicators are seen to be, if they are seen as serving their own interests, their motives will be suspect and any communication from them may be discounted as designed to serve such interests rather than to convey the truth. For this reason, we predict that another major predictor of trust will be the extent to which the council is perceived to have residents' interests at heart.

## 2. Method

### 2.1. Sample

A total of 8378 copies of a questionnaire was distributed by post, including freepost reply envelopes, to addresses in selected wards within Areas A (3603) and B (4775). These wards were selected so as to vary in their proximity to brownfield sites targeted for redevelopment and/or with a history of contamination. Depending on the size of the ward, either all or alternate households were included in the sample. A total of 747 questionnaires were returned (407 from A; 340 from B). Although low, the response rate (8.9%) is not out of line with similar unsolicited mail surveys (e.g. White et al., 2004). Of those responding, 48.6% were male, 65.6% owned their own home, 61.4% were employed or self-employed, with 7.8% seeking work and the remaining 30.8% being home-makers, retired or in education. Their average age was 51.0 years (S.D. = 16.3). Although, it would be unsurprising if there were a self-selection bias towards individuals with greater interest in the issue, the above figures indicate that the demographic characteristics of those responding were very much in line with those of other households in the sampled areas. Furthermore, even if any such self-selection bias might result in elevated means across the total sample for, say, concern with contamination risk, there is no reason to suppose it would affect the associations between levels of concern and other variables that are the focus of this study.

### 2.2. Questionnaire

The questionnaire was entitled "Redeveloping Urban Land: Tell us what you think" and covered a variety of topics, including attitudes to brownfield redevelopment, preferences for different forms of redevelopment (e.g., housing, recreation), and perceived impact on their area of new housing developments. We here report the findings of a subset of questions relating specifically to satisfaction with, and trust in, communication by the local council, as well as perceptions of risk from contaminated land.

*Satisfaction with the council* was measured by three items, asking whether (in the context of housing and redevelopment) respondents were satisfied with how the local council had (a) kept residents informed, (b) sought residents' views and (c) taken residents' views into account. Responses were on a 5-point Likert scale (definitely no, no, not sure, yes, definitely yes; scored 1–5). Since responses to these three items were highly consistent with each other (Cronbach's  $\alpha = .91$ ), they were averaged to yield a single score ('Satisfaction').

*Perceptions of risk of contamination:* This section of the questionnaire was introduced as follows, so as to avoid implying to residents that they had been selected because their own home was at risk:

It is always possible that brownfield land is contaminated because of the way it has been used in the past. For

example, the soil may contain residues from factory processes, or left-over materials that might be toxic. Because of this one has to be careful how the land is developed.

Respondents were then asked the following questions to assess their perceived *vulnerability*:

Do you think any brownfield land in your local area might be contaminated? (5-point scale: definitely no = 1 to definitely yes = 5)

Compared with other urban areas in the UK, do you think there is more or less contaminated land in your neighbourhood? (5-point scale: lots less, less, not sure/about average, more, lots more; scored 1–5).

Compared with other homes in your neighbourhood, do you think there is more or less contaminated land near your own home? (5-point scale as mentioned above).

*Concern* with the consequences of contamination was measured by asking respondents how concerned they would be, if they learned they lived near contaminated land, about 11 potential effects (including effects on their own health and that of friends, children, pets; on wildlife, house prices and mortgages; on local recreation and bathing; and the implications of eating locally caught fish or locally grown vegetables). A twelfth asked how concern over contamination compared with that over other urban risks (crime, air pollution and traffic accidents). Items were rated on a 5-point scale from not at all concerned = 1 to extremely concerned = 5. In view of their high internal consistency (Cronbach's  $\alpha = .91$ ), these 12 items were averaged to yield a single measure of concern.

*Trust*: Respondents rated their general trust in their local council in the context of decision-making about contaminated land (wouldn't trust at all = 1; would trust completely = 5), together with five aspects of decision-making and communication that might contribute to such trust:

- (a) *Expertise*: not at all able to judge how safe or dangerous it was = 1; extremely able to judge = 5.
- (b) *Interpretation bias*: would definitely see the risk as safer than it really was = 1; would definitely see the risk as more dangerous than it really was = 5.
- (c) *Communication bias*: would definitely underplay the risks when communicating to the public = 1; would definitely exaggerate the risks when communicating to the public = 5.
- (d) *Openness*: not at all prepared to tell what they know = 1; extremely prepared to tell = 5.
- (e) *Shared interests*: definitely has not got my interests at heart = 1; definitely has got my interests at heart = 5.

### 3. Results

The mean scores for the two areas on the principal variables are shown in Table 1, together with the results of *t*-tests for the univariate differences.

#### 3.1. Vulnerability

Residents of the two areas did not differ in their beliefs that there was contaminated land in their local area; however, the combined mean response (3.70) significantly exceeded the scale midpoint of 3 ( $t = 20.11$ ,  $p < .001$ ), indicating that both groups considered their local area to be affected. Likewise, the combined sample tended overall to believe that there was more contaminated land in their neighbourhood than in other urban areas ( $M = 3.23$ ,  $t = 7.53$ ,  $p < .001$ ), but in this case the two groups differed significantly, with residents of Area B believing they were relatively more affected. When asked about risk of contamination near their own home compared with the rest of their neighbourhood, Area B residents again considered themselves more at risk than those in Area A. A striking aspect of these data, however, is the comparative reluctance of respondents, at least in Area A, to believe their own home was at risk, even when acknowledging the presence of contamination in their neighbourhood, as shown by a highly reliable mean difference between these latter two items for the sample as a whole ( $t = 9.23$ ,  $p < .001$ ). These three items measuring vulnerability were significantly ( $p < .001$ ) intercorrelated. For the sake of simplicity, therefore, we averaged them to yield a single score (*vulnerability*) for use in subsequent analyses (Cronbach's  $\alpha = .68$ ).

#### 3.2. Concern

Residents of both Areas A and B said they would be quite concerned if they learnt about local contamination, but did not differ from each other in this regard. Concern and vulnerability were only weakly associated ( $r = .08$ ,  $p < .05$ ).

#### 3.3. Satisfaction with council

Residents of both areas were rather dissatisfied with their local council in terms of their perceived style of communication, the overall  $M$  (2.44) being significantly to the negative side of neutral ( $t = 15.40$ ,  $p < .001$ ). Such dissatisfaction, however, was significantly stronger in Area A than B. Satisfaction was negatively associated with perceived vulnerability ( $r = -.21$ ,  $p < .001$ ) and, more weakly, with concern ( $r = -.08$ ,  $p < .05$ ). When we

Table 1  
Mean scores for the two areas

Area	A	B	<i>t</i>	<i>p</i>
Local area contaminated?	3.71	3.69	.26	ns
Neighbourhood more contaminated?	3.14	3.34	3.28	<.001
More contamination near home?	2.87	3.04	3.04	<.005
Concern	4.02	3.97	.97	ns
Satisfaction with council	2.35	2.55	2.80	<.005
General trust	2.05	2.23	1.73	<.09

performed an analysis of covariance to look at area differences in satisfaction, controlling for vulnerability, the A vs. B comparison was even clearer (adjusted  $M_s = 2.33, 2.58$ ;  $F(1,727) = 11.80$ ;  $p < .001$ ). The effect of vulnerability was also highly significant ( $\beta = -.22$ ,  $F(1,727) = 37.00$ ,  $p < .001$ ).

### 3.4. General trust

Overall, respondents were quite distrustful of how their local council would deal with issues of contaminated land ( $M = 2.13$ ; difference from midpoint,  $t = 17.38$ ,  $p < .001$ ). This was slightly more so for Area A compared with B. Controlling for vulnerability, concern and satisfaction rendered the area difference in general trust clearly nonsignificant ( $F(1,699) = 1.45$ , ns). The effects of vulnerability ( $\beta = -.11$ ,  $F(1,699) = 9.45$ ,  $p < .002$ ) and especially satisfaction ( $\beta = .35$ ,  $F(1,699) = 93.92$ ,  $p < .001$ ) were highly significant, but not that of concern ( $\beta = -.05$ ,  $F(1,699) = 2.40$ , ns). In other words, irrespective of area, residents trusted their council far more if they were satisfied with its record on communication, but somewhat less if they perceived themselves to be at relatively greater risk from contamination.

### 3.5. Aspects of trust

Finally, we performed a multiple regression to examine how general trust might be predicted from other aspects of trust. Since there were no area differences on these items, the analysis was performed on the total sample. The items measuring interpretation and communication bias were each recoded from 1 to 3 (i.e. 1,5 = 1; 2,4 = 2; 3 = 3) so that 1 represented maximum bias either in the direction of underplaying or exaggeration the extent of risk, and 3 represented a lack of bias. After such recoding, the five aspects together accounted for 59.7% of the variance in general trust ( $F(5,651) = 193.20$ ,  $p < .001$ ). The two most important predictors were openness ( $\beta = .38$ ,  $t = 11.60$ ,  $p < .001$ ) and shared interests ( $\beta = .37$ ,  $t = 11.15$ ,  $p < .001$ ), followed by a lack of communication bias ( $\beta = .13$ ,  $t = 4.03$ ,  $p < .001$ ). The effects of a lack of interpretation bias ( $\beta = .05$ ,  $t = 1.76$ ,  $p < .08$ ) and expertise ( $\beta = .04$ ,  $t = 1.41$ , ns) were not statistically reliable. In other words, trust in the council was only weakly related to perceptions of the quality of their decisions as such, but strongly related to perceptions of their openness and lack of bias as communicators, and to their perceived motives; that is, whether they had residents' interests at heart.

## 4. Discussion

Taking responses to these questionnaire items as a whole, these data indicate, as might be expected, that residents' attitudes towards their local council in terms of trust, evaluations of general performance and communication were positive associated. The purpose of our statistical

analyses, however, was to unpick these associations to uncover underlying processes and to determine the relative importance of different factors. Two 'non-obvious' conclusions are especially noteworthy. First, although satisfaction with the council was lower among residents who perceived themselves as more vulnerable, the differences between the two areas were even stronger when controlling for perceived vulnerability. This suggests that there were important differences in practice between the two local authorities rather than that the relative dissatisfaction with council A arose from more land in Area A being seen as contaminated (since the contrary was the case). Second, although satisfaction and trust are associated, trust had relatively little to do with the council's perceived knowledge or expertise, but a great deal to do with their perceived openness and motives. Hiding bad news for fear of seeming less competent can thus damage trust far more than admitting a problem and engaging local residents in the process of finding a solution.

These findings provide both discouraging and encouraging news for those charged with looking after the interests of local communities and, in particular, protecting residents from the potential harmful consequences of environmental contamination. On the one hand, both local councils were held in somewhat low regard, attracting ratings of dissatisfaction and distrust overall, rather than satisfaction and trust. Such negative evaluations were strongest among residents who perceived themselves to be relatively more vulnerable to the risks associated with contaminated land. On the other hand, where council officials appeared to have made more effort to be open with local residents and to engage them in discussion about the relevant issues (and/or were perceived to have done so), such distrust and dissatisfaction were significantly reduced.

It is difficult within the limitations of the design of this study to attribute these differences between the two areas to any single incident or example of good (or bad) practice by any particular local government officer(s). Our background interviews<sup>3</sup> and observations suggested differences in organisational culture rather than merely the attitudes of specific individuals. Our data are likewise silent on how far, if at all, such differences may have spread to other aspects of the councils' activities. Nonetheless, our characterisations of the communication strategies of the two councils were broadly borne out by residents' responses to our questionnaire. Extra confidence can be placed in these

<sup>3</sup>This study was informed by a series of background interviews with 27 key actors associated with these sites that were conducted by the authors between March 2004 and August 2005. These included those involved in deliberating on the future of these sites—past and current local authority environmental health officers, the Health Protection Agency, the site owners—and actors excluded from internal decision-making (local councillors, neighbourhood representatives, and so on). In addition, documentation including both material in the public domain and internal local authority files were analysed. Because of the sensitivity of the sites, confidentiality has been maintained throughout.

findings in that our postal questionnaire method lessened any chance that they could be the result of demand characteristics, since direct contact between researchers and respondents was avoided and the questionnaire itself made no mention of our intention to use the data to draw comparisons between different areas. Furthermore, the area differences in residents' satisfaction cannot be simply put down to differences in the (perceived) extent of contamination *per se*. Although greater perceived vulnerability predicted more dissatisfaction at an individual level, residents of Area B were *less* dissatisfied with their local council while seeing themselves as *more* affected by contamination than residents of Area A.

While commending the more open approach adopted by the council officers in Area B, what we observed amounted merely to a preparedness to adhere to principles that, from the perspective of the broader literature on risk communication (Calman, 2002; Kasperson and Stallen, 1991), one might have hoped to be more widely acknowledged and adopted. By contrast, the reluctance of some council officers in Area A proactively to engage with residents when aware of possible contamination risks flies in the face of the principle that the withholding of information can lead to a loss of trust that may be very difficult to recover. A more worrying possibility is that such examples of poorer practice, and possibly a lack of professional training in risk communication, may not be uncommon within local government or other relevant agencies. As mentioned, the council for Area B had built up more experience of dealing with serious contamination issues and therefore had developed a more thought-through strategy for communicating with local residents. This could imply that many councils or other agencies with less experience of such issues may rarely have a prepared risk communication strategy in place before being confronted with particular incidents. Under such circumstances, their response may be largely determined by short-term considerations and/or the intuitions, good or bad, of individual officers. None of this suggested a systematic dissemination of evidence-based good practice.

At a more conceptual level, our findings reinforce the message that risk perceptions, attitudes and trust are closely interconnected, as noted in previous research on other forms of risk (e.g. Eiser et al., 2002). Those residents who perceived their neighbourhood and/or home to be more vulnerable to the effects of contaminated land were more dissatisfied with and distrustful of their council. Nonetheless, even against a background of generally heightened risk perceptions, residents saw their own home as no more at risk (Area B) or even less at risk (Area A) than other home in their neighbourhood, a finding reminiscent of an effect known as 'unrealistic' optimism or optimistic bias (Weinstein, 1987, 1989). This term refers to the tendency for individuals, on average, to see themselves as less likely than average (or 'the average person') to suffer from illness, accidents or other mishaps, and/or more likely than average to experience various

forms of good fortune. Such optimism is said to be 'unrealistic' since individuals *on average* cannot have a below average risk.

When considering different predictors of trust, residents attach greatest weight to aspects that reflect their perceptions of the council's motives (having residents' interests at heart) and their openness in communication. These aspects take precedence over those aspects more central to the judgement of danger or safety itself (expertise and interpretation bias). In other words, it helps a little (in residents' minds) if the councils appear to know what they are doing, but it helps build trust even more if they are seen to be acting honestly, and for the right reasons. Such findings suggest that ordinary citizens, even though often lacking the expertise to interpret unaided technical information concerning levels of specific contaminants, for example, may yet rely on their everyday knowledge about *people* and their motives when forming judgement of risk and trust. In so doing, they recognise, explicitly or implicitly, the extent to which risk is a product, not merely of physical hazards, but of human behaviour.

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