Development of a Strategic Framework for Effective Community-Manager Participation at Contaminated Sites

Development of the PERE Framework and an Investigation into the Remediation of the Former Fruitgrowers Chemical Company Site at Mapua, New Zealand

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Dimidium facti qui coepit habet: sapere aude

[He who has begun is half done: dare to know]

- Horace

Abstract

Environmental remediation problems present some of the most challenging and divisive dilemmas faced by modern society. Major impediments to successful resolution include the intense technical demands of complex clean-up sites, different attitudes to risk, tradeoffs between clean-up and development costs, and the associated political will required to bring about action. The vast majority of the literature on contaminated site clean-up has focused on the technical aspects of the clean-up problem and while these aspects are undoubtedly important in generating efficient and effective clean-up programmes, they tend to under-represent the complexity of large contaminated site decision making. In particular, in large complex remediation projects, the perception and influence of local citizens, indigenous groups, environmental lobby groups and other members of the broad 'Community' become critical to clean-up success.

Only a small amount of research has been dedicated to the investigation of effective Community participation during complex environmental clean-ups. The present research seeks to fill the gap through a development of a new psychosocial framework to assist project managers and a detailed case investigation of a complex environmental clean-up in Mapua, New Zealand.

The core facets of the framework emerge from in-depth literature investigation and a collaborative inquiry with experienced facilitators. These include development of Presence; self-Empathy and empathy with community participants; Rational and systematic understanding of the contamination problem from multiple perspectives; and Empowerment of community perspectives as well as those of the environmental manager – The PERE framework.

The Mapua site is an example of a clean-up that proceeded in a typical way, yet was not wholly successful. Previous Government-sanctioned reports have highlighted issues in the project management, however, the impact of these on the public, and correspondingly how public perception and action affected project management, has not been investigated. The PERE framework is used to explore the project and investigate how participation may have been performed more effectively.

This thesis therefore provides both a detailed investigation of a complex environmental clean-up and a new framework to assist environmental managers in enhancing Community participation for the amenable resolution of complex remediation projects.

Dedication

For my Mother Leonie

and Grandmother Muriel (1922-2008)

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Abbreviations and Explanations

AEE	Assessment of Environmental Effects
Aroā	Understanding, rational thought
Aroha	Love, care, affection, empathy
CSM	Contaminated Site Management
EDL	Environmental Decontamination Limited
EMS	Site management team which coordinated operations at Mapua after MfE took over management of the project
EPC	Extended Peer Community
EU	European Union
FCC	Site of the former Fruitgrowers Chemical Company
Forest & Bird	Royal Forest and Bird Protection Society of New Zealand
Hapū	Kinship group, clan, tribe, subtribe - section of a large kinship group.
HCB	Hexachlorobenzene
Kāinga	Home
Kaipūtaiao	Scientist
Kaitiaki	Guardians of an area
Kawa	Processes
Koiwi	Human remains
Mana whenua	Territorial rights
Mātauranga Maori	The body of knowledge originating from Māori ancestors, including the Māori world view and perspectives, Māori creativity and cultural practices.
Mauri	Force binding the physical and spiritual
MCD	Mechanochemical Dehalogenation – The technology used to remediate soil at Mapua
MfE	Ministry for the Environment of New Zealand
Mihi	Speech of greeting, acknowledgement, tribute
MoH	Ministry of Health
MTF	Mapua Task Force – A TRC initiated and predominantly council

	comprised (although there were up to three community members during the clean-up) committee for overseeing the clean-up of the former Fruitgrowers Chemical Company site
NES	National Environmental Standard
NGO	Non-Government Organisation
PCB	Polychlorinated Biphenyl
PCE	Parliamentary Commissioner for the Environment
PoP	Proof of Performance
POPs	Persistent Organic Pollutants
PUF	Poly-urethane foam samplers
RAP	Remedial Action Plan
Rohe	Territory
Tangaroa	The domain of the sea
Taonga	Treasures
TDC	Tasman District Council
THI	Total Hazard Index
Tikanga	Customs, protocols
TRC	Technology Review Committee – Expert group set up to investigate remediation options at Mapua.
TSP	Total Suspended Particulate
Wāhi tapu	Sacred sites
Whakaaro	To be present, mindful
Whakamana	Empowerment
Whare	House

Contents

1 | Introduction

In the varied topography of professional practice, there is a high, hard ground overlooking a swamp. On the high ground, manageable problems lend themselves to solution through the application of research-based theory and technique. In the swampy lowland, messy, confusing problems defy technical solution. The irony of this situation is that the problems of the high ground tend to be relatively unimportant to individuals or society at large, however great their technical interest may be; while in the swamp lie the problems of greatest human concern.

The practitioner must choose. Shall s/he remain on the high ground where s/he can solve relatively unimportant problems according to prevailing standards or rigor, or shall s/he descend to the swamp of important problems and non-rigorous inquiry?

- Donald Schön (in Jowitt 2004)

1.1 Introduction

Environmental management continues to pose some of the most politically divisive and controversial decisions for contemporary society. One realm of environmental decision making which has proven particularly challenging in terms of scale and complexity is that of contaminated sites. Large scale land contamination is a worldwide problem, the European Environment Agency estimates that there may be as many as 3 million contaminated sites across the EU, of which about 250, 000 sites require clean-up (EC 2006; EEA 2007). In the United States, the figure is even larger, an estimated 400,000 sites have been discovered (GAO 1987); as of October 25, 2011, nearly 1300 sites have been placed on the National Priorities list for immediate remediation under the Superfund scheme (USEPA 2011). Even in New Zealand, a country with a relatively low level of industrialisation, soil contamination has been discovered in every region (MfE 2007a). The Ministry for the Environment (MfE) has identified 4,424 contaminated sites, of which 559 have been characterized as high risk

(MfE 2007a, pg 247). Many of these sites present significant environmental health risks and require urgent clean-up.

While contamination issues are vast, they are also incredibly difficult to manage. According to Scholz and Schnabel (2006) contaminated site clean-up represents "one of the most difficult management issues of municipal and state agencies." There are multiple reasons for this difficulty. Firstly, contaminated site clean-ups are technically complex. Significant technical uncertainty may be evident surrounding contaminants present, their pathways, and the specific effects on ecosystems (Swartjes 2011). Effects may be dynamic or delayed and synergistic relationships between contaminants prove to be challenging for the scientific assessment of effects (Leschine et al. 2003). Furthermore, remediation technologies present another extensive area of technical uncertainty. Methods for cleaning up contaminated sites are rapidly evolving yet robust studies of efficacy may be quite limited (EPA 2010a). Large technical uncertainty means that traditional command and control approaches to management may be unsuitable.

Secondly, large contaminated sites and their subsequent remediation are politically complex. Due to extensive costs associated with remediation, responsibility for the contamination is frequently disputed. The two parties usually most culpable, owners of contaminated sites and regulatory agencies, may each deny liability or blame one another, resulting in political stalemate (Sustainability Council of New Zealand 2005). If this occurs, Community members may view site owners as money-oriented capitalists and regulatory agencies as impotent, perceived as allowing the contamination to occur and then not protecting citizens when effects become evident. Furthermore, those most affected by contaminated sites are often poor and minority groups, already distrusting of government and powerful industry, and least able to effect change (Ashford and Rest 1999). The result is commonly a context of limited trust, highlighting complex socio-political issues of justice, power, fairness and equity in which action to alleviate environmental threats may be difficult to achieve.

The combination of political and technical complexity makes contaminated sites perfect for investigating how participation occurs hence they have been used for investigating a range of factors associated with multi-perspective involvement into complex environmental decision making. The earliest studies investigated how and why contamination could occur, extensively analysing several high profile cases in the late 1970s (e.g. Love Canal, NY; Times Beach MO; Lekkerkerk, the Netherlands; Minimata, Japan). Contaminated sites then became the subject of extensive risk research when efforts were made to understand why technocentric methods for determining clean-up options proved controversial and difficult to implement (Slovic et al. 1982; Kasperson et al. 1988; Slovic et al. 1991). In the early 1990s attention turned to participatory approaches for assisting in contaminated site decision making, first in an idealised manner justifying participation, i.e. highlighting the normative justification for participation (e.g. English et al. 1993; NRC 1996b), then to examine the issues and merits of public participation using case analysis (e.g. Ashford and Rest 1999). Similar investigations persisted through the 2000's as participatory approaches continued to be extensively employed, critiqued and reviewed from regulatory (e.g. USEPA 2001; Charnley and Engelbert 2005) and community (Laurian 2004) perspectives. As nuances of participatory decision making became evident, attention turned to the investigation of specific facilitation techniques in an effort to understand "which public participation mechanisms work best, when" (e.g. Laurian 2005; Webler and Tuler 2006). Increasingly, efforts have been placed on understanding specific aspects of the contaminated site clean-up which have been highlighted as significant for clean-up performance, these include trust (e.g. Meadd 2007; Danielson et al. 2008), power (e.g. Culley and Hughey 2008; Lloyd-Smith 2009) and long-term management (Leschine 2007). Recently, exploring different methods for making knowledge claims and associated verification during contaminated site clean-up has led to the development of a tentative epistemology of public participation (Healy 2009). Thus, contaminated sites offer a useful context for investigating how participation in complex environmental decision making may be effectively performed.

Over the past 40 years, the interaction between the Extended Peer Community- non-experts, citizens, environmental non-government organisations, indigenous representatives (herein "Community") - and project management representatives has receiving increased attention (Funtowicz and Ravetz 1993; Wynne 2003; Delgado et al. 2011; Jabbar and Abelson 2011). Broad involvement in environmental problem solving has been hailed as providing a suite of benefits including:

1. A more comprehensive problem understanding through the inclusion of local knowledge and historically marginalised epistemologies (e.g. Fischer 2000, 2004);
2. Provision of social, ethical, and political values (e.g. Fiorino 1990; Middendorf and Busch 1997);

3. Enhancing democracy - “citizens are the best judge of their own interests” (e.g. Fiorino 1990; Laird 1993);
4. Improving institutional legitimacy (e.g. Dryzek 1990; Fung 2007);
5. Opportunity for social learning (e.g. Daniels and Walker 1996; Stringer et al. 2006; Pahl-Wostl et al. 2007; Pahl-Wostl 2009);
6. Improving procedural fairness (e.g. Webler 1995)
7. Improving public trust and confidence (e.g. Petts 2008; Rae and Brown 2009);
8. Quality assurance of expert assessments (e.g. Funtowicz and Ravetz 1990; Funtowicz and Ravetz 1993);
9. Reduction in conflict, in particular public outrage over decisions (e.g. Wiedemann and Femers 1993; Beierle 1998);
10. Minimising cost and delay (Creighton 2005, p18);
11. Reduction in litigation (Creighton 2005, p18);
12. Results in longer lasting decisions, decisions which “stick” (e.g. Wiedemann and Femers 1993; NRC 2008)

However, Community participation generates a more complex problem solving context. Researchers have raised a number of issues with increased involvement, the most important of these relate to the capability (or incapacity) of non-experts in addressing often quite technical problems, the potential injustices which are capable of emerging through “capture” by well-organised and well-funded interest groups, and most often cited, the extensive delays, costs and stalemate which may occur as a result of protracted negotiations or strategic behaviour (NRC 2008). Thus, while the benefits of public involvement have been clearly described, there remains much uncertainty surrounding how public involvement can be meaningfully and practically incorporated in environmental problem solving (Stewart and Sinclair 2007).

Research into participation has explored both practical and theoretical understanding. Practical studies of participation have focused on best practice examples to ascertain criteria for *how to do* participation exercises well (e.g. Creighton 2005). These have specifically targeted the spaces of interaction, and provide useful insight into appropriate conduct for meetings, task forces, consensus conferences etc. Practical investigations have provided practitioners with a useful set of tools, but have been criticised for lacking theoretical robustness (Webler 1995). Furthermore, investigation of individual participation mechanisms neglects the overall influence and contribution that different methods of participant input can have on a project. Thus, practitioner-derived best practice only provides a partial account of how Community participation should be conducted.

Historically, Community participation has been considered “a practice in search of a theory” (Wengert 1976). Since its inception in environmental planning however, many useful contributions have been made to further the understanding of participation. Deriving from communication theory, emancipatory theory and ideal speech, three dominant models of Community participation have emerged. The information model emphasises communication between members of the Community and project sponsors (Rowe and Frewer 2000). The second, power model, emphasises the agency of participants to influence environmental problem solving decisions and highlights disparities in power between communities and managers (Arnstein 1969). The third, deliberative model proposes an idealised communication space which promotes fairness and competence (Webler 1995). While these three models dominate studies of participation and evaluation in environmental problem solving, much criticism remains as to whether they represent an accurate depiction of pragmatic goals for Community participation (Delgado, Kjolberg et al. 2011).

Researchers have cautioned practitioners to “mind the gap” between theoretical ideals of Community participation and implementation (Irwin 2001a; Wynne 2006; Delgado, Kjolberg et al. 2011). While it may be that theoretical aims of participation are aspirational targets which will become closer to reality as practice matures, the gap between theory and practice may also indicate that the theories are impractical or inadequate.

Practical investigation of participation mechanisms offers specific criteria for implementation which may not be wholly applicable. General theories offer prescriptive definitions for participation but require practical grounding. What appears to be lacking is middle-range theory (c.f. Merton 1968; Rappert 2007), a framework that connects empirical research with theoretical knowledge in Community participation thus enabling the design of strategies for effective participation (Roberts 2004).

1.2 Purpose

The purpose of this thesis is to develop a strategic framework for participation between managers and Communities during the clean-up of contaminated sites. Thus the primary research question is:

> *How can effective manager-Community participation be generated and sustained during contaminated site clean-up?*

Specific tasks are to:

1) to investigate the challenges that have faced multiparty involvement in contaminated site clean-up;
2) to explore the effectiveness of existing approaches to participation between communities and managers during contaminated site clean-up;
3) to understand the central characteristics of effective participation between communities and project managers during contaminated site clean-up, thereby developing a strategic framework;
4) to use the strategic framework to perform a retrospective analysis on a contaminated site clean-up case.

1.2.1 Clarification of terminology

The literature on broad involvement in environmental problem solving is extensive and the concept is referred to in various ways, for example, consultation (NAB and SWMG 2000; DEC 2006; MfE 2006a), participation (Churchman 1984; Chess and Purcell 1999; Rowe and Frewer 2000; NRC 2008; Carson 2009), involvement (Hunsberger et al. 2005; Robinson 2006; Yang 2006; Heikkila and Isett 2007; Wawrzynek et al. 2007; Yang and Callahan 2007), and more recently collaboration (Vigoda 2002; Bruce 2006; Hawryszkiewycz 2007; Weinberger et al. 2007) and engagement (Rowe et al. 2005; Burgess and Clark 2006; Horlick-Jones 2008). While these terms have sometimes been used to usefully differentiate between subtleties regarding how participation is conducted, it is evident from the literature that the different terms are frequently used interchangeably, and may confuse rather than clarify understanding (Rowe and Frewer 2000; Rowe and Frewer 2005).

Community participation involves participation between those managing a contaminated site and the communities associated with the site. While seemingly straightforward, "Community" is used in various ways in the literature (Ashford and Rest 1999) and affects the scope and strategic intent of participation (cf. “community” defined as only those directly associated with a site or affected by it (Ashford and Rest 1999), and a wide network of individuals and organisations who may be interested or affected (Funtowicz and Ravetz 1994)). In this thesis the term “Community” is used to denote a broad set of individuals and groups, similar to the “Extended Peer Community” concept which originated in the writings of Funtowicz and Ravetz (1990; 1993) in the use of non-traditional methods for the assessment of quality in science for policy. Community therefore acknowledges the expertise held by historically marginalised groups (e.g. local experts, indigenous representatives etc. and is sufficiently broad to encapsulate the multitude of perspectives which may be brought to bear on a common problem, hence it is preferred over narrower forms which may exclude important groups, such as citizens (which potentially excludes non-citizens that may be affected or interested), public (which can be ambiguous, variously defining members of the public directly affected or otherwise; and/or offensive if used to connote indigenous custodians), and stakeholders (which confine discussion to those with an obvious “stake” in the issue). Chapter 3 explores components of the Community participation to further characterise the concept, for example, as the directly affected community, indirectly affected community, regional and national publics, environmental NGOs, indigenous groups etc. Community participation is thus used to define, in the broadest sense, the “who” of participation.

A tendency in the literature is to confine the notion of participation to formal participation exercises such as consensus conferences, meetings, hearings, etc. (e.g. Rowe and Frewer 2000; Rowe and Frewer 2005). While formal contexts are indeed important considerations in establishing the effectiveness of participatory problem solving, a sole focus on “invited” participation excludes other potentially significant contexts (Delgado, Kjolberg et al. 2011). For example, polemics from distrusting citizens in local newspapers, or town rallies opposing projects can significantly influence decisions. Restricting ‘participation’ to formal, organised, and (possibly) contrived contexts may paint a false picture on what is effective, and thus undermine robust understanding of how to incorporate Community participation effectively. Consequently, in this thesis a broad view of participation is adopted, to explore both invited and uninvited aspects.

1.3 Case Study: Former Fruitgrowers Chemical Company Site, Mapua, New Zealand

The clean-up of the former Fruitgrowers Chemical Company (FCC) site in Mapua, New Zealand provides an opportunity for exploring Community participation in real world environmental problem solving. In similarity to many other large scale environmental clean-ups, the remediation of the FCC site proved to be far more complex and costly than originally anticipated (PCE 2008a). Although on a world scale the volumes treated were moderate, clean-up of the Mapua site took nearly 20 years and cost (not counting administrative overheads) in excess of NZ$13 million, more than three times the original budget (PCE 2008a). Contrary to some reports published on the clean-up which highlight the uniqueness of the technology employed, the unusual scale of the problem within the New Zealand context, and the difficulties encountered during clean-up, the most fascinating aspect of Mapua is, quite simply, how beautifully ordinary it is. Common to many environmental problem solving measures, the Mapua clean-up encountered a range of socio-political, technical and economic hurdles which were overcome, with varying degrees of success. As such, Mapua proves to be a typical case of environmental problem solving.

1.4 Contribution

This thesis contributes to our understanding of participatory processes for environmental problem solving. In contrast to other studies, the issue of Community participation is approached systemically, looking at participation from multiple perspectives in an effort to understand why it is perceived to be useful or divisive. A novel middle range theory is proposed, based on the concept of *presence*, development of *empathy*, *understanding* and *empowerment* within and between project participants.

The large majority of literature on participation is intended for project sponsors and practitioners, those parties in general responsible for implementing participatory processes. The empathy, understanding, and empowerment model is directed primarily for assisting contaminated site managers in more effectively managing highly complex projects, however is equally useful to Community participants in understanding why participatory processes they are involved in are working, or alternatively, what may be improved.

1.5 Outline of the Thesis

This thesis is divided into 11 Chapters. Firstly, a brief overview of the main technical and non-technical issues associated with contaminated site clean-up which have been highlighted in the literature is provided (Chapter 2). Focusing on the issue of participation, the broader literature is then reviewed to examine the various theories and attributes of effectiveness in environmental problem solving. Mauri is identified as a potentially useful measure of effectiveness in participation (Chapter 3). To understand the central characteristics of effective participation between Communities and project managers during contaminated site clean-up a collaborative inquiry is performed (Chapter 4). A further literature exploration is then performed, centring on psychosocial factor affecting participation (Chapter 5). Integrating many of the insights from Chapters 2, 3, 4 & 5, Chapter 6 develops a framework for effective manager-Community participation (PERL).

The following four chapters employ the PERL framework to investigate the effectiveness of participation during the clean-up of the former Fruitgrowers Chemical Company site at Mapua, New Zealand. Chapter 7 identifies case study method, Chapter 8 provides an overview of the clean-up, Chapter 9 an inquiry into critical contexts, and Chapter 10 an inquiry into systems and interactions is performed. Finally, Chapter 11 concludes the research and identifies avenues for future research

The second part constitutes the main focus of the thesis, consisting of an empirical examination of participation during the clean-up of a contaminated site in Mapua, New Zealand. Chapter 4 presents the case study methodology, consistent with the insights from Chapters 2 and 3. Chapter 5 provides a case history of the clean-up including a timeline of important stages and events and a narrative describing the evolution of events. Chapters 6 and 7 provide a detailed analysis of the major events identified, including interpretations of the effectiveness of management interventions.

The final part of the thesis, based on the literature review, case investigation, and a collaborative inquiry with experienced facilitators, provides a meta-model for the strategic development of effective participation (Chapter 8). Lastly, Chapter 9 offers conclusions and recommendations for further research.

2 | Contaminated Site Clean-up

Contaminated Site Management and Its Challenges

The regeneration of contaminated land has always required a multi- and trans-disciplinary approach, but increasingly scientists, engineers, planners and lawyers are turning to the social sciences for reinterpretation of the issues historically viewed as driven by technological or economic concern alone. As a result, we are gaining valuable insights into the value of institutional trust, into 'process' issues in terms of involving others in the decision making, into issues of equity and the perceptions and reporting of risk. This work now needs to be integrated within the existing management frameworks for contaminated land management.

- Pollard et al. (2001)

2.1 Introduction

At first sight, contaminated site clean-up decision making appears to be a relatively straightforward exercise – transforming a site that has been degraded to one in an acceptable state. However, as this chapter demonstrates, there are various difficulties associated with remediation decision making which prove challenging for environmental managers to overcome, and these challenges become magnified when multiple perspectives are included in decision making.

2.2 The technoscientific approach to contaminated site cleanup

This chapter begins with an exploration of the standard technoscientific approach to contaminated site clean-up. Although there are differences in the manner in which contaminated sites are discovered and remediated, in different Western country contexts approaches are remarkably similar. Table 1 lists various stages of contaminated site management from the worldwide literature. According to these approaches, problem solving should pass linearly from problem recognition to evaluation.

Table 1. Stages of contaminated site management as defined by agencies in various localities

Location	New Zealand	New South Wales Australia	United States	United Kingdom
Stages	Preliminary site inspection report	Preliminary Investigation	Identify problems needing further investigation	Preliminary Risk Assessment
	Detailed site investigation report	Detailed Investigation	Characterise nature, extent, and rate of problems	Generic Quantitative Risk Assessment
	Remedial action plan	Site Remedial Action Plan	Evaluate options and identify preferred remedy	Detailed Quantitative Risk Assessment
	Site validation report	Validation and Monitoring	Propose selected remedy	Identification of Feasible Remediation Options
	Ongoing monitoring and management plan.		Conduct public involvement	Detailed Evaluation of Options
			Authorise selected remedy	Development of the Remediation Strategy
			Design and implement chosen remedy	Preparation of the Implementation Plan
				Design, Implementation and Verification of Works
				Long-term Monitoring and Maintenance
Reference	MfE (2004a)	NSW DoP (2008)	Drew (2002)	Environment Agency (2004)

The technoscientific approach emphasises the role of expertise in the management of environmental clean-up. As shown in Table 2, scientific and technical experts constitute the primary parties involved in all stages of clean-up. Experts are capable of providing skilled assessment of contamination, clean-up options, implementation and monitoring and are thus thought to offer the best basis for remedial decisions (Swartjes 2011). Through thorough investigation, experts are anticipated to supply pertinent facts to politicians who then pass judgement on what level of risk and expense is appropriate for a given context. As detailed later in the thesis, the clear distinction between "facts" and "values" has been widely disputed; nevertheless it lies at the foundation of the technoscientific approach.

Table 2. Clean-up stages for Superfund sites and extent of primary involvement (Drew, Nyerges et al. 2002)

	Cleanup Stage	**Primary involvement**
1	Identify problems needing further investigation	Scientific experts
2	Characterise nature, extent, and rate of problems	Scientific experts
3	Evaluate options and identify preferred remedy	Scientific experts, some input from political elites
4	Propose selected remedy	Scientific experts, some input from political elites
5	Conduct public involvement	Scientific experts, political elites, NGOs, public
6	Authorise selected remedy	Scientific experts, some input from political elites
7	Design and implement chosen remedy	Scientific experts
8	Long-term monitoring and maintenance	Scientific experts

2.3 Stages of contaminated site clean-up

As noted above, contaminated site clean-up ideally proceeds through a number of different stages. For this review, these stages are divided into problem investigation; identification of feasible remediation options; detailed evaluation of options; preparation of the implementation plan; public comment and review; design, implementation and verification; and post-remediation monitoring. The following sections provide a brief overview of the technical stages of contaminated site clean-up.

2.3.1 Problem investigation

Technical assessment begins with a preliminary investigation of the suspected contaminated site. To efficiently identify contaminated sites and develop strategies for their remediation if necessary, most frequently a tiered approach is employed (Swartjes 2011). The basic rationale for a tiered approach is pragmatic - there is little point expending much time and effort if a site is unlikely to present unacceptable risks. Initially an inventory is conducted of all possible contaminants, for example chemicals that were used or manufactured at the site. This initial inventory can then be extended to a full historical investigation to ascertain the probability of contamination. In each tier, an assessment is thus performed with generally two possible outcomes: either a judgment of the absence of unacceptable risks is established thus completing the assessment, or unacceptable risks cannot be excluded, deeming further investigation necessary.

The tiered approach continues with a screening assessment and conceptual model development. This is usually a desktop study to review past records at the site but may also involve interviews with past and/or current workers, land owners, neighbours as well as the local community (MfE 2004a). The objective of these historical investigations is to establish whether contaminants were likely to be present at the site and identify possible threats. If a site is deemed to be a possible threat, estimation of impacts on humans and ecosystems begins with the development of a conceptual model of the contaminant system. This model includes the contamination source, its pathway, and any potential receptors (Figure 2).

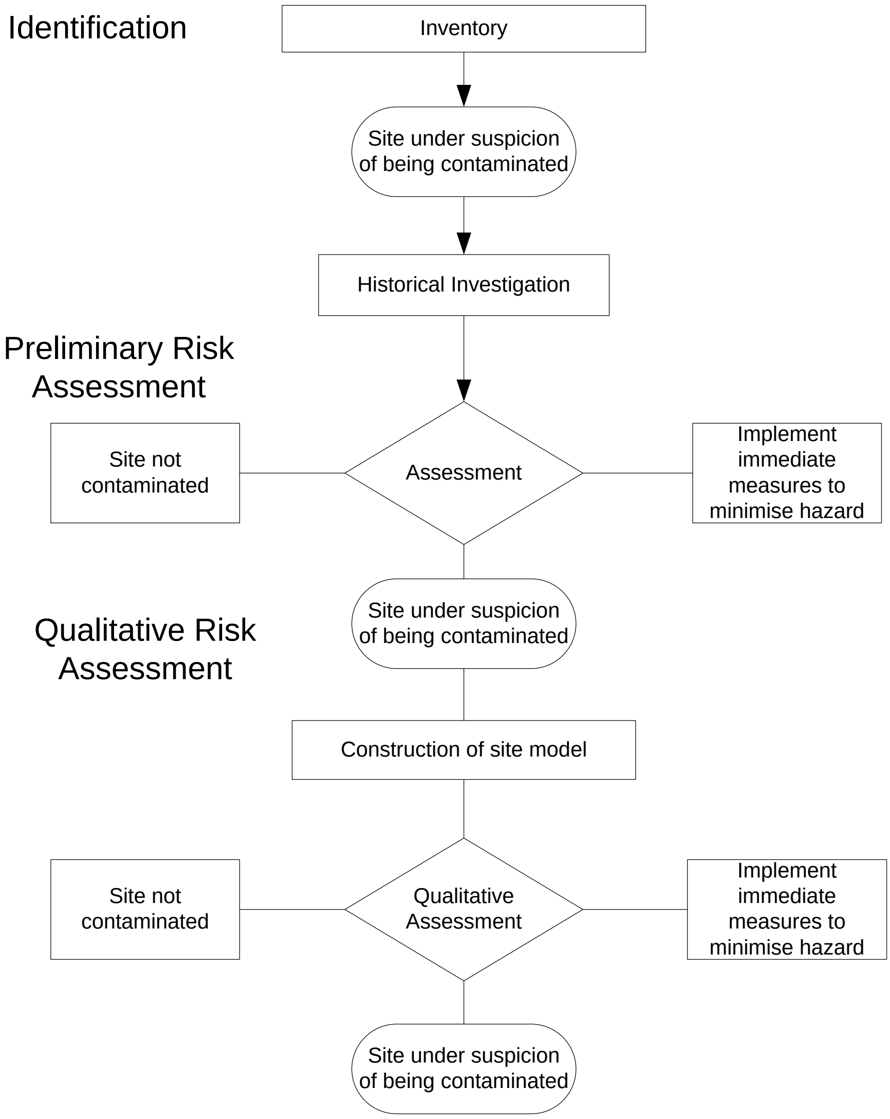

Figure 1. Standard method of the design of investigations for preliminary identification of a contaminated site.

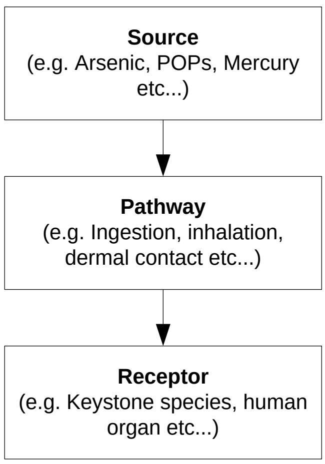

Figure 2. The SPR model of contaminated site risk.

The Source/Pathway/Receptor (SPR) conceptual model is usually developed by environmental consultants with expertise in risk assessment. Development of the conceptual model is an iterative process - refinements to the model occur as site specific information becomes available and further investigation is conducted (Swartjes 2011). Usually the second tier in a tiered approach is a qualitative assessment of risk which identifies pathways and receptors which are most likely to be adversely affected. Finally, quantitative tools may be employed, enabling detailed modelling of the system. An overview of the expert risk assessment process is identified in Figure 3.

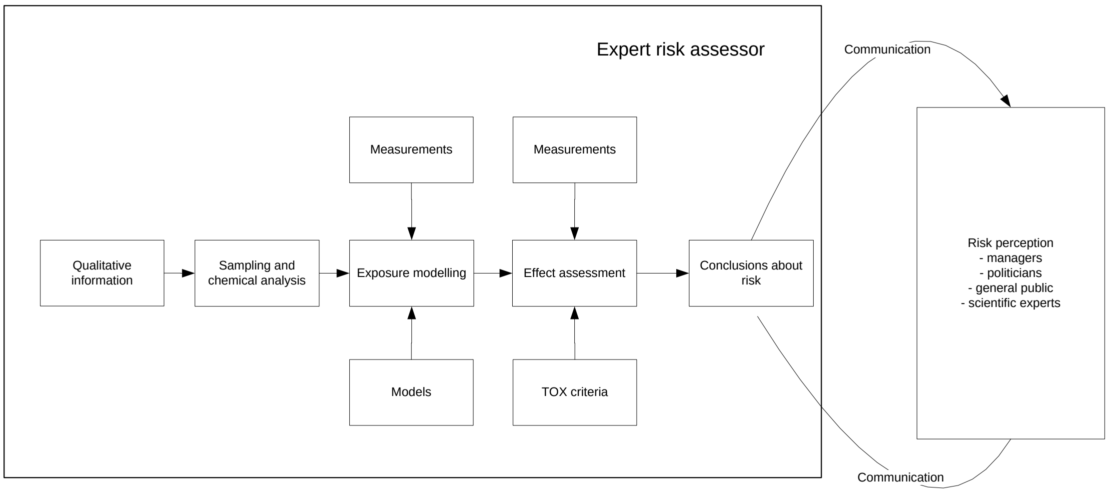

Figure 3. A general view of the steps taken in a risk assessment for contaminated sites (Swartjes 2011, pg 1033)

At the end of this stage, three primary aspects will have been investigated (Environment Agency 2004): 1) A conceptual model of the site will have been established, identifying principal SPR linkages; 2) A method for estimating and evaluating the risks from particular pollutant linkages will have been established; 3) An evaluation of the degree of risk associated with the linkages will have been performed, therefore identifying whether unacceptable risks are present. From these investigations a decision regarding whether further action is required will be made.

Risk pervades decision making during contaminated site clean-up, it is usually calculations of risk that determine authorities' desire for clean-up. For project sponsors and authorities, technoscientific assessments are commonly employed to assess risk. But risk is a complex phenomenon, and effective Community participation may be compromised if risk is not sufficiently understood (Fiorino 1990).

One reason for caution in disclosure is that technical assessments of risk can be highly uncertain. Firstly, understanding the contaminant source is rarely a simple exercise (Swartjes 2011). Usually, by the time a contaminated site is designated as such, contaminants may be considerably dispersed.

Secondly, despite approximately 50 years of research into environmental toxins and some substantial improvements, huge uncertainties exist in the understanding of the mobility and fate of toxins in the environment (Pilkey and Pilkey-Jarvis 2007). Physical models of environmental transport are hampered by the complexities associated with 'real world' situations, invariably omitting potentially pertinent components of the contaminant transport system. In particular, the curious interactions which mobilise, stabilise or otherwise modify purely physical projections of environmental fate are difficult to model. For example, DDT, while relatively immobile, may be degraded by micro-organisms into potentially more bioavailable and toxic forms (Zitko 2003). Models have difficulty making predictions in regard to the extent of biodegradation and eventual breakdown products, hence these factors are usually omitted.

Thirdly, establishing receptors (i.e. specific impacts) for humans and other sentient members of ecosystems is especially difficult. Animal testing, combined with appropriate safety factors, can provide estimated contaminant levels of No Observable Effect Levels (NOEL). However, these studies are limited and costly, and may not be statistically robust (Hartung 2009). Furthermore, they do not and cannot account for the complex cocktail of contaminants usually present in real contaminant situations. Potential cumulative effects are usually considered in a simple additive manner, however studies increasingly point to synergistic relationships between multiple contaminant sources and general health (Hartung 2009). Establishing possible impacts on other living species in ecosystems is hampered by similar issues. Animal rights activists are as strongly opposed to non-human testing as testing on humans. Furthermore, practical considerations mean that toxicity considerations are limited to particular species, not all ecosystem components (British Toxicology Society 1990). Specifically, more effort is usually directed toward understanding toxicity of keystone species or species which are threatened (Shrader-Frechette and McCoy 1994; Chapman 2002). These species, however, may not be suitable for controlled laboratory investigations - threatened species are obviously not candidates (Chapman 2002).

Finally, physical modelling of the contaminant pathway assumes a passive flow. However, ecosystems are capable of adapting, to various degrees. We know, for instance, that living systems possess specific regulatory subsystems which control the level of uptake and excretion (Odum and Odum 1959; Odum 1993). Thus, while a particular contaminant may be physically available within an ecosystem, inhibition factors may mean that it is not biologically available. These factors contribute to uncertainty in scientific assessments of risk. Unless this uncertainty is readily acknowledged, trust and credibility may be compromised (Petts 1997). As highlighted by *NEPA* (2011)*:*

> *Scientific competence is essential to establish credibility, but is by itself not sufficient to assure trust. Openness, honesty and transparency are also necessary to demonstrate credibility and warrant trust. This includes a frank and honest approach to dealing with uncertainty, which is inevitable in any risk assessment. Denial of uncertainty (both knowledge uncertainty and uncertainty caused by variability) will eventually backfire and undermine credibility.*

Furthermore, risk has shown to be an inherently subjective phenomenon. Risks may be tolerated or rejected depending on how they are perceived (Figure 4). Risk communication research has demonstrated significant hazard levels may be tolerated if emotional reactions about a risk event are low, however low hazards may not be tolerated when there is a perception that agencies are unresponsive or unconcerned with public health (Maxwell 2003). Thus how risk issues are included in problem understanding can have a significant influence on project planning and Community participation. In other words (NEPA 2011):

> *Risk, in the context of contaminated land, is an inherently predictive, multi-dimensional estimate that is useful in trying to prevent future harm from happening. Because predictions of risk inevitably rely on a mixture of evidence, assumptions and judgment, characterising any differing beliefs of the public about risk as being just 'perception' is guaranteed to undermine trust and mutual respect, if not create open conflict and further outrage.*

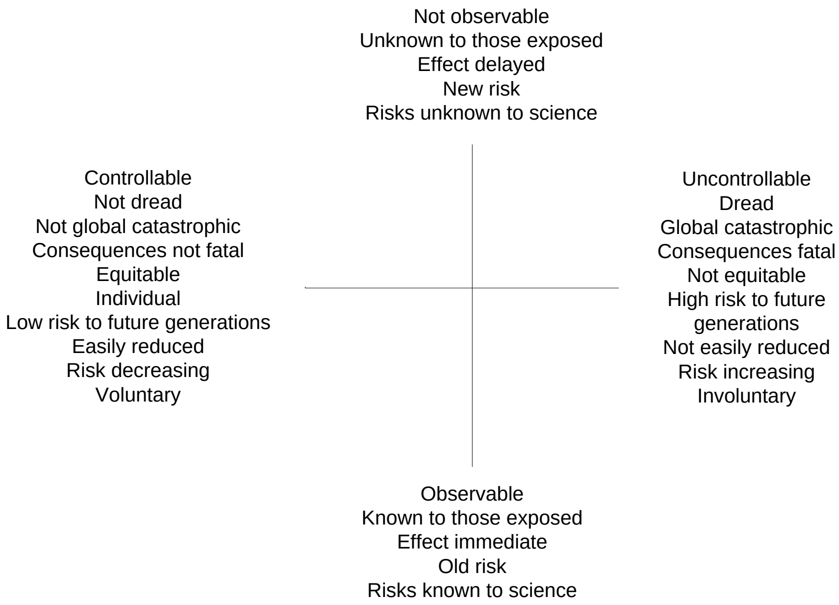

Figure 4. Factors which affect risk perception (Slovic, Fischhoff et al. 1982)

Challenges for contaminated site managers arise in several areas in the problem investigation phase. Firstly, scientific experts may not be able to establish all pertinent information in relation to the site – cost, time, and technical limitations may compromise accuracy; previous or current site owners, neighbours, community members may not fully disclose all information they possess; as a result, conceptual models may not totally represent the level of contamination or the contaminant transport system. Secondly, definitions of acceptability may not be shared between scientific representatives and Community members. Differences in understandings of acceptability are particularly apparent if Community participants are overwhelmed by the volume of information presented or its technical complexity (Hillier et al. 2009), or if feelings associated with what is 'acceptable' differ markedly from expert determinations (e.g. Due to dread, involuntary risk etc) (Healy 2009).

2.3.2 Identification of feasible remediation options

If an initial assessment of environmental risk has been conducted with the conclusion of acute threat, an investigation into remediation strategies will normally be performed. Two fundamental requirements are necessary for an effective remediation strategy: a definition of limits setting the scope for the project and a vision for the end use of the site (Environment Agency 2004). Together, these define the remediation objectives.

There are three principal mechanisms to reduce or control unacceptable risks in land contamination applications (Environment Agency 2004):

1. Remove or treat the (source) of pollutant(s);
2. Remove or modify the pathway(s);
3. Remove or modify the behaviour of receptor(s).

In practice, most efforts at contaminated sites management have involved treating the source of pollutant or modifying the contaminant pathways to accomplish technical remediation objectives (Swartjes 2011). The simplest strategy uses natural attenuation processes to degrade and detoxify. The second is to engineer a barrier between the contaminant source and any potential receptors, which may be done either in situ (containment) or ex situ (dig and dump). Finally, a strategy can be employed to treat or destroy the contamination. Each strategy requires different levels of analysis to ascertain viability.

At the end of this phase, two primary questions will have been addressed (Environment Agency 2004): 1) What site-specific remediation and other objectives should apply to options appraisal; 2) Which remediation options should be taken forward for more detailed evaluation.

Challenges for contaminated site managers arise in several areas when investigating the feasibility of remediation options. Politico-technical challenges may occur while defining the scope of the project or the end vision for the site, for example if cost constraints preclude all possibilities from being explored fully or if contrasting end visions with different clean-up requirements are posited (e.g. industrial end use vs. residential end use).

Secondly, the technoscientific approach places the onus on political representatives for assessing cost considerations, and the scientific community to identify technical facts associated with technology capability. If broad political will is aligned with Community will, disputes over cost and scope are rare. However, if political vision and will differs significantly from some or all Community participants, intractable disputes may result (Lloyd-Smith 2000; Lloyd-Smith 2009).

Another complicating factor in this stage relates to the difficulties comparing disparate strategies, since they each require different types of investigations. For example, natural attenuation requires a detailed understanding of soil ecosystems and contaminant degradation pathways; barrier methods require comprehensive geotechnical and hydrological knowledge; treatment methods require robust knowledge of technological efficacy and specific contaminant characteristics. Each investigation is resource intensive, and the payoff is uncertain. Furthermore, investigations are independent; knowledge acquired for one strategy will not be transferable to another. Thus concurrent investigations represent a definite sunk cost. For instance, investigations into a barrier strategy require little examination of the precise contaminant quantities, locations and characteristics, which are essential components of the treatment strategy. Since investigations into each strategy are conducted relatively independently, investigations for all options will not usually be undertaken simultaneously. Historically, investigations into possible remediation strategies have been performed by the technoscientific community, or more specifically, by engineering consultancies (Swartjes 2011). Familiar with barrier methods, and able to estimate costs with reasonable accuracy, consultants and their clients have been reluctant to extend investigation into the more challenging areas of natural attenuation and treatment. Barrier methods have historically been viewed by the technoscientific community as an effective method of reducing threat with a high degree of certainty (Mulligan et al. 2001). Due to a combination of institutional factors and social values, barrier methods have therefore been the primary strategy of choice. However, for Community participants, alternative methods may be viewed as preferential, due to different perceptions of what “clean-up” means (clean-up versus containment) or the technologies used to remediate (e.g. bioremediation and ‘natural’ techniques may be viewed favourably (Becvar et al. 2009))

A corollary to the dominance of the “engineering mind-set” has been a tendency to focus on well proven strategies, even when novel strategies may be better suited (Rothschild 1993; Miller 1999). Softer methods of treatment such as natural attenuation or bioremediation have been discounted since they do not meet requirements for sufficient process control (Vidali 2001). Alternative treatment technologies also have met with immediate barriers, principally due to cost factors being viewed as prohibitive (STAP 2004). This act of dismissal determines the scope of inquiry and has implications when other perspectives are introduced during subsequent phases.

Since for the linear approach the principal criterion for subsequent phases is defensibility, elimination of options through scope limitation is at some risk to project managers. Scope is an area of inevitable challenge and defines the extent of the problem as well as associated options for resolution. Only through scope definition can project managers define and defend their preferred strategy, yet by doing so they effectively eliminate any dialogue with alternative perspectives. Therefore initial scope justification must take into account the institutional systems in place and the power of alternative perspectives to influence the framing of the problem.

Remediation technologies operate within an interesting context since their primary function is to alleviate a potential threat. Although the technologies themselves may be considered benign, the transformation which they facilitate can lead to deleterious effects. For example, the strategy associated with the implementation of a technology regime may lead to increased risk of mobilisation of contaminants, the addition of potentially new contaminants, and/or new safety hazards. Thus even if a remediation technology does not in itself pose a threat, the context in which it operates is by definition threatening (it is contaminated) and potentially malignant.

Due to potential malignancy, the degree of causal robustness expected of a remediation technology is usually quite high. Citizens, land owners and regulatory bodies naturally expect a high degree of process control from technology vendors, since they wish to alleviate potential health and liability concerns. Thus well established technologies with proven history are more likely to be favoured than emerging technologies which have had little detailed scrutiny (IAEA 2002). However, the relative merits of well established technologies may be re-examined as new knowledge emerges.

2.3.3 Detailed evaluation of options

Following identification of feasible remediation options, a detailed examination may be undertaken. Detailed evaluation requires determination of the scope of the project, establishing end use expectations and the discovery of suitable remediation technologies. Usually an iterative process is followed in which options are explored in increasing detail. To ensure a defensible process is followed, projected clean-up costs are normally set against perceived benefits and the most cost effective technology is typically selected.

Analytical tools, or Multi-Criteria Decision Analysis (MCDA) of various types are predominantly used for assisting in complex contaminated site management decisions and for making detailed evaluation of options. MCDA has inherent properties that make it appealing and practically useful in complex environmental problem solving (Mendoza and Martins

2006; Batchelor 2007; Li et al. 2010). Belton and Stewart (2001) contend that MCDA: (1) helps to structure the management problem; (2) takes explicit account of multiple, conflicting criteria; (3) provides a model that can serve as a focus for discussion; and (4) offers a process that leads to rational, justifiable, and explainable decisions.

A detailed review of the use of decision analytical tools in the European Union was conducted as part of the Contaminated Land Rehabilitation Network for Environmental Technologies project (CLARINET 2002). The review found a variety of decision analysis tools used in contaminated site management including environmental risk assessment (ERA), cost-benefit analysis (CBA), life cycle assessment (LCA). Quantitative methods such as CBA and ERA were the main tools however (CLARINET 2002). Similarly, in the US, quantitative methods like ERA and CBA are presently the dominant decision support approaches in use while MCDA and explicit tradeoffs are used less frequently (Linkov et al. 2005). In Western democracies (e.g. New Zealand, Australia, US and the UK) ERA and CBA are the primary formal analysis tools (as specified in legislation such as New Zealand's Resource Management Act 1991).

More complicated heuristics may be employed which better enable the inclusion of factors difficult to translate into monetary terms. Common heuristics or 'decision support tools' which have been used in the comparison of options for contaminated site management include benefit-opportunity-cost-risk (BOCR) analysis, life cycle assessment, cost effectiveness analysis, comparative risk assessment, and a variety of other multiple criteria decision analysis techniques. For an extensive review of these tools interested readers are directed to Wrisberg et al. (2002). Each of these tools has different characteristics which illuminate different aspects of the problem, and as such may be used in appropriate circumstances (Table 3).

While MCDA tools appear to the preferred method of choice-making by contaminated site managers, the benefits of use are accompanied by several rarely acknowledged disadvantages. Firstly, although MCDA helps to structure the problem, care must be taken to ensure that the way that the problem is framed does not simply represent the framing of the manager. For example, a contaminated site clean-up may be framed in terms of decontamination for human safety, decontamination for ecological safety, land development, social development and a range of other reasons and different participants may view it in different ways according to their own worldviews, values and interests (Tversky and

Kahneman 1981). Problem framing determines to a large extent: 1) the options which will be evaluated; 2) how those options will be evaluated, and thus biases are likely to be introduced unless consensus can be achieved on how the problem is to be structured.

A further complication relates to the general epistemological assumptions on which MCDA is based. MCDA approaches infer a machine metaphor, that systems components can be controlled and predicted (Jackson 2000, p136). In complex environmental problem solving, such as the clean-up of a contaminated site, accurate understanding of variables and control of the system may be unrealistic.

Additionally, although MCDA may provide an opportunity for participation through the inclusion of participant values, it fails to attend to the special characteristics of the human component of socio-technical systems (Jackson 2000, p137). As Jackson (2000, p137) notes: "people are treated as components to be engineered just like other mechanical parts of the system. The fact that human beings possess understanding, and are only motivated to support change and perform well if they attach favourable meanings to the situation in which they find themselves, is ignored." In other words, MCDA may obscure understanding rather than assist it.

A corollary to the above is the issue of allocation and normalisation of weights, a fundamental part of MCDA, yet the most controversial and challenging aspect (Hämäläinen and Salo 1997; Yeh et al. 1999; Wang and Elhag 2006; Belton 2008). Weighting is challenging because different perspectives must be meaningfully integrated and time discounted (Frederick et al. 2002). Methodological inconsistencies are apparent within some MCDA techniques, giving rise to seemingly irrational rank reversals (Salo and Hämäläinen 1997). In these instances, participants may distrust the tool and therefore distrust the outcome of the process.

Table 3. Characteristics of Analytical tools for contaminated site management (derived from Hofstetter et al. (2002) and UNEP (2001))

	Purpose	Approach	Conceptual Model	Scale/focus	Initiator	Units	Decision Making Principle	Example
Cost Benefit Analysis (CBA)	Economic evaluation with costs included	Attempts to measure both costs and benefits associated with alternatives	Cost Inputs/Benefit Output model	Site specific, allocation of costs and benefits (e.g. how much is a life worth?) contextually dependent	Proponent of project or other initiative; investor	Monetary	Maximise net benefits	Diakoulaki and Karangelis (2007)
Environmental Impact Assessment (EIA)	Identifies and predicts the environmental impacts of a project	Often utilises prescribed requirements from regulatory authority including identification, mitigation and monitoring of impacts	Source-pathway-receptor model	Usually site specific but uses wider systemic considerations (standard procedures)	Applicant for regulatory approval	Impacts on natural resources, ecosystems, human health, safety and well-being	Lowest Impacts	Westman (1985)
Life Cycle Assessment (LCA)	Guides choice, assesses life cycle impacts	Life cycle inventory of energy and material requirements and wastes produced; impact analysis and improvement analysis	Source-Impact	While some source information site specific, data used to define impacts generic	Proponent of project or other initiative; investor; stakeholders who may be impacted	Physical impacts/damages or “ecopoints”	Lowest overall impacts, though weighting impacts problematic	Ozeler et al. (2006)
Environmental Risk Assessment (ERA)	Establish risks to the environment and public health	Hazard identification, dose-response and exposure assessments, risk characterisation	Source-pathway-receptor model	Site specific sources, dose-response usually generic, some consideration of localised ecosystem response	Proponent of project or other initiative; investor; stakeholders who may be impacted	Probability of negative impact	Lowest risk	Hansen et al. (2003)
Cost Effectiveness Analysis (CEA)	Economic evaluation that emphasises benefits	Similar to above but measures non monetary consequences in physical indicators	Dominant cost-benefits and source-pathway-receptor hybrid	Site specific, but can include broader system components	Proponent of project or other initiative; investor; institution	Monetary costs; direct health outcomes or health metric benefits	Maximum utility	Bage et al. (2004)
Multiple Criteria Decision Analysis (MCDA)	Brings together results from diverse studies and combines them in a structured way	A systematic, often quantitative comparison of alternatives , guided principally through the allocation of value	Dominant system component model	Site specific, but can include broader system components	Proponent of project or other initiative; investor; institution	Varies	Varies, MAUT=Utility;	(Linkov et al. 2006)

2.3.4 Preparation of the implementation plan

The final planning phase involves a more detailed investigation into how proposed clean-up processes are to be implemented. During this phase a diverse number of issues will be explored including (Environment Agency 2004): 1) the remediation strategy for the relevant pollution linkages, that formed the basis of the implementation plan; 2) who will undertake each aspect of implementation of the remediation strategy (including verification, monitoring, maintenance, health and safety and environmental protection measures) and what competencies are required; 3) what regulatory permits or licences are likely to be required; 4) what form of contract and technical specifications will be used to deliver the remediation strategy; 5) timescales for completion of different activities, including any subsequent long-term monitoring activities.

2.3.5 Public comment and review

Following selection of a clean-up strategy, project managers will usually have to account for their decisions in a public forum. While the specific process differs from country to country, at this stage Community participants are generally provided with the opportunity to review and comment on aspects of the proposed strategy. Frequently this process is mandated by legislation; in New Zealand this process involves disclosure of effects on human health and the environment as a consequence of the proposed action (MfE 2006e, p34). During this stage, in essence, project managers must demonstrate that the proposed course of action is the most appropriate for the remediation.

Historically, public comment at review has offered limited opportunities for public input. Commonly, the strategy taken by contaminated site managers has involved "decide, announce, defend", or simply the conveyance or defence of a well-developed remediation strategy (Beierle 1998). However, increasingly, risk managers have investigated alternative strategies for eliciting public opinion on risk issues (Muro et al. 2012).

In terms of the management of the remediation project, the public defence is one of the most critical phases. The public defence sets expectations for how the resulting project is to be managed and finalises many project parameters that may have social impact. For example, limitations may be placed on hours of operation, emission limits or noise levels. The manner in which public engagement occurs and in which risks are identified, communicated and managed significantly influences the degree in which the remediation is accepted by the Community.

Being so critical to contaminated site management, a large variety of guidance documentation has been developed for public engagement. For example Heath et al. (2010) recommend ten key take-home messages for contaminated land practitioners in regards to Community engagement (Table 4).

Table 4. Ten cardinal rules of public engagement in CSM (Heath, Pollard et al. 2010; NEPA 2011)

	Rule	Explanation
1.	**Risk is complex and inherently uncertain.**	Predictions of risk in the context of contaminated sites inevitably rely on a mixture of evidence, assumptions and judgment. Characterising any differing beliefs of the public about risk as being just 'perception' is guaranteed to undermine trust and mutual respect, if not create open conflict and further outrage.
2.	**Credibility is based on more than scientific and technical competence**	Openness, honesty and transparency are necessary to demonstrate credibility and warrant trust. This includes a frank and honest approach to dealing with uncertainty, which is inevitable in any risk assessment. Denial of uncertainty (both knowledge uncertainty and uncertainty caused by variability) will eventually backfire and undermine credibility.
3.	**Effective communication is necessary but not sufficient**	Scientific and technical evidence is often complex and difficult to understand. If an audience is presented with confusing information they can at best ignore it or at worst be angered by it. However, regardless of how carefully or compassionately it is presented, scientific or technical evidence will have no constructive impact if the public has been allowed to become outraged.
4.	**Avoiding community engagement will guarantee trouble**	There is no all-purpose, sure way to avoid problems simply by engaging communities. However, it is equally certain that failing to engage a community about an issue that many citizens care about will create problems that could be reduced, if not avoided, by effective Community engagement.
5.	**Do not promise more than you can deliver**	Overly zealous claims (even if they are sincere) about what or how quickly something can be achieved will, when not achieved, cause disappointment that may boil over into distrust. It is better to be realistic from the outset. With the public engaged from the beginning, they can make the journey through a project with some sense of ownership and reality that can lead to tolerance of missed targets.
6.	**An unfair process will generate outrage**	People who believe they are being treated unfairly, in a condescending manner, or being ignored altogether, will become aggrieved, possibly to the point of active opposition. An outraged public is extremely difficult to engage in a constructive manner.
7.	**Effective communication must be a two-way process**	One-way communication is simply preaching or selling. Any risk communication process that lacks an effective means to listen to community concerns and a commitment to seriously seek to understand those concerns will be dismissed by the community as merely public relations.
8.	**Resolving disputes requires a dedicated process**	Because manager objectives for dealing with contaminated land may not coincide with the objectives of other stakeholders, there is always potential for disputes that are unlikely to be resolved purely by communication. Because litigation is expensive and often ineffective, there is now extensive international experience with alternative dispute resolution that should be pursued before disputes are allowed to become unmanageable.
9.	**Validate your messages and behaviour with your own public surrogates**	Everyone involved in a project will have associates, whether they are family members, friends or non-technical staff, who can offer perspectives on key issues that will not be based on, or limited to, narrow scientific and technical interpretation.
10.	**Trust and credibility are both essential**	Trust and credibility are closely related and interdependent. Credibility (being worthy of confidence) is usually necessary to establish trust, but credibility alone does not guarantee trust. Because we are all busy and we already have more things to think about than we have time for, we inevitably have to rely on the views of others for most of the things that we face in our lives. When we rely on the views of others rather than analysing a problem for ourselves first-hand, we are placing trust in others. In essence, trust often serves as a means for dealing with complexity that we have insufficient time to resolve for ourselves.

2.4 Design, implementation and verification

Following successful selection of a remediation strategy, the clean-up process is implemented. Clean-up can be an incredibly complex task, extending over substantial periods of time and consuming vast resources. Implementation may offer a new suite of risks, new sources of contamination may be added, contaminants may be mobilised, transformed and made more bioavailable. Remediation must be carried out in such a way as to ensure the safety of workers and affected parties while meeting project objectives.

Implementation is accompanied by a series of work plans which specify activities and tasks undertaken at the site. For example, earthworks plans to co-ordinate the movement of soil, environmental monitoring plans to ensure that controls are met. Usually a Community liaison plan is adopted to provide a strategy for interaction with the local Community (DEC 2006; Heath, Pollard et al. 2010). The Community liaison plan provides a conduit between site operations and Community expectations, it is therefore critical to establishing and maintaining good communication.

Regulatory bodies are charged with enforcing consents, thus following public defence, dialogue between project managers and regulatory authorities predominate. To reduce tension between authorities and project managers, consent conditions must be specific, measurable and enforceable (EPA 2010b). Measurement and interpretation is conducted by technoscientific experts who act as intermediaries between project managers and the regulatory body. Using this information, regulatory bodies may issue orders to cease operations.

The technoscientific community, prominent in the identification of contaminated sites, also plays a dominant role in establishing the efficacy of a technology and in environmental monitoring. The technoscientific community provides robust methods and standards for testing parameters and interpreting the effect inferred by the data. The dominant method for establishing risks to humans and ecosystems during implementation begins with technoscientific measurement. Measurement provides a strong source of evidence, difficult to challenge, robust. Ensuring protection of human and environmental health rests chiefly with the scientific monitoring regime and the suite of potential toxins which are thought to be of primary concern. From the monitoring suite, contaminant emissions may be established and effects on humans and ecosystems estimated.

There are two principal purposes for monitoring. The first is to establish whether the strategy implemented is functioning as expected; this is operational monitoring. The second is to identify whether defined limits have been surpassed, i.e. whether the strategy is being controlled effectively, protecting human and environmental health; this is commonly referred to as environmental monitoring.

To establish the effectiveness of a technological intervention requires implementation of an effective monitoring programme. An effective monitoring programme requires knowledge of what should be monitored and how it can be measured to ensure the precision and accuracy of obtained data. In order to determine what should be monitored, one must have a good understanding of the process and of the causal connections which give rise to a particular parameter of interest. Choosing particular parameters thus requires substantial knowledge which may not always be available during the introduction of new technologies.

Furthermore, monitoring comes at substantial expense. Pragmatic reasons preclude all possible parameters being measured, therefore parameters must be carefully selected - decisions must be made which balance the effort required to gain an adequate understanding of the process with associated monitoring costs. Because of the costs associated with monitoring there may be a tendency to minimise the level of sampling where possible.

While methods and standards may be well understood by members within the community of practice (i.e. scientists and managers), for those outside, language and inference may appear esoteric or obscure. Furthermore, the decision of the technoscientific community relies on measuring, thus parameters which are difficult or impossible to measure accurately are likely to be excluded from analysis. Lay citizens and interested parties may feel such exclusion is not warranted. The result of the dominance of the technoscientific community is to minimise Community concerns.

Furthermore, scientific models are the subject of continued scrutiny. New observations can challenge historical assumptions. For example, according to strict thermodynamic equilibrium considerations, dioxin formation is unlikely to occur below 200^{o}C, however, the presence of certain metal catalysts has been demonstrated to modify these considerations (Yazawa and Nakazawa 2001; Stanmore 2004). Thus, the issue of dioxin formation becomes substantially more complex.

Moreover, new technoscientific knowledge may arise too late to enable past problems being detected and corrected. For instance, if no monitoring for dioxin is undertaken because of theoretical scientific limits being judged as unlikely to be passed, yet dioxin emission is later hypothesised to be possible, no facility will be capable of investigating since emissions have already occurred. Thus epistemological limits occupy the past as well as the future.

To minimise monitoring costs, project managers must emphasise the technology's ability and de-emphasise any foreseeable problems. Those closely involved in a technology are of course most aware of any potential problems associated with it, however due to a perception that disclosure is likely to increase monitoring costs, potential problems may not be disclosed. Furthermore if a technology is implemented on the basis of confidence and little monitoring is applied, no facility will exist in order to enable the early detection of possible problems, meaning that problems may either go unnoticed or they may compound and escalate. Monitoring decisions are therefore some of the most critical, and the most complex.

A variety of risk assessments may be performed to ascertain health and ecological risks during a clean-up. A cumulative health risk assessment, also known as a Total Hazard Index, provides an evaluation of risks associated with non-carcinogenic toxins (EPA 2005). A second common form of health risk assessment relates to carcinogenic toxicity, to determine if releases pose a cancer risk (EPA 2005). For effects on biota, an ecological risk assessment may be performed to assess ecological risk.

Engineering risk assessments may be implemented for identification of potential operational failures. Systematic analysis enables a detailed understanding of potential problems to be identified early and measures introduced to ameliorate them. However, some amelioration measures are likely to be impractical, expensive or otherwise unfeasible. Risk management balances the costs of mitigation against the probability of adverse effects, thus for any hazardous project risk mitigation has practicable limits. In any risk situation, potentially significant hazards may be identified for which no avoidance measures are possible or undertaken. Engineering risk assessments are usually commissioned by project managers to ensure process control and to understand and characterise the risk they are assuming. Engineering risk assessments, paid for by project managers become intellectual property, therefore disclosure is not usually mandatory.

Site works are usually initially accompanied by considerable Community enthusiasm. Community members, often pleased that something is finally being done, are interested and inquisitive. Considerable interaction between site staff and the interested public is likely to occur.

If implementation differs from expectations, Community participants possess a limited set of options for recourse. One option is to discuss concerns with project managers or their project managers. The degree to which concerns are realised and action taken to resolve them depends on a wide variety of factors, including but not limited to whether the complaint is deemed to be genuine, the relationship to legal standards, and the technical feasibility and cost associated with amelioration. If Community participants perceive that their concerns are not being taken into consideration they may pursue alternative options.

A second option is for Community participants to discuss concerns with regulatory bodies. Regulatory bodies may then relay concerns to project managers and/or conduct further confirmational enquiries. Whether Community participants' concerns transform into concrete action on the part of regulatory authorities depends on a wide variety of factors but relies heavily on institutional structures, for instance, the likelihood that consents are breached and the ability to prove noncompliance in a court of law. Regulatory authorities have power to force compliance thus possess significantly more statutory influence than Community participants. Additionally, they possess a variety of mechanisms to ensure complaints are considered seriously, for example, written warnings or issuance of abatement notices. If Community participants' concerns are not realised prior to involvement of the regulatory authorities then trust between Community participants and the project managers is likely to be compromised. If regulatory authorities are unable or unwilling to enforce Community participants' concerns they may be viewed by Community participants as either impotent or ineffective or closely aligned to project managers.

A third option is for Community participants to attempt to enrol the support of other Community participants. Support may be garnered through a variety of means, for example, weblogs, opinion pieces in newspapers, enlisting journalists, word of mouth, local meetings. Broad support can pressure project managers into reviewing their remediation strategy. These indirect methods of communication are difficult for project managers and regulatory authorities to counter, thus they provide an avenue to strengthen perspectives not closely aligned to the technoscientific community. Frequently this avenue is pursued by Community participants disillusioned with the technoscientific community.

Commonly a significant part of the community liaison strategy is regular information updates, through newsletters, web based media, or attendance at community meetings. Information updates are one-way, from project managers to the Community, and treat Community members as passive recipients. To be an effective means of communication, updates must not only provide information on what is occurring at the site, but they must also pre-empt Community enquiries. Another common strategy is to provide a free telephone number to facilitate Community enquiry, allowing Community participants direct access to project staff. This service enables a two-way dialogue to occur as well as providing a forum for immediate concerns to be addressed.

During implementation, while physical parameters are likely to be monitored, albeit to different degrees depending on context, monitoring of participation appears much less frequently. As Finger et al note (Finger et al. 2004):

> *The importance of monitoring in documenting the success of remediation is often overlooked because of funding limitations. However, a well-designed and carefully implemented monitoring program is an extremely valuable means not only to evaluate the success of an ongoing project, but also to document ways to improve success in future restoration activities.*

The application of standards limits the extent of citizen participation. While providing certainty for project managers it is not until implementation that an understanding of resultant impact for surrounding affected parties becomes evident. For example, a 100 decibel limit only attains meaning for affected parties when it is applied, furthermore such a limit may not encompass factors which add an adverse psychological effect such as tone or duration. Standards thus provide certainty to project managers and inhibit adaptive management of the project and disempower Community participants.

2.5 Post-remediation monitoring

Finally, at completion, the clean-up process must be evaluated to ensure that standards have been adhered to. In some cases, long-term monitoring is necessary to ensure remediation goals are sustained. For example, if a containment strategy is introduced long term monitoring will be required to detect any migration of contaminants.

At the end of this stage, the following questions will have been addressed (Environment Agency 2004):

- Whether remediation has performed in accordance with the original or revised remediation design and has met the agreed remediation objectives and criteria;
- Whether there is a need for further monitoring and maintenance work;
- A monitoring and maintenance plan has been developed if required.

2.6 Summary

The identification and clean-up of contaminated sites is a complicated process. At each stage of the clean-up process facts may be contested and methods disputed. The scientific analysis of risk is a direct result of the regulatory regime; however, if the regulatory regime is misaligned with public perceptions of risk this analysis may be contested. Options also are subject to critique based on societal values. Implementation may be subject to complications and unforeseeable problems.

Kua takato te manuka

The leaves of the manuka tree have been laid down

3 | Community participation

A review of the discourses

Kete kete, kā kā kū kū , whakawhitiwhiti wheiao

"Diversity creates the world's rich chorus"

- Māori whakatauki (proverb)

3.1 Introduction

This chapter explores the effectiveness of existing approaches to participation between communities and managers during complex processes of environmental problem solving. The purpose is thus to understand the state of knowledge of participation theory within the context of planning and implementing a complex environmental project such as a contaminated site clean-up and to establish the necessary prerequisites for effective participation.

3.2 General rationales for Community participation

As we have seen from Chapter 2, contaminated site clean-up is a highly technical exercise, consisting primarily of interactions between project managers, technical experts and regulatory authorities. Increasingly however, communities are being involved in the planning and implementation, with mixed results (Ashford and Rest 1999). Before exploring why results may have been mixed, it is useful to understand the basic rationale for participation. Scholars of participation recognise three primary rationales or imperatives for participation with communities in environmental problem solving (Fiorino 1990; Stirling 2008; Delgado, Kjolberg et al. 2011). These are substantive, instrumental, and normative imperatives.

3.2.1 Substantive imperative

Historically for complex environmental problems such as contaminated site clean-ups, those with scientific and technical expertise have been considered the primary proponents of substantive knowledge, providing the “facts” and “know how” (Fischer 2004). Furthermore, under this technocratic framing, project managers, politicians and political elites or powerful project managers provide a substantive contribution in the form of knowledge of societal “values” (Fischer 2004). Latour (1993) defines this as the “Modern Constitution,” legislating the separation of science from politics, knowledge from power, facts from values. Thus under conventional environmental problem solving, substantive input is provided solely by political and scientific elites.

The substantive imperative suggests that Community participation brings important additional knowledge to an environmental problem. It stems from an increasing body of literature that seeks to extend the traditional monopoly of Western scientific on “factual” knowledge. Irwin (1995; 2001b, pg 96), for example, argues for the importance of “situated knowledge”, local knowledge formed over extensive periods of experiential learning, as opposed to the generalised abstract knowledge of scientists. Other scholars contend that the extensive and time proven knowledge of indigenous people can also assist in developing a better understanding of problem contexts and solutions (Folke 2004; Mander and Tauli-Corpuz 2006; Morgan 2006a). For some, these differences warrant close examination of “civic epistemologies” (Wynne 2003) or “citizen science” (Irwin 1995) and adoption within problem solving frameworks. Thus, involvement may make technical research more robust by providing higher quality information inputs (Fischer 2000; Beierle 2002). As highlighted by the European Environment Agency (European Environment Agency 2001, 177):

> *The point is not that lay people are necessarily more knowledgeable or environmentally committed [than specialists]. Rather the benefit of attending to lay knowledge rests in its complementary character, its sometimes firmer grounding in real world operational conditions . . . and the associated independence from the narrow professional perspectives that can be a downside of specialist expertise. Often too, lay knowledge of a technology or risk may be based on different assumptions about what is salient, or what degree of control is reasonable to expect or require, whereas technical specialists may simply respond to granted authority without further reflection.*

The substantive imperative also emphasises the inclusion of values that would not normally be included in a technocratic assessment. Whether the political elite or powerful should have a monopoly on the application of “values” has been extensively questioned (Fischer 1993;

Jasanoff and Wynne 1998; Fischer 1999). In the context of contaminated site clean-up, project financers may exclude “externalities” in assessments of risk, and act primarily on self-interested motives; politicians may be biased by vested interests such as corporate elites, neglect minority groups in favour of the voting majority, or place more effort on projects with immediate political gain (Miller 1999, p74). These characteristics mean that whether project proponents (including managers) and politicians truly represent the opinion of those most affected by an environmental problem is frequently questionable. Thus citizens across the world have frequently expressed their desires for more substantive involvement (Fiorino 1990; Durant et al. 2004).

3.2.2 Normative imperative

Normative imperatives view Community participation as simply “the right thing to do” (Stirling 2008). Fiorino (1990) contends that “the case for broad participation begins with a normative argument—that a purely technocratic orientation is incompatible with democratic ideals.” Normative concerns are thus driven by a desire that processes for resolving complex environmental problems match aspirations for strong democracy. Such notions seek to inject legitimacy to the process of environmental decision making through the incorporation of citizens’ preferences (Rowe and Frewer 2000). Furthermore, it is argued that citizens “are the best judge of their own interests” and have a “right” to be involved in decisions that affect them (Fiorino 1990; Laird 1993). In this manner, broad involvement is hoped to promote fairer, more just environmental decisions (Laird 1993).

At both local and international levels, access to information, participation, and environmental justice have become widely regarded as standard desirable practice (Newig 2007). At the international level, following the lead set by the Rio Earth Summit in 1992, 40 nations have signed the Åarhus Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (UNECE 1998). Furthermore, four recent European Union directives passed since the year 2000 have set new legal standards (Newig 2007). Local laws such as the Resource Management Act 1991 in New Zealand mandate participation when adverse environmental effects are deemed to be “more than minor” (MfE 2006e). Thus, for project sponsors, legal imperatives provide fixed justification for Community participation.

3.2.3 Instrumental imperative

Instrumental imperatives relate to supposed enhancements to decision making and environmental outcomes as a result of participation. Diverse instrumental benefits have been noted, including reduction or avoidance of conflict, enhancement of "social capital" (Innes and Booher 1999), building trust between participants, development of long-term support and active implementation of decisions thereby reducing implementation costs (Creighton 2005), generating "productive real change" (Daley 2007), enhancing "mutual learning" (Burgess and Clark 2006), contributing to overall project objectives, and long-term "cost effectiveness" (Rowe and Frewer 2000; Beierle 2002). Table 5 identifies short, medium, and long-term effects of participatory processes (Innes and Booher 1999). While a diverse number of instrumental factors have been highlighted in individual studies, primary benefits relate to four factors: 1) Better outcomes; 2) Reduced conflict; 3) Mutual learning; 4) Enhancing trust.

Table 5. First, second and third order effects of collaborative participatory processes (Innes and Booher 1999).

First Order Effects	Second Order Effects	Third Order Effects
• Social Capital: Trust, Relationships • Intellectual Capital: Mutual Understanding, Shared Problem Frames, Agreed Upon Data • Political Capital: Ability to Work Together for Agreed Ends • High-Quality Agreements • Innovative Strategies	• New Partnerships • Coordination and Joint Action • Joint Learning Extends Into the Community • Implementation of Agreements • Changes in Practices • Changes in Perceptions	• New Collaborations • More Coevolution, Less Destructive Conflict • Results on the Ground: Adaptation of Cities, Regions, Resources, Services • New Institutions • New Norms and Heuristics • New Discourses

Although a wide variety of instrumental benefits have been suggested, assertions of instrumental benefits have been the most disputed aspects of Community involvement (Reed 2008). Of primary concern to project managers is the claim that the direct inclusion of public knowledge, interest and values makes the process of decision making more costly, longer, and more uncertain (Irvin and Stansbury 2004; Ventriss and Kuentzel 2005). At face value, technocratic problem solving does appear to be a faster and less costly method of resolving environmental problems. However, efficient, narrow problem solving relies on decisions being accepted by other parties. This is not always the case. In fact, the history of technoscientific problem solving is rife with examples of public opposition, distrust, litigation and even sabotage (Slovic, Layman et al. 1991; Miller 1999). Thus, while technoscientific problem solving may be more efficient in some instances, where the views of the public differ from managers and administrators, costly conflict may result. In other words, participatory theorists contend that while non-participatory processes may be less costly in the short term, considered over the whole length of projects participation is more cost effective.

Another criticism of the apparent instrumental benefits is the perception that broad participation is a “dumbing down” of scientific and technical perspectives, meaning that robust outcomes are compromised (Cooke and Kothari 2001). In this view, rigorous technical capacities are diluted with inferior knowledge resulting in poorer quality decisions. Such a position subscribes to a now widely discredited ‘value free’ framing of scientific knowledge, that the outputs of scientific inquiry are dictated solely by the ‘facts’ (Kuhn 1962; Bahm 1971; Latour 1987). In contrast, Fisher (2000, p15) contends that a more open problem solving context clarifies important tradeoffs and produces more scrutinised, and therefore robust, solutions. Going one step further, Nowotny (2006) argues that “more involvement on the part of society means not a better social solution, or a better adapted solution, or one that brings social tranquillity to a community, but a better technical solution”.

Further concerns have been raised surrounding the accountability and representativeness of participants, leading to questions over the legitimacy of outcomes (Abels 2007). Implicit in this view is the contention that delegated elites are the legitimate purveyors of societal values, however, as already noted above, substantive input from representatives may be distorted by vested interests and other factors. While biases and distortions may also be present in participatory processes, they may be mitigated by careful selection and implementation processes (Ashford and Rest 1999; Kasemir 2003; Brodie et al. 2009).

While there are some concerns surrounding participatory problem solving, there is significant evidence which affirms the capacity to provide improved decision performance. As noted in a comprehensive summary of the extensive literature by the National Research Council (2008, p226):

> *When done well, participation improves the quality of a decision and improves the capacity of all involved to engage in the policy process. It can lead to better outcomes in terms of environmental quality and other social objectives. It also can enhance trust and understanding among parties. Achieving these results depends on using practices that address difficulties that specific aspects of the context can present*

Whether instrumental benefits arise depends strongly on the way that problem solving processes are conducted, who is involved, and how they are involved (NRC 2008, p230). While there has been considerable research into how participatory processes may be conducted to maximise instrumental benefits, as we shall see in the following sections, this research is largely lacking theoretical foundation. Finally, any notion of instrumental benefit is contingent on how ‘beneficial’ is framed, a question explored in the following section.

3.3 What is effective Community participation?

3.3.1 Academic and dominant practitioner literature

Under traditional technocratic framings of contaminated site clean-up projects, effectiveness is judged according to standard cost and quality parameters (Swartjes 2011). However, extending the problem solving space to include multiple perspectives expands this simple framing to a more complex definition of effectiveness. While the issues of “success”, “effectiveness” and “good process” have been extensively researched by participatory theorists, there remains significant divergence of opinion (Rowe and Frewer 2000; Webler et al. 2001; Rowe, Horlick-Jones et al. 2005; Ducker and Morgan 2010).

In general, the literature on Community participation has paralleled other evaluation discourses by acknowledging the multifarious nature of ‘effectiveness’ (Rowe and Frewer 2000, 2004). Establishing effectiveness is complicated by the multiple perspectives and interpretations on the concept. For example, if democratic principles are emphasised, effectiveness is likely to be judged by the degree of fairness in the process (Fung 2007); a more pragmatic view suggests effectiveness as an outcome of a completed project; a collaborative perspective contends that effectiveness is predicated by the notion of consensus (Innes and Booher 1999). The following paragraphs explore the many aspects to the notion of effectiveness in participatory problem solving.

A first common distinction in relation to success or effectiveness relates to the way participation takes place and the outcomes of that process (e.g. Chess and Purcell 1999). Outcome attributes correspond to the “results” of participation, and presuppose an endpoint for participatory endeavours. In particular, theorists have emphasised that success in participatory exercises relies on “productive real change” (Daley 2007), and the degree of influence the process ultimately has on decision making (Arnstein 1969). Furthermore, successful participatory processes result in “mutual learning” (Burgess and Clark 2006), and are “cost effective” (Rowe and Frewer 2000; Beierle 2002).

While outcome related measures appear to be useful for operationalising success criteria, difficulties arise regarding the question of who determines success (Webler 1995; Chess 2000; Rowe and Frewer 2004). In any participation exercise there will be different constituents, with different interests and preferences. As Webler (1995) identifies following a "failed" public participation process during the siting of a landfill:

> *The research team wanted to reinvigorate democracy with a new instrument for collective decision making. It wanted to provide its employer with a satisfactory outcome and better its chances for a research centre in this area of work. The State wanted to site a landfill in a low-conflict and low-cost manner and also gain the confidence of the citizenry. Residents of the targeted community, on the other hand, wanted to minimize their share of the negative impacts (stigma, risk, annoyance, costs) and assert themselves against the traditional decision making authority of the State and experts. As a consequence, the "preferred outcome" depends on the interests of each group involved in the event. To the citizens, the process was a success – they used it to keep the landfill out.*

A "good" outcome is thus highly contestable. For these reasons some theorists and practitioners have emphasised process attributes, intended to define how interaction between participants should occur. The most sophisticated theoretical investigation into the constituency of good process has been developed by Webler (1995) who contends that "fairness" and "competence" represent primary "meta-ethical" parameters. Other examples from the literature include adequate "representation" of all interests (Abelson et al. 2003), "resource accessibility" to ensure that all perspectives can be conveyed, "independent facilitation" to manage conflict in contested situations (Reed 2008), perceived optimal methods for decision making such as "consensus processes" (Innes and Booher 1999), "structured decision making" (Rowe and Frewer 2000; Rowe et al. 2004) and a host of other factors.

In summary, a wide variety of success criteria have been established in the literature. Table 6 provides a summary of outcome and process related evaluation criteria. Increasingly, a mixture of ends and means criteria has been advocated to evaluate success (Rauschmayer et al. 2009). A point of note is that there has been little agreement on the most appropriate criteria for determining success in participation. As Rowe and Frewer (2004) advise, any definition of success will not be free of ambiguity or controversy.

Table 6. Evaluative criteria for Community participation (modified from Blackstock et al. 2007)

Criteria	Process/Outcome	Description	Source
Access to resources	Process	Referring to provision of support to allow participants to engage and meet expectations for their roles	(Rowe and Frewer 2000; Laverack 2001; Webler, Tuler et al. 2001; Asthana et al. 2002; Brinkerhoff 2002; O'Meara et al. 2004; Richards et al. 2004b)
Accountability	Outcome	Referring to whether the representative's core constituencies are satisfied, including expectations	(Webler, Tuler et al. 2001; Asthana, Richardson et al. 2002; Brinkerhoff 2002; Richards, Sherlock et al. 2004b)
Capacity building	Outcome	Referring to developing relationships and skills to enable participants to take part in future processes or projects	(Brinkerhoff 2002; Grant and Curtis 2004; O'Meara, Chesters et al. 2004)
Capacity to influence	Process	Referring to the participant's ability to influence the process (being heard, competencies in technical and process techniques, influence on others)	(Rowe and Frewer 2000; Webler, Tuler et al. 2001; Brinkerhoff 2002; Abelson, Forest et al. 2003; Grant and Curtis 2004; O'Meara, Chesters et al. 2004; Richards, Sherlock et al. 2004b)
Capacity to participate	Process	Referring to the individual's ability to value different points of view and willingness to learn as well as their competence	(Webler, Tuler et al. 2001; Brinkerhoff 2002; Abelson, Forest et al. 2003; Grant and Curtis 2004; O'Meara, Chesters et al. 2004; Richards, Sherlock et al. 2004b)
Champion/ leadership	Process	Referring to both internal leadership and champions but also the role of the critical outsider	(Laverack 2001; Asthana, Richardson et al. 2002; O'Meara, Chesters et al. 2004)
Competence	Process	Ability of the process to reach the best decision possible given what was reasonably knowable under the present conditions.	(Webler 1995; Webler and Tuler 2000)
Conflict resolution	Process/Outcome	Referring to the degree of conflict between participants and the way in which this was resolved during the process	(Asthana, Richardson et al. 2002; Grant and Curtis 2004; Richards, Sherlock et al. 2004b)
Context	Process	Referring to the political, social, cultural, historical, environmental context in which the process/project occurs	(Asthana, Richardson et al. 2002; Richards, Sherlock et al. 2004b)
Cost effectiveness	Outcome	Referring to the improvements created through the process in relation to the costs accrued	(Rowe and Frewer 2000; Asthana, Richardson et al. 2002; Brinkerhoff 2002)
Develop a shared vision and goals	Process	Referring to the creation of an agreed and clearly defined vision, objectives and goals for the process/project.	(Grant and Curtis 2004; O'Meara, Chesters et al. 2004)
Emergent knowledge	Outcome	Referring to the influence of local knowledge on the outcome	(Asthana, Richardson et al. 2002; Grant and

		of the research	Curtis 2004)
Legitimacy	Process/Outcome	Referring to whether the outcomes and process are accepted as authoritative and valid	(Fischer 2000; Rowe and Frewer 2000; Beierle and Konisky 2001; Bellamy et al. 2001)
Opportunity to influence	Process	Referring to the participant's opportunity to influence (enough time; involved early enough; access to policy makers and leaders; organisational structure)	(Rowe and Frewer 2000; Laverack 2001; Webler, Tuler et al. 2001; Brinkerhoff 2002; Grant and Curtis 2004; O'Meara, Chesters et al. 2004; Richards, Sherlock et al. 2004b)
Ownership of outcomes	Outcome	Referring to whether there is an enduring and widely supported outcome	(Beierle and Konisky 2001; Webler, Tuler et al. 2001; Brinkerhoff 2002; Grant and Curtis 2004; Richards, Sherlock et al. 2004b)
Quality of decision making	Outcome/Process	Referring to the establishment and maintenance of agreed standards of decision making	(Rowe and Frewer 2000; Beierle and Konisky 2001; Brinkerhoff 2002; Grant and Curtis 2004; Richards, Sherlock et al. 2004b)
Quality of information	Process	Referring to the adequacy, quality and quantity of information provided	(Beierle and Konisky 2001; Asthana, Richardson et al. 2002; Grant and Curtis 2004)
Recognised impacts	Outcome	Referring to whether participants perceive that changes occur as a result of the participatory process	(Davies and Burgess 2004; Richards, Sherlock et al. 2004b)
Relationships	Outcome	Referring to issues of social capital through new and existing social networks developed during the process/project e.g. trust, reciprocity and collaboration	(Asthana, Richardson et al. 2002; Brinkerhoff 2002; Davies and Burgess 2004; Richards, Sherlock et al. 2004b)
Representation	Process	Referring to the spread of representation from affected interests; including how legitimate the representation seen to be; the diversity of views not just representatives	(Rowe and Frewer 2000; Beierle and Konisky 2001; Brinkerhoff 2002; Abelson, Forest et al. 2003; Grant and Curtis 2004; O'Meara, Chesters et al. 2004; Richards, Sherlock et al. 2004b)
Social justice	Outcome/Process	Referring to the distributive dimension of the costs and benefits associated with the outcomes	(Asthana, Richardson et al. 2002; Brinkerhoff 2002; Grant and Curtis 2004; Richards, Sherlock et al. 2004b)
Social learning	Outcome/Process	Referring to the way that collaboration has changed individual values and behaviour, in turn influencing collective culture and norms	(Asthana, Richardson et al. 2002; Brinkerhoff 2002)
Transparency	Process	Referring to both internal, whereby participants understand how decisions are made; and external, whereby observers can audit the process	(Fischer 2000; Rowe and Frewer 2000; Beierle and Konisky 2001; Webler, Tuler et al. 2001; Davies and Burgess 2004)

Efforts to reduce the ambiguity defining attributes of public participation success have emerged through three main approaches, which vary in terms of the scale of their applicability (Rowe and Frewer 2004). The first entails a prioritisation of contextual factors agreed upon by project participants, the second suggests criteria should be applied only to a subset of participation exercises, and the third is to search for universal criteria. Following Rowe and Frewer (2004), we refer to these as specific, local, and universal criteria.

Proponents of specific criteria suggest that definitions should be user based. They contend that authentic 'success' can only be defined by participants through a negotiated process, and is therefore case specific. For example, specific objectives such as the production of a document, a recommendation, the making of a decision or a particular way of working together may be identified. Wondelleck and Yaffee (1994, p36) exemplify the rationale for specific criteria:

> *Rather than composing our own definition of success...we asked the individuals involved to construct a definition through their own reflection on the successful situations in which they were participants. We asked them why they perceived a particular situation to be a success; what specifically set this situation apart from the norm?*

While user based definitions of success can be useful for identifying lessons, they may be problematic for a number of reasons. Firstly, they are dependent on the knowledge of the problem solving group, which may not have broad understanding of the critical characteristics of participation practices. Furthermore, locally derived criteria may be prone to interest group capture (Abelson, Forest et al. 2003). Moreover, satisfaction can be influenced by aspects of the experience that are unrelated to quality. Long and tedious participatory processes can lead to higher degrees of satisfaction among participants who, having devoted much time and effort, justify their efforts in a belief that the process was successful (NRC 2008). Additionally, participants who are not normally consulted may express satisfaction that is rooted in the opportunity to participate (Abelson, Forest et al. 2003). Thus intrinsic biases may invalidate context specific criteria.

In contrast, local criteria attempt to define the attributes of effective participation according to the specific modes of interaction. These local success criteria acknowledge the influence of context on success. For instance, Baker et al. (2005) identify requirements for successful public hearings; McComas (2001) provides criteria for successful public meetings. While these are potentially useful additions to improving specific aspects of participatory practice, they lack a critical view that the problem solving process involves a wide variety of mechanisms, and assume that the mechanisms introduced are appropriate in terms of timing and relevance. Thus local criteria fail to present a holistic picture of the process, making them less useful for broad evaluations of involvement in environmental problem solving.

Finally, global approaches aim to determine a universal set of criteria on which all successful participation exercises depend. They are essentially efforts to define a benchmark for comparison and may be grounded in theory or practice and provide the basis for a strategic approach to designing participatory practices. Examples include Webler's (1995) participatory process criteria of "fairness and competence" which will be discussed later; Rowe et al. (2000; 2004) comprehensive review of the literature to define nine criteria of representativeness, independence, early involvement, influence, transparency, resource accessibility, task definition, structured decision making, and cost-effectiveness; Beierle and Cayford's (2002) account of incorporating public values, improving substantive quality, resolving conflict, building trust, and public information. As seen from these few examples, there is considerable diversity among universalist approaches.

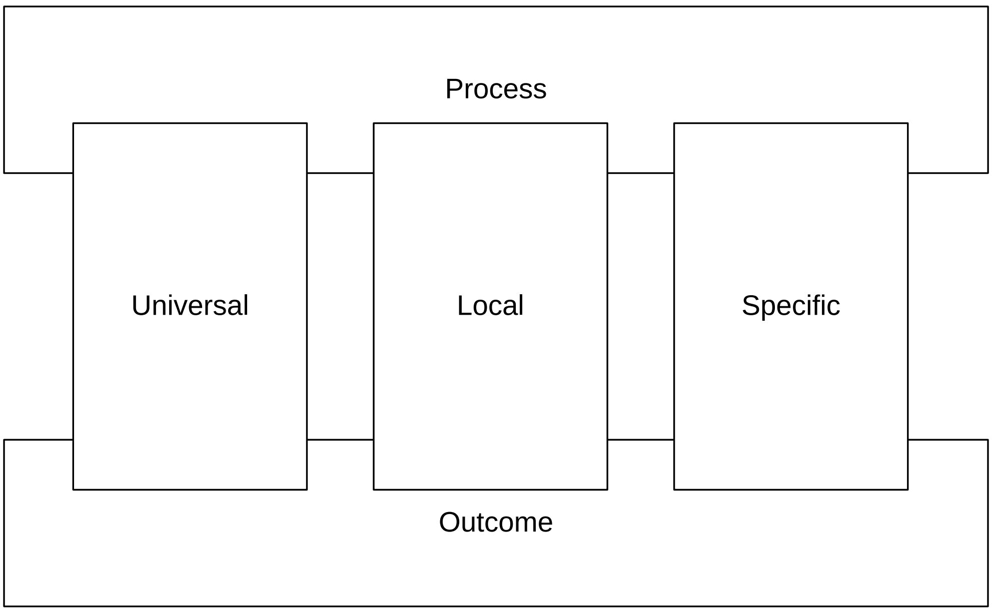

Figure 5. Generic framework of "success" criteria from research into public participation (adapted from Chess and Purcell 1999; Rowe and Frewer 2000, 2004; Midgley et al. 2007).

Formal attempts to define universal success criteria adopt two research modes: theoretical inquiry or empirical analysis. The most common approach is through empirical investigations of the practice of environmental engagement and combines attempts to draw lessons from that practice. Evidence is most overwhelmingly derived from two sources: scholarly case studies and practitioner reflection (NRC 2008).

Practitioner reflection utilises the extensive experience of practitioners over often very different forms of engagement, and provides useful ‘rules of thumb’ or guidelines for attaining success (e.g. Creighton 2005). For example Brown and Isaacs (1994) identify the six C’s of effective engagement in environmental problem solving (Table 7). While practitioner reflection is useful because it is grounded in practice, several authors stress that practitioner reflection carries systematic biases, thus should be triangulated with other forms of evidence (Romm 1996; Midgley, Foote et al. 2007; NRC 2008).

Table 7. The six C's model of effective Community participation (Brown and Isaacs 1994)

Capability	The members are capable of dialogue.
Commitment	Mutual benefit beyond self interest.
Contribution	Members volunteer and there is an environment that encourages members to ‘have a go’ or take responsibility/risks.
Continuity	Members share or rotate roles and, as members move on, there is a transition process that sustains and maintains the community corporate memory.
Collaboration	Reliable interdependence. A clear vision with members operating in an environment of sharing and trust.
Conscience	Embody or invoke guiding principles/ethics of service, trust and respect that are expressed in the actions of the community.

Scholarly case studies usually consist of reflections from researchers combined with formal evaluations using input from some or all parties involved. They can be very useful for providing evidence for the existence of certain phenomena (NRC 2008). However, generating empirical data from Community participants may be affected by various factors. Exit surveys have generally been used for evaluating processes but are prone to biases in common judgement or “halo effects” (Bruce 2006). NRC (2008, p65) warns extrapolation from these data-sets to identify beneficial procedures can generate spurious conclusions. Interviews can also be affected by halo effects, but may offer useful insight into the perceptions and emotions of participation. Other empirical approaches to clarify the findings of these investigations are desirable (Bruce 2006).

Single case studies and practitioner reflection have resulted in a wide diversity of supposedly universal attributes of participation (Rowe and Frewer 2004). In an attempt to manifest the most salient attributes, multiple case analysis has been employed. Proponents suggest that by comparing and contrasting individual cases, universal attributes, principles, or recommendations may be derived (Beierle 2002). For instance, Beierle and Cayford (2002) compared 276 cases in an attempt to establish general attributes of successful participation. Other authors however caution this approach, highlighting the difficulties in comparing cases due to extensive contextual variability (Burgess and Chilvers 2006).

Much of the criticism aimed at empirical approaches to participation is due to a perceived lack of theoretical grounding (Perold 2005). Empirical approaches are quite good at answering questions relating to the 'what' of participation, but do not attempt to respond to questions of 'why' 'effective' participation is indeed effective. Theoretical inquiries instead begin with this second question in mind, building on commonly accepted principles (i.e. 'normative'), for example the central democratic tenets of liberty, justice, and equality (e.g. Fung 2007). From these overarching principles operational criteria may be deduced. Theoretical inquiries are thus the most global and idealistic of the universal approaches and are neither time-bound, nor context-dependent. These make them most useful for providing a strategic orientation regarding how contaminated site managers can incorporate Community participation effectively in contaminated site clean-up.

3.3.2 Mauri

Indigenous cultures of the South Pacific contain a significantly different perspective on the effectiveness of participatory endeavours, through an acknowledgement of mauri (Aotearoa New Zealand, Fiji, Vanuatu), mouri (Tonga), moui (Niue), mauli (Hawaii) (Best 1924; Morgan 2008). Although conceptual understandings vary between cultures, there remains a common thread.

Mauri is the "life principle" (Marsden 2003; Peet 2006), the "binding force between the physical and the spiritual" (Durie 1998), the "life essence or force that binds the physical and spiritual elements of all life" (MfE 2006e), the "spark of life, the active component that indicates a person is alive" (Mead 2003). Importantly, while Western conceptualisations of life relate wholly to animate objects, within mātauranga Māori (Māori systems of knowledge), life, and consequently mauri are considered more broadly - mauri is "found in water, land, forests as well as mist, wind, soil and rocks, and is the force that interpenetrates all things to bind and knit them together" (Marsden and Henare 2002). Thus mauri is holistic in that it "encompasses everything, individually and collectively, in the natural world...due to its representation and role in the genealogy of creation, as the impetus or perhaps justification for existence" (Morgan 2008).

Mauri is central to the well-being of relationships and how complex problems are managed (kaupapa). It informs "how and why activities should be undertaken and monitors how well such activities are progressing towards their intended goals" (Pohatu 2011). As such, mauri is fundamental to kaitiakitanga – the appropriate practices and conduct for maintaining and enhancing human and environmental health (Morgan 2008).

The acknowledgement of an environmental problem reflects diminished mauri, but also provides an opportunity for restoration. In order to ascertain the effectiveness of a proposal, Morgan suggests exploring effects on mauri may be considered over extensive spatial (whanau (family), community, hapu (local territory), and broader environment - see Figure 6) and temporal scales – Morgan (2006b) describes considerations of "the mokopuna of the mokopuna (grandchild)" or a minimum of 150 years. If practices are conducted poorly, giving rise to animosity, degraded environmental health, erosion of values and beliefs, mauri will be adversely affected (mauri heke – diminished; mauri mate – denigrated) (Morgan 2006b, a; 2008). In contrast, if practices are conducted according to tikanga (correct principles), generating energy and vigour (pākahukahu), growth (whakatupu) and connectedness (tūhono), mauri may be enhanced (mauri piki) or restored (mauri tu) (Morgan 2006b, a; 2008).

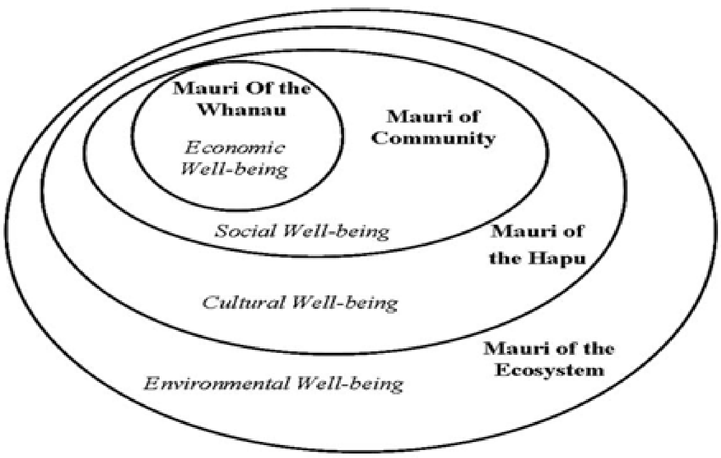

Figure 6. Four interdependent considerations of mauri operationalised in the "Mauri Model" (Morgan 2008)

In contrast to the rather instrumental notions and frameworks of effectiveness detailed in the previous section, mauri emphasises many less commonly acknowledged (in the West) aspects of environmental problem solving. Dominant attributes which enhance mauri include warmth (mahana) in relationships, proceeding slowly, gently and deliberately (āta), with self awareness (te tuakiritanga) and an appreciation of interconnectedness (te tūhonohonotangi) with both the people involved in a problem solving exercise and the land (Pohatu 2011). Mauri appears to be a useful indicator of participation effectiveness in environmental problem solving because it synthesises psychological, technical, social, environmental and spiritual aspects. Mauri has been used in contemporary environmental problem solving by Morgan (2006b, a; 2008), and as an indicator of wellbeing in economic assessment by Awatere (Awatere 2008). Although not widely adopted among Western theorists, similar concepts are present in Eastern understandings (qi, gi, and ki – Chinese, Korean, and Japanese) (Morgan 2009). Nascent texts by contemporary facilitation scholars identify a concept of essence, similar to mauri, as being central to the "art of facilitation" (Hunter et al. 1999; Hunter 2003, 2006; Hunter et al. 2007). Mauri may therefore be considered a fundamental operating principle (takepū) to guide effective participation in environmental problem solving, and consequently during contaminated site clean-up.

3.4 Theoretical approaches to "effective" participation

A wide variety of theoretical perspectives have been adopted which seek to characterise how to coordinate and conduct participation exercises. Space prohibits a full review of all of the theoretical positions, instead, a range of the most dominant or novel are critically analysed in the following sections. Four theoretical perspectives characterise the range of theoretical approaches to participation including "power", "information flow", "deliberation", "conflict resolution".

3.4.1 Power model

Some theorists insist that use of the term "participation" is only justified when the participants are actively involved and where decision makers are substantially influenced by that involvement (e.g. Bishop and Davis 2002, p15–17). A number of theorists and practitioners stress the need for involvement to be "meaningful" and "not just data to decision makers elsewhere" (Delgado, Kjolberg et al. 2011; Lockie 2001), the ability to exert influence over decisions is often seen as critical (Creighton 2005; IAP2 2009). But how are concepts such as 'meaningful decision making' and 'influence over decision making' translated into operational terms?

Sherry Arnstein advocates in her famous "ladder of participation" a fundamentally egalitarian ideal for meaningful Community participation (Arnstein 1969). Arnstein's framework details differences in influence on outcome between agency representatives (managers) and other participants, framing participation as decision making power (Arnstein 1969). Arnstein (1969) claims that "citizen participation is a categorical term for citizen power - it is the redistribution of power that enables the have-not citizens, presently excluded from the political and economic process, to be included in the future". Meaningful participation is explicitly associated with processes which are higher up the rungs of the ladder (Table 8).

Table 8. Levels of citizen participation (Arnstein 1969)

Level	Type	Explanation
Level 8	Full control	Full delegation of all decision-making and actions.
Level 7	Delegated power	Some power is delegated.
Level 6	Partnership	People negotiate with institutional power holders over agreed roles, responsibilities and levels of control.
Level 5	Placation	Power holders still make the decisions but other people's views have some influence.
Level 4	Consultation	People are given a voice, but no power to ensure their views are heeded.
Level 3	Informing	Power holders tell people what is going to happen, is happening, or has happened.
Level 2	Therapy	As below.
Level 1	Manipulation	Assumes a passive audience, which is given information that may be partial or constructed.

Arnstein's ladder is designed to focus attention on historically disenfranchised groups - her explicit emphasis on power is a pragmatic one. A variety of studies indicate that the results of participation are frequently nullified by power relations at the political level (Birkland 1999), thus an understanding of power relations is fundamentally important to understanding participation. However, ultimately, an excessive prominence on power has considerable limitations.

Firstly, Arnstein assumes that control is a fundamental goal of participation. To the contrary, other researchers have discovered that participation is context dependent and that citizen control may not be ultimately desirable for all parties. For example, Webler and Tuler (2001) investigated attributes of good process according to citizens and discovered a dominant discourse which endorsed responsible leadership, not citizen control. Furthermore, participation is dynamic, however Arnstein's ladder does not recognise the agency of participants who may seek different methods of involvement in relation to different issues and at different times (Tritter and McCallum 2006). For instance, potential participants may not wish to be involved at all, or participate in observational or advisory roles during different stages of a contaminated site clean-up.

Secondly, Arnstein’s ladder assumes that power has a common basis for users, providers, managers and policymakers and ignores the existence of different relevant forms of knowledge and expertise (Tritter and McCallum 2006). An emphasis on power thus limits the potential for sharing experience, knowledge and the harnessing of multiple perspectives inherent in successful user involvement (Collins and Ison 2009; O'Faircheallaigh 2010). Hence Arnstein’s power theory of participation has considerable drawbacks.

A number of alternative typologies for assessing effective Community input have been developed which also focus on power. IAP2 (2007), in a typology comparable to Arnstein’s, suggest there are five levels of participation: Inform, Consult, Involve, Collaborate and Empower. Similarly, Pretty (1995) defined seven levels ranging from manipulative participation, passive participation, participation by consultation, participation for material incentives, functional participation, interactive participation, to self mobilisation. While being useful for highlighting power disparities, these models also fail to recognise the diverse goals and contributions of participants.

3.4.2 Information flow model

Some theorists are content to conceptualise Community participation as communication and thus frame involvement in terms of information flow between agents. For example, Rowe and Frewer (2005), in one of the most widely cited references to public participation, develop a theory of participation which draws a distinction between communication (a flow of information from managers to the Community), consultation (a flow of information from the Community to managers) and public participation (a two way flow of information between managers and the Community) (Figure 7). From this perspective, the aim of participation is “to acquire all relevant information from all relevant members of the population (sources) and transfer this to relevant recipients (be these the sponsors or the participants)” (Rowe and Frewer 2005).

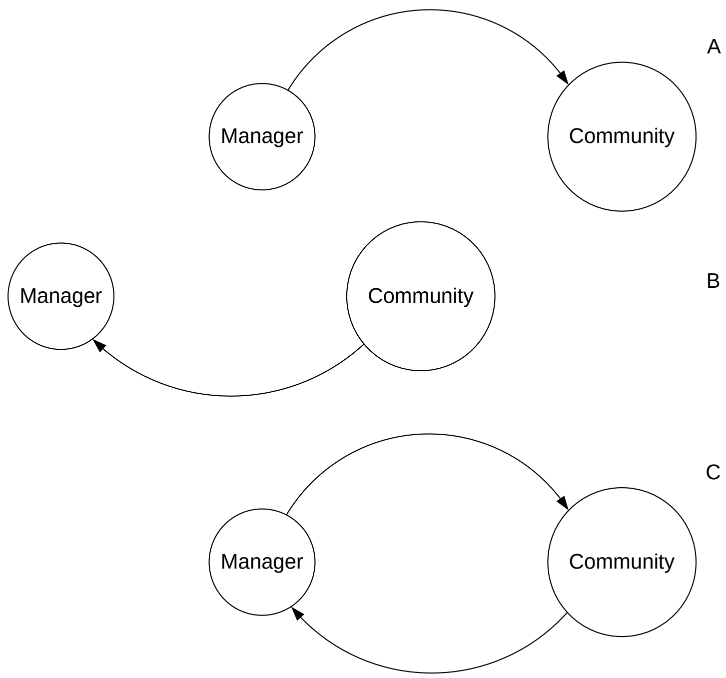

Figure 7. Three forms of engagement as adapted from by Rowe and Frewer (2005): a) Public communication - Information conveyed from project sponsors to members of the public; b) Public consultation - Information conveyed from members of the public to project sponsors; c) Public participation - two way exchange of information between project sponsors and members of the public.

Treating participation as information flow is useful because it highlights the crucial role of good communication and feedback. Consequently, the information flow model identifies the necessity of openness and transparency in authentic collaborative inquiry. However an emphasis on 'information' has several weaknesses. Firstly a strict information flow model fails to comprehensively account for important participatory factors. For example, information (communication) is but one component of trust development - a focus on information does not account for the various perceptions which may be present interpreting that information (Kasperson et al. 1992; Abelson, Forest et al. 2003). Secondly, an emphasis on information precludes exploration of the subtleties of interaction. Involvement of the Community is frequently an emotional process, in which participants may passionately advocate particular perspectives according to interest (Harvey 2009). The information flow model cannot account for emotional aspects. Thirdly, the information flow model barely accounts for power, emphasising the power to control information flow as most critical. However power may be exerted in other subtler forms (e.g. overwhelming Community participants with information), yet these cannot be incorporated in the information flow model. While a useful theoretical perspective, the information flow model is incapable of providing a comprehensive account of important participation concepts.

3.4.3 Deliberative model

Thomas Webler (1995) builds on the Habermassian notion of communicative rationality and ideal speech (Habermas 1984), to develop a normative theory of participatory process. Webler (1995) ascertains global success "meta-ethical" criteria of fairness and competency for effective interactions between communities and managers. Webler (1995) contends that "right" participation encourages multi-way communication; is consensual and non-hierarchical; requires respect for individual autonomy; relies on Community participants' reasonableness; and promotes critical self-reflection.

While this meta-ethical stance provides an important contribution to research into evaluation by grounding criteria in fundamental social theory, it is also sensitive to the criticisms of Habermassian theory, particularly that communicative action is an overly idealistic account of interaction and that generating the ideal speech situation is impossible due to differences in agency and knowledge (Tewdwr-Jones and Allmendinger 1998). Furthermore, if effective participation is defined as increase in mauri, it is not apparent that emphasis on fairness and competency will translate into solutions that are viewed with vigour and energy and that enhance Community and environmental wellbeing. Nevertheless, Webler's rigorous and thorough exposition is an important contribution to the field of Community participation and has been widely adopted as a basis for determining the effectiveness of participatory endeavours (e.g. Palerm 2000; Kinney and Leschine 2002; Santos and Chess 2003).

3.4.4 Conflict resolution

Environmental problem solving has many analogies with conflict resolution – viewpoints are frequently entrenched and challenges lie fundamentally in an ability (or lack thereof) to reconsider issues from different perspectives. Thus, conflict resolution provides a useful entry point into understanding how Community participation may be more effectively enacted. The dual concern model of conflict resolution is a widely acclaimed conceptual perspective that contends the preferred method of dealing with conflict is based on two underlying dimensions (Thomas 1976; Carnevale and Pruitt 1992; Rahim 2001; Forsyth 2009):

1. A concern for self; and
2. A concern for others.

According to the model, different outcomes are possible based on the degree of concern one has for personal needs and the needs of the conflicting party (Figure 8). Low levels of concern lead to the avoidance of conflict and avoidance of productive resolution. High levels of selfish concern generate competitive style behaviour, whereas high levels of altruistic concern lead to concessionary tactics. Both high levels of concern for self, and for the other party involved in conflict are necessary for genuine solution finding.

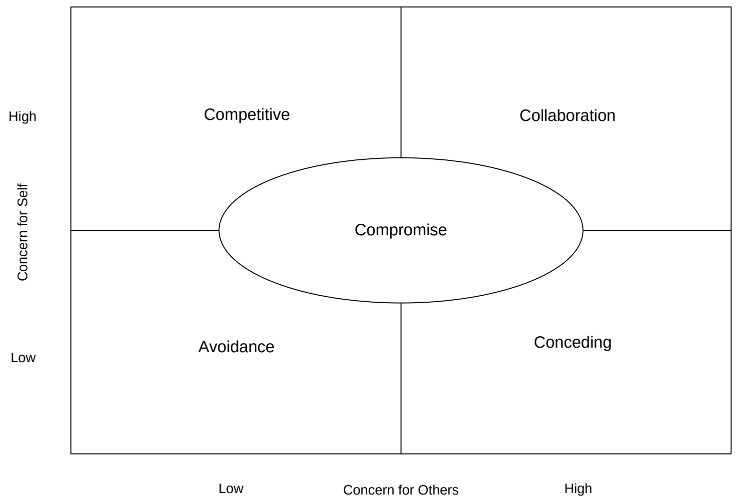

Figure 8. Dual concern model

The dual concern model of conflict resolution provides a useful conceptual foundation for Community participation in environmental problem solving. Furthermore, it provides some understanding of how contaminated site managers may enhance participation activities to promote collaboration and compromise – namely through a high degree of concern for Community participants as well as themselves. However, environmental problem solving is a complex mix of technical, political and socioeconomic challenges. To encapsulate the full range of attributes associated with environmental problem solving the dual concern model appears inadequate.

A second criticism of the conflict resolution model emerges due to perceived limitations of the scope or purpose. Conflict resolution techniques have been generally employed to resolve outstanding issues between conflicting parties, and usually end in a formal agreement (Bar-Tal 2000). While some exploration of novel solutions may be present, in general the emphasis is related to reconciliation and the discovery of solutions which are satisfactory to all involved. Closing the solution space on 'satisfactory' solutions has been described as overly pessimistic (Hunter, Thorpe et al. 2007), and may limit opportunities for enhancements to mauri.

3.4.5 Summary

The four theoretical positions highlighted above provide a range of perspectives on what effective Community participation is, how contaminated site managers may promote effective Community engagement and therefore different types of strategic guidance. The information flow model highlights discursive aspects between project managers and Community participants, the power model emphasises the necessity of Community agency, Webler’s (1995) deliberative model notes the importance of process elements, and the dual concern model provides some insight into psychological considerations. In many aspects these apparently divergent approaches converge and there are opportunities to improve theoretical understanding through synthesis, however, the literature illustrates a paucity of research directed toward this kind of theoretical development.

3.5 Why do Community participants participate?

For theoretical approaches to be useful to contaminated site managers they must be informed by the realities of participation in practice. To further investigate the notion of effective participation, it is necessary to explore the perspectives of Community participants, why they participate, and what constitutes effective participation to them.

Firstly, Community participation is predicated by knowledge of a given problem or situation. In the context of contaminated sites, this usually relates to the perception that a site is indeed contaminated and dangerous in some way. Knowledge may be derived from direct observation of a problem context, or information provided by project sponsors or regulatory authorities, media and other Community participants. If information provided by project sponsors is disputed or if there are information gaps, other sources, for example from opposition groups, may fill the void.

In order to participate in environmental problem solving, there must be opportunities for Community members to participate, and they must be aware of those opportunities (Bauer and Randolph 2000; Lowndes et al. 2001; Irvin and Stansbury 2004). Formal, or “invited” opportunities include prescribed and highly organised exercises such as hearings, citizens’ juries, task forces, public meetings, citizens’ panels and referendums.

In addition to “invited” participation opportunities, Community members may be involved in contaminated site problem solving in what has been termed “uninvited” or “unofficial” participation (Culley and Hughey 2008; Delgado, Kjolberg et al. 2011). If formal opportunities to participate are not present, or if processes are not trusted, participation may take “uninvited” forms such as comments in the media, protests and civil action (Delgado, Kjolberg et al. 2011). While most research emphasis has been on “invited” participation, “uninvited” participation can shift the focus of attention, or problem framing from that provided by project managers (Wynne 2007). Thus “uninvited” participation constitutes an important but under-researched component of environmental decision making.

Given appropriate information, opportunities and motivation, members of the Community may participate in environmental problem solving. There has been considerable research exploring why members of the Community choose to participate or not to participate during the course of resolving a complex environmental problem (Beierle and Konisky 2000; Laurian 2004; Solitare 2005; Cheng and Mattor 2006). Scholars have identified at least six reasons including interest, rational choice, trust, self-efficacy, social factors and power. The following paragraphs provide further clarification of these factors.

Firstly, decisions to participate depend on the degree an environmental problem piques interest and values. In complex environmental problem solving, Community participants may wish to gain knowledge of the problem or may simply be curious about the situation. Perceptions of risk can be an important determinant for interest in many environmental problems (Laurian 2004). The media can play an important role in generating interest or controversy, stimulating participation (Kasperson, Renn et al. 1988). Conversely some potential participants may be apathetic to a particular environmental problem and therefore not engage. While disinterest has been historically considered a strong reason for non-participation (Milbrath 1981), more recent studies have indicated disinterest to be relatively unimportant. For example, Diduck and Sinclair (2002) surveyed reasons for non-participation in an environmental impact assessment and found that the least frequent response was that citizens were uninterested. Similarly, Laurian (2004) found non-participation to be more likely due to simple time and resource limitations or a feeling of resignation that current (and perceived to be corrupt) systems of problem solving will not change.

Since participation often requires extensive time and effort, it comes at some cost to the individual. According to rational choice theory, one of the dominant theories of economic and social interaction, a person will engage in socio-political debate if the benefits outweigh the costs (Cheng and Mattor 2006). For example, residents adjacent to a contaminated site may become involved because of the financial benefits (increased land value) to them of cleaning up the site. Furthermore, some Community participants, although interested, may be constrained by time or financial factors and thus unable to participate. For example, studies have demonstrated that non-participation in environmental decision making is particularly high amongst the underprivileged (who must work to support their families) and those with young children (Ashford and Rest 1999).

Participation is also affected by trust. In fact, trust has been highlighted as one of the primary determinants of participation (Beierle and Konisky 2000; Yang 2006; Höppner 2009; Laurian 2009). Firstly, decisions regarding formal participation are affected by perceptions of whether managers are considered unbiased and competent (Cheng and Mattor 2006). If trust in managers is high, participation levels are likely to be low, participation is accommodative and conduct loyal (Laurian 2004). Conversely, in situations where project sponsors are distrusted, participation as ‘watch dogs’ may occur (Garcia 2011, p107).

A second critical aspect of trust that affects participation relates to trust in the process. If processes are trusted, Community members are more likely to participate in invited ways, in fact, they may be highly encouraged to do so (Innes and Booher 1999; Beierle and Konisky 2000). Alternatively, if decision making processes are perceived to skew or bias outcomes, participation may be withdrawn in resignation or take uninvited forms (Cheng and Mattor 2006; Lofstedt 2006).

A third aspect of trust that affects participation, yet one that has received little research attention relates to the “self-efficacy” or “self-trust” (Bandura 1994; Govier 1997; Cheng and Mattor 2006). Self-trust is predicated by the perceptions that Community participants have of their own capacity and effectiveness. Participants may be shy, insecure in public speaking, or generally uncomfortable in conflict situations, thus may retract from participation. Alternatively some participants demonstrate opposite character traits such as confidence and feel comfortable expressing their views in public fora.

Trust extends to networks of individuals active in environmental problem solving. Firstly, the existence of already trusted, mobilised Community groups or NGOs and social networks can drive engagement and participation (Laurian 2004). Simultaneously, these groups may also contribute to non-participation, for example if citizens perceive that others are representing their views they may disengage from active proceedings (Diduck and Sinclair 2002).

In many ways associated with trust, power influences decisions to participate. If Community participants perceive "that the process will not legitimately confer shared power over decisions", they may choose to disengage (Cheng and Mattor 2006). Arnstein (1969) believed that without sufficient power, engagement with citizens consisted of simple placation or manipulation. Participants with a lack of power and an associated lack of trust may be resigned to the project and thus choose to avoid engagement (Laurian 2004).

Together, interest, trust and power provides a basis for why Community members participate in environmental problem solving and are thus important components of effective participation. To better understand how participation may be effectively implemented it is first useful to explore the ways that Community participants partake in environmental problem solving.

3.6 Role and influence of Community participants

In addition to being the primary determinants of why Community participants become involved in environmental problem solving, interest, trust and power also define the level of involvement. The level of involvement relates to the degree of influence over the length of a contaminated site clean-up project and the role played by Community participants.

Theorists of participation suggest that Community participants adopt a limited number of distinct roles (Garcia 2011). Laurian (2004) begins by suggesting that responses to environmental threats may be accommodative (passive) or manipulative (active). Non-participatory responses involve accommodative behaviour, and participation is linked to the active mode. To better define active responses, Garcia (2011) investigated the participants' perspective in the context of decision making surrounding a contaminated water supply. In addition to non-participative responses, Garcia (2011) discovered reactions she termed "legitimisation", "collaboration", and "watchdogging".

Legitimisers participate in environmental decision making primarily by validating the positions of managers. In the context of contaminated site clean-ups, legitimisers exhibit trust in regulatory authorities and loyally endorse their decisions (Laurian 2004). Legitimisers are trusted by regulatory authorities and managers, but are provided no real power. Innes and Booher (2004) contend that most instances of Community participation are implemented to maximise opportunities for the involvement of legitimisers, to the detriment of other participatory roles.

Collaborators are Community participants involved with managers to work toward a shared goal. Collaboration is an often cited aim of participatory environmental processes in which decision making power and responsibility are shared (e.g. Frame et al. 2004; Renn 2006; Margerum 2008; Sherman 2011). Instead of adversarial decision making, collaboration is intended to generate diverse consensus or meaningful compromise through deliberation (Renn 2006). In practice however, collaboration is often limited to those participants with closely aligned problem framings, marginalising those with other perspectives (Bryan 2004; Bidwell and Ryan 2006; Shilling et al. 2009).

Watchdogs, as the name suggests, refers to participants with a scepticism of project managers, regulatory authorities and/or the decision making process. Garcia (2011) contends that watchdogs play a dual role as accountability checkers and adversaries, however, it is instructive to separate the two since they present quite different activities. To check the accountability and integrity of decision makers the primary requirement of watchdogs is full information access. Open access mandates (such as New Zealand's Official Information Act 1982) help to facilitate the presence of watchdogs. In contrast to collaborators, watchdogs are afforded little direct "invited" influence by decision makers, participation is reactive in the sense that response is based on information from managers.

Adversaries extend the notion of watchdog participation by asserting alternative framings of problems, challenging data, and proposing different solutions (Wiedemann and Femers 1993). Adversaries generally have strong and relatively rigid needs and expectations. Historically, environmental managers have attempted to reduce the influence of adversaries by limiting information flow and power (Miller 1999). However, adversaries have responded by empowering themselves through legal channels and civil action, often to the benefit of environmental outcomes (Cole 1993; Plater 1993). A relationship of mutual distrust is evident between adversaries and project managers.

The role adopted by Community participants varies according to interest, trust, and power (Miller 1993b; Harding 1998; Bubna-Litic and Lloyd-Smith 2004; Laurian 2004; Garcia 2011). If interest in the project is low, Community members are likely to adopt a passive role or not participate at all. If project managers are trusted, Community members may assume the role of legitimisers. If mutual trust is high between project managers and the Community, participation may take a collaborative form. If trust is reduced, project managers or regulatory authorities may exclude Community members participating substantially in decision making. Where only limited power is conferred to the Community, members may adopt a watchdogging role if their interests are roughly aligned. However if interests diverge markedly, Community participants may employ tactics to greater empower their viewpoint, adopting an adversarial position.

During the course of environmental problem solving, such as the clean-up of a contaminated site, the role adopted by any individual or group may change. Increased interest shifts Community participants from passive to active roles (Aggens 1983; Creighton 2005). At large contaminated sites it is common for regulatory authorities to attempt to increase interest and awareness of the hazard, legitimising the necessity of remediation activities (Hasan 2004). During the course of a project interest is likely to wax and wane according to the issues being addressed. Perceptions of risk, as highlighted in Chapter 2, highly influence the level of interest present (Richard Eiser et al. 2007). Interest may arise inadvertently, as Creighton (2005, p 56) explains:

> *Groups that raise concerns about health risks often do so as a tactic; they may be primarily concerned with preventing a facility from being located in their neighbourhood, but they will raise the question of health risks in an effort to gain political support. But new people will get interested in health risks as a result, and while the people who initially raised questions about health risks may be using the issue as a tactic, the people whose interest is attracted by the health issue are genuinely concerned about health risks*.

While interest contributes to the extent of active involvement, power determines the extent to which participants actively modify the discourse. Lorenz Aggens, a seminal practitioner in Community participation, has investigated participation levels and developed an analogy with atomic structure to identify 'orbits' of influence, which has been widely used by practitioners (Creighton 2005, p52). Aggens explains (Aggens 1983, p 193):

> *Think of each level as an 'orbit' of activity around the project nucleus – the decision making process. The closer an orbit of activity is to this decision making centre, the greater the opportunity there is for influence in that decision.*

Creighton (2005, p52) further expands on Aggen's Model to include the participants within an organisation (i.e. the project sponsors) as well as public participants. Creighton suggests six orbits of co-decision makers, active participants, technical reviewers and advisors, commenters, observers, and unsurprised apathetics/non-participants (Figure 9).

Table 9 provides a detailed explanation of each of the categories.

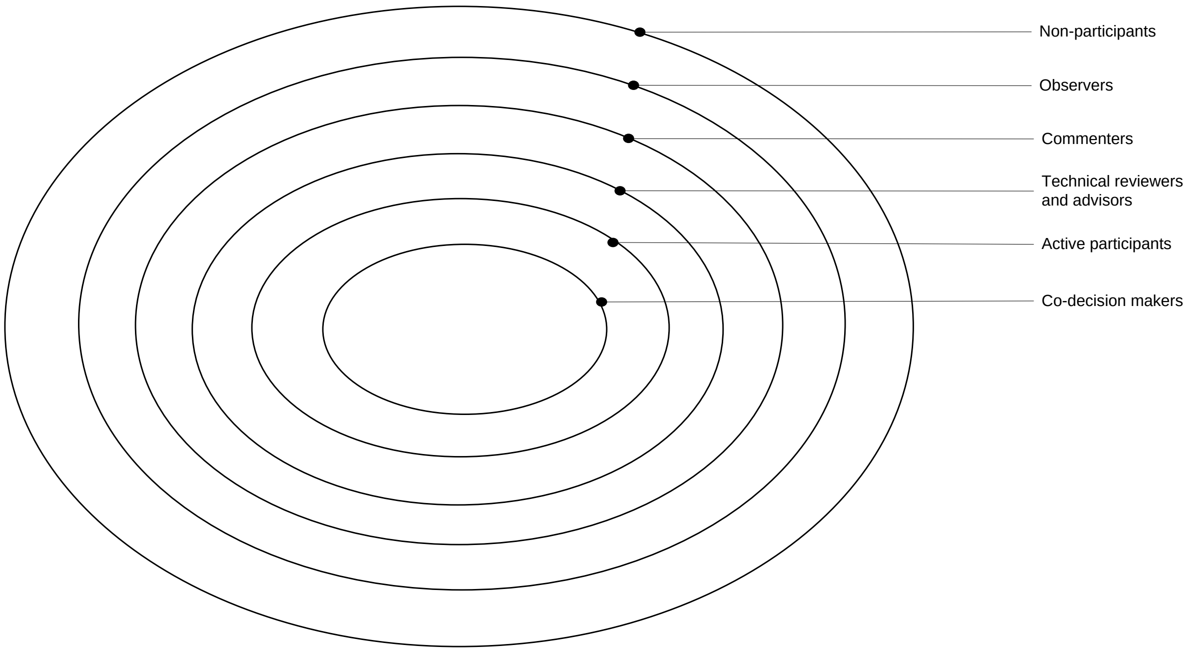

Figure 9. 'Orbits' of participation (Aggens 1983; Creighton 2005)

Table 9. Roles of participants (Aggens 1983; Creighton 2005)

Non-participants	Are people who choose not to participate due to time limitations or lack of interest in the specific project? They may not be wholly apathetic to political issues, for example, they may be actively involved in schools, community groups or other organisations, but they are apathetic to the specific issue involved.
Observers	Read information being disseminated, however, unless they become very concerned with what they observe, are unlikely to actively participate. Nevertheless, they may influence the project indirectly through comments to other units of government, public interest groups, and special interest organisations. They may become active participants if they perceive that information is being withheld or they are being lied to.
Commenters/ Reviewers	Are very interested in the problem but may be 'time poor'. Commenters are likely to speak out at public meetings or send letters to relevant representatives, however, are unlikely to be able to make a sufficient time commitment for participation in an advisory group.
Technical Reviewers/ Advisors	May be required for their specialist knowledge about particular aspects of the problem. Usually only involved in selected parts of the project, for example, for reviewing methodology or providing expert advice. Expertise in Creighton's (2005) sense is associated with scientific and technical knowledge, however, this limited conception of expertise has been extensively disputed (e.g. Irwin 1995; Fischer 2000, 2004; Healy 2009). Aggens (1983) instead refers to advisors, which may be considered in a technical or non-technical sense.
Active Participants/ Creators	Will actively commit time and energy to ensure they have an influence on decisions. Engagement can take the form of advisory group participation, community organisation, attendance at workshops or meetings or a variety of other ways. Active participants care deeply about the issues involved, thus, if they are unable to exercise their opinion in a participatory inquiry process, they may resort to alternative means (e.g. political lobbying or legal challenges) to make themselves heard.
Co-decision Makers	Are core participants who will make the final decisions and those organisations and groups which effectively have veto power over the course of the problem solving process. A co-decision maker might constitute a regulator, local government with permitting authority, a joint venture partner, powerful NGO, key community organisation, etc. Co-decision makers should assist in designing and conducting the participatory process, since withdrawal of their collaboration can derail the inquiry.

Power contributes to the role of Community participants in several ways. Without power, Community participants are passive nonparticipants and legitimisers, indeed, prior to the 1990s, when technocratic decision making was common, Community power remained constrained (Miller 1999, p67). Increased Community power enables greater diversity in the roles that Community participants can play during environmental problem solving such as contaminated site clean-up, and thus increases the complexity for contaminated site managers. It is only through empowerment that watchdogs, collaborators, and adversaries can emerge. However, the actual role adopted is influenced primarily by the final attribute, that of trust.

Trust relates to the nature of the relationship between parties participating in an environmental clean-up. Firstly, Garcia (2011) contends Community participants and project managers or regulatory authorities will only collaborate if there is a high level of mutual trust. This means that for collaboration, not only must the Community trust project sponsors, but project sponsors must also trust Community participants throughout the process. Collaboration is thus a tenuous exercise, as exhibited by the many challenges that collaborative efforts have faced (Fadeeva 2005). Secondly, if Community participants' distrust in project managers or the problem solving process is high, roles of watchdogs or adversaries are likely to be assumed. If initially high trust is eroded during the course of a project, participants may revert from collaborators or legitimisers to the role of watchdogs or adversaries (Figure 10).

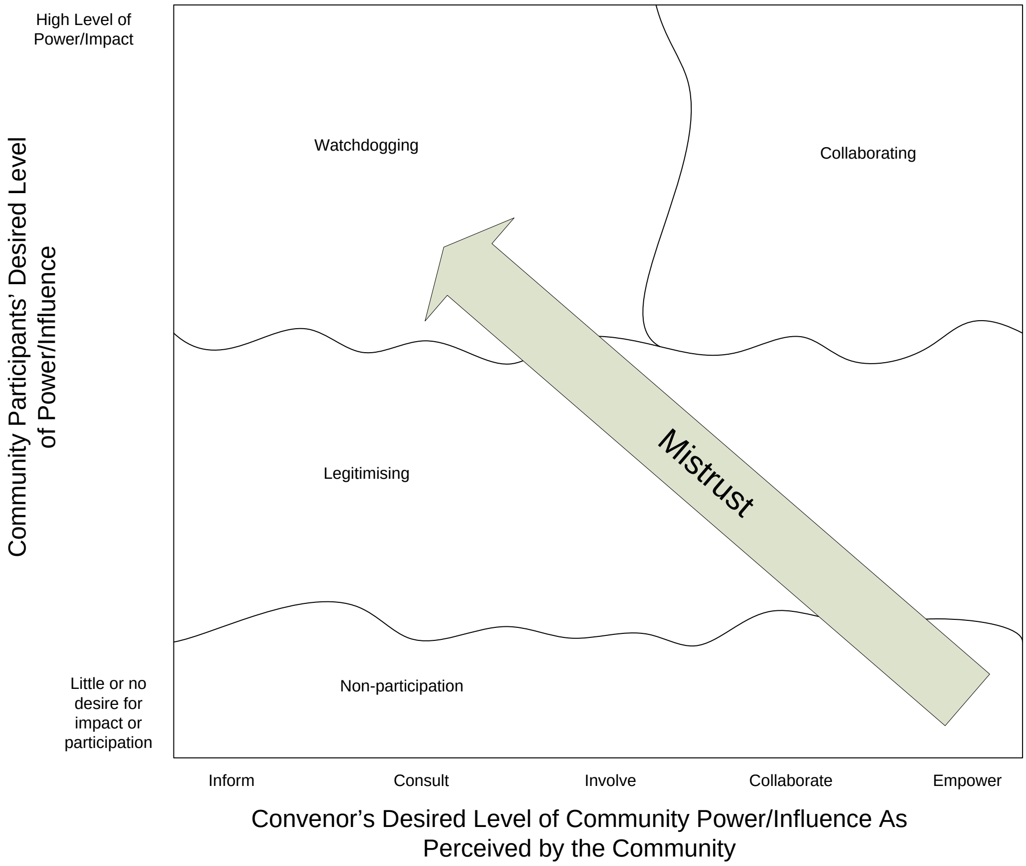

Figure 10. Contributing factors to the role of Community participation (Garcia 2011)

Since the role of Community members is malleable, it is useful to inquire into the constitution of roles in effective environmental problem solving exercises. Which roles create the best context for effective environmental problem solving? A large majority of the theoretical literature on decision making identifies collaboration, where power is shared and trust is developed, as the preferred approach to resolving complex or "wicked" environmental dilemmas (e.g. Selin and Chevez 1995; Margerum 1999; Bauer and Randolph 2000; Bryan 2004; Frame, Gunton et al. 2004; Armitage 2005; Topper 2007; Armitage et al. 2009; Brown et al. 2010; Sherman 2011). As a consequence, the Community role of the collaborator is generally acknowledged as being preferential.

However, the efficacy of wholly collaborative problem solving approaches has been extensively questioned. Investigating small group collaboration, Boulding (1964) discovered that groups with dissenting individuals possessed much more effective problem solving capabilities. In the context of a contaminated water supply, Garcia (2011) found several instances of watchdogs and adversaries disputing project managers' facts and interpretations and overall improving the quality of decision outputs. This suggests a clear role for dissenting voices in effective participation. Interestingly however, Boulding (1964) also noted that dissenting individuals were the first to be chosen to be excluded if group members were provided the opportunity, a result that seems to suggest groups have a natural tendency for reducing diversity and valuing harmony over effectiveness. In long term collaborative group interaction, this tendency can lead to “group think”, the suppression of ideas, and reduced levels of problem solving quality (Janis 1972; Parkins 2007).

Pluralist theoreticians contend that there is a substantial and meaningful role for dissent in all but the simplest problem solving exercises (Mouffe 1999; Smith 2003; Mouffe 2009). “Agonists” argue that deeply rooted differences in power cannot be overcome, and that alternative perspectives will be subverted in seemingly collaborative contexts (Garside 2002). Thus, agonists determine a distinctive role for adversaries in environmental politics. Unfortunately however, the history of adversarial interaction is one of “bad tempered bickering” in which the problem solving process is “engulfed in posturing rather than improved in quality” (Miller 1999, p124). Thus, while there is certainly a useful role for adversaries, particularly when power is unbalanced, it seems preferable to address differences before destructive, intractable conflict arises.

3.7 Summary

This chapter has explored the effectiveness of existing approaches and theory of participation in environmental problem solving. A major part of the challenge to identify effective participatory processes has been shown to be the multifarious nature of ‘effectiveness’. A review of the dominant Western discourses demonstrated an array of measures of effectiveness, however none completely satisfactory. Turning to mātauranga Maori and contemporary facilitation understanding, the concept of mauri has been explored, generating a novel basis to define effectiveness in participation. A discursive investigation of the reasons Community members choose to participate and the role that they assume when they participate suggests that interest, trust and power are essential components. However, whether these aspects are critical to effective participation - to participation that enhances mauri - remains to be explored.

4 | Collaborative Inquiry

Generating Collaboration in Complex Environmental Decision Making

All theory, dear friend, is gray, but the golden tree of life springs ever green

- Johann Wolfgang von Goethe

4.1 Introduction

The previous chapter outlined some of the central characteristics of participation in environmental problem solving as interest, trust and power. However, many questions remain as to the necessity of these three characteristics for effective participation. In order to begin to understand whether these characteristics were necessary an inquiry with experienced facilitators was conducted. The basic rationale is that practitioners endeavouring to implement effective Community participation in environmental problem solving carry extensive knowledge of "what works and what doesn't", and the fruit of their experiential learning may be readily supplemented with appropriate theory. To systematically combine practitioner and theoretical insights a collaborative inquiry method was implemented.

4.2 Cooperative inquiry into effective Community participation

Cooperative inquiry has been developed extensively by John Heron (Heron 1981a, b; Heron 1996), and extended with Peter Reason and John Rowan (Reason and Rowan 1981; Heron and Reason 1986, 2000, 2008). The central tenet of cooperative inquiry is to "research 'with' rather than 'on' people" (Heron and Reason 2000). Fundamentally, cooperative inquiry celebrates participation and democracy in the research process (Bray et al. 2000, p3).

Cooperative inquiry is particularly useful for investigation of complex social issues (Bray, Lee et al. 2000). Cooperative inquiry enables a wider array of knowledges to be explored in depth than would usually be possible in traditional inquiry methods. Data collection benefits from challenges which naturally occur during dialogical inquiries, enabling early identification of dilemmas and points of difference. Analysis, aggregation and interpretation are aided by multiple perspectives generating consensus and pointing out inconsistencies and problems. Conclusions may be more robust since data has been obtained and examined by a range of perspectives. Furthermore, in cooperative inquiry, both participants and researchers feel a deep connection to the research and a sense of empowerment – participants, because their time and effort is spent contributing to an issue they care deeply about, and researchers, because the social value of his or her research topic is verified by participant enthusiasm (Goodfellow 2005). Hence, cooperative inquiry is particularly appropriate for ascertaining how effective processes can be generated and sustained for Community participation during environmental problem solving.

Heron (1981a) suggests there are two types of cooperative inquiry which he terms “strong” and “intermediate”. Strong cooperative inquiry involves collaboration in all phases of the research endeavour – from the development of research hypotheses and methods, to data collection and finally to interpretation of the results and formulation of conclusions. In contrast, intermediate cooperative inquiry places less emphasis on collaboration in the development of initial research hypotheses and in the finalisation of research results. While Heron’s preference is obviously for strong cooperative inquiry, he remains optimistic about the research opportunities that even intermediate cooperative approaches offer.

Table 10. Intermediate cooperative inquiry (Heron 1981a)

	Researcher	Participant
Contribution to research propositions	High	Low
Contribution to research action	High	High
Contribution to research conclusions	High	Low

Intermediate cooperative inquiry retains many of the beneficial aspects of the strong cooperative approach, such as enhancing the diversity of knowledge input; using consensus and dissent during analysis and aggregation to improve robustness; enhancing conclusion validity through verification; and empowering participants and researchers. However, intermediate cooperative inquiry also places significant emphasis on the individual researcher. Individual researchers are responsible for formulating and refining research questions; devising the research method; facilitating data collection and collecting data; deeply inquiring into participant ideas and expanding on insights; and developing conclusions. Table 10 provides a summary of input from participants and researchers. Thus in intermediate cooperative inquiry, although collaborating participants significantly contribute to the core research ideas, errors, omissions, results and conclusions are chiefly the responsibility of the researcher.

4.2.1 Limitations of the method

Derived from a participatory, relational perspective, the cooperative inquiry method possesses a number of apparent weaknesses. The following subsections elaborate on the major limitations of the method.

4.2.1.1 Generalisability

Traditionally, cooperative inquiry primarily values practical, experiential forms of knowing (Reason 1997). Methods with experiential forms of knowing are more difficult to generalise, meaning that high levels of rigor must be adopted in relation to process and outcomes.

4.2.1.2 Validity

Research findings are valid if they are well grounded and have been developed through well reasoned argumentation (Heron 1996, p159). Seven fundamental tenets form the basis of the cooperative inquiry method to enhance validity (Thorpe 2008, p90). These tenets were implemented as part of the research design to promote reliability and validity of the research findings.

Table 11. Cooperative inquiry validity concepts

Validity concept	Explanation
Research cycling	The research topic is taken through several cycles of reflection and action.
Divergence and convergence	Within the action phases co-inquirers can diverge and converge on the topic and its parts.
Reflection and action	Since reflection and experience refine each other, it is important to keep a balance between them, so that there is neither too much reflection on too little experience, nor too little reflection on too much experience.
Aspects of reflection	Within intellectual, create a balance between: describing, evaluating descriptions, building theory and planning application.
Challenging uncritical subjectivity	A procedure authorising any inquirer at any time to adopt formally the role of devil's advocate in order to question the group as to whether uncritical subjectivity is occurring.
Chaos and order	Allowing for the interdependence of chaos and order, of ignorance and knowing.
Authentic collaboration	One aspect is that group members internalise the inquiry method and make it their own so that they become on a peer footing with the initiating researchers. The other is that each group member is fully and authentically given the opportunity to engage in each action phase and in each reflection; on a peer basis with every other group member.

4.2.2 Cooperative inquiry method

To operationalise the cooperative inquiry, eight distinct steps were taken (Figure 11). Inquiry began with preliminary investigations into generating effective EPC participation [1]. Next, a formalised online cooperative inquiry was conducted with 10 experienced facilitators (individual knowledges are shown as different sizes, representing the varying level of experience of the facilitators) [2], with the result of a draft set of characteristics required for effective EPC participation in environmental problem solving [3]. Further individual reflection on these findings, as well as additional theoretical inquiry [4] enabled the development of several alternative models of effective Community participation in environmental decision making [5]. Over a 1 ½ year period, each emergent model was critically evaluated and critiqued by individual participants creating an iterative cycling process [6,4,5]. Through this creative process models were gradually refined and converged into a single model of Community participation. A summary of model theory and development was sent to participants for comment and feedback [7], culminating in a finalised model of effective Community participation in contaminated site clean-up [8]. The following sections provide an account of the collaborative inquiry process, model development, and feedback from participants.

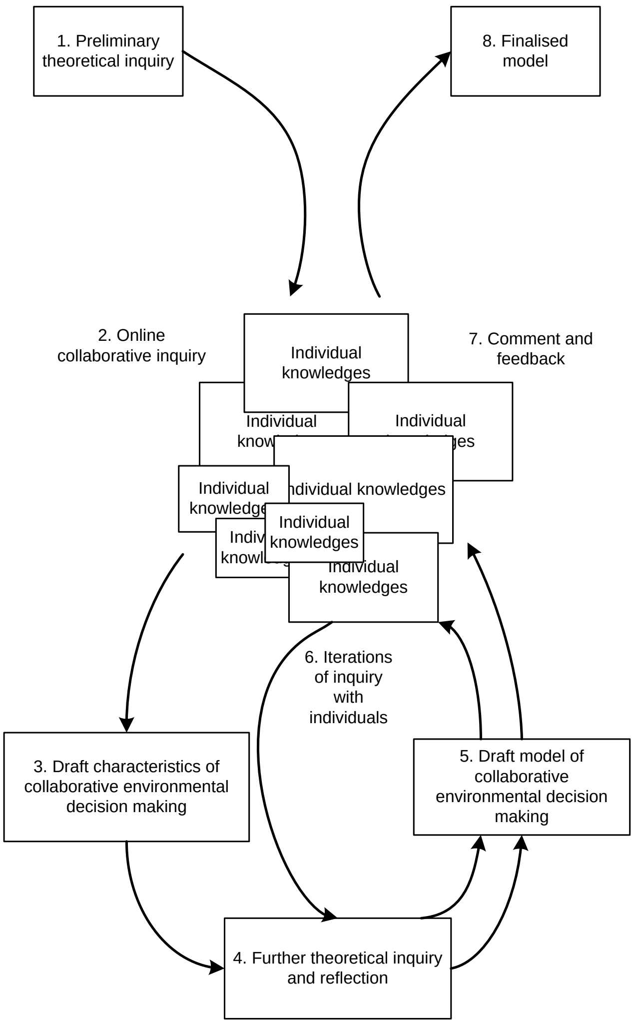

Figure 11. Cooperative Inquiry research method for the development of cooperative model of environmental decision making

4.2.2.1 Preliminary theoretical inquiry

Initial research consisted of preliminary literature investigations into collaborative decision making theory and experiential learning. While a few research methods suggest that minimal theoretical investigation should be conducted prior to data collection (e.g. grounded theory (Glaser 1995)), the vast majority identify preliminary research as an essential first phase. To enable significant dilemmas to be explored, it is useful to have a general understanding of the issues and the broad arguments for and against each position. These have been documented in the literature review (Chapter 3).

For holistic understanding of a complex social issue, purely theoretical inquiry is insufficient, theoretical inquiry must be supplemented with experiential learning (Reason and Rowan 1981; Checkland and Holwell 1998; Heron and Reason 2008). Thus, during this phase of research, the author undertook extensive facilitation training and facilitation practice in an academic context.

4.3 Online collaborative inquiry

Following literature investigation and experiential learning an online inquiry with experienced facilitators into how collaborative processes can be generated and sustained during environmental problem solving was conducted (Figure 11-[2]).

4.3.1 Collaborative inquiry implementation

4.3.1.1 Participant Selection

An invitation was sent to all members of the Zenergy online facilitation network. The Zenergy network was chosen because it consisted of experienced facilitators from around the world and thus potentially enabled the discovery of generalisable facets of Community participation. The network emphasised collaboration and was mature in the sense that it had developed a core purpose and culture. Figure 12 shows the purpose and culture of the network.

Ten people agreed to participate in the research from England, Switzerland, Qatar, Australia and New Zealand. All were experienced facilitators, a brief profile of the participants is provided in Appendix 1. Participants were provided a written introduction to the research and an introductory video (http://www.youtube.com/watch?v=eaERSkihLvQ). Consent forms were then dispatched and any questions were responded to.

Figure 12. Culture and purpose of online facilitation network

4.3.2 Design

The inquiry was co-ordinated online using a number of different tools. Ning groupware was used to structure and organise discussions. Googledocs was employed for general recording purposes since it allowed all participants to collaborate in real time. Cisco Webex and Skype were used for visual and oral communication, including interactive whiteboard technology (Armstrong et al. 2005).

The inquiry consisted to three distinct activities, intended to focus attention on the process of attaining satisfactory resolution of environmental problems. The overarching question for the initial phase of inquiry was:

> *How can collaboration in environmental problem solving be generated and sustained?*

Inquiries focused on thoughts, feelings and actions that were required in order to reach a successful endpoint. Inquiries included personal reflection and identification of an environmental issue, then group discussion regarding how Community participants could be effectively engaged to help resolve it and how this engagement could be generated and sustained.

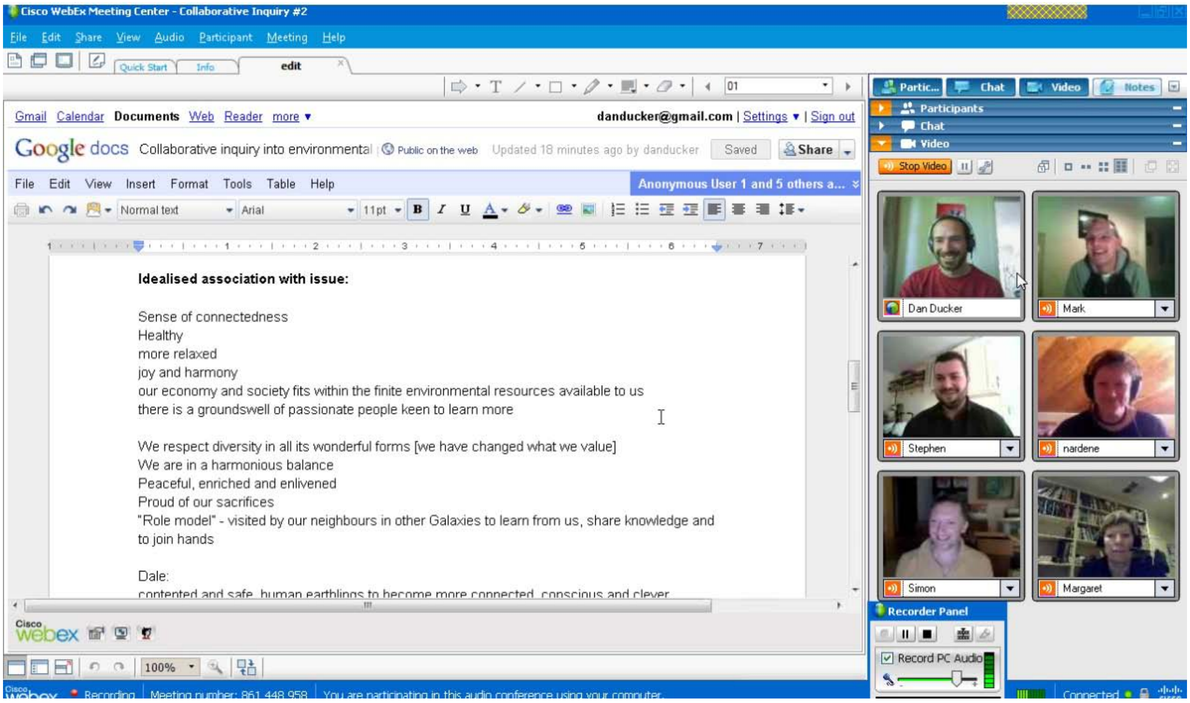

Figure 13. Screenshot of online cooperative inquiry method

4.3.2.1 Collaborative inquiry activities

The inquiry consisted of three distinct activities, intended to focus attention on personal aspects of resolving environmental issues and how collaboration may be generated and sustained.

Activity 1: Reflections on an environmental issue

On a personal weblog, participants were invited to share with the group an environmental issue they felt passionate about. Participants were encouraged to:

- Describe the issue (and perhaps post a photograph);
- Describe their feelings associated with the issue;
- Describe what they sensed associated with the issue.

Then, participants were encouraged to fast forward their mind and imagine the best possible endpoint. Following this, they were invited to share:

- How they might feel at the best possible endpoint;

- What they were doing;
- What they sensed.

After posting on their own weblog, participants were encouraged to explore other participants' weblogs, consider similarities and differences and provide comments.

Activity 2: Peer conversations - Exploring how we got there (in pairs, Skype)

The second activity consisted of exploring the necessary requirements for genuine collaboration. Participants were invited to have a paired conversation on Skype to specifically discuss personal endpoints then to explore how to get there. In this exploration the following questions were posed:

- What do you need to feel to get there?
- What do you need to sense?
- What do you need to do?
- What needs to happen?

Participants were also encouraged to reflect on:

- Would everything you have identified keep you engaged (interested and involved)?
- What challenges do you foresee?

Activity 3: Group exercise "Tying the threads, exploring the repercussions"

The final activity consisted of a series of workshops intended to bring together the most important findings from paired inquiry. Using Webex, two 1 hour workshops were conducted. The express aim of these workshops was to understand the requirements for genuine collaboration. Interactive whiteboard technology (Armstrong, Barnes et al. 2005) from Webex, and Googledocs collaboration software was used to record ideas, conversations, and discussions.

4.4 Results from the collaborative inquiry

Ideological differences were patently apparent in discussions. As may be anticipated, most participants were strongly aligned to an Arcadian mode of thinking (Miller 1999, pp13-17). Participants strongly contrasted their views on an idealised state of the world with the status quo, and inferred that major changes were necessary to prevent environmental catastrophe. Participants identified problems of the dominant Imperial paradigm, the "self centred culture and primacy of the individual".

Participants suggested that only through adopting and aligning on a more "collaborative culture" could we hope to generate a more collaborative form of environmental problem solving. In relation to this development however, participants were divided. Some were optimistic that repetition of ideas would be sufficient to bring about change in the "resistance" of the powerful. Others were fairly pessimistic, aligning with Noam Chomsky's concept of not speaking truth to power, but to "those who want to bring about change" (Chomsky 1996). Emphasis was future oriented, placed on the "leaders of tomorrow".

All participants emphasised learning in the development of specific ideologies, suggesting that education for collaboration begins with the very young. Participants stressed targeted education for collaboration, consciousness raising, looking at problems in a systemic manner. One participant envisaged "children nagging their parents" to exhibit more collaborative behaviour.

Empathic concern was highly valued for generating collaboration. Participants talked about "falling in love with the planet", and caring about all the citizens of the planet. Territorial boundaries were thought to inhibit this empathy, and a more globalised citizenship was called for.

Being a group of facilitators fairly new to the tools available on the web, extensive discussion focused on how new tools could improve or inhibit collaboration. Most participants were enthusiastic surrounding the capacity of new tools, for example suggesting that we had become a "small world brought together by the internet". Others were less optimistic, claiming that internet technologies "fall short of the intimacy which may be generated through face-to-face interaction".

Participants emphasised personal attributes which fostered generation of collaboration. Especially emphasised were "empathy", "mindfulness", "consciousness" or "living in the moment" and a strong commitment to life-long learning. These factors, coupled with a "commitment and willingness to act" or personal empowerment, served to facilitate the open and authentic portrayal of ideas which could then be used to understand problems better and formulate solutions.

Participants emphasised systemic factors as a barrier to collaboration. Inequity in terms of time availability or resources was claimed to skew which arguments became prominent. A related factor involved the systematic selection of "bad news stories" over stories which spread information about “good” initiatives. The corporate media was seen to be a major impediment to more collaborative behaviour, instead spreading a “culture of individualism” which reinforced non-collaborative behaviours.

Participants spoke of personal responsibility in the collaborative environmental problem solving endeavour. One participant suggested we have “no right to complain until we have done everything we can to improve the situation”. Another emphasised that collaboration “starts with us”, and that as facilitators, all should “walk the talk”.

Participants stressed that bringing about a global change to a more collaborative way of thinking and acting was not a short term ideal. One participant suggested thinking not in terms of generations, but “thousands of years”.

Relating to specific environmental problems, participants highlighted a number of barriers to successful collaboration. One participant noted the time trade-offs in participating: “For me, then, to stay engaged, the activity must compete favourably over another choice. And therefore, if the activity isn’t competing favourably, I may disengage.”

Systems and processes were also noted as being fundamental to efforts at collaboration and participation. Discussing recycling initiatives and community gardens in Switzerland, a participant suggested “inculcation and systemising something has benefits, and I think it works BECAUSE it is kept local and community spirited - not centralised and depersonalised”

Overwhelmingly among the participants, the endpoint of resolution was one of joy; a feeling of happiness that the effort required to manifest change had paid off and that the world was a slightly better place.

4.4.1 Outcomes

Figure 14 provides a graphical representation of the main outcome from the collaborative inquiry developed at the end of the collaborative process. Trees and connectedness with nature proved to be a prominent feature of discussions; hence the central figure of the tree was used. The trunk features alignment, an element closely associated with trust in people and trust in the process. The leaves represent different characteristics considered necessary for problem solving: personal integrity, holistic thinking, learning from others, personal empowerment, and long-term thinking. An underlying culture was thought to be a necessary first step toward generating collaborative practices, hence the depiction of the earth. Consciousness and self-awareness provided the light enabling the generation of ideas and their authentic portrayal. Clouds represent the necessary facilitative processes and systems, essential for the growth of collaborative practices.

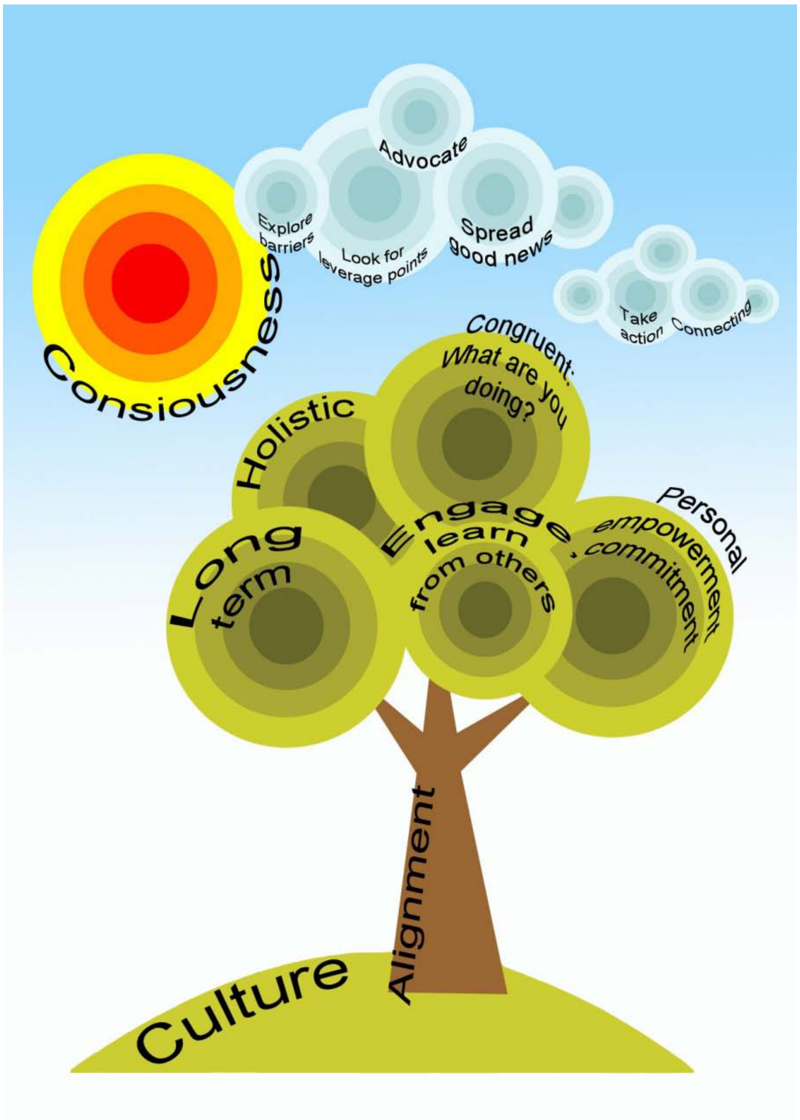

Figure 14. Outcome of the collaborative inquiry, graphical representation of strategies for generating collaboration

While participants were all highly regarded, well established facilitators, the choice of participants has methodological implications. Most importantly, coming from a broad culture of facilitation, most participants appeared to align strongly with the Arcadian paradigm (see pg 79). It is likely that alternative perspectives, especially those strongly sympathetic to the Imperial ideology would have benefitted the process. Instead, reliance was placed on participants being the "devil's advocate" to ensure counter-perspectives were adequately portrayed. Nevertheless, participants did appear to be acutely aware of the barriers to collaboration, as a result of their extensive experience.

4.5 Conclusion

A collaborative inquiry into how collaborative practices could be generated was conducted, providing insight into the most important aspects of effective participation process from the perspective of practitioners. Four individual attributes were highlighted as critical to facilitating collaborative practices:

- Empathy toward oneself, other people and toward all life on the planet
- Conscious, self-aware behaviour
- Trust (in the form of alignment with others and with the process)
- Empowerment (the power to act)

These characteristics appear to align fairly well with the insights generated from the literature (Chapter 3), with the addition being that practicing facilitators appear to recognise the value of self-awareness in assisting with problem solving. While these characteristics are helpful to know, to be useful it is necessary to understand how they interact with one another and how they may be generated.

5 | Individual Participation

A Review of Psychosocial Characteristics

There are many things that we would throw away if we were not afraid that others might pick them up

- Oscar Wilde

5.1 Introduction

The purpose of this chapter is to understand the central characteristics of effective participation between communities and project managers during contaminated site clean-up. The previous chapters suggest a central importance of the characteristics interest, trust, self-awareness and empowerment in the generation of effective participation. This chapter expands on these psychosocial aspects of participation.

5.2 Psychosocial characteristics which affect participation

5.2.1 Ideologies/Kaupapa

Mental models colour the way we perceive, think and act in the world. Our brains are hard wired for learning and over time, we grow to form particular perspectives, or ideologies which help us to make sense of, and function in the world (Miller 1999). Ideologies form the basis for differences of opinion in environment matters and can be so ingrained that they elicit automatic and habitual responses. A range of factors is thought to influence ideological development, significant influences include intrinsic genetics, hormone levels, gender, upbringing, access to education, affluence etc. Many of these factors are of course inter-related, and there is strong evidence for interdependencies between intrinsic (biological) mechanisms, and extrinsic (social) influences (Miller 1999).

In a world with considerable genetic and cultural diversity, a wide variety of environmental ideologies may be anticipated. However, a broad body of diverse literature suggests there are chiefly two disparate orientations which conflict during environmental problem solving. Although called by various names, for example competitive/cooperative (e.g. Hunter, Thorpe et al. 2007), dominant/indigenous (e.g. Mander 1991; Mander and Tauli-Corpuz 2006), reductionist/holistic (e.g. Peet 2006), contemporary/alternative (e.g. Harding 1998; Harding et al. 2009), these two orientations provide a useful entry point into understanding why environmental decision making is so challenging, and often intractable. Following Worster (1993) and Miller (1999), these are subsequently referred to as Imperial and Arcadian ideologies. While there are subtle differences in the ways that these two ideologies have been described by the various authors cited above, there remains considerable convergence. The following two sub-sections draw heavily on Miller (1999, pp. 13-17).

5.2.1.1 Imperial ideology

The Imperial ideology views life as an individual struggle for existence. The overwhelming emphasis of the Imperial ideology is individualism, thus, competition is inevitable and natural. For Imperialists, human beings are chiefly self-interested creatures competing for power. In the words of Friedrich Nietzsche "not necessity, not desire - no, the love of power is the demon of men. Let them have everything - health, food, a place to live, entertainment - they are and remain unhappy and low-spirited: for the demon waits and waits and will be satisfied" (Nietzsche 2011). This primal competitive drive can generate predispositions of aggression; however, Imperialists also contend that self-interest drives humans to be ingenious, creative and innovative.

Aligned with perceptions regarding human nature, the Imperial ideology values demonstrations of power over other humans and nature. As such, competitive excellence is revered - the strong able-bodied youth, the intelligent, and the beautiful are all held in high esteem. Those able to out-compete their opponents through demonstrations of strength, beauty or wit deserve a special status in society. Applied to areas such as boxing matches, beauty contests and intelligence tests, such ideologies appear relatively benign. However, in extreme cases reverence toward power and control can generate regimes of brutality and violence (Miller 1999, p13).

Power over others is accompanied necessarily by emotional detachment. Detachment facilitates unbridled pursuit of self-interest devoid of feelings of guilt or empathy for the less fortunate. Potential feelings of unease which accompany inevitable social inequities are further repressed through social segregation and media suppression (on a free market, news which challenges dominant orthodoxy is unpopular and therefore not newsworthy). While some compassion may be evident, staunch individualism contends that people are responsible for their own wellbeing, meaning that they ought to fend for themselves.

Detachment is further facilitated by the staunch belief amongst Imperialists that emotions can and should be repressed (Miller 1999, p. 13). In this way, Imperialists, like the Stoics before them, believe that unpolluted truth may be attained. For example, the belief that emotional and personal biases may be excluded from scientific analysis to establish "objective" judgements remains common amongst scientists and scientific pedagogy, leading to the assertion that 'facts' should be separated from 'values' and 'thinking' from 'feeling' (Miller 1999, p. 13). In keeping with notions of power and detachment, dominance of nature is viewed as a sign of intelligence, of an ability to control nature's emotional outbursts. Thus, the Imperial ideology suggests that objective, detached thinking for mastery and control are the best strategies for resolving environmental problems.

Ideological considerations extend to preferences for social organisation. Adherence to individualism encourages structures which facilitate individual freedom and the pursuit of self-interest. The striving of individuals in education sees appropriate employment niches filled on the open market. Differences in inherent talent and personal effort naturally differentiate society into high achievers and low achievers, thus social stratification is viewed as completely natural. Furthermore, stratification ensures that those considered most appropriate to lead (the competitive high achievers) are those who reach principal decision making roles. State intervention in personal affairs, beyond a minimum level to ensure personal freedom is accommodated and talent rewarded, is generally admonished (e.g. IP laws). Power and achievement is principally considered an ability to control and expand economic resources, thus the overarching rationale is that the best societies are the most efficient at converting goods and services into capital (King and Howard 2008; Ritzer 2011). Efficient conversion requires high economies of scale and directed effort, hence centralised facilities are considered most appropriate to compete in a global market. Efficient management of organisations requires a powerful leadership style which is authoritative, swift and decisive. Respect for leadership is expected by rite, since leaders have worked hard to obtain their positions – positions anyone can obtain as long as they persevere and compete strongly enough. The ideology of power, talent and beauty is perpetuated by free market media and extreme parochialism to disregard other ways of looking, thinking, feeling and acting as out of step with the times and out of touch with reality. The status quo, being built on fundamentally robust assumptions about human nature and organisation, deserves protection. Challenges from outside (terrorists) or inside (deviants) the system demand intervention which may be exercised ruthlessly by the state.

Imperialists view nature as something to be feared and exploited. In keeping with a version of Darwinian philosophy, nature is considered hostile and competitive – "survival of the fittest". This aligns to the very essence of individualism, that an individual's purpose is principally to improve opportunities for having offspring and furthering one's own interests. Nature is a potential death-trap, and all opportunities for self protection and protection of kin should be implemented (from weatherproof houses to antibacterial soap). Substantial increases in life expectancy due to protective measures (medical advances) have only furthered this. Many now believe that the quest for immortality is near – that scientific discoveries will soon enable humans to live forever.

While nature is dangerous, it is also the source of wealth and opportunity. Slices of nature (known as territories by ecologists) may be divided, owned and exploited in whatever manner deemed fit by the individual. Nature is thus a resource, and valued because of the potential benefits which may be derived from it.

The act of controlling, exploiting, and manipulating nature gives rise to what Dunlap refers to as an "exemptionalist" attitude (Williams 2007; Dunlap 2008). In other words, through superior intellect, humans are above the laws of nature. Economists such as Julian Simon typify the exemptionalist mindset, which views technological advancement as panacea for resource scarcity (Simon 1981). As absolute resources decline, price rises stimulate opportunities for further exploration and discovery, more efficient use through improvements in technology, and substitution to other suitable resources.

Thus, the Imperial ideology merges core values of individual self-interest, intrinsic talent and creativity, domination and utilitarianism with strategic or detached reasoning. The culmination of these factors is a hierarchical society focused on economic growth and personal advancement (Miller 1999, p. 15)

Christopher Marlowe (Marlowe 1592 [1994]; Act II, Scene VII) captures the essence of the Imperialist ideology:

Nature that framed us of four elements,
Warring within our breasts for regiment,
Doth teach us all to have aspiring minds,
Our souls, whose faculties can comprehend,
The wondrous architecture of the world,
And measure every wandering planet's course,
Still climbing after knowledge infinite,
And always moving as the restless spheres,
Wills us to wear ourselves and never rest,
Until we reach the ripest fruit of all,
The perfect bliss and sole felicity,
The sweet fruition of an earthly crown.

5.2.1.2 Arcadian ideology

While the Imperial ideology related above is relatively widely agreed and adopted, the opposite pole presents quite diverse and divergent viewpoints. Therefore the following section should be read with some caution. Nevertheless, the author has attempted to summarise the principal points in distinct contrast to the Imperial perspective.

Compared to Imperial ideology, the primary claim of Arcadians is that humans are social animals. Rather than purely individualistic traits, Arcadians focus on pro-social parts of human nature. More specifically, Arcadians suggest humans are cooperative creatures capable of behaving non-aggressively. Furthermore, Arcadians suggest that humans are innately empathic and compassionate. Thus, at the core of the Arcadian paradigm is a belief that human nature extends beyond narrow views of self interest.

For Arcadians, cooperation extends beyond the human realm into the natural world. Arcadians view nature as benign and that human tendency is to live in harmony with it. However, nature is also viewed as fragile, and that tipping points exist which when overstepped, producing irreversible transformations (Barnosky et al. 2012). Human exploitation is generally considered deleterious to appropriate ecosystem functioning, hence humans should "tread lightly on the earth". Technical virtuosity does not exempt us from the laws of nature, meaning that growth cannot go on forever.

Much of Arcadian ideology is placed in direct contrast to the Imperial paradigm. In fact, Arcadians believe that the dominant forces of elite Imperialism inhibit the exhibition of natural empathic tendencies (Milbrath 1996). Thus, Arcadians advocate deconstruction of the Imperial paradigm, and the erection of new systems for humans to flourish.

Arcadians believe that societies are naturally egalitarian (Miller 1999, p. 13). Envisioned political systems involve a decentralisation of political power, with restrictions on the ambitions of those who wish to attain and retain individual power. The idealised method of political decision making is based on direct democracy, that everyone has an opportunity to be involved in every political issue. In this way, adherents claim a reinvigoration of political decision making, closely aligned to the needs of local people.

Coinciding with the decentralisation of state power, Arcadians envisage a change in living arrangements. Social structure is organised around small, self sufficient communities with citizens enjoying lives of voluntary simplicity (Miller 1999). Instead of materialistic pursuit, claimed to be at the root of alienation with nature, Arcadians suggest an emphasis on non-material (spiritual) self-development.

In summary, Arcadians emphasise strong communities, in harmony with nature. They believe that humans are much more capable of empathy than at present and that current systems disempower individuals. Instead, they advocate a partnership society in which communalism is favoured over individualism.

Table 12. Comparison of Imperial and Arcadian orientations (compiled from Cotgrove 1982; Mander 1991; Pepper 1996; Harding 1998; Miller 1999; Harding, Hendriks et al. 2009)

Arcadian	**Imperial**
Human Nature	
Humans can be altruistic	Humans are wholly self interested
Humans are naturally cooperative	Humans are naturally aggressive and competitive
We are capable of widespread concern	We are capable of only limited caring
Caution should be exercised	Risks should be taken to attain rewards
We should take care of each other	Individuals should look after themselves
Reasoning Style	
Constructivist ontology	Realist ontology
Subjectivist epistemology	Objectivist epistemology
Emotion and intuition are at least as important as any other knowledge	Rational and objective thought is more important than intuition and emotion
Fact and reasoning cannot, and should not be separated from value and feeling	Fact and reasoning can and should be separated from value and feeling
Nature of Society	
Social hierarchies are naturally egalitarian	Human societies are naturally hierarchical
We should all be involved in decision making	Decisions should be made by experts: Politicians advised by

	scientists
The way forward is through direct democracy	The way forward is through representative (parliamentary) democracy
Spiritual quality of life and loving relationships are of utmost importance	Material acquisition underlies social progress
Spirituality integrated within all aspects of life	Separation of spirituality and life, church and state
Indiscriminate economic growth is bad and should not continue	Economic growth is desirable and can go on forever without harming the environment
Trade should be reduced to foster local self-sufficiency	Trade should be increased to further economic development
Small scale production locally controlled is more desirable	Large scale production and central control are desirable
There needs to be fundamental socio-political change	Current socio-political arrangements are acceptable
The best societies are resilient	The best societies are efficient
Public ownership is valued	Private ownership is valued
Justice based on natural law	Justice based on adversarial process
Justice enacted by esteemed peers	Justice enacted by 'impartial' judges
Past, present and future acknowledged	Future focused
Long-term goals	Short-term goals
Reverence toward aged	Reverence toward youth
Nature	
Nature is benign	Nature is hostile and neutral
Complex and chaotic	Mechanistic
Earth's resources are limited	The natural world contains ample reserves
Ecosystems are delicately balanced	Ecosystems are resilient
Humans are part of nature	Humans are separate from nature
We must respect and protect nature, nature has intrinsic value	Nature should be exploited for human material benefit
Environmental problems can only be solved by holistic approaches.	Environmental problems can be solved by analytic/scientific reasoning and technology

5.2.1.3 Ideological differences

During environmental problem solving, it is common for conflict to emerge between the two rationalities. Can such ideological conflict be amicably resolved? At first sight, the two paradigms appear to have little in common. However, many authors suggest that the rationalities represent polar opposite views and contend that in reality a wide variety of intermediate perspectives are possible, indeed normal (Harding 2006). While representation along a continuum seems to offer greater opportunities for amicable resolution of conflict between perspectives and appears to more accurately represent reality (Figure 15), it also generates major conceptual difficulties. First, linear representation leads to typical conceptualisation of environmental issues as tradeoffs between economic and environmental ideals. While such tradeoffs have been widely demonstrated as ill-justified and ill-informed, the myth persists and provides a playing field for political football between the green (far left) and conservatives (far right). Secondly, it suggests that moderate views present the greatest opportunities for social harmony. An idealised society contains individuals with a moderate amount of self-interest, creativity, altruism and environmental concern. Such a representation obviously dissatisfies advocates of both the left and right and seems to represent an intractable dilemma. When dilemmas dominate, it is necessary to reframe problems (Laws and Rein 2003; Innes and Booher 2004).

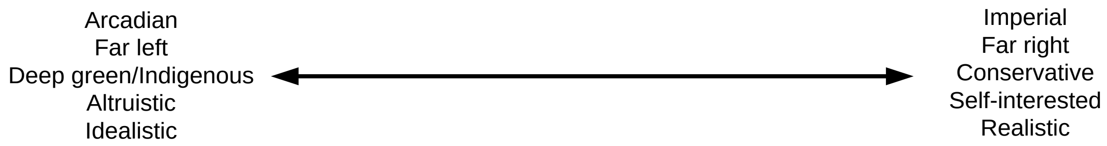

Figure 15. Traditional linear perception of environmental problem solving perspectives

5.2.2 Perception/ Mōhiotanga

In addition to core ideologies, perception, memory and cognition affect both Community and manager participation. An enormous amount of research attention has been directed toward the understanding of various 'errors' of perception. The following paragraphs provide an account of the most widely researched perceptual difficulties.

Confirmation bias is the tendency for people to selectively favour information that verifies their previous beliefs. In environmental problem solving, this bias is demonstrated extensively. For example Whitmarsh (2011) found that people sceptical about climate change favoured information sources which validated their attitudes, which in turn affected their tendency to engage or disengage in debates. Such biases are typical of false positives or "type 1" error (Miller 1993a).

An associated perceptual error is the illusion that two phenomena are related when in fact they are not. A common example of this is when two rare occurrences are correlated with one another. For instance, the common misconception that minority groups are more prone to violent behaviour may be attributed to an illusory correlation between statistically small groups and rare behaviours. Illusory correlations are characteristic of stereotypical behaviour and indicate false negatives or "type 2" error (Miller 1993a).

A final cognitive consideration relates to the observation that environmental problems may be perceived, or "framed" in numerous, and sometimes quite contrasting ways. For example, a contaminated site problem may be framed as a historical failure of the regulatory regime, an opportunity, a health threat, or an expense. The way that a problem is framed can have significant implications for the type of information that is sought and the possibilities for stakeholder participation (Leschine, Lind et al. 2003). Framing effects generate "type 3" errors, or efforts to solve the "wrong problem" (Dunn 2001).

Ideally stakeholder participation serves to correct these errors of perception, or at least to clarify the different perspectives on any given problem. While cognition is fundamental to stakeholder participation it is only meaningfully included in the deliberative model, cognition is assumed to be perfect in the information model, and is not included at all in the power model.

5.2.3 Memory/Mahara

The way that information is stored and recalled from memory has considerable consequences for environmental problem solving. A range of factors affect storage and retrieval from memory including proximity of events, the degree of affect, whether events are one-off or repetitive. Events which are recent, repeated, and contain strong emotional cues tend to be more "available", hence remembered more readily (Tversky and Kahneman 1973; Sunstein 2006). While these heuristics contribute to perceptual filters, they may also augment the biases illustrated in the previous section.

Psychologists often distinguish between two different kinds of memory: episodic and semantic (Miller 1999, p31). Episodic memory pertains to the relatively direct storage of events, a "sort of verbatim repository for events that fill our daily lives" (Miller 1999, p31). In contrast, semantic memory entails the conversion of details into conceptual abstractions, which may be applied for fast and efficient retrieval.

We all exhibit both types of memory, however when considering environmental issues, people differ in their reliance on semantic and episodic memory. The difference is most palpable when considering the way that experts and non-experts relate to environmental risks. As Miller (1999, p31) explains, "Scientifically and technically trained professionals have been educated to make more use of their semantic memory, whereas lay people are more inclined to rely on the more holistic, but less abstract, episodic memory about the matter at hand." The difference in memory processing can help to differences in the way risks are perceived – for scientists, risks equate to a specific category of hazard; however, for non-experts they are likely to be strongly inter-related with emotions and feelings.

A further consideration in multi-participant problem solving relates to memories which may inhibit effective interaction. For example, participants may be triggered to emotional states by aspects of discussion (e.g. if a person has suffered but overcome cancer, they may be especially sensitive to discussion regarding carcinogenicity), carry past grievances with one another, or have a fixed idea regarding what an 'ideal' solution should look like. Hunter (2003) refers to this as the "shadow" element, which must be overcome or confronted before collaborative processes can emerge.

5.2.4 Reasoning/Whakaaroaro

Reason is the way in which we make sense of the world. It relies on the ability to identify and link concepts and has traditionally been assigned to higher level cognitive processes. Evans et al. (1993) suggests *reasoning* lies at the foundations of decision making. There are chiefly three modes of reasoning – deductive, inductive and abductive (Peirce 1992). Most textbooks define deduction as pattern matching "from the general to the particular", in this way it is possible to deduce essential elements which make up the whole; induction is generally characterised as pattern matching "from the particular to the general" (Johnson-Laird 2006). Inductive and deductive reasoning are exemplified in Mendeleev's construction of the periodic table (inductive reasoning) and identification of missing elements (deductive reasoning).

Abductive reasoning involves the cross fertilisation and recombination of seemingly disparate cognitive nets. Abductive reasoning is used in the literature for a variety of reasoning processes, in Peirce's original sense abduction is a kind of guesswork or intuition (Peirce 1992). The sense used here involves the transfer of patterns from one part of the cognitive network to another, thereby providing new sources of inspiration which may be queried using deductive methods. Abductive pattern matching is often a source of hypothesis formation. For example:

1) Some round, white, pockmarked objects are made of cheese;

2) The moon is round, white and pockmarked;

Therefore

3) The moon may be made of cheese.

Abductive pattern matching is probably the most creative of the human pattern matching processes since it largely involves the synthesis of abstract concepts. Abductive pattern matching relates to neuroplasticity, and may involve cognitive remapping (Baudry et al. 1993). Different degrees of neuroplasticity are evident as a result of intrinsic genetics (e.g. synaesthesia (Jamie and Ward 2008)), age, stress levels (Lutz et al. 2004) and a variety of other factors. Abductive pattern matching is the basis of poetry and humour, and the formation of analogies from known concepts. In environmental problem solving, diversity enables the identification of novel options through abductive reasoning, and is an antidote to group-think (Aliseda 2006; Fernandez 2007). However, as the above example aptly illustrates, it is also the least reliable of the three methods of reasoning.

During environmental problem solving, individual reasoning is tested and expanded on in a fabric of participatory relations. Individual participants may have specialist local knowledge or technical knowledge which contributes to problem understanding (Linstone 1981; 1984; 1999). From this perspective broad participation is useful for contributions to methodological or practical questions which arise during the inquiry.

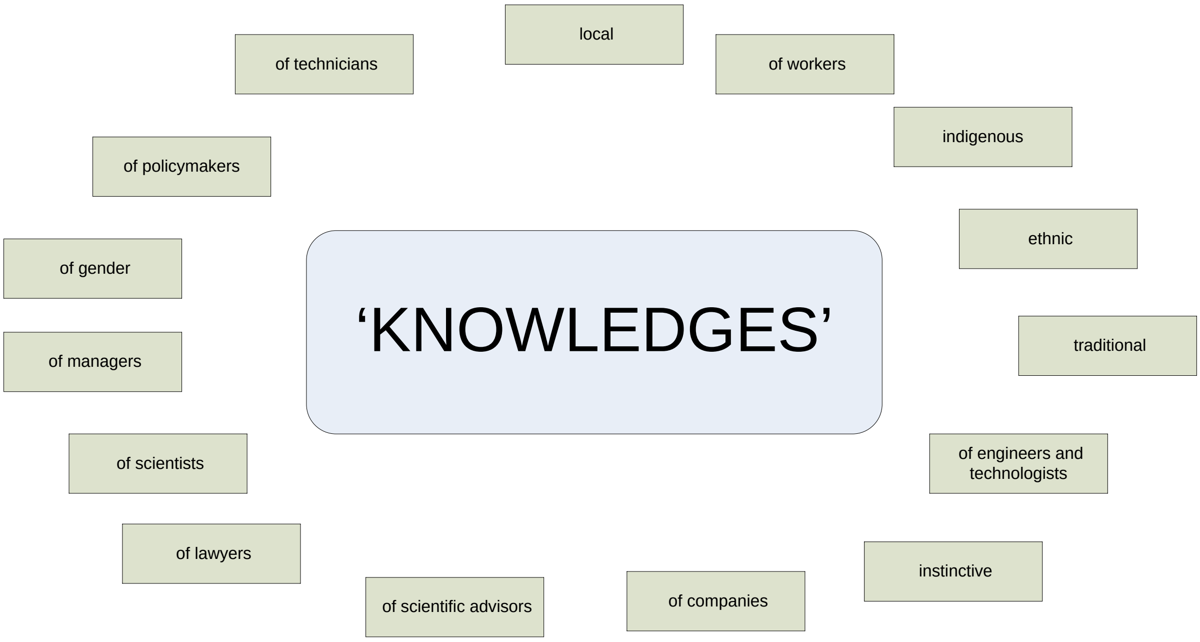

Figure 16. Different types of knowledge (Linstone 1999)

While multiple perspectives are near ubiquitously regarded as useful, integration of knowledge during the problem resolution phase is less clear. The need for integration is inherently complex and arguably the most challenging aspect of complex problem solving. Theorists of transdisciplinary inquiry discuss different dimensions of integration. Among these dimensions include epistemological integration between different disciplines, integration of empirical, experiential and intuitive types of knowledge, integration of qualitative and quantitative knowledge, integration of theoretical and practical knowledge, and integration of different levels of reality (Nicolescu 2002; Scholz and Tietje 2002; Bergmann et al. 2005; Max-Neef 2005; Wickson et al. 2006; Zierhofer and Burger 2007; Pohl and Hadorn 2008). Miller and Mansilla (2004) outline four modes of increasing integration of bodies of knowledge in groups:Mutual ignorance of other perspectives;

2) Stereotyping that may have significant misconceptions about the other's approach;

3) Perspective-taking where individuals can play the role of, sympathise with, and anticipate the other's way of thinking;
4) Merging of perspectives has been mutually revised to create a new hybrid way of thinking.

Després, Brais, and Avellan (2004) contend that scientific knowledge is incomplete for the resolution of wicked environmental problems; instrumental, aesthetic and ethical knowledge is also required (Figure 17). Critically, rational knowledge, they conclude, emerges not solely from "what we know" but also relates to "how we communicate it". Complex problem solving therefore entails a fifth emergent type of knowledge which synthesises and extends individual knowledge acts. Ramadier (2004) contends that the concept of and the effort put into integration does not imply a unity of knowledge. Rather than the futile effort of trying to establish a unity of knowledge, integration should be aimed for by looking for similar patterns and coherence across different participants and by articulating and communicating these convergences (Wickson, Carew et al. 2006).

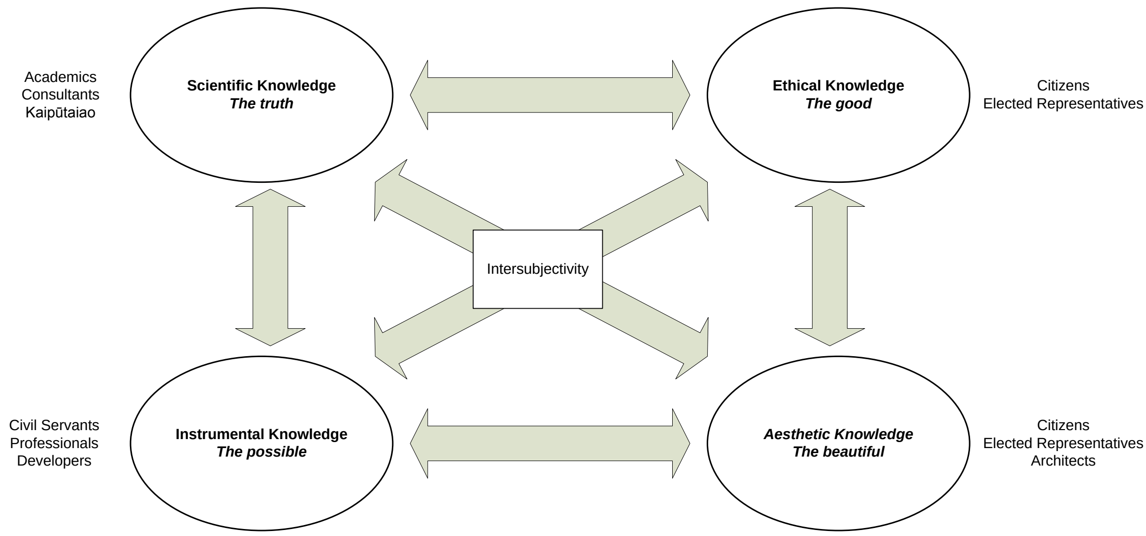

Figure 17. Intersubjectivity in transdisciplinary inquiry (Després, Brais et al. 2004)

For effective emergence of this fifth type of knowledge, Després, Brais, and Avellan (2004) caution that simply combining knowledge sources is insufficient. Communication across diverse perspectives and knowledges is challenging, but lies at the core of effective transdisciplinary inquiry. As Klein (2004) notes, "there is no transdisciplinary Esperanto". A number of authors have noted links between transdisciplinary inquiry and Habermas' theory of communicative action (Habermas 1984; Klein 1996; Després, Brais et al. 2004). Communicative rationality requires that measures are introduced to avoid dominance by any single discourse, in what Hollaender et al. (2008) describe as a “controlled confrontation” of epistemologies. To achieve this, active facilitation is usually necessary (Reed 2008).

5.3 Emotion and feeling/Whatumanawa

Emotions underlie much of our behaviour, environmental or otherwise. A wide variety of literature increasingly supports the view of recognising and embracing emotion as both an important component of learning and a potent decision making tool (Baumeister et al. 2007; Harvey 2009; Quartz 2009). While cognition has historically been separated from affective behaviours, increasingly, the literature has emphasised emotion as a core component of adaptive decision making (Schwarz 2002; Slovic et al. 2004; Berthoz 2006). In the past 10 years there has been a substantial shift in orientation in the behavioural sciences, in what has become known as “the emotions revolution” (Weber and Johnson 2009). Emotions have been cited as an alternative “affective rationality”, used to guide decision making (Slovic et al. 2002).

The discourse on emotion within the Western canon provides some interesting insight into the current understanding of emotions in environmental management. Beginning with Socrates (as presented by Plato), the dominance of *pathos* (“emotion”, “feeling”) over *logos* (reason) suggested a sign of immaturity (Aristotle 2003; Plato 2003). Socrates used the metaphor of master and slave, with the “wisdom of reason firmly in control and the dangerous impulses of emotion safely suppressed” (Solomon 1993, p3). Later, famously the Stoics inquired deeply into emotion, and came to nuanced position that some emotions were helpful (*eupatheiai* – e.g. awe and reverence, certain kinds of joy, love, and wishing*)* while others such as the common emotions of fear and anger (the passions - *pathos*) were inappropriate (Graver 2008, p5). These nuances were later lost from Western discourse, which came to regard Stoicism as “an absence of emotion” and regaled the benefits of emotional suppression (Graver 2008, p1). The height of doubt in the validity of emotions emerged during the period of 17th-century continental rationalism from Descartes’ famous dictum *Cogito ergo sum – I **think** therefore I am*.

Continental rationalism and the subsequent “enlightenment” further distanced emotion from any contribution to rational thought and action (although there were many exceptions, e.g. Spinoza, Swedenborg, Goethe, Nietzsche) and became the *de facto* management position. Such thinking remained pervasive throughout the 20th century as rational decision models, hard systems thinking and operational research arose in prominence. While as described in the first paragraph of this section, acceptance of the role of emotions has undergone somewhat of a renaissance, there nevertheless remains considerable doubt when effectively managing environmental problems (Kennedy and Vining 2007; Nieto et al. 2009).

The position taken in this thesis is aligned to that within contemporary facilitation and psychological discourse - that emotions are helpful (with some caveats). Emotions serve four distinct functions in environmental problem solving (Peters et al. 2006; Weber and Johnson 2009). First, emotions act as a spotlight, targeting specific problem components for deeper analysis. For example, in the context of a contaminated site clean-up, Community participants may express fear regarding the potential threat to human and environmental health. Such fears serve to promote further action, or investigation of the problem in more detail. If information is not available or is not deemed satisfactory, further inquiries or other avenues may be pursued (e.g. moving out of the area) (Laurian 2004). As a spotlight, emotions can also be helpful for highlighting needs. For example, Rosenberg (2003) suggests that "every expression of anger is the tragic expression of an unmet need." Unpacking the emotion to get to the root cause of dissatisfaction can enable the identification of novel solutions.

Secondly, emotions act as a source of information; positive and negative past associations contribute to decisions (Schwarz 2002). Similar to functioning as a spotlight, emotions as a source of information provide potent cues to support or refute premises. If for example, an environmental manager has failed to meet agreed timelines for a project and disappointed or angered Community participants, this anger or resentment may re-emerge after new timelines have been proposed.

Thirdly, emotions act as a "common currency", establishing whether something is good or bad (Slovic, Finucane et al. 2004). Making decisions thereby entails a weighing of the strength of positive feeling versus the magnitude of negative feelings. Obviously this function of emotion also has significant cognitive components.

Finally, emotions act as motivator, promoting action. For example fear can instil the motivation to escape a perceived threat, anger may motivate action against a perceived oppressor (Weber and Johnson 2009). In the context of a contaminated site clean-up, emotions of fear may help drive initial investigations, anticipation of a cleaner, safer environment and joy may motivate remediation efforts.

Thus emotions can be helpful tools to assist with decision making during complex environmental problem solving. Effective Community participation therefore incorporates the expression of emotion, both from managers and Community participants (Harvey 2009). However, as Hunter et al. (2007) note, and the Stoics rigorously demonstrated, not all emotional expressions are necessarily relevant and wise. Nevertheless, being "mindful" of emotions can greatly assist with understanding what is evident (e.g. where there is enthusiasm, spirit and joy) and what is missing and needs to be addressed (e.g. where there is anger or disappointment) when resolving an environmental problem (Weber and Johnson 2009).

5.3.1 Trust/Whakawhirinaki

As noted in chapter 3, trust plays an important function in effective Community participation during environmental problem solving. Senecah (2004, p20) argues that trust is "the most commonly identified missing or present element in ineffective or effective processes". To better understand effective Community participation it is thus necessary to enquire into the concept of trust.

Trust has long been considered one of the most important characteristics of environmental problem solving, and indeed of more generalised problem solving - philosophers, economists and political theorists have asserted its importance over many centuries (Luhmann 1979; Giddens 1990; Das and Teng 1998; Laurian 2009). But trust is also one of the most conceptually difficult constructs; it is somewhat of an enigma, described as "the chicken soup of the social sciences. It brings us all sorts of good things—from a willingness to get involved in our communities to higher rates of economic growth … to making daily life more pleasant. Yet, like chicken soup, it appears to work somewhat mysteriously" (Uslaner 2002, p1). The purpose of this section is to clarify some of the 'conceptual potholes' of trust in relation to effective Community participation.

A great deal of the literature on trust has focused on interpersonal trust, the trust that manifests between individuals. However, the concept of trust has also been used to elucidate similar concepts in relation to "self-trust" (Govier 1997; Lehrer 1997; McLeod 2002; Goering 2009; Jones 2012), trust in institutions (Hardin 2002), trust in processes (Hunter, Thorpe et al. 2007). All of these facets of trust are important to the study of effective Community participation in contaminated site management, and are therefore elaborated on below.

5.3.1.1 Defining trust

Defining the concept of trust is important, since any definition of trust generates constraints to what can be established regarding the conditions of trust (Jones 1996). Unfortunately, the literature on trust exhibits no agreement on how trust is defined, revealing a wide number of definitions that vary over time and are often author specific. Nevertheless, there appears to be considerable acceptance of the definition of interpersonal trust proposed by Rousseau and colleagues that trust is "a psychological state comprising the intention to accept vulnerability based upon positive expectations of the intentions or behaviour of another" (Rousseau et al. 1998; Twyman et al. 2008). This definition has given way to the "consensus approach" to trust (Earle 2010), that trust consists of two distinct, but interrelated components, a component based on intention, motivation, interest or need (termed 'trust' proper) and a component based on ability (normally referred to as 'confidence').

In the context of a contaminated site clean-up, trust has frequently been correlated with desired individual character traits such as honesty and integrity in managers, values alignment in the identification of clean-up priorities, needs for information access, transparency, involvement and representation (USEPA 2001; IAEA 2002; NRC 2003). Confidence based trust corresponds with technical and operational capabilities in completing the clean-up, and thus involves perceptions of expertise, reputation and reliability. Hitherto in contaminated site management, emphasis has been placed on the latter attributes of trust, namely confidence (Strange 2009; Heath, Pollard et al. 2010).

However, empirical studies of trust raise questions as to whether an emphasis on confidence is warranted. A wide range of studies have established differences in the way that trust and confidence are judged. Trust has cognitive as well as strong affective aspects and is based in the present while confidence is primarily cognitively derived and based on past behaviour (Earle 2010). In an extensive range of research contexts, trust has been demonstrated to be more significant (more predictive, more heavily weighted) than confidence (Fiske et al. 2007; Earle 2010). It matters more to know intentions than to know capabilities. This suggests that in contrast to the historical emphasis placed on technically competent solutions during contaminated site management, for effective Community participation trust factors must also be considered (DEC 2006).

Further qualitative differences in trust have been established, with implications for Community participation. Govier (1997, p67) contends there are three distinct levels of trust:

innocent trust, implicit trust, and reflective trust. Innocent trust is based on unquestioned acceptance, the type that children and novices have in relation to what they have been told. Because innocent trust is characterised by a lack of search for disconfirming evidence it has also been characterised as ‘blind trust’ or ‘faith’ (Pidgeon et al. 2003; Walls et al. 2004; Hobson-West 2007). Implicit trust entails a more comprehensive judgement, which may be automatically granted if there is no reason to query information provided. While not formally established in the literature, it seems apparent that innocent trust and implicit trust are linked with the legitimising role of Community participation.

Reflective trust is the most deliberative of the three levels, attained through careful consideration of the situational context and the perceived likelihood that a trustee will competently meet a truster’s needs. Other authors refer to reflective trust as “critical trust” (Walls, Pidgeon et al. 2004; Petts 2008; Flynn et al. 2012). Reflective trust requires an element of “suspended doubt” - a partial belief in the merits of an individual accompanied with a degree of scepticism (McDonell 1997), and corresponds with collaborative participation in environmental decision making. While innocent and implicit trust have historically been desired by contaminated site managers (Lichten 1993), Petts (2008) suggests that reflective trust may be the best that can be achieved.

A further important distinction for effective Community participation during contaminated site clean-up is the relationship between trust and distrust. Some theorists contend that distrust and trust should be considered simply as different ends of a continuum (e.g. (Luhmann 1979; Omodei and McLennan 2000). Indeed, this appears to be the most common conceptualisation in the literature (Cvetkovich and Löfstedt 1999). However, empirical evidence of the existence of ‘critical trust’ - a state in which both trust and distrust are apparent, seems to validate the notion that they are two distinct phenomena (Earle and Cvetkovich 1995). Furthermore, recent studies have identified the neural correlates of trust and distrust, showing that trust is associated with the brain’s reward, prediction, and uncertainty areas and is distinctly cognitively based, while distrust is associated with the brain’s intense emotions and fear of loss areas, chiefly the amygdala (Dimoka 2010). Nevertheless, it is apparent the two concepts are closely related - distrust diminishes trust and lack of distrust can lead to the formation of implicit trust. Furthermore, efforts to enhance trust, if implemented successfully, simultaneously reduce distrust. Hence the following sections are chiefly oriented toward the trust development, rather than distrust amelioration.

5.3.1.2 Characteristics of trust

A number of characteristics of trust are relevant to Community participation during contaminated site clean-up. First, trust has important reciprocal elements, especially in localised communities where common agreements can be reinforced and aberrant behaviour punished (Laurian 2009). Mutual strengthening of trust provides positive feedback, further enhancing trust and collaboration opportunities (Nyquist Potter 2002). Conversely, distrust can lead to avoidance behaviour, undermining subsequent attempts at cooperation (Sitkin and Roth 1993; Hargie et al. 2003). Interrupting cycles of distrust is therefore important to generating effective Community participation.

Second, trust follows an asymmetric relationship – it is easier for trust to be lost than gained (Barber 1983; Slovic 1993; Laurian 2009). Asymmetry is created by the psychological tendency for negative events to be perceived more acutely and stored in more accessible regions of memory (Slovic 1993). Such predispositions are accentuated by media reporting which tends to favour bad news stories (trust reducing) over good news (Kasperson, Golding et al. 1992). Thus, Poortinga and Pidgeon (2003) contend there is an inbuilt "negativity bias" which can be difficult to counteract.

Third, trust is connected with power and control (Luhmann 1979; Govier 1998). Trust is often conceptualised as power exchange between two parties: in trusting, A relinquishes control to B regarding C. However, power is also relevant in the development of the trust relationship. Excessive power, for instance, negates the desire for trust, as explained by *Farrell (2009, p85):*

> *Trust does not apply when I am holding a gun to your head; while I certainly have power over you and know that you have an overwhelming interest to do what I tell you to do, the degree of certainty I have about your interests renders trust irrelevant.*

While rational choice conceptions of trust are normally formulated on a basis of equal power, in environmental problem solving situations power disparities are common (Laurian 2009). For example, Community participants, regulators and project managers in contaminated site clean-ups have different levels of resources, time, and expertise. Well resourced individuals and groups tend to have more options available to them and therefore higher Best Alternatives to Negotiated Agreements (BATNAs), consequently exhibiting lower likelihood of trusting others and cooperating (Laurian 2009). Power imbalances therefore decrease the ability of trust to manifest in environmental problem solving situations.

5.3.1.3 Trust in Experts

Technical expertise is a major contributor in complex environmental problem solving, and particularly in the context of contaminated site clean-up. Experts provide important advice and knowledge regarding contaminant types, availability, migration, clean-up mechanisms, safety and monitoring. Community participants usually have little experience in such technical matters, and must thus trust expert testimony. For effective Community participation in contaminated site clean-up, the nature of the relationship between the Community and experts is therefore pertinent.

As a distinct form of interpersonal trust, trust in expertise corresponds to a belief in competence and belief in motives. The dominant form of trust espoused by both experts and their employers relates to competence. Experts are highly experienced in their field, perform tasks reliably, with skill, credibility etc (Haskell 1984). While these attributes are certainly useful to contaminated site decision making, the literature on decision making points to some provisos of expert judgement. Firstly, while experts may be skilled in generalised aspects of a field of knowledge, they may not be familiar with local conditions, or local factors that may contribute to the complexity of a project. This "local" or "situated" knowledge presents competence difficulties, particularly for experts that have been seconded from other territories or countries (Clarke and Montini 1993; Fischer 2000). Secondly, experts may view problems as being similar to those problems they have previously experienced ("confirmation bias") or to frame problems in ways that make them amenable to a known solution rather than exploring other possible alternatives ("framing bias") (Evans 1989; Christensen et al. 1991; Malsch and Freckelton 2005; Kynn 2008). In the context of contaminated site clean-up for instance, experts familiar with cap and bund solutions may be more likely to recommend such methods. Thus, while specialists may have a high degree of generalised expertise, Community participants may question local competence and judgement.

The second form of trust, which relates to interest and motivation, is less widely acknowledged in the contaminated site management literature. Of primary concern to Community participants relates to the "politicisation" of science (Maasen and Lieven 2006), and the close ties between experts and those who employ them. As Miller (1999, p67) contends, "in return for a so-called comfortable position in society, [experts] offer (on the whole) their allegiance to the elites whom they serve". Of course, the question of allegiance and expert ethics is neither uniform nor simple, there is a whole spectrum of ethical behaviour. Vesilind and Gunn (1986, p24) summarised stages of expert moral development, where interest and motivation shifts from egotistical pursuits to universal principles (Table 13). Nevertheless, Miller (1999, p205) contends that most experts "are entangled in a web of professional and career obligations that defines acceptable behaviour" (stages 3 and 4). Thus, on the whole, Community participants "recognize that expertise is valuable, but they are suspicious that experts may purport a political agenda" (Webler 1995, p57).

Table 13. Professional moral development of engineers (stages and descriptions follow Kohlberg and Lickona 1976; Vesilind and Gunn 1986, pp. 24-25)

Kohlberg's development Stage	Description
Level 1. Preprofessional	
Stage 1. Obedience and punishment orientation (*How can I avoid punishment?*)	At this level, the engineer is not concerned with social or professional responsibilities. Professional conduct is dictated by the gain to the individual, with no thought to how such conduct would affect the firm, profession or society.
Stage 2. Self-interest orientation (*What's in it for me?*) (*Paying for a benefit*)	Recognition that there is some personal advantage to be gained from appropriate "professional" behaviour. While there is some understanding of the notions of loyalty to the firm and client confidence, ethical professional behaviour is based on the motive of self-advancement.
Level 2. Professional	
Stage 3. Interpersonal accord and conformity (*Social norms*) (*The good boy/good girl attitude*)	At this stage, the engineer puts loyalty to the firm above any other consideration. The firm can dictate the proper action, and the engineer is freed from further ethical considerations. The engineer buries him or herself in technical matters and becomes a team player who ignores the ramifications of the job on society and on the environment.
Stage 4. Authority and social-order maintaining orientation (*Law and order morality*)	The engineer recognises that the firm is part of the larger profession, so that loyalty to the profession enhances the reputation of the firm and brings rewards to the engineer. Engineering practise is viewed from a purely professional perspective, with no thought toward the larger issues of professional responsibility and social welfare.
Level 3. Principled Professional	
Stage 5. Social contract orientation	Service to human welfare is considered paramount, and it is recognised that such service will also bring credit to the firm and profession. It is the rules of society that determine professional conduct, as long as these rules have been arrived at by democratic process.
Stage 6. Universal ethical principles (*Principled conscience*)	Professional conduct is dictated by universal rules of justice, fairness and caring for fellow human beings and the whole of nature. This sometimes brings the engineer into conflict with the prevailing social order as deeply felt principles override social and professional expediency.

To gauge the trustworthiness of experts and the veracity of expert knowledge, Community participants may be provided opportunities for inquiry. Blok (2007) refers to opening the "scientific black box", an experience which can be quite uncomfortable for specialists unused to scientific communication. A considerable amount of research has been dedicated to expert-Community interactions (e.g. Petts 1997; Collins and Evans 2002; Cook et al. 2004; Davies and Burgess 2004; Carolan 2006; Blok 2007). In addition to factual questions, Community participants have been found to be particularly concerned with testing the limits of knowledge, knowledge certainty, and the assumptions that have been made (Petts 1997). Furthermore, cross examination of multiple experts has also been found as an effective mechanism for building trust, as Petts (2008) remarks, “members of the public somewhat astutely seem to prefer to listen to and engage with a range of experts with differing viewpoints rather than with individual experts”. Interactions which enable questioning and verification of facts and interpretations enable Community participants to gain a better understanding of the limits of scientific knowledge and provide clues into the motivations of experts, thus entail a useful mechanism for trust development.

5.3.1.4 Trust in Institutions

Community trust or distrust also extends to institutions and systems of governance, and has also been referred to as macro trust (Greenberg and Williams 1999), public trust (Kasperson, Golding et al. 1992), and social trust (Govier 1997; Cvetkovich and Löfstedt 1999). In the context of broad societal interaction, institutional trust contains significantly increased complexity compared to interpersonal trust, and has been described as a “conceptual quagmire” (Metlay 1999). Nevertheless, there is considerable agreement in the literature that institutional trust, like interpersonal trust, can be considered a function of trust in the interests of the institution and confidence in abilities (Braithwaite 1998a; Braithwaite 1998b; Hardin 1999).

Macro level trust is important in contaminated site clean-up since the belief in governance systems and processes can contribute to Community participation or non-participation. There is some evidence which suggests that institutional trust has declined worldwide in recent times, as a result of increased affluence and changing expectations (Nye et al. 1997, p1; Dalton 2005; Donovan et al. 2010, p167). As Earle and Cvetkovich (1999, pp9-10) note “people tend to trust institutions that 'tell stories' expressing currently salient values, stories that interpret the world in the same way they do". When trust in institutions is low, Community participants respond by careful observation of the policymaking process, in other words assuming a watchdog role.

5.3.1.5 Self-trust

Like other forms of trust, self-trust corresponds with aspects of motivation and competence, however instead of being directed externally, self-trust, as the name suggests, is oriented toward oneself (Govier 1997). Self-trust involves “personal autonomy and self respect” that is essential for Community participants, technical experts and regulatory authorities when attempting to resolve environmental dilemmas (Govier 1993; Anderson and Honneth 2005; Dodds 2013, p75). While self-trust is necessary for effective Community participation, there remains a relative paucity of research specifically directed toward the issue.

For Community participants in complex environmental problem solving, self-trust is critical since it facilitates meaningful participation. With self-trust, Community participants are more likely to become involved in environmental deliberations and contribute effectively. If self-trust is low, Community participants may be less likely to put forward their questions and concerns and therefore less effective contributors to deliberations and discussions (Cheng and Mattor 2006). Community participant self-trust is affected by a large number of factors, including but not limited to affluence, education, life history, experience, and social factors (Govier 1997). While there has been little research specifically aimed at self-trust in environmental problem solving, a number of initiatives have nevertheless been introduced which have consequences for Community participant self-trust.

The most popular initiative, based on the “deficit model”, is the introduction of expert assistance to compensate for a perceived lack of technical competence in Community participants (Gaines 2006). In complex environmental problem solving, and in particular contaminated site clean-up, many decisions may be highly technical, as NRC (2008) states “many participants lack sufficient technical and scientific background to understand the scientific issues as scientists present them. It is impractical to educate all participants, so this challenge requires that someone perform a translational role in linking publics to the relevant science”. Technical assistance has been routinely employed in the US, offered to Community participants in contaminated site clean-ups since 1988 (USEPA 2012). It is thought that assistance increases technical understanding in complex decision making, and consequently improves levels of self-trust.

However, whether technical assistance results are helpful for increasing levels of self-trust may be questioned. Firstly, the idea that Community participants are “deficient” in their reasoning and the accompanying preference toward expertise has been increasingly disputed (Burgess et al. 1998; Maranta et al. 2003; Lawton 2007). As noted above, expert decision making can be prone to systematic biases such as overconfidence and confirmation bias (Cassidy and Buede 2009), and there have been a number of high profile mistakes in scientific judgment which have undermined confidence in scientific judgement (Jasanoff

1997; Wynne 2006). Secondly, as noted above (section 5.3.1.3), Community participants use different methods for judging the validity of scientific statements and information, generally placing more emphasis on reliability, honesty and integrity of sources (Fischer 2000, p143; 2004). Thirdly, Community participants must trust the motivation and interests of experts. Somewhat predictably, Community participants can be quite sceptical where the translational role is performed by experts affiliated to an adversarial party (Danielson, Santos et al. 2008; Eiser et al. 2009).

Empirical examination of the effect of expert assistance has been equivocal. Trieste (1999) examined a Superfund clean-up in the US and contends that with expert assistance, citizens were able to readily articulate their concerns and participate meaningfully in collaborative partnership. In contrast however, Healy (2009) observed that Community members found the advice of ‘independent’ experts at a contaminated site clean-up in Australia unhelpful, closely associated with dominant scientific framings. For this reason, Healy (2009) cautions that “while translational roles can enhance the technical literacy of citizens, technical expertise may reproduce, or even compound, asymmetries in trust and power” (see also Benn et al. 2009; Brown and Benn 2009; Rae and Brown 2009).

Can self-trust be enhanced in Community participants? While specific effects of independent expertise on self-trust have not been investigated in the literature, there is some evidence to suggest that expertise may be useful for enhancing technical competence. However, very little research has been undertaken regarding how advice contributes to the clarification of motivation, interests and needs. While the emphasis on technical enhancement is understandable, given the complexities of most environmental problem solving, the significance of interests and motivations for developing self-trust appears critical.

5.3.1.6 Trust in processes

In addition to personal characteristics of trust, effective Community participation is dependent on trust in the problem solving process. If trust in the process is high there may be a greater likelihood of solutions being widely accepted, however, low process trust may lead to the questioning of integrity and honesty of project managers and therefore generate problems for project implementation (Lofstedt 2006). Problem solving processes occur at various levels. As shown in chapter 2, at the broadest level, problem solving processes during a contaminated site clean-up entail a staged progression from early recognition and problem identification, to post-remediation monitoring. Lower level processes occur during these stages, in the form of public meetings, hearings, citizen advisory panels etc. Community trust is affected by both the overarching process and the lower level processes which feed into them.

The literature on trust in environmental problem solving processes is considerable, and although there are some contradictions, considerable agreement is evident surrounding good practice. At a meta-theoretical level, Webler's (1995) fairness and competence maxims have been commonly applied. At an operational level, general rules of thumb have emerged, which, as the paragraphs below illustrate, conceal some important caveats.

First, there is considerable agreement regarding the broad characteristics of trusted processes. In particular, processes should also be "open" and "transparent" enabling Community participants to access how and why a decision has been made (Rowe and Frewer 2000; Dalton 2006; Drew et al. 2006). Furthermore, processes should be "fair" and "equitable", i.e. that all perspectives should have the opportunity to participate and that participation should have some influence on decision making (Arnstein 1969; Abelson et al. 2004; Stewart and Sinclair 2007; Reed 2008). Together, these characteristics provide a basis for subsequent attributes.

Openness and transparency involves the disclosure of information and may be mandated by legislation. For example, in the United States, much environmental information is available through the Freedom of Information Act (FOIA) 1966; in New Zealand similar legislation exists in the form of the Official Information Act 1982. However, analysis of the success of these efforts in informing Community participants has been mixed (Gupta 2008; Dingwerth and Eichinger 2010; Bauhr and Nasiritousi 2012). To be successful, transparency policies "must be accurate, must keep ahead of disclosers' efforts to find loopholes, and, above all, must focus on the needs of ordinary citizens" (Fung et al. 2007). Furthermore, information must be in accessible formats, otherwise participants may "drown in disclosure...bombarded with large volumes of disclosed information, not knowing how to find the 'needle in the hay-stack' or even what to look for" (Gupta 2008).

A widely adopted condition to generate fair and equitable processes is through consensus rules – that all parties must agree on a decision before it is implemented (Susskind et al. 1999; Sidaway 2005; Dressler 2006; Dukes 2007). Although consensus can form strong long-term commitments and enhance trust, the process may be undermined for a number of reasons. Reed (2008) contends that consensus based decision making may suppress diversity of opinion and lead to generalised discussion or to the investigation of issues that are readily soluble, but less important – according to Coglianese (1999, p4) “the ultimate goal shifts away from reaching a quality decision and moves it towards reaching an agreeable one”. Other complications arise through rights of veto that may be used to strategically delay or defer decisions (van de Kerkhof 2006). Thus, while consensus may be useful as a goal, having it as an inalterable part of problem solving culture can be inhibitive.

Second, Community participation in the contaminated site clean-up process should be “as early as possible” and “throughout” (e.g. Rowe, Horlick-Jones et al. 2005; DEC 2006). As DEC (2006) notes, “proponents should ensure Community consultation commences as early as possible in the contaminated site assessment process. The temptation to delay Community consultation until the extent and nature of contamination has been fully delineated should be avoided. Early Community consultation, which continues throughout the site investigation and management stages, is most likely to build credibility with the organisations involved and result in an outcome which receives broad Community acceptance”. Critically however, the notion of “as early as possible” is somewhat contested. Investigations by the US National Research Council question whether early public input necessarily leads to better outcomes (NRC 2008). NRC (2008) contends that if public input is requested before agency constraints have been clearly articulated, unrealistic expectations may develop surrounding options for resolution. As a result, participants may feel that their time has been wasted and assess the participatory process as a failure. Furthermore, without a basic understanding of the problem, important affected parties may not be identified. As a result, significant perspectives may be excluded from initial discussions and cement feelings of distrust from omitted parties if they are eventually included. Consequently, NRC (2008) suggests that public input into wicked environmental problem resolution is most effective when a clear purpose for participation can be identified, and after major Community members and affected parties have been recognised, which may occur substantially after the problem has been formulated. Thus, broad agreement on the timing of Community involvement conceals some disagreement.

Third, there is also considerable agreement that trusted processes include representation of all Community interests so that their needs can be identified. Particularly critical are those most affected by environmental problems, in the context of contaminated sites, namely residents and businesses adjacent to the site, local communities and indigenous custodians. However, resource, knowledge and power disparities can prevent a ‘level playing field’, and may be sufficient to exclude less affluent demographics, families, younger people, women and indigenous people (Echeverria 2001; Petts 2004; Jensen-Lee 2009; Lloyd-Smith 2009). Research into the constitution of citizens’ advisory groups, for example, suggests that participation is frequently disproportionately comprised of affluent and educated males (Williams 2002, p18). Furthermore, potential participants may be deterred by conflict or lack thereof (Ashford and Rest 1999), or may simply be uninterested or have other more pressing concerns (Milbrath 1981; Aggens 1983; Diduck and Sinclair 2002; Creighton 2005). To meaningfully include all Community participants in participatory inquiry exercises may require affirmative action, that special measures are introduced to include all relevant perspectives (e.g. financial compensation for time, travel expenses paid etc).

Fourth, contexts for participation should be carefully considered – the type and timing of lower level processes can affect the development of trust. The number and variety of engagement “techniques”, “methods”, “mechanisms” and “processes” is extensive and ever increasing. Rosener (1975) documented 39 “techniques” for public participation, ranging from structured to semi-structured processes. The International Association of Public Participation (IAP2) has produced a “toolbox” of 59 techniques to share information, to compile and provide feedback, and to bring people together (IAP2 2006). Rowe and Frewer (2005) produced a list of over 100 mechanisms.

Each process has strengths and weaknesses which affect trust. For example, public meetings serve a “ritualistic” purpose in reifying certain norms or control behaviours, reaffirming civic values and encouraging group cohesion (McComas et al. 2010), but suffer from inflexible formats, adversarial seating arrangements, overly technical presentations, and the tendency to amplify risks (McComas 2003). The most common mechanism in environmental decision making, public hearings, provide opportunities for participants to put forward their views, but usually at a stage of the process that renders collaborative decision making impossible. Instead adversaries are pitted against one another, leading Callahan (2007) to comment “public hearings, do little more than inform the public. Public hearings, while they have a purpose, do nothing to facilitate communication and build trust”. More substantive participatory processes such as Citizens’ Advisory Committees (CACs) or task forces are also commonly employed, providing citizens the opportunity to comment on decisions early in the problem solving process. But these too have weaknesses of limited involvement (while the intensity of CACs is a strength, it is also a weakness since only a small number of Community participants are able to be involved), legitimacy of (sometimes) self appointed representatives, and representativeness (Brown 2006; Fung 2006). To combat the deficiencies of each process, strengths and weaknesses should be recognised and counteracted in other parts of the problem solving process (Creighton 2005; NRC 2008, p114).

Fifth, process trust is contingent on those coordinating the problem solving process (Nathanail 2006). General attributes of trustworthiness include perceptions of sincerity, integrity, honesty and goodwill in process convenors (IAEA 2002; Nyquist Potter 2002; Laurian 2009). Furthermore, convenors must be open to multiple perspectives and approachable (Reed 2008). In intractable conflicts, Danielson et al. (2008) found the presence of intermediaries or "trust bridges" as an important conduit for communication, allowing decision processes to advance. For lower level processes, independent, impartial facilitation is recommended by practitioners and theorists (Richards et al. 2004a; Reed 2008). In these contexts highly skilled facilitators are able to moderate power imbalances, maintain positive group dynamics, manage dominating or offensive individuals, encourage participation in those reluctant to contribute, and promote reflection on assumptions and intransigent positions (Reed 2008). While the benefits of skilled facilitation have been well recognised there is evidence of limited uptake within the contaminated site clean-up context (Ashford and Rest 1999; Heath, Pollard et al. 2010).

5.4 Summary

This chapter has outlined many of the psychosocial factors which complicate participation during complex environmental problem solving. Of particular significance are ideological differences, cognitive factors including perception, memory and reasoning, emotions, the way in which knowledge is integrated, and trust between participants. These core factors have hitherto not been integrated into participatory problem solving, and serve as the foundation for building a new framework, the subject of the next chapter.

6 | Knitting the Threads

Development of a participatory framework for environmental problem solving

Ka pu te ruha ka hao te rangatahi

As an old net withers another is remade

- Whakatauki/Māori proverb

6.1 Introduction

The previous four chapters have identified: (1) psychosocial and technical difficulties associated with problem solving during the clean-up of contaminated sites; (2) mauri as being a useful concept for understanding the complex issue of 'effectiveness'; (3) the predominance of psychosocial characteristics associated with ideology, reasoning and feeling, self-awareness, empathy, power, and trust in the generation of effective participation. This chapter synthesises these concepts to develop a framework of effective participation.

6.2 Reframing participation/Titiro kaupare

As we have seen, Community participation is characterised by ideological differences, cognitive and emotional factors, and social considerations chiefly related to trust. While other models of participation (detailed in chapter 3) provide some useful insight into problem solving, they fail to sufficiently address these critical considerations.

For simplicity, and following Rowe and Frewer's (2004) information flow model (chapter 3), we begin with the assumption that there are only two parties associated with environmental problem solving – the manager and a Community participant (Figure 18). However, an important factor omitted from Rowe and Frewer's (2004) model, and one highly emphasised by kaupapa Māori (Maori ideology) is the recognition of *context*. In Figure 18, mauri is the contextual thread that weaves between the two parties, forming a relationship - it is the situation or problem that has been identified by each of the parties.

For Morgan (Morgan 2008) “mauri is the binding force...the glue that makes it possible for everything to exist, by holding the physical and spiritual elements of a being or thing together in unison. When actions impact negatively upon the mauri, this essential bond is weakened, and can lead to the separation of the physical and spiritual elements resulting in the death of a living thing or alternatively the loss of a things capacity to support other life.” Contaminated sites make an excellent illustration of degraded mauri, for not only do they frequently fail to support life, but also the connection (binding force) between the place and humans is degraded – humans do not usually wish to live near them.

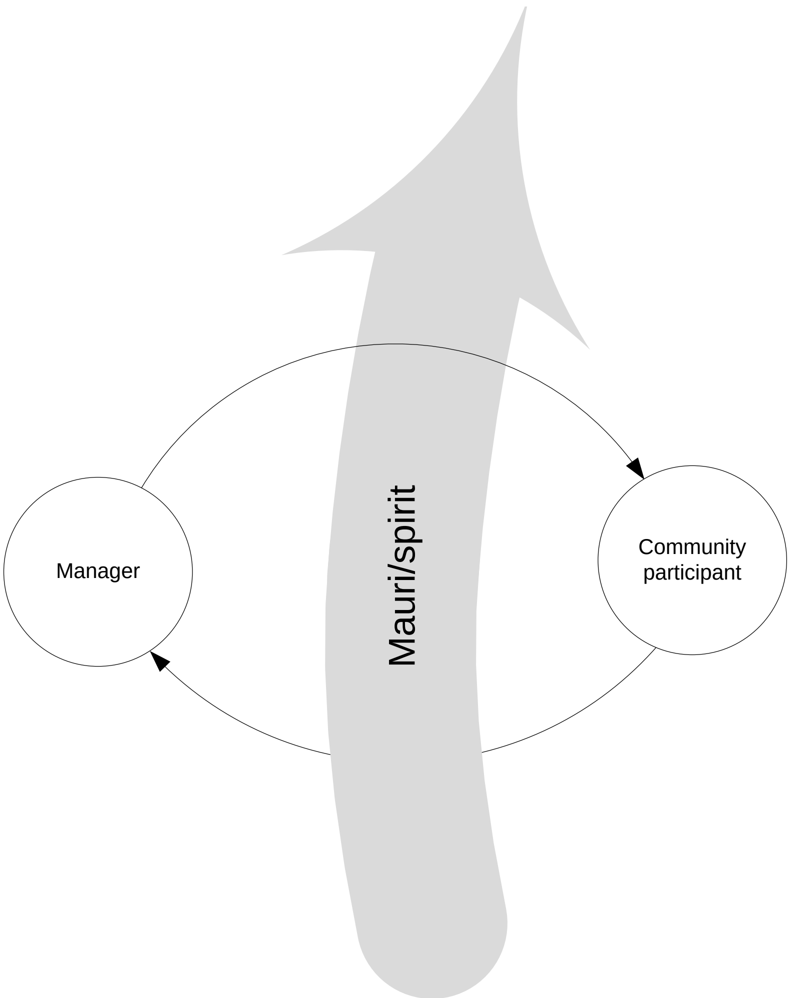

Figure 18. Interaction between Manager and Community participant

In addition to context, individual participant characteristics affect the efficacy of participation. In the previous chapters ideological, emotional, and cognitive factors were noted as being particularly challenging for collaborative problem solving, resulting in apparently intractable dilemmas. When dilemmas dominate, it is necessary to reframe problems (Laws and Rein 2003; Innes and Booher 2004).

6.2.1 Individual characteristics

The following subsections present components of a framework for participation in environment problem solving, derived and extended from the literature in Chapters 3 and 5, and the collaborative inquiry of Chapter 4.

6.2.1.1 Presence/Whakaaro

Identifying the ‘problem’ or ‘how things really are’ at any time during the course of a clean-up requires ‘being present’. “Being present” or “mindful” is an important concept within Buddhism (Hạnh 1990; Kyabgon 2001), and has been increasingly adopted within facilitation (e.g. Hunter, Thorpe et al. 2007, p46), psychology (Weber and Johnson 2009) and management (Senge et al. 2004) literature. Presence is relatively simple, entailing observation (of a situation, others or oneself) without attachment, in other words observing without overlaying thoughts (judgements) and feelings. Although it appears straightforward, our brains have a tendency to continually process past and future, making being present challenging. Senge et al. (2004, p13) describe their conception of presence:

We first thought of presence as being fully conscious and aware in the present moment. Then we began to appreciate presence as deep listening, of being open beyond one’s preconceptions and historical ways of making sense. We came to see the importance of letting go of old identities and the need for control...and making choices to serve the evolution of life. Ultimately, we came to see all these aspects of presence as leading to a state of “letting come,” of consciously participating in a larger field for change. When this happens, the field shifts, and the forces shaping a situation can move from recreating the past to manifesting or materialising an emerging future

Presence/whakaaro is the overarching theme of effective participation, the necessity of paying close attention to the problem/situation, to others involved, and to oneself (Figure 19). Other components of Figure 19 will be discussed below.

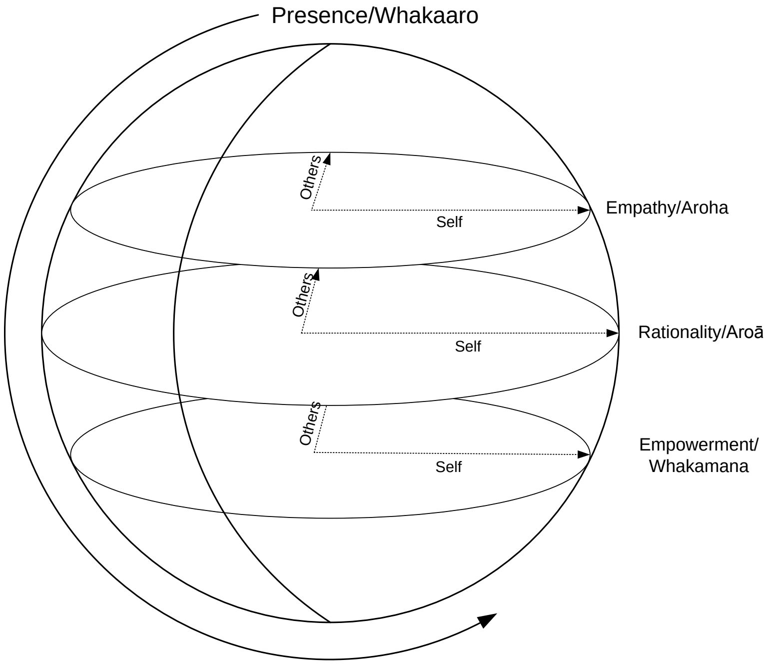

Figure 19. Presence/whakaaro as the overarching theme of effective participation

6.2.1.2 Empathy/Aroha

The first component for generating and sustaining effective manager-Community participation in contaminated site clean-up relates to empathy/aroha. As highlighted above, being present provides a clearer understanding of what ‘is’, but also enables detection of what ‘isn’t’. In other words, what may be needed. Needs or interest rests as one of the principal motivators, thus is fundamental to participation in complex environmental problems (Latour 2004; Marres 2007; Delgado, Kjolberg et al. 2011). Understanding needs is heavily dependent on empathic *feeling* (Rosenberg 2003).

Empathy pervades environmental problem solving, but is largely ignored by most technical texts. In relation to a problem situation, for example, a contaminated site, observation may give rise to a feeling of sadness, anger, or disgust, that the mauri of a particular place has been degraded. Historically in Western discourse, empathy has been considered as “putting oneself in another person’s shoes”. As such, empathy is sometimes considered tantamount to imitation of others (e.g. Iacoboni 2009). However, fuller accounts suggest the concept is heavily related to emotional connectedness – to feel what others may be feeling (de Waal 2008). Most contaminated site managers exhibit significant empathy to those they are serving, and attempt to eliminate a potential health hazard and the feelings of fear associated with it in those affected.

Empathy is frequently aligned with altruistic behaviour and contrasted with selfishness (e.g. de Waal 2008). In fact they may be considered to be closely linked - altruism being emotional concern for others directly and selfishness simply being emotional concern for our (future) selves. Both externalised empathy and self-empathy may be beneficial.

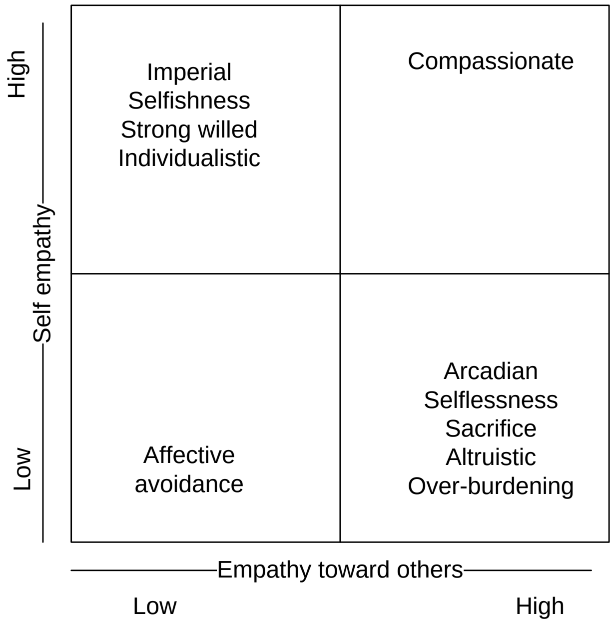

Figure 20. Dual nature of empathy/aroha

In environmental problem solving empathy is fundamental to the development of effective Community-manager participation (Figure 20). At the heart of empathy is being present to one’s own needs and the needs of others/the situation. Strong empathic concern for oneself without concern for others can lead to strong willed, uncompromising, archetypal Imperial attitudes – selfish needs come first. Lack of concern toward others results in parties talking past each other, listening poorly or not listening at all, and being overly sensitive to their own needs. Conversely, those with overwhelming concern for others are more closely aligned with the Arcadian paradigm, commonly displaying altruistic or selfless behaviours – the needs of others come first. While these behaviours appear to be prosocial, an inability to adequately acknowledge personal needs means that demonstrations of selflessness can become self-sacrificing – endangering ones health and wellbeing. Those with low levels of empathy for oneself and for others are more likely to demonstrate affective avoidant behaviours or inaction. In contrast, individuals with both high levels of self concern and high concern for others exhibit more compassionate behaviour, unencumbered by feelings of superiority or inferiority.

Development of empathy between contaminated site managers and Community participants requires reciprocal awareness of feelings. There is a whakatauki (proverb) to the effect that empathy has to be earned and reciprocated: "*Aroha mai, aroha atu*" - "Love toward us, love going out from us." (Patterson 1994). Thus, for effective participation in contaminated site clean-up, systems (kawa/practices and tikanga/protocols) should be introduced to assist mutual awareness of needs/feelings between the managers and the Community. Disclosure of feelings can be quite intimidating or difficult for some participants (e.g. shy, insecure, those who have conditioned themselves for suppression of feeling) therefore diverse and tailored methods for exchanging awareness of feelings are likely to be the most effective.

Since needs reflect the emotional requirements of the Community and the manager, they may change throughout the clean-up project. However, near ubiquitous needs include fairness, honesty and respect which is why they are often regarded as primary attributes of trust (Höppner 2009). Needs may also be quite specific, relayed by Community participants, making openness another commonly cited imperative for contaminated site managers (DEC 2006; NRC 2008). Other common needs include reliability and integrity, to act in accordance with one's assertions.

6.2.1.3 Rationality/Aroā

A further component for generating and sustaining effective manager-Community participation in contaminated site clean-up is rationality/aroā. Rationality pertains chiefly to *thinking*, the cognitive ability to remember and recognise patterns. It thus more directly relates to the past and to the future.

Rational thinking as a path to understanding involves an array of potentially useful processes including reasoning (deductive, inductive and abductive), analysis, judgement, criticism, envisioning, prediction, interpretation (Johnson-Laird 2006). Thinking processes help to clarify our understanding of what was, what is, and what will be or ought to be.

Thinking processes are highly regarded in contemporary environmental problem solving, and in particular during contaminated site clean-up (as demonstrated in the technical overview of Chapter 1). Thinking assists in structuring the problem, envisioning an alternative future, and planning a series of steps in order to achieve that goal. However, thinking may also be counterproductive if it is associated with excessive deliberation (analysis paralysis), fixation on a particular future (time) which may be unattainable given the resolution constraints, or unhelpful “shadows” of the past (e.g. racial bigotry, misogyny, control, dominance, entitlement etc). Thinking is thus a tool to assist with clarification and understanding, but should be employed wisely.

Commonly among scientists and engineers, rationality is considered solely in terms of external understanding – knowledge of the world around us. However, it has long been recognised that self knowledge also provides a foundational role in understanding, inscribed in the pronaos (forecourt) of the Temple of Apollo at Delphi were the words γνῶθι σεαυτόν – know thyself (Pausanias 1794). Including the psychological world blurs the distinction between reality (concrete ‘things’ that can be independently measured) and the abstract (ideas which may be wholly subjective), however it enables a more comprehensive picture of participation to be developed which includes common psychological barriers. Thus, following Miller (1999), rationality may be framed in terms of knowledge of ourselves, others and the world around us.

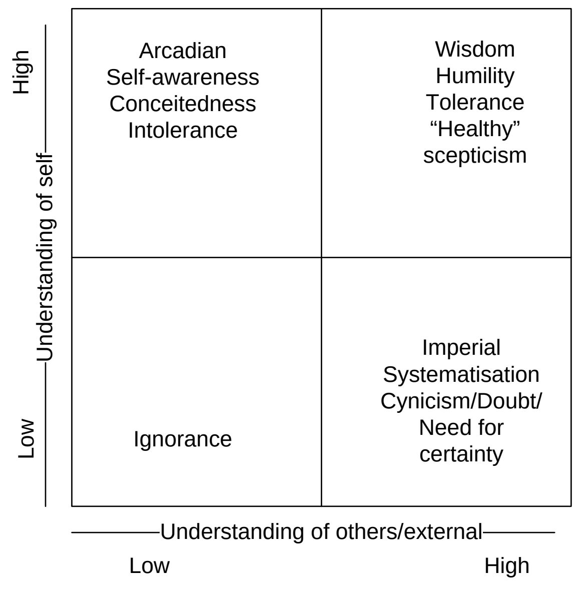

Figure 21. Dual nature of rationality/aroā

Rationality is fundamentally important to effective manager-Community participation (Figure 21). High external understanding is typical of the materialistic techno-scientific paradigm which emphasises systematisation. Paradoxically, while proffering scepticism, a high level of external understanding can lead to an increasing need for certainty – as exhibited by the adherence to dominant customs and traditions by conservatives and scientists (Kuhn 1962). Self understanding is largely neglected by the Imperial ideology but highly regarded by the Arcadian. High self understanding is increasingly recognised as important to the effective coordination of teams (Goleman 2004), but is also essential for collaborative environmental problem solving (Hunter, Thorpe et al. 2007). High levels of self understanding can lead to self-awareness, but may also be accompanied by a certain level of conceitedness and intolerance (Miller 1999). Low levels of both self and external understanding are tantamount to ignorance, and conversely, high levels of both are correlated with humility, tolerance, “healthy” scepticism and wisdom.

Development of understanding between contaminated site managers and Community participants requires reciprocal awareness of thoughts. Many systems and strategies have been developed to clarify and understand the technical process which must be followed to remediate a contaminated site, from the perspective of rigorous scientific inquiry (e.g. NSW EPA 2000; MfE 2011b; Swartjes 2011). While these thorough investigations have undoubtedly improved the generalised understanding of contaminated site management, they fail to adequately address context specific attributes. More alarmingly, the reliance on systems and corresponding de-emphasis of contextual attributes equates to the underutilisation of Community participatory input. Thus providing opportunities for discussion and deliberation between Community participants and managers is necessary throughout the remediation process.

6.2.1.4 Empowerment /Whakamana

A final component for generating and sustaining effective manager-Community participation in contaminated site clean-up is empowerment/whakamana. It is first useful to explore the twin concepts of power and empowerment which feature heavily in the discourse on participation (Chapter 3), particularly through evolution of the ideas of Arnstein (1969). As discussed in Chapter 3, there are important caveats to the adoption of power, or even empowerment, as a component of effective participation.

At a cursory level empowerment/whakamana pertains to agency, the ability to act. Empowerment thus translates empathy and rationality into action. Commonly, empowerment is considered self agency, the capacity to promote one’s own ideas and ideologies, to act on one’s will. But empowerment also relates to the empowerment of others, service which enables others to act - the whole ‘art’ of facilitation, for example, is the precise ability to enable a group of other people to achieve their own purpose (Hunter, Thorpe et al. 2007). Thus empowerment is not only about self agency, it includes participating in activities which enable the agency of others.

Difficulties in the concept of empowerment arise from the widely held erroneous assumption that empowerment equates to power, that power is limited, and that power can only be won, bought or exchanged. Such a conception promotes *realpolitik* thinking and action - fighting to hold onto control, coercion, and deception. Although Arnstein (1969) and the subsequent discourse she inspired may have been mortified to be compared with *realpolitik*, her suggestions for participation are nothing less than this. *Realpolitic* thinking and action is obviously counterproductive to meaningful collaboration, yet empowerment does appear to have a significant role in generating action on the resolution of environmental problems and ‘getting things done’.

Empowerment is used here to define an action (including speech act) which equates to taking deliberate, conscious steps to assist in improving the wellbeing of a person (oneself or another), group or place. In Māori, empowerment corresponds with whaka- (to cause something to happen, cause to be) mana (the essence, presence and authority). Empowerment in this way adopts principles close to the concept of Parrhesia in Ancient Greece – fearless speech (Foucault 2001). Parrhesia is best described through an example (Foucault 2001)”

> *When a philosopher addresses himself to a sovereign, to a tyrant, and tells him that his tyranny is disturbing and unpleasant because tyranny is incompatible with justice, then the philosopher speaks the truth, believes he is speaking the truth, and, more than that, also takes a risk (since the tyrant may become angry, may punish him, may exile him, may kill him)*

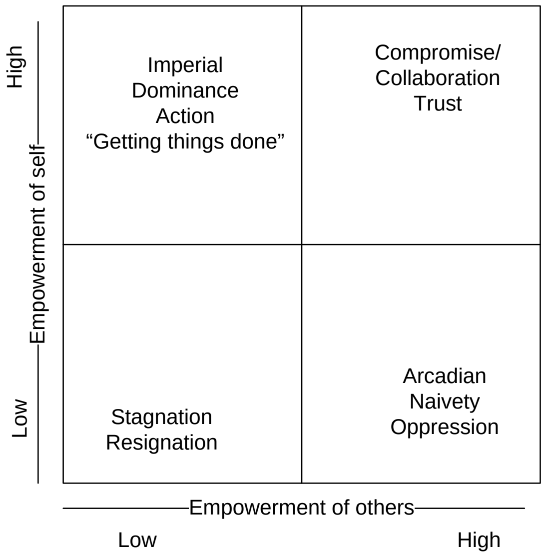

Figure 22. Dual nature of empowerment/whakamana

Comparatively, Imperialists exhibit high desires for self agency whereas Arcadians are more likely to help others (Figure 22). High levels of self empowerment can lead to action, to "getting things done", but may be accompanied by domineering behaviour and the wielding of power. High propensity to help others can encourage pro-social behaviours, but may also lead to those being offered help taking advantage of that assistance. Low levels of both self and other empowerment leads to stagnation and resignation, whereas high levels of both can generate sensible compromise solutions, love, collaboration and trust.

6.2.2 Ideological comparison

Together, Presence (whakaaro) and self and externalised Empathy (aroha), Rationality (aroā) and Empowerment (whakamana) make up the PERE framework of effective participation. It is suggested that in individuals, paying attention to being present, empathy, rationality and empowerment (PERE ideology) are likely to contribute to more effective environmental problem solving.

Table 14 compares the capacities of the PERE ideology with those of the Arcadian and Imperial ideologies. In contrast to the PERE ideology, Arcadians exhibit greatly reduced capacity for self-empathy and self-empowerment, and greatly reduced capacity for external understanding. Alternatively, Imperialists exhibit greatly reduced capacity for empathy and empowerment of others, and for introspective rationalisation. Rather counter-intuitively, both Arcadians and Imperialists exhibit reduced capacity compared to the whole person in relation to their most treasured attributes – the PERE ideology is more caring than the Arcadian, more knowledgeable and powerful than the Imperialist etc. The reasons for improved performance may be attributed to a greater cognitive balance, to reduced anxiety and self-protectiveness, to a realistic pairing of what is and what is perceived, to a curiosity and humility which enables new ideas to be generated or perceived, and to a fearlessness which promotes action and challenges old ideas.

Table 14. Comparison of capacities of effective participation between Arcadian, Imperial and PERE ideologies.

Characteristic	Arcadian	Imperial	PERE
Presence/Whakaaro	Uneven. May be present in relation to some issues, but Arcadian assumption that human self-interest is bad is limiting.	Uneven. May be present in relation to some issues, but Imperial assumption that self-interest is the primary motivator is limiting.	Even. Considerably larger capacity for presence than either Arcadian or Imperial modes of thinking.
Empathy/Aroha	Considerable empathy for others however not always forthright in identification of own needs	Considerable recognition of own needs but limited concern for others.	Expanded concern for self and others/environment.
Rationality/Aroā	Focuses attention more directly towards self-understanding, sometimes considered “living in their own world”.	Focuses attention externally, usually toward “the problem”, but solely from the perspective of one’s own worldview or set of values.	Attentive to thoughts regarding both internal and external factors. May exhibit more expansive, creative thinking due to enhanced focus of people and problem while retaining detachment.
Empowerment/Whakamana	Can be very effective at assisting others meet their needs but may neglect one’s own needs.	Focused primarily on empowering one’s own perspective, thus prone to “type 3” error – solving the ‘wrong’ problem.	Possesses deep respect and appreciation for land/place. Is alert to spirit and enthusiasm in oneself and others, and once detected will act to cultivate it.

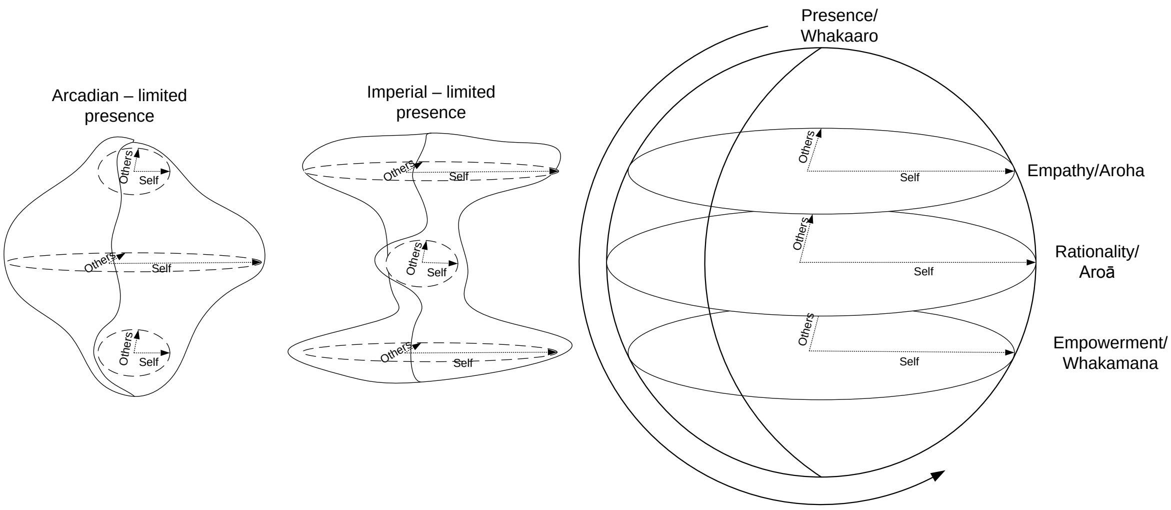

Figure 23. Three-dimensional representation of Arcadian, Imperial and PERE ideologies in environmental problem solving

Figure 23 illustrates topographically the differences between the three ideologies (it is difficult to illustrate this appropriately in a two dimensional diagram). Presence pertains to the surface characteristics of the models – Arcadians and Imperialists exhibit uneven surface characteristics with bulging parts in areas that they place the most of their attention. In comparison, the PERE ideology contains a more expansive, yet uniform surface area, or presence. Presence has a dynamic relationship with the three underlying characteristics of empathy, rationality and empowerment - if one is 'present', heightened opportunities for empathy, reasoning, and empowerment may be generated because the "mind is clear, cognizant, and balanced" (Bodhi 1994). Conversely, efforts to empathise, rationalise, and empower oneself and others can assist in expanding presence. For example, Borgonovi (2008) confirmed that volunteering increases one's sense of happiness – doing good feels good and feeling good helps one to be present.

The PERE ideology emphasises balanced development of problem solving attributes and continual reflection. It reminds us that the capacity to be present, to care, rationalise, and empower, both ourselves and others, is not fixed, it may be expanded and developed. While there has been much research on promoting individual aspects of the PERE such as external rationality (taught extensively in schools and universities), only recently have empathy and self understanding been seriously considered as essential for human development. Increasing research is dedicated to promoting emotional literacy, and a raft of tools are now available (e.g. Cherniss and Goleman 2001). With effort, it has been demonstrated that much personal progress can be made (Goleman 2004).

While presence and the three characteristics of empathy, rationality, and empowerment have been defined individually, interlinkages between the concepts are clearly evident. The willingness to empower others for instance is necessarily preconditioned by feelings of empathy – the autonomous motivation to help relies on empathy (Pavey et al. 2012). Without empathy, the tendency toward dismissing other perspectives and empowering one's own perspective is strong. Moreover, empathy is required to comprehend differences in rationality between perspectives. Without empathic connection, a fixation on one's own knowledge can limit opportunities for learning about different perspectives and thus gain a deeper understanding of the problem context. Furthermore, a certain level of rational problem understanding is necessary to enable the power to act, and actions promote additional inquiry and reflection which may stimulate novel and unanticipated feelings. Thus, the capacity to participate optimally in environmental problem solving is constantly changing, meaning that interactions between individuals and groups must continually be present to changes in dynamics and adapt accordingly.

6.2.3 Participation during environmental problem solving

The PERE ideology is aspirational, and may be regarded as an idealised participant with the characteristics of presence, high empathy, rationality and empowerment of self and others. We may now return to Figure 18, incorporating the ideological characteristics from the previous sections. Figure 24 demonstrates a hypothetical situation of idealised participation. Presence begets individual empathic feeling regarding the mauri of a particular place which may be exchanged with other participants (special consideration should be placed on the deep empathic connections of kaitiaki (guardians) to a place) thereby developing strong connections through mutual empathy. As different knowledges are brought to bear on the issues a shared understanding may develop. The solution space can then be explored, generating potentially novel ideas in which all parties agree; a shared sense of purpose develops. Shared purpose invigorates and enlivens action which corresponds to a reinvigoration of relationships between participants. Action may also contribute to enhancement of the mauri of the site. Participants continually reflect on process - that it is indeed contributing to mauri piki (enhancement) – any perceived challenges are discussed and overcome together and openly. Finally, with agreement from all those involved (especially kaitiaki (guardians)); mauri may be considered restored (mauri tu).

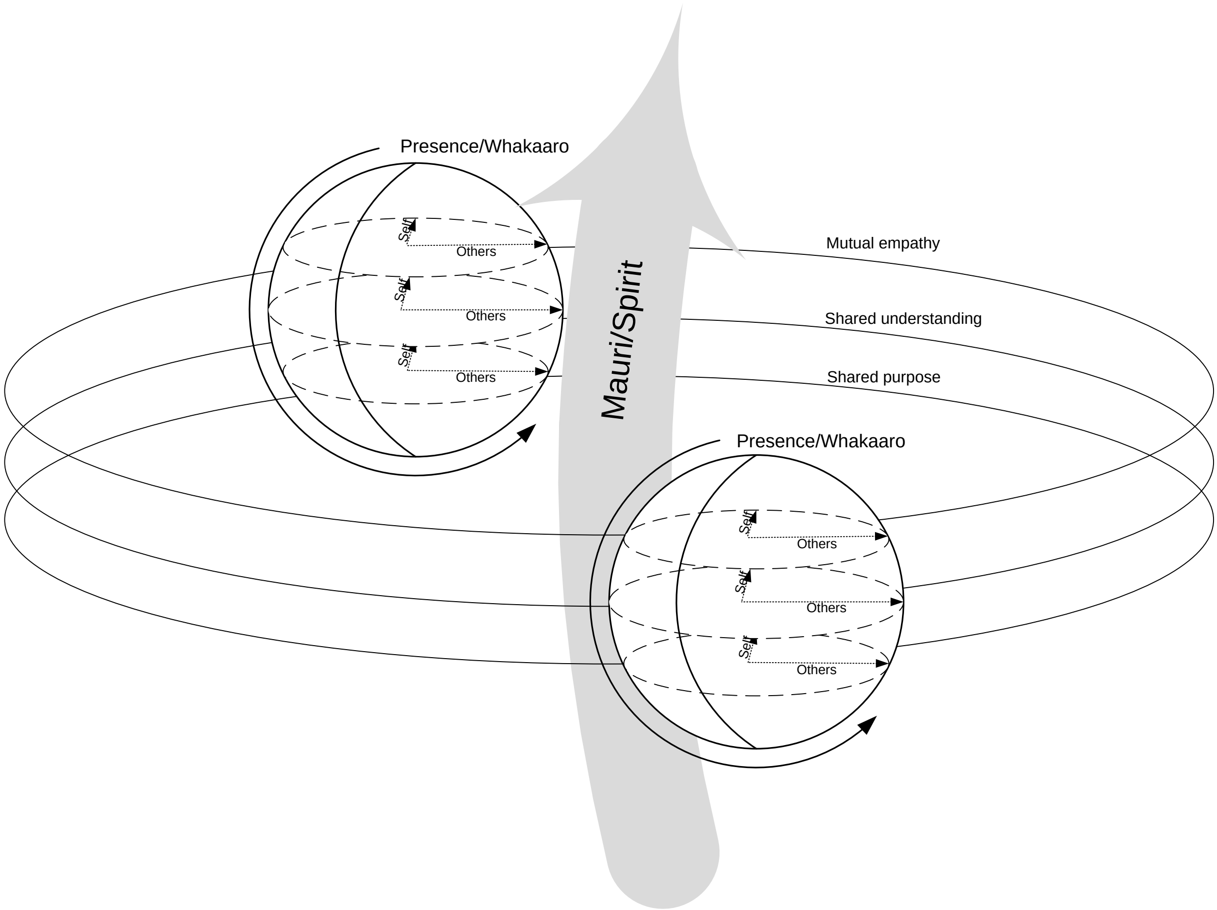

Figure 24. Generating and sustaining effective Community-manager participation

Clearly the above paints an idealised picture of participation. Some may even ask - is the idea of a PERE ideology reasonable? Psychological differences have been elaborated on in this chapter but it is clear that the contribution of social systems is significant and may either facilitate or inhibit the development of PERE type ideologies. Although further research is necessary, it is apparent that a variety of current systems serve to polarise and incapacitate development. For example, education systems which provide the core of our formative learning remain heavily distorted toward teaching external understanding, introspective tutelage remains seriously neglected. The myth of power persists which sees young children being chastised for competitive behaviours and adults being revered for them. Media promotion of role models for peace and not war is rare. Modern employment hours are longer than ever before, yet there remains a perception for most people that they need to work harder simply to keep up. Such perceptions constrain the allocation of time to listen, reflect, care, and most importantly, be present. The substantial role that social systems play on constraining the development of effective participatory behaviours suggests that further critical analysis of presence, empathy, rationality and empowerment is necessary.

A second critique of the idea of PERE participation is whether this kind of participation is possible? The response is we simply don't know, since participation exercises have never been specifically co-ordinated to manifest these attributes. Further research and implementation is necessary. What may be possible however is to highlight the "shadow" or aspects of participation that draw participants away from affirmative, life-enhancing relationships (PERE) and cause difficulties during environmental problem solving.

6.3 Summary

Building on insights from the previous four chapters, the PERE (Presence/Whakaaro; Empathy/Aroha; Rationality/Aroā; Empowerment/Whakamana) framework for effective Community-manager participation has been developed. PERE provides an ideological basis for participation, emphasising being present, and reflecting on feelings/needs, thoughts/inferences, and desires/actions both of oneself and others involved in an environmental problem solving exercise. Such a framework is hoped to generate effective participation, improving the mauri of relationships and the issue at hand. While the framework is yet to be implemented and tested, it makes a useful basis for interpretation of past cases with a view of learning from them, the subject of the following chapters.

7 | Case Study Method

...there will be no 'sustainability' without a greater potential for citizens to take control of their own lives, health and environment. However, success in this goal requires careful consideration of the relations between technical expertise, citizen needs, and contemporary culture.

- Irwin (Irwin 1995, pg 7)

7.1 Introduction

The previous chapter set out a framework for effective Community-manager participation. The following chapters seek to employ the framework to identify "shadow" elements (elements which run counter to the central tenets of the framework) during the course of a contaminated site clean-up. The purpose of this chapter is to outline the method used to investigate the case.

7.2 Approach/Methodology

Investigation of effective Community participation during contaminated site clean-up may be performed in a number of different ways. English et al. (1993) employ a theoretical approach based on value focussed thinking and practitioner reflection. While a purely theoretical approach enables strong justification of guidelines, resultant guidelines may be disconnected from the contextual realities of implementation.

Multiple cases have also been used to assist in understanding effective Community participation. Ashford and Rest (1999) adopt a multiple case study approach exploring instances of successful participation to establish a number of recommendations for managers. Using a multiple case method provides a broad understanding of effective participation but individual case detail may be sacrificed. Furthermore, practices which have been successful may simply be so because the context was relatively uncontroversial. Illustrating effective participation may be simple when contexts are simple.

Broader explorations of Community participation have used similar approaches. Webler (1995) employs a theoretical approach adopting Habermassian social theory to develop fairness and competence as the primary factors of effective participation. Creighton (2005) and other practitioners have utilised reflection from extensive implementation to ascertain what works and what doesn't. Theoretical emphasis is useful for explicit determination of what ought to be effective but has been criticised for an apparent disconnection with the realities of Community participation (Abelson, Forest et al. 2003; Healy 2009). Practical emphasis provides some broad guidance on effective Community participation but has been criticised for lack of robust foundations (Webler and Tuler 2002). Both approaches have benefits as well as drawbacks and neither approach has hitherto developed a grounded yet practical model of Community participation in contaminated site clean-up.

7.3 Case study approach

7.3.1 Case study approach considerations

Case study research is a widely used qualitative or quantitative research strategy for exploring real-life phenomena. Eisenhardt (1989) describes the case study method as "a research strategy which focuses on understanding the dynamics present within single settings." For Yin (2009), the case study "is an empirical inquiry that investigates a contemporary phenomenon in depth and within its real-life context, especially when the boundaries between phenomena and context are not clearly evident".

Case study research has several merits which make it particularly well suited for research into Community participation. First, case study research allows for the careful examination of phenomena of interest - the essence of the case study method is to shed light on a 'real world' problem (Schramm 1971). Furthermore, case study contrasts with traditional reductionist notions which attempt to isolate problem components - akin to viewing a beautiful painting at different distances, case study research allows for detailed examination while retaining broader context (Eisenhardt 1989). Thus, instances which facilitate and inhibit effective Community participation can both be closely scrutinised yet details associated with problem context are not lost.

Since the research involves exploring the effectiveness of Community participation, description of the phenomenon of interest is critical (Eisenhardt 1989). The case study method is therefore particularly appropriate given it allows for the rich detail necessary to examine contextual characteristics of a theory (Eisenhardt 1989). A further characteristic which supports the use of case studies in this research is the fact that they are especially effective where research aims to provide practitioners with evidence based tools (Gummesson 2000).

Retrospective case analysis has been chosen since unlike real-time studies, understanding and targeting of the appropriate case can be achieved. While an observational approach may allow this, time constraints prevented such an investigation. One of the limitations of retrospective research, its reliance on memory, will be addressed through the use of multiple informants and a strong reliance on triangulation with other sources of evidence.

Problem solving research incorporating case studies may be undertaken using multiple or single case analysis. Multiple cases are powerful since investigation can follow a replication logic (Yin 2009, p. 53). However, the merits of conducting single case studies are considerable since they allow for issues to be investigated in a level of detail not usually afforded through multiple case design (Gerring 2004). For this reason a single case method was adopted.

According to Yin (2009, p. 47) there are five rationales for single case design: critical case; extreme or unique case; representative or typical case; revelatory case; and longitudinal case. Longitudinal case rationale follows changes within a single case and is useful for comparative studies. For mature, well formulated theories, critical, unique, or revelatory cases can provide potent avenues for critique. For most types of problem solving research, selection of a typical case is considered important since it allows for exploration within the standard domain. Thus, for exploring Community participation during contaminated site clean-up a typical case is preferable.

Figure 25 defines the stages involved in the application of case study method for developing testing and refining theory (modified from Yin 2009, p57). In the previous chapter, a framework for effective Community-manager participation was described, developed though a collaborative inquiry and theoretical investigation (PERE). To explore the efficacy of the framework and to identify aspects of the problem solving approach which may have been counterproductive to effective participation requires selection of an appropriate case.

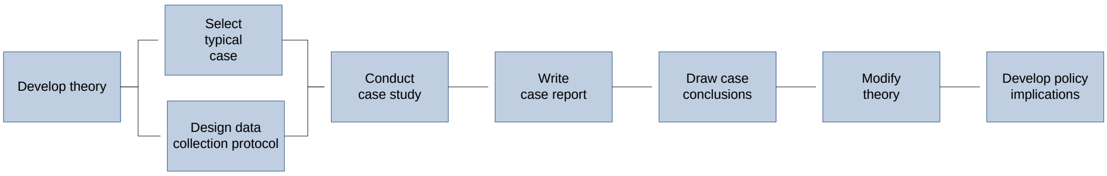

Figure 25. Case study method (modified from Yin 2009, p57)

7.3.2 Selection of a case study

Six potential case study sites were identified for the empirical research stages of the project:

1) Tui Mine, Te Aroha, NZ;
2) Rotowaro Carbonisation Plant, Huntly, NZ;
3) Lake Rotoitipaku, Kawerau, NZ;
4) Former Fruitgrowers Chemical Company, Mapua, Tasman District, NZ;
5) Orica (former ICI site) Banksmeadow in the City of Botany Bay in South-Eastern Sydney, NSW
6) Pasminco Cockle Creek Smelter, Bunderra, in the Lake Macquarie Shire on the coast of NSW.

Each of the potential sites was illustrative of typical environmental decision making processes used to clean-up contaminated sites. Each case involved complex interactions between multiple perspectives. Differences between the cases lay in outcomes which resulted from multi-perspective involvement - some cases have proceeded relatively smoothly (e.g. Pasminco, Te Aroha) whereas others have been marred by controversy and stagnation (e.g. Orica). These potential case studies were identified because preliminary investigations indicated that all were likely to produce sufficiently robust information. All sites had readily accessible websites and archives of information on Community attitudes, and tools, techniques and reports on Community engagement process associated with the sites. Several sites had been the subject of protracted court proceedings, providing valuable information sources relating to the extent of interaction. The location of the potential study sites also allowed primary empirical research to be conducted without exceeding the project budget (some of the other potential sites would have been too costly due to budget constraints).

The former Fruitgrowers Chemical Company site at Mapua was selected as a primary case for several reasons. Firstly, Mapua is a typical example of a complex environmental decision making process: standard stages of problem formulation, option investigation, resolution choice, implementation and monitoring are evident. Mapua is also typical of environmental decision making in that multiple perspectives contributed to the eventual solution. Furthermore, Mapua operates in the New Zealand legislative environment, a context which provides strong opportunities for Community participation. Moreover, Mapua was implemented using a novel clean-up technology which garnered much interest from Community participants. Therefore, the contaminated site clean-up at Mapua presents both a typical case of environmental decision making and an opportunity for longitudinal investigation of issues related to Community participation. These factors establish Mapua as a case relevant for a 'typical' investigation of contaminated site clean-up and justify the use of a single case study.

Practical factors also contributed to the selection of Mapua as a primary case. Extensive archival data are available, good records have been kept by national and regional authorities, non-governmental organisations and Community groups which detail the nature and consequences of interaction. Furthermore, remediation has been recently completed (clean-up was completed in 2007) thus critical decisions, events and incidents are still strongly ingrained in memory.

7.3.3 Research design

The generalised research design involved three distinct layers (Figure 26). The outer layer related to the broad context of participation in environmental problem solving. The subset of environmental problem solving explored in detail related to problem solving during the clean-up of contaminated sites. An inner context involved the investigation of a clean-up at a specific site – The former Fruitgrowers Chemical Company at Mapua, New Zealand.

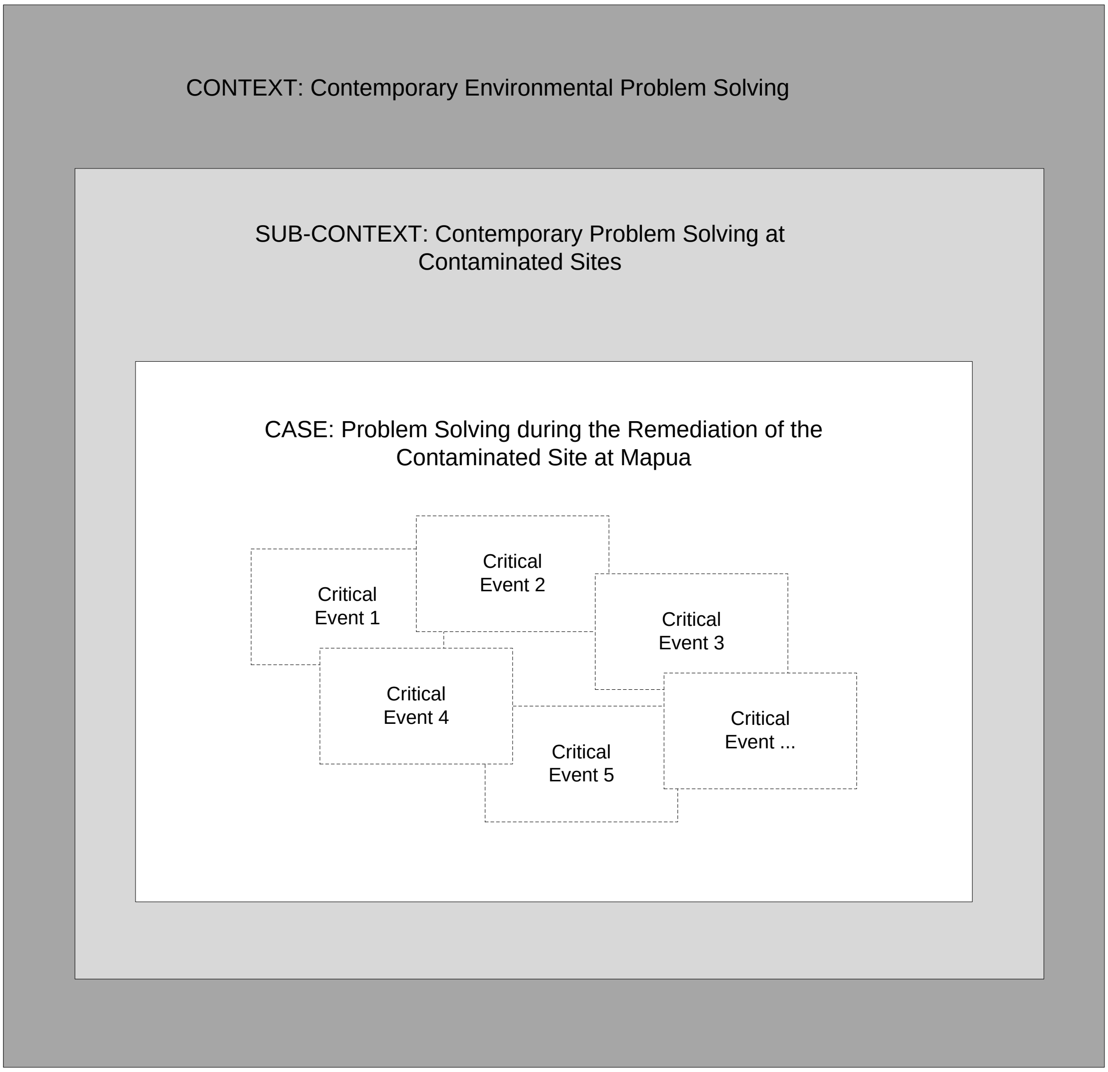

Figure 26. Generalised research design

As detailed in Chapter 2, complex environmental decision making such as the clean-up of a contaminated site involves a network of complex events, which include investigations, decisions, actions, foreseeable outcomes and unforeseen consequences. Embedded within this setting are opportunities for Community participation. In contrast to other studies of participation which have focused on the participation exercises or mechanisms, this study explores the unit of the project. This is because formal participation exercises represent only a small proportion of project decisions and may thus be misleading in determining effectiveness. Furthermore, an emphasis on participation exercises fails to provide a holistic account of participation in a real problem solving context.

7.3.4 Case study protocol

A comprehensive case study protocol was developed which documented ethics, general rules, and procedures. Yin (2009, p79) contends that a case study protocol is essential for maintaining the reliability of data collection. The protocol includes an overview of the research project, issues being investigated and an explanation of project funding for dispatch to participants (Appendix 2). The second section of the protocol documents field procedures, considerations for gaining access to interviewees, ethical requirements, and documents a concrete schedule of data collection. In this manner, data can be collected efficiently and effectively. The third section relates to case study questions. Throughout the process two primary questions were investigated and reflected on, namely:

1) What were the critical contexts for Community participation?
2) Was Community participation effective in these contexts?

Critical contexts are those situations, events, decisions, and actions which serve as potent bifurcation points for either project development or perception. Vergragt (1988) suggests that critical contexts modify problem framings and can lead to transformed problem definitions. Critical contexts are therefore useful to investigate since they enable a detailed understanding of the most important components of project development.

To understand these critical events during the project and their implications for Community participation it is necessary to document:

a) Situations/context. The decisions, actions, investigations or events which had a strong impact on the project;
b) Actors perspectives. Different perspectives on events which had a strong impact;
c) Significance of the events to the actors/epistemological perspectives – sensitivity/stakes which play a pivotal role in determining the extent of involvement.

Critical contexts are informative for investigating effective participation because they are useful for identifying "shadow" elements (Jung 1921). Directly related to mauri, identified in the chapters 3 & 6 as a useful indicator of effective participation, Hunter et al. (2007) suggests that essence may be most easily observed though its "shadow" which "highlights unhelpful, conditioned behaviour, distress from the past and fear of the future." While focusing considerably on shadow elements may appear pessimistic, it may also be viewed as potent learning opportunity (Argyris and Schön 1978). Thus the identification of shadow elements within critical contexts can help to understand: a) whether Community participation was effective, and if not what may be learnt; and b) whether the PERE framework adequately addresses the most important aspects of participation.

7.3.5 Data collection

There are six major sources of evidence which may be collected to develop case analyses (Yin 2009, p101). Those relevant to retrospective case analysis include documentation, archival records, interviews and physical artefacts. Each source of evidence has relative strengths and weaknesses and can best be employed in a complementary manner (Table 15).

Table 15. Four sources of evidence of retrospective case investigation (Yin 2009, p102)

Source of evidence	**Strengths**	**Weaknesses**
Documentation	• Stable – can be reviewed repeatedly • Unobtrusive – not created as a result of the case study • Exact – contains exact names, references and details of an event • Broad coverage – long span of time, many events and many settings	• Retrievability – can be difficult to find • Biased selectivity – if collection is incomplete • Reporting bias – reflects (unknown) bias of author • Access – may be deliberately withheld
Archival records	• [same as those for documentation] • Precise and usually quantitative	• [Same as those for documentation] • Accessibility due to privacy reasons
Interviews	• Targeted – focuses directly on case study topics • Insightful – provides perceived causal inferences and explanations	• Bias due to poorly articulated questions • Response bias • Inaccuracies due to poor recall • Reflexivity – interviewee gives what interviewer wants to hear
Physical artefacts	• Insightful into cultural features • Insightful into technical operations	• Selectivity • Availability

Three principles governed case data collection: collecting multiple sources of evidence, creating a case study database, maintaining a chain of evidence (Yin 2009, p114). By utilising multiple data sources, evidence may be triangulated and any consistencies or inconsistencies noted (Yin 2009, p114). For these reasons, multiple data sources were pursued. Data was stored systematically and important excerpts were arranged chronologically in a Microsoft Excel database, thus improving reliability (Yin 2009, 119). Finally, links were used in Excel and Microsoft Word, maintaining a chain of evidence between the reported facts and the original documents, thus further ensuring reliability (Yin 2009, p122).

There is considerable debate in the literature surrounding the process by which case data is obtained. Some theorists suggest that interview data should be obtained first and conducted with virtually no prior case knowledge. Glaser (1992) argues that interviewing conducted in this manner allows the researcher to concentrate fully on what is being said without overlaying preconceived ideas or other sources of bias. Such an approach is useful for exploratory research (Babbie 1989). However, others argue that it is necessary to have a comprehensive understanding of case details to enable deep questioning and effective interviewing. Kvale (1996, p148) for example suggests that good preparation is an essential element of high quality interviews since the interviewer must know which issues are important to pursue. This research involves problem solving rather than exploratory research, thus comprehensive case understanding prior to interview is more appropriate. Understanding prior to the interview allows the interviewer to inquire into the different perspectives associated with commonly voiced events.

Data was collected iteratively. Iterative collection allows the researcher time to examine data thoroughly, contemplate important case questions or missing elements, consider contributions and to develop more robust conclusions (Glaser and Strauss 1967; Polkinghorne 2005). Where contradictory evidence is discovered, further investigation may resolve inconsistencies or assist in understanding why such differences exist. In keeping with the concept of iterative data collection and desire for comprehensive case understanding prior to interviews, data collection for the Mapua case involved several distinct phases.

Table 16. Three phases of research at Mapua

Phase I: Preliminary	Preliminary research and desktop investigation.	January 2008 - September 2009
Phase II: Exploratory	Extensive archival record and document investigation. Site visit. In-depth interviews of managers and heavily involved local Community participants.	September/October 2009
Phase III: Consolidation	In-depth interviews of Community sample and managers. Supplementary questioning as necessary.	April 2011

7.3.5.1 Phase I

Phase I primarily focused on desktop research to develop an understanding of potentially significant events which occurred prior to and during the clean-up. A general media database search was performed using the keywords “Mapua” and “contaminated” or “clean-up” or “clean-up” which allowed searching national (New Zealand Herald, North and South, Listener), and regional (Christchurch Press, Otago Daily Times, The Dominion, The Nelson Mail) media. Local media was also investigated; all issues of The Coastal News (Mapua’s local newspaper) between July 2001 and November 2011 were examined for articles or comments relating to the clean-up. Back issues of the Motueka Golden Bay News, The Guardian Motueka, Tasman and Golden Bay, and The Leader Nelson were also examined.

All articles were recorded in a database, totalling 140 articles. Media reports and letters to the editor provided a valuable initial history of how the clean-up progressed and an overview of some of the major perspectives.

Media collation was supplemented with preliminary telephone interviews with Tasman District Council (TDC) project staff. Representatives provided a broad overview of the primarily technical aspects of problem solving and many of the issues they faced.

Additional preliminary information was gathered from numerous publically available reports. These included early investigations at the site (Woodward-Clyde 1992, 1993c, b, 1994a, 1995c), first resource consent applications, assessment of environmental effects and submissions (e.g. Woodward-Clyde 1996), data associated with second resource consent (T&T 2003b, c), independent publications from project managers (Fenemor et al. 2002), remedial action plans (Thiess 2004c; MfE 2005d), MfE releases (e.g. MfE 2005b) and reports subsequent to the clean-up (Bell 2008; PCE 2008a, c, b; SKM 2008; PDP 2009). These official reports mostly contained information from project sponsors' perspectives, but significantly included details of major decisions and some insight into how Community participation took place. Furthermore, they provided important contact points for other perspectives.

7.3.5.2 Phase II

The purpose of Phase II was to augment published desktop data with more detailed accounts and sources of information. This stage began with a site visit and familiarisation with the clean-up context. Further archival records were obtained from the Mapua public library (MfE monthly reports), Tasman District Council archives (Mapua FCC Remediation Subcommittee minutes, Mapua Task Force minutes, Peer Review Panel minutes, weekly project meeting minutes, memos, press releases, newspaper archives, correspondence between council staff and other representatives, complaint forms), and the secretary of the Mapua and Ruby Bay Residents and Ratepayers Association (now Mapua and Districts Community Association). In total, over 10,000 pages of information pertinent to Community participation were obtained.

Archival records were supplemented with first-hand accounts of the project. In-depth interviews were conducted with a TDC project manager and member of the Peer Review Panel; a heavily involved member of the public (site neighbour, submitter to both Resource Consent applications, representative on Council-Community Task Force) and a TDC compliance officer who also lived locally. Phase II interviews were performed in a semi-structured manner, with interview questions provided in Appendix 2. Semi-structured interviews were performed to clarify important events, who was involved, when, and how. Phase II interviews lasted between 1 and 3 hours with an average interview time of 2 hours 15 minutes.

7.3.5.3 Phase III

Hard data from Phases I & II was augmented with unstructured, in-depth, purposive interviews (Seidman 2006). During Phase II interviews it was discovered that data collection was too restrictive, therefore, in Phase III it was sought to expand the depth of input. For this reason unstructured interviews were conducted, but it was ensured that all stages of the clean-up were discussed. The 'unstructured' interview in qualitative research methodology is not strictly unstructured, instead it may be characterised as flexibly structured with the express purpose of uncovering unanticipated knowledge (Hesse-Birber and Levy 2003; Warren and Karner 2007). In-depth interviews emphasise information quality rather than quantity (Seidman 2006). As suggested by Seidman (2006, p9), the purpose of interviewing is not to obtain answers, "at the root of in-depth interviewing is an interest in understanding the lived experience of other people and the meaning they make of that experience". The focus was on specific experiences, with the retrospective approach taken to build an understanding of how the clean-up proceeded.

Face-to-face interviews served as the primary source of information during this phase. Attempts were made to gather perspectives from a wide range of people associated with the clean-up through understanding the affiliations of different groups at each stage of the clean-up process (Figure 27). However, time and resource constraints precluded contacting a complete set of participants. Studies on the effectiveness of program evaluation techniques suggest that conducting evaluations on the basis of interviews or surveys of a limited set of participants can lead to significant biases (Leach et al. 2000). Other studies emphasise the importance of fully representing diverse perspectives (Muraskin 1993; USEPA 2003). To combat these distortions, Leach et al. (2000) suggest sampling a range of agents including those directly affected, interested parties and "knowledgeable observers" - highly regarded Community members able to provide a broader account of the issues. Thus a core group of participants was selected closely associated with the clean-up, as well as Community observers. Phase II interviews lasted between 1 and 2 hours with an average interview time of 1 hour 15 minutes.

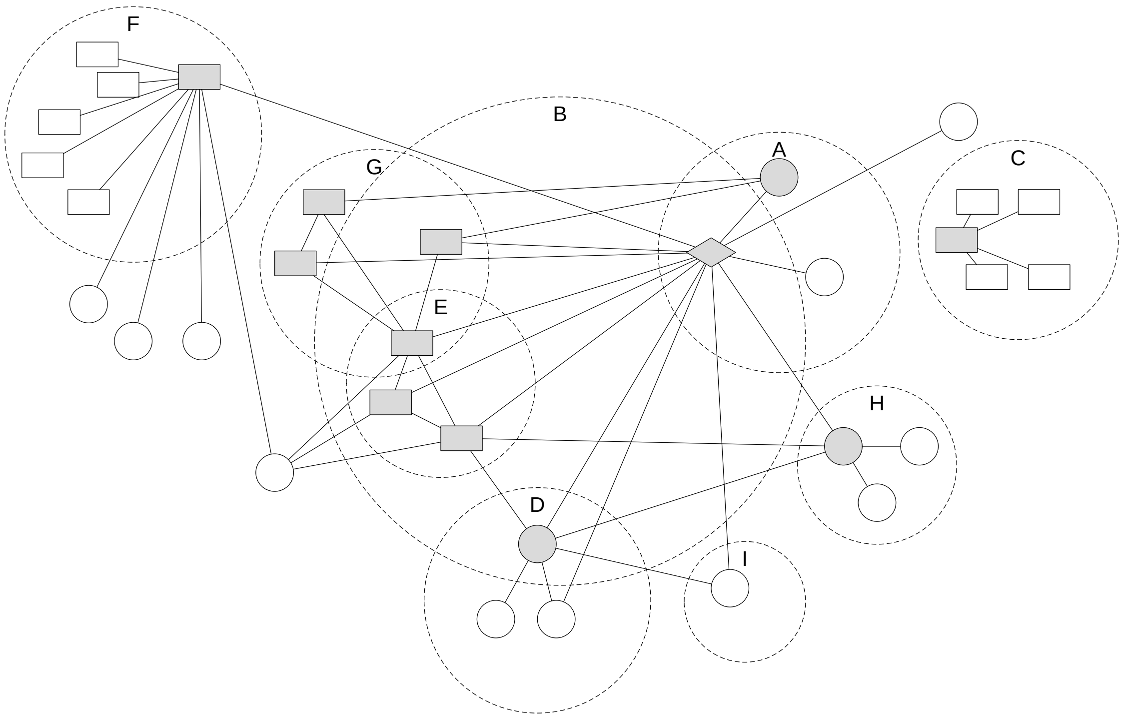

Figure 27. Schematic representation of primary relationships during stage 5, development of the second RAP, at FCC Mapua. Squares represent affected or interested parties; Diamond represents Environmental Manager; Solid circles represent other major technical actors. Shaded boxes represent actors selected for in-depth interview. Dotted circles represent aggregated groupings: A= Landowner (Tasman District Council) B=Mapua Task Force; C=Ngati Rarua; D= Thiess (Project Managers); E=Residents and Ratepayers Association; F=Forest and Bird; G=Adjacent Residents; H=EDL (Technology Vendor); I=MfE

7.3.5.4 Participant Selection

A database of potential interviewees was developed containing a total of 140 people or organisations directly involved in the decision making process. Particular attention was placed on interviewing advocates of each of the dominant perspectives – project managers, directly affected people, indigenous people, local community, environmental NGOs, and scientists. In this way a prioritised list of potential participants was developed.

Potential participants were recruited through email contact or telephone. In total, approximately 30 potential participants were contacted. Participant information sheets and consent forms were delivered prior to interviews being conducted. From these 30 potential participants, seventeen people agreed to participate in the research as formal interviewees. Interviews were conducted with a range of stakeholders including project management staff, municipal authorities, indigenous representatives, scientific and technical representatives, environmental interest groups, community representatives and locally affected people. Although persistent requests were made to Ministry for the Environment officials, interviews were not forthcoming. While it is regrettable that no MfE representatives were able to be interviewed, considerable information regarding MfE perspectives was obtainable through archives and documents. Table 17 provides a list of the principal affiliations of people interviewed

Table 17. List of interviewees

Role	Major Group/s	Interview Location
Member of Local Environmental NGO	NGOs; Women	Home
Local indigenous CEO	Indigenous groups	Workplace
Scientific and technical specialist	Scientific and technical	Home
Compliance officer, environmental scientist	Local government; Women; Affected public; Scientific and technical	Workplace
Project manager, local council representative, scientific advisor	Local government; Scientific and technical;	Cafe
Site neighbour	Affected public	Home
Site neighbour	Affected public; Women	Home
Indigenous site worker	Indigenous groups; Workers and trade unions	Marae
Former worker	Workers and trade unions; Women	Home
Site neighbour	Affected public	Home
Site neighbour	Affected public, Women	Home
Site neighbour	Affected public	Home
Specialist Engineering Consultant	Scientific and technical	Workplace
Local indigenous group representative	Indigenous groups	Workplace
Site neighbour	Affected public; Women	Home
Local resident, former chairperson of Mapua Community Association	Affected public	Home
Department of Conservation officer	NGOs, Scientific and technical	Workplace

7.3.5.5 Interview Process

Interviews began with a short introduction to the research. Participants were then given an additional information sheet and sufficient time was afforded for them to review it independently. Next, participants were informed of their rights as participants, consent forms were explained and an opportunity was provided for any issues or questions to be discussed. The interviewee was then invited to complete and sign the consent form.

To initiate the interview proper, participants were first asked about their connection with the site. Participants were then encouraged to discuss their perspectives of the clean-up and experiences during the course of remediation. Particular attention was placed on exploring major issues which the participants were directly involved with or deeply affected by and expanding on the cause and consequences. At the end of the interview participants were given the opportunity to amend their comments and ask questions.

Formal interviews were conducted in a variety of locations. Five were conducted at the participant's workplace, ten were conducted at the participant's home, one took place in a cafe and one on a marae. Notes were taken during all interviews, with special attention paid to documentation of events perceived as significant, the role in which the interviewee played in those events and the implications for them as well as body language and perceived emotional state. Following the interview, interviewees were invited to provide any additional information. A variety of participants provided notes, letters, and physical artefacts.

All interviews in Phase II, and five selected interviews from Phase III were digitally recorded, with participant consent. Barnball (1994) contends that recording interviews reduces potential interviewer error, enables a nuanced understanding of the interactions between participant and interviewer (i.e. pauses, intonations), and improves the overall completeness of data collection. Thus, participants who were directly associated with the project, able to provide a detailed account of their perspectives (e.g. directly affected party, project sponsors, indigenous representative, worker, and local community member) were digitally recorded.

Digitally recorded interviews were listened to several times and transcribed by the researcher. For the remainder of interviews, a note-based analysis was used (Swartling 2002). Notes were taken describing content, tone, and body language, were written up promptly following the interviews and stored systematically.

7.3.6 Data analysis

7.3.6.1 Development of case chronology

Analysis began with the development of a chronology of the CSM process, documenting contexts critical to the project. Critical contexts were identified in five different ways. Firstly, a review of the Contaminated Site Management (CSM) literature provided broad categorisation. For example, as documented in Chapter 2, CSM progresses through various stages such as technology selection and public comment and review. Secondly, critical contexts were derived from case documents, for example technical reports which illustrated challenges to the project. Thirdly, archival records such as meeting minutes and media coverage provided further indication of importance. Fourthly, correspondence between Community participants and project managers provide signifiers of critical situations. Fifthly, interviews with project sponsors and community participants provide direct insight into perceptions (Figure 28). The identification of critical contexts was an iterative process which evolved as further information was collected.

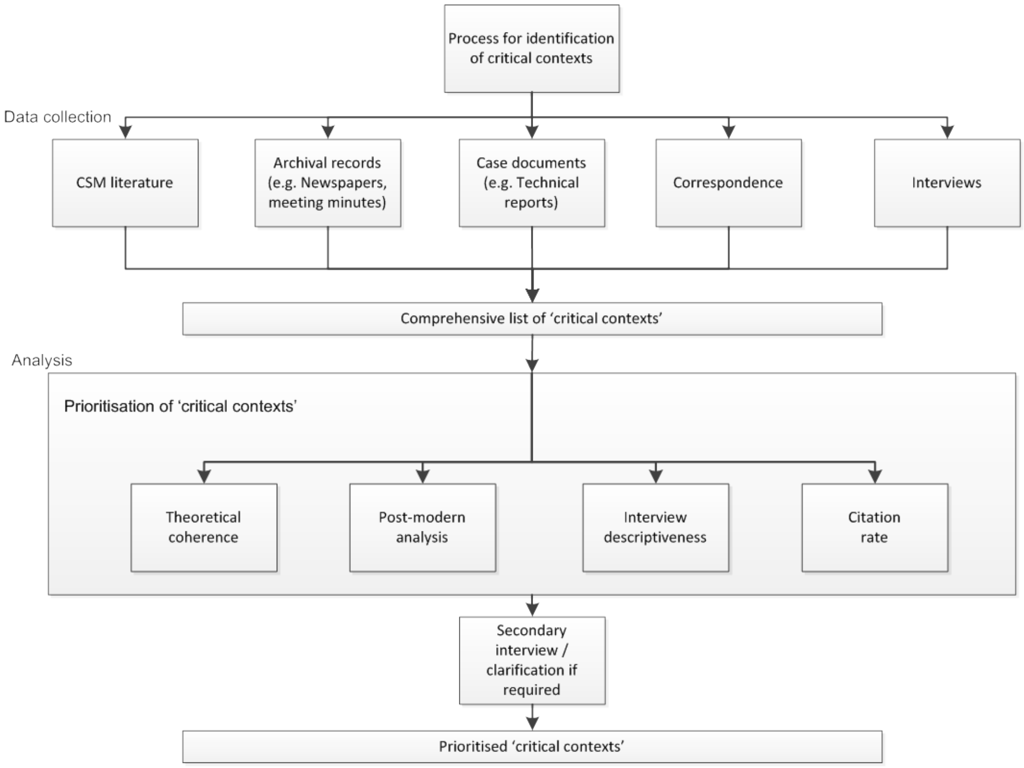

Figure 28. Description of the process used for identifying critical contexts

Critical contexts were designated according to four different approaches (Figure 28). Firstly, critical contexts were determined by theoretical coherence, i.e. whether a context was critical to CSM according to management guidelines. Secondly, critical contexts were determined by post modern analysis (searching for points of difference rather than just typicality, investigating emotional features of the clean-up etc.) (Opie 2003, p248). Thirdly, the frequency that a particular context was cited from different sources (e.g. newspaper archive, interviews, reports) determined how critical it was. Fourthly, interview data were qualitatively assessed for descriptiveness; high level of descriptiveness was deemed to constitute a critical context. If necessary secondary telephone interviews were conducted clarifying information. In this manner a case chronology of critical contexts was systematically developed.

7.3.6.2 In-depth investigation of critical contexts

Following prioritisation, critical contexts were explored in depth. The following questions were used to orient the inquiry:

1. What led up to the critical context?
2. Who was involved in the critical context and how were they involved?
3. What were the feelings of community participants before and after the critical context?
4. How effective was community participation during the critical context?

For the most part, a form of postmodern analysis has been used. Opie (2003) notes in relation to postmodern analysis: “the objective of analysis is to move the data on. It is reliant on what researchers 'see' as valuable and goes beyond reporting on the descriptive or providing a content analysis. Post modern analysis calls for textual strategies (e.g. reading against the grain (attending to the margins), reading for nuance and difference rather than just typicality, attending to particular textual features)." Postmodern analysis was preferred over hard-coding of data, because, as Opie (2003) warns:

> *Perhaps because of the development of software packages for qualitative analysis, some recent articles on modernist qualitative analysis focus on coding procedures, naming codes and the provision of audit trails. Hence there is an account of what package was used, the code names developed, whether or not data was multiply coded, and so on. These accounts unsatisfactorily highlight the mechanics of qualitative analysis. They do not offer an evaluation of the quality of the journal entries or how they advanced the analysis; they assume there is a final point where all data can be ‘accurately’ coded, they suppress differences in interpretive strategies. They prioritise the coding practice rather than using it as a tool, an early analytic process encouraging researchers’ engagement with their data, and they suppress a critical aspect of the analysis, i.e. the reflexive intellectual and experiential capital one brings to bear on that data.*

To examine the degree of influence on the decision making process a modified version of Aggens (1983) orbital model was adopted (Figure 29). For each critical event, participants in the decision making process were identified as one or more of eight orbits. Figure 30 provides a hypothetical example.

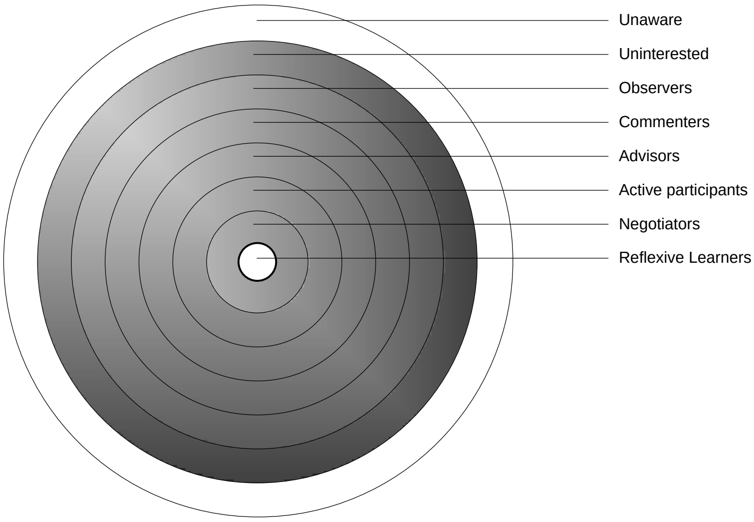

Figure 29. Orbits of influence (Aggens 1983)

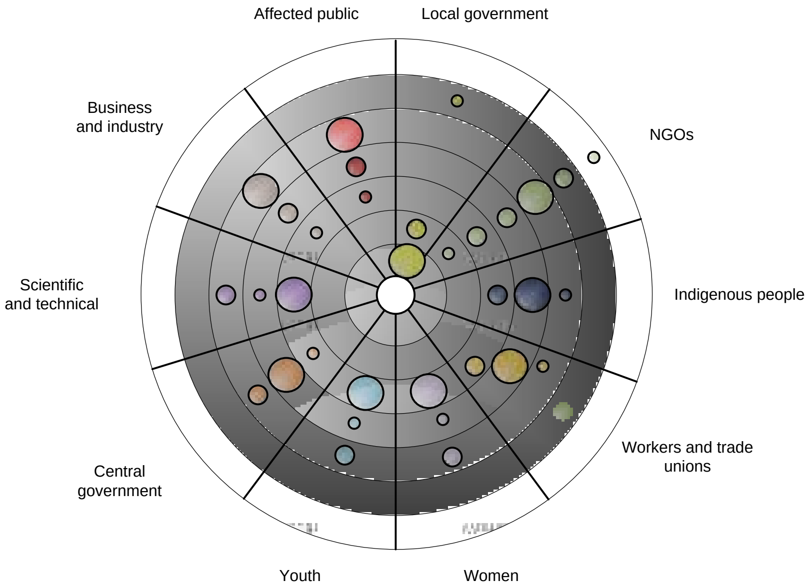

Figure 30. Hypothetical example of the modified orbital model.

Analysis of feelings before and after a critical context was determined by a closed coding. While a number of theories of emotion have been developed, Robert Plutchik's (2001) circumplex model has been widely adopted. Plutchik (2001) contends that there are eight primary emotions: Fear, anger, sadness, joy, disgust, trust, anticipation, and surprise (Figure

31). All eight primary emotions may be exhibited by Community participants during contaminated site clean-up. As noted in Chapter 3, Community participation is frequently emotive, something that most theories of participation fail to recognise. Thus Plutchik's (2001) primary emotions were adopted as a primary analytical aid.

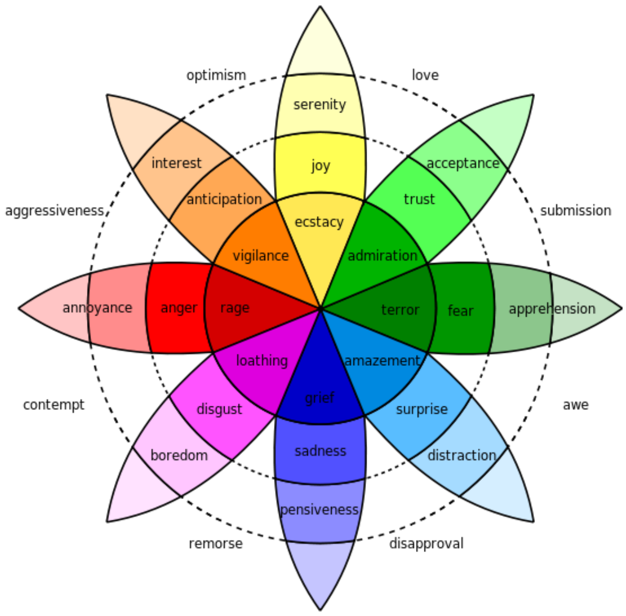

Figure 31. Plutchik's (2001) circumplex model of emotion

7.3.7 Write up

The act of writing up a case is often a neglected aspect of case study research, and a skill in itself (Yin 2009). Case study research is much more than a description of "this is happening, and then this is happening, and then something else is happening" (Hayles 1995). To be effective, narrative requires a sense of how the present relates to past and future and of causal relations between events.

Write up entails constant consideration of boundary and scope – to determine what is included and what is excluded. As beautifully explained by Yanow (1996, pg 52):

> *The practice of writing entails analysing [yet] writing has rarely been considered a methodological issue. Once we move, however, to a world in which multiple, even incommensurable meanings are the rule and social science is not seen as mirroring reality, writing up itself becomes, if not a form of research as data collection, a form of research in its presentation or representation of data. Writing practices themselves are, in this view, ways of worldmaking.*

In general, this filtering of material must be done on the basis of how it helps to inform the core purpose of the case investigation - chiefly to better understand effective community participation during contaminated site clean-up.

7.4 Summary

In this chapter the case study research method has been identified for use in exploring a retrospective case - the clean-up of the former Fruitgrowers Chemical Company site, in Mapua New Zealand. Specific ‘critical contexts’ are to be investigated to explore ‘shadow elements’, or less than effective participation. Furthermore, critical contexts at Mapua will help to explore and test the PERE framework.

8 | Mapua Case Overview

Our knowledge of the way things work, in society or in nature, comes trailing clouds of vagueness. Vast ills have followed a belief in certainty.

- Kenneth Arrow

8.1 Introduction

The purpose of this chapter is to document aspects of the clean-up of the contaminated site clean-up at Mapua which may have impacted on effective participation. For the most part, a chronological case description is performed proceeding through the stages of investigation to post-remediation monitoring. As will be seen however, the case illustrates much of the complexity and challenge associated with large contaminated site clean-ups.

8.2 Legislative context

Legislation provides the structural and procedural foundations for environmental decision-making as well as often setting prescriptive limits on levels of environmental contamination. In New Zealand, obligations arise from a variety of statutory acts, including the Resource Management Act 1991 (RMA 1991), Hazardous Substances and New Organisms Act 1996, Health Act 1956, Health and Safety in Employment Act 1992, and several others (see Table 18).

The primary piece of legislation in New Zealand when considering options for management of contaminated sites is the RMA 1991. The RMA provides a framework for sustainable management of resources through the creation of government, regional council and territorial authority structures and interactions between consent applications and these parties (MfE 2006e). It also specifies the extent of public involvement required by law through the imposition of notified and non-notified resource consents.

Commonly, regulatory bodies set standards for the identification of contaminated land, specifying the degree of contamination that poses an unacceptable risk. Provision for prescriptive standards is made in the RMA 1991 through the adoption of National Environmental Standards (NES). However, during the period of the clean-up at Mapua there was no NES for contaminated land. MfE has recently requested public submissions toward the development of such a standard (MfE 2006c, d, 2007b), and an NES has now been enacted (Resource Management (National Environmental Standard for Assessing and Managing Contaminants in Soil to Protect Human Health) Regulations 2011).

Table 18. Main legislation relating to contaminated land, and relevant areas (MfE 2006c). Modification has been made to MfE's assessment of relevant areas through extension of RMA to include access to information (red) – the RMA necessitates information sharing in the case of notified consent application and inhibits information sharing in the case of non-notified consents, hence plays an important role in public access to information about the options for contaminated site management.

Prevention	Management	Protection of the Environment	Access to Information
Resource Management Act 1991	Resource Management Act 1991	Resource Management Act 1991	Resource Management Act 1991
Hazardous Substances and New Organisms Act 1996			
		Health Act 1956	
		Health & Safety in Employment Act 1992	
		Building Act 2004	Building Act 2004
		Food Act 1981	
			Local Government Official Information and Meetings Act 1987

New Zealand legislation defines contamination very broadly, identifying contamination with a change in certain defined characteristics. The Resource Management Act 1991 states:

"**Contaminant**, means any substance (including gases, liquids, solids, and micro-organisms) or energy (including radioactivity and electromagnetic radiation but excluding noise) or heat, that either by itself or in combination with the same, similar, or other substances, energy, or heat—

> "(a) Changes or has the potential, when discharged into water, to change the physical, chemical, or biological condition of that water; or
>
> "(b) Changes or has the potential, when discharged onto or into land or into air, to change the physical, chemical, or biological condition of the land or air onto or into which it is discharged".

4 (1) contaminated land means land of one of the following kinds:

> (a) if there is an applicable national environmental standard on contaminants in soil, the land is more contaminated than the standard allows; or
>
> (b) if there is no applicable national environmental standard on contaminants in soil, the land has a hazardous substance in or on it that—
>
> > (i) has significant adverse effects on the environment; or
> >
> > (ii) is reasonably likely to have significant adverse effects on the environment

The RMA 1991 pays special attention to those who are likely to be most affected by a proposal. The RMA defines an affected person as "a person or a group of people who may experience an adverse effect generated by the proposed activity that will be greater than, or significantly different from, the effect on other people ("the general public")" (Part 6, Section 95D; MfE 2007c) . The RMA test for whether someone is an affected person is whether the proposal has adverse effects on them that are "minor or more than minor, but are not less than minor" (MfE 2006e). Critically, this decision is made solely by regulatory authorities, and designation of minor or less than minor effects has proven controversial (McNeilly 2012; Thompson 2012).

In New Zealand, soil contamination has been discovered in every region (MfE 2007a). The Ministry for the Environment (MfE) has identified 4,424 contaminated sites, of which 559 have been characterised as high risk (MfE 2007a, pg 247). The problem is clearly not an insignificant one. New Zealand's waste management strategy states that by December 2015, all high risk contaminated sites will have been managed or remediated (MfE 2002).

8.2.1 Public participation under the RMA

The RMA provides directly and indirectly for widespread participation. It assumes that "public participation leads to better outcomes for the environment. Therefore, the environment is the loser if the public is deterred or hindered from participating in the decision making process" (PCE 1996). However, some have criticised the RMA for creating an adversarial system, focused on individual rights and ownership, and dependent on expensive expert witnesses. As one respondent to a parliamentary inquiry into public participation noted (PCE 1996, pA26):

> *The entire culture surrounding public participation and legal services (access to justice) needs to change. The legal processes of adversarial decision making, "winners" and "losers", penalising the "losers" through the awarding of costs, and the extravagant expenses of expert witnesses is not an appropriate model for decision making where a range of values are always present. The basis for the legal approach is rooted in private property rights, the expropriation of resources to maximise profit and a market philosophy that sees individual members of a civic community as units competing with each another to satisfy individual needs (usually at the expense of one another). This adversarial culture is not an appropriate basis for a society that wishes to implement sustainability principles*

8.3 Chronology of the clean-up at Mapua

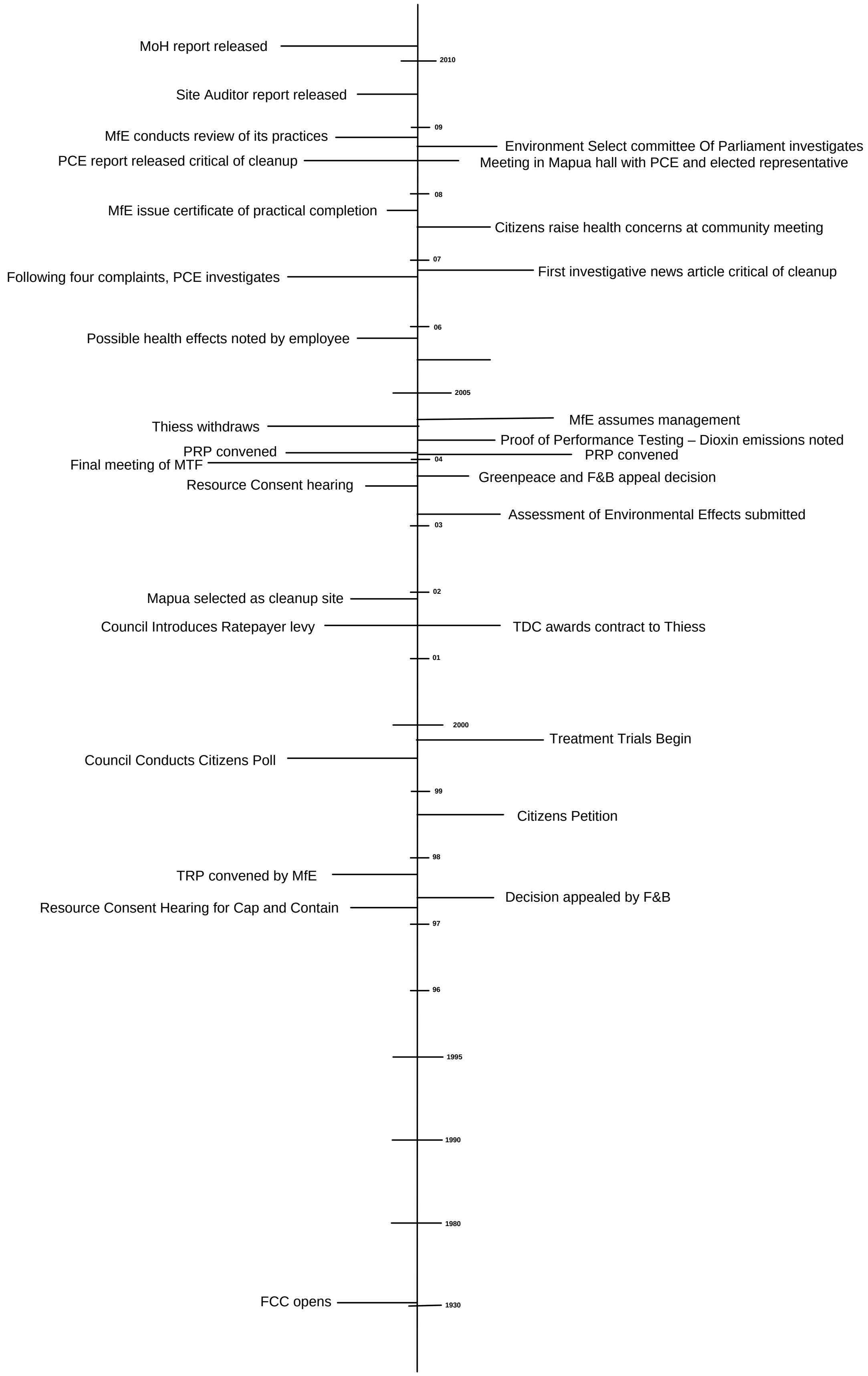

Figure 32. Chronology of events related to the contaminated site and subsequent clean-up at Mapua

8.3.1 Background

Mapua is a small coastal community with a population of approximately 2000 people, located at the north of the South Island (Te Wai Pounamu) of Aotearoa New Zealand (Statistics New Zealand 2008) - Figure 33. It has been occupied since the archaic period of Maori settlement (900-1450AD) due to an abundance of seafood, and was first settled by Europeans in the 1850s. In the early 1900s the pip fruit industry began to expand in the surrounding area and Mapua became a trade hub due to wharf expansion (MfE 2011a).

Figure 33. Location of former Fruitgrowers Chemical Company site, Mapua (Red (A))

Between 1932 and 1988 the Fruitgrowers Chemical Company (FCC) produced pesticides at their formulation and micronising plant in Mapua (MfE 2011a). Initially, the FCC was a revered part of the community, however in the late 1970s concerns were increasingly raised about emissions from the plant (North and South 1993). Following a series of high profile incidents, such as a substantial fire at the plant, a grassroots movement formed to encourage FCC to be more accountable to local issues and to control discharges (MfE 2011a). The regulatory regime at this time possessed little power to control emissions, thus lagged behind the concerns of citizens about risk issues.

The 1980s were a time of demographic transition at Mapua, with the community historically composed of members closely aligned to the pesticide plant gradually being replaced by increasingly affluent residents. To these residents, the FCC represented a blight and was not part of their community vision. As prominent citizen Bill Williams noted “We were fighting the factory on its right to manufacture toxic substances in the heart of a community, and we were trying to stop the dumping of that waste in other parts of the district” (MfE 2011a). As such, the community became increasingly divided between those loyal to the plant and those vehemently opposed to it.

In the mid 1980s considerable support for increased discharge control was evident. Pressure from citizen groups led to a review of discharge limits in 1986 and eventual operational closure in 1987 (MfE 2011a). Local citizens, with knowledge of past activities at the plant, were well aware that a potentially severe contamination threat existed, and in 1989 the first discussions occurred between council, landowners and locals about possible clean-up. These early discussions broke down after the company expressed reluctance to investigate contamination concerns.

Although contamination was deeply suspected, statutory authorities did little to force landowners to investigate. The Health Act 1956 empowered the Health Department to investigate and compel polluters to remediate. Under the auspices of newly developed resource management legislation, (Resource Management Act 1991), regional authorities became obligated to protect coastal and marine resources. Contamination of the estuary was highlighted by Department of Conservation representatives and environmental NGOs, pressuring council to fulfil their statutory requirements.

In response to enquiries from citizens and concerned groups, local authorities suggested they lacked power to force investigation and that the contamination was primarily an issue for Public Health. Public Health Authorities, although expressing concern about possible implications for public health, were largely impotent, lacking technical skills and financial resources to investigate and enforce the Health Act. Furthermore Public Health officials were disinclined to pursue stringent enforcement because of past inabilities to reclaim remediation costs. The failure of authorities to act in response to citizens’ concerns was a mobilising influence for further inquiry.

Citizens were concerned about the possible health implications of the contamination and raised concerns through letters to councillors, TDC staff, central government, and health authorities. Furthermore individual citizens gathered together to form collectives - Moutere

Districts Community Health Committee, and the special committee of the local Residents and Ratepayers Association.

Tasman District Council owned portions of potentially contaminated land as a result of transfer of title from the former Harbour Board. Following receipt of this land TDC commissioned initial investigations by an environmental engineering consultancy to ascertain the extent of contamination. The consultants performed an audit of operations to establish potential contaminants on site and identified significant risk to the estuary. In 1992, to fulfil obligations to protect the estuary a slurry wall was constructed to partially arrest contamination (Woodward-Clyde 1993c). The slurry wall intervention was conducted with minimal community consultation or input.

Following protracted negotiations, TDC with contribution from central government agreed to subsidise investigations at remaining areas of the site (Bioresearches 1993). Although partially funded by regulatory authorities, these investigations remained the property of the site owners, and were not immediately disclosed to the public.

Although the substantial communication between the local authority and community groups was evident, knowledge derived from investigations was distributed slowly and in instances of commercial sensitivity, not at all. Commonly therefore, community enquiries were initiated from second hand information. Evidenced i*n a letter to the TDC from a local Community Health Committee requesting reports (CHC 1993):*

> *We want to be a responsible, not an emotional lobby group for our community; for this we need facts, not hearsay and supposition.*
>
> *It may be that there are good reasons for keeping these reports confidential at this stage; please be assured that we would not jeopardise any possible resolution of the problems by acting irresponsibly. Any premature statements or actions are more likely to be the result of ignorance on our part.*

The decision by TDC not to release information immediately appears to have been largely due to negotiations that were occurring regarding any possible liability. However, the reactive approach taken by council generated uncertainty amongst citizens surrounding the status of the land, and perceived benevolence of those managing it. It is evident that concerned citizens wished to be more than passive recipients of risk information at this early stage of investigation, yet possessed little agency for more substantial involvement.

Following technoscientific confirmation of the contamination problem a further series of more detailed investigations was commissioned, exploring sources and possible receptors, including risks to human health (Woodward-Clyde 1993c, a, b, 1994a, b, 1995b, c, a). The outcome of these investigations was a preliminary site assessment and conceptual model development, and an early identification of technically feasible methods for containing the contamination.

To assist council in overseeing the possible remediation project, in 1994 a special council task force was initiated. The Mapua Task Force (MTF) initially consisted of three councillors, representatives of the Environment and Planning department, and a single community representative. This representative was intended to provide a link between council and community (MTF 1994). Simultaneously, a Subcommittee of Council (Mapua FCC Subcommittee) was established to consider wider implications of the project, solely composed of elected representatives from the MTF and council staff. FCC Subcommittee considered legal, risk and financial issues pertaining to the project.

In 1996, Council made the important (and somewhat controversial) decision to take over ownership of the site and responsibility for remediation (Fitzsimons 1999; PCE 2008a; MfE 2011a). Soon considerable evidence emerged that any remediation effort would come at substantial cost. Financial considerations strongly affected which technologies could realistically be implemented. Contributions from central government were uncertain, thus TDC through the Mapua FCC Subcommittee decided to constrain project scope to a very limited budget. Furthermore TDC possessed limited technical capability, thus relied substantially on external consultants. At the request of TDC, the engineering consultant provided a number of possible remediation options, including to cap the site and contain the contamination, bioremediation and soil treatment.

Investigation of remediation options was undertaken solely by the engineering consultant. Council scope restrictions essentially limited the space of possibilities to be investigated by the consultant. Subsequently only a very limited number of possible options were pursued in any level of detail. Options other than standard engineering procedures were quickly discounted due to cost or process control concerns. Perhaps unsurprisingly, the engineering consultancy offered a solution with which they were familiar – to cap the site and contain the contaminants.

Submissions by two environmental NGOs questioned the council's proposal as well as the process of implementation. Royal Forest and Bird Protection Society (Forest and Bird) disputed the fundamental choice to cap the site and contain the contaminants (F&B 1996). For Forest and Bird, insufficient investigation of possible options for treatment of contaminants had been conducted, therefore the competence of the inquiry was called into question. Furthermore, they suggested that a cap and contain solution did not constitute sustainable management of the land, since it left a significant risk for future generations. Thus, a fundamental difference in values is apparent between Forest and Bird and project managers, with core disagreement over the vision presented.

For a second NGO, Friends of Nelson Haven and Tasman Bay (FoNH), the process of implementation was paramount. In particular, consent conditions which enabled implementation plans to be developed without community consultation proved to be a source of conflict (FoNH 1996). FoNH desired stronger measures for community input during implementation.

Furthermore, central government demonstrated a reluctance to endorse the 'cap and contain' vision for the site. Instead they contended that new cost effective technologies would most likely become available in the near future which would be able to fully treat the contamination. Thus, central government questioned the competence of the TDC vision, and instead endorsed the alternate vision of treatment.

In the interests of fairness and to reduce the likelihood that the decision would be contested, council appointed three independent commissioners to preside over the resource consent hearing. The commissioners' decision placed severe restrictions on the end-use of the site, thus validating many of the concerns raised by NGOs. Restrictions were intended to ensure that future treatment would be possible, however, it also eliminated council's ability to amortise remediation costs with the sale of land. The decision was subsequently appealed by Forest and Bird on the basis that containment was unsustainable and unacceptable.

Following the resource consent decision and subsequent appeal by Forest and Bird, central government convened an expert panel to explore technical options for treatment of the contamination. The Technology Review Committee's (TRC) role was to conduct a due diligence assessment of technologies prior to any commitment to undertake a clean-up of the contaminated site for the Minister for the Environment and the Tasman District Council (TRC 1997c). The TRC's principal aims were:

- Explore a strategic approach to cost-effective site clean-up of the Mapua pesticides contaminated site that takes into account the needs of collaborating parties;
- Ensure that technical, policy, procedural, timing and community concerns, and costs, are properly identified and taken into account;
- Provide the Minister for the Environment and the Tasman District Council with information relevant to a decision on the clean-up.

The TRC anticipated that several new technologies were close to being developed which could effectively treat the contamination. In 1997 Expressions of Interest were obtained from technology vendors resulting in a preliminary assessment of options (CMPS&F 1997) and a short-list of four treatment technologies.

The TRC consisted of six members with expertise in organochlorine contamination and remediation, selected at the discretion of MfE officials. Panel members all demonstrated similar characteristics: experienced males closely aligned to the technoscientific regime (TRC 1997b). The TRC met four times before being disbanded by MfE. The single and important outcome of the TRC's recommendation was that treatment would be technically challenging and expensive, with costs estimated between $5 – 11 million (TRC 1997a).

Through the Mapua Remediation Subcommittee, TDC had committed $2 million towards the clean-up, however, central government was yet to make any firm commitment. A variety of actions were taken to persuade government to contribute. Community representatives wrote letters to the local members of parliament and the Minister for the Environment. Furthermore, a community representative sent a petition to Parliament signed by 300 local residents requesting sufficient funding for 'full and final clean-up'(Motueka Golden Bay News 1998). The TDC also petitioned to parliament on the basis that contamination of the land at Mapua was both a national responsibility and a site of national significance. The issue divided citizens (Clark 1999):

> *Tasman ratepayers have been divided over whether the council should put up more money towards the clean-up, with both supporters and opponents putting their views forward in submissions to the council's 1999-2000 plan. Some said the council had a*

responsibility to ensure the site was cleaned up properly and should make the most of Government's funding offer. Others said they objected to their rates being used to clean-up a problem which it did not cause.

By the late 1990s, it became evident that there were numerous sites in New Zealand which were contaminated and potentially threatening to human health and for which no party could be held individually accountable and thus forced to remediate (Kingsbury 1998). In mid-1999, central government finalised an overarching strategy for management and remediation of these 'orphaned sites'(Parliament of New Zealand 2009). Mapua became the centrepiece for effort surrounding orphaned site management, being labelled as "New Zealand's most contaminated site" (Fenemor 2003). Central government finally committed $3.7million toward the clean-up.

With government funding the TDC became closely tied to central government priorities, especially surrounding public perceptions of the remediation project. Although funding from central government was not committed to any particular remediation strategy, the Minister for the Environment demonstrated a clear preference for treatment over options which simply contained the contamination (RSNZ 1999). Treatment was still thought to be the more sustainable option in the long term, idealistically representing complete destruction of contaminants and negating any future concerns.

8.3.2 Selection of a novel treatment technology

With funding secured, TDC could pursue a more extensive investigation of remediation options for the site. TDC's first action was to more comprehensively understand technical specifications for the eventual fate of contaminants. TDC commissioned an external consultant to develop risk based criteria for a range of end uses for the site, as well as limits for deposition of partially treated contaminants in a local land fill. After a substantial review of worldwide clean-up criteria the consultant produced site specific limits for a range of chemicals of concern, for open space, residential, and commercial end use (EGIS 2001). Recommendations were peer reviewed by another consultant based in the United States and were accepted by members of the Mapua Task Force (MTF).

The setting of remediation objectives was achieved with some community consultation (Figure 34). TDC set the scope of the remediation to a specific area of the site and focused on surface contamination but were yet to define the end use for the site. TDC appeared to favour a mixed approach with areas of residential and non-residential use, but they engaged with some members of the community regarding options. TDC engagement focused on the local community and to a lesser degree NGOs, indigenous people were not consulted. The residents and ratepayers group were involved in discussions of endpoints and were generally aligned with the council - they did not wish to have the whole of the site treated to residential levels. A resident explained (Interview 3):

> *We had to start lobbying because it was all over the zoning of the land. We knew we couldn't get it residential, nor did we want to 'cause if we kept it under that industrial it could be a park at 200ppm.*

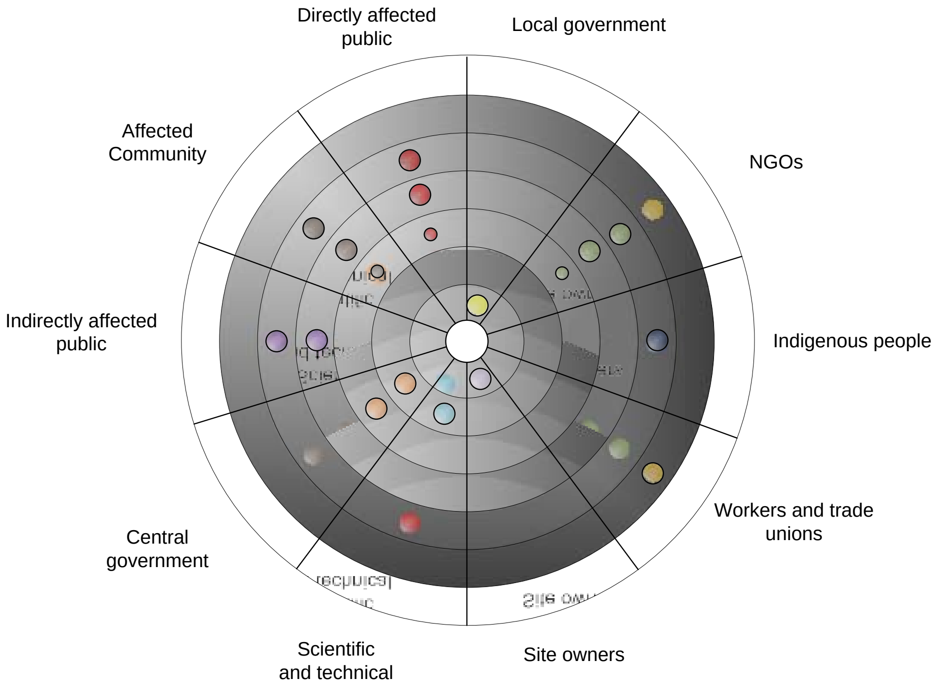

Figure 34. Extent of involvement during the setting of clean-up objectives during the second remediation feasibility analysis

A mixed end use approach was favoured but other options were left open in case remediation technologies were able to cost-effectively comprehensively treat the contamination. TDC were then able to commence investigations into a remediation strategy. A second international call for Expressions of Interest in 1999 resulted in twenty-six companies offering technologies for trialling (TDC 2001). Six companies were short listed and three companies trialled their technologies with soil taken from the site. The technologies trialled included two novel bioremediation techniques and a novel ball milling technique known as Mechanochemical Dehalogenation (MCD).

The primary purpose of these investigations was to ascertain the applicability of prospective treatment technologies. Initially, TDC project managers proposed to have laboratory and pilot sized trials with a central control, independent monitoring, and have the pilot trials located at Mapua (TDC 2001). However, practicality and cost barriers precluded this controlled approach being adopted. Instead, samples were sent to technology vendors in Auckland and Canada, and analysed independently (Interview 2). One bioremediation technology vendor implemented on-site trials. Trialists were screened by technoscientific advisers according to qualitative estimates of technical efficacy and confidence (Table 19). Investigations by TDC suggested that the three companies each demonstrated technologies capable of reducing contamination (to levels for groundwater protection).

Table 19. Summary of Findings for Mapua Treatment Trials (TDC 2001)

Issue	ERL	EDL	Waste Management
Confidence in claimed reduction in pesticide concentrations	High	High	Low – Medium
Potential for treatment to achieve soil suitable for leaving on site	Low	Medium (residual nitrogen needs to be further considered)	Low
Potential for treatment to achieve soil suitable for disposal to landfill	Low – Medium (residual dieldrin levels likely to require secure containment)	Medium – High (residual nitrogen needs to be further considered)	Low – Medium (residual dieldrin levels likely to require secure containment)
Potential to be able to treat full range of wastes	Low Not clear	High	Low (Thermal desorption may be required for high concentration material)
Other issues	Odour (large volumes of manure involved)	Noise, vibration, water stream	
Potential for acceptable level of cost	Low – Medium (insufficient information to determine this)	Medium	Low – Medium (depends on need for and cost of thermal treatment)
Overall: Potential to have achieved an acceptable treatment process	Low – Medium	High	Low – Medium

Further knowledge of site and contaminant characteristics was obtained during this time. Excavation and screening of 300 cubic metres of contaminated soil for these treatment trials provided information on the variability of the contamination, and how to handle excavated soil (TDC 2001). Test pits in the FCC landfill and a contamination vs. particle size investigation were completed. All information was synthesized for estimating likely volumes of contaminated material. Although excavations involved intrusion into a potentially valuable archaeological site with strong tangata whenua (Māori) connections, no hapū (local sub-tribe) members were consulted.

During this period extensive effort was made to include local community concerns. Communication from project managers to directly and indirectly affected citizens was enhanced by regular updates posted in local newspapers and mail drops, which included common questions and answers vetted by community members on the MTF. Intensive communication had also been bolstered, the number of community representatives on the Mapua Task Force was increased from one to three, thereby enabling a stronger community voice and advisory role. Furthermore, extensive links existed between community representatives on the task force and the Residents and Ratepayers Group, as well as Forest and Bird.

In February 2001, the three successfully trialled technology vendors as well as a fourth technology (thermal desorption - not initially trialled as its efficacy had been deemed sufficiently demonstrated) were invited to tender for remediation of the site. Tenders were evaluated according to six attributes set by engineering consultants (MWH). These attributes were: Financial Security (minimum level required), Experience and Track Record (15% weighting), Project Appreciation and Risk Management (15%), Standard of Clean-up Proposed (30%), Degree Proven (15%), Price (25%) (Fenemor 2003). In June 2001, after vetting recommendations through the MTF, the Remediation Sub-committee of Council awarded the contract to an Australian Remediation Company, Thiess Environmental Services, based on the trialled MCD technology from Environmental Decontamination Limited (EDL) for a mixture of commercial and residential clean-up criteria.

8.3.3 Development of the remediation strategy

Thiess's contract with TDC consisted of the following stages:

- Stage 1 – Final Site Characterisation, trialling, planning and submittal of Resource Consent Applications
- Stage 2 – Environmental Permitting and Finalisation of Stage 3 of the Contract
- Stage 3 – Site Remediation Works in accordance with the approved remedial action plan, including auditing that the site meets the target criteria

Thiess began with a more extensive effort at site characterisation. A sampling regime was implemented based on an expert assessment of likely contaminants. In this way knowledge was gained about the chemical constituents and approximate volumes to be treated. At this time, costs were estimated to be $6.5 million, with contributions from the government and

TDC (NZPA 2003). TDC partially funding the project through a uniform annual charge of $12 per ratepayer (Huband 2004b).

Contracts which set out responsibilities for clean-up during Stage 1 are displayed in Figure 35. Several potential difficulties are apparent. Firstly, the unsigned funding agreement from Government generated uncertainty in the allocation of resources, and how much could be spent to clean-up the site. Secondly, as can be seen the allocation of responsibilities is multifarious, in a situation which PCE (2008a, p22) described as complex due to the “various ‘hats’ worn by the parties”. As can be seen, TDC is both the land owner/primary project manager and the consent authority, a situation with the high potential for conflicts of interest.

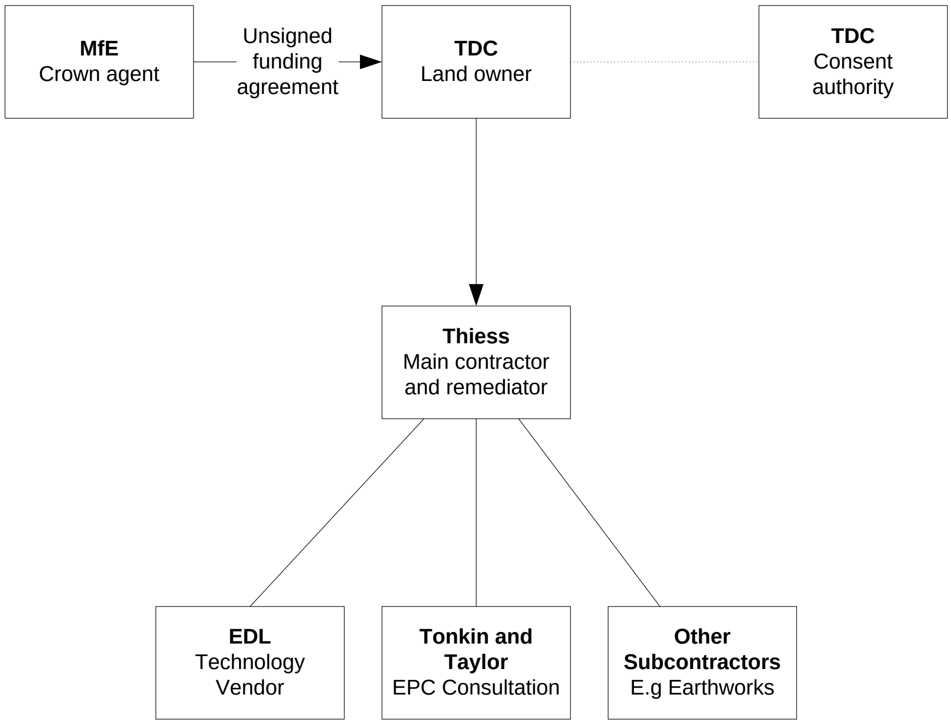

Figure 35. Summary of contracts relevant to Mapua

Although the remediation provider had been chosen, decisions were yet to be made regarding where to treat the contaminated soil. TDC in conjunction with the remediation providers surreptitiously investigated other sites for treatment and disposal. Three sites were earmarked as potential treatment locations, all were within trucking distance from Mapua, relatively isolated and had historic use in either timber treatment or refuse disposal (Figure 36). For TDC and the technoscientific perspective, additional risks to adjacent residents would be insignificant and would greatly reduce the noise and nuisance effects on Mapua citizens.

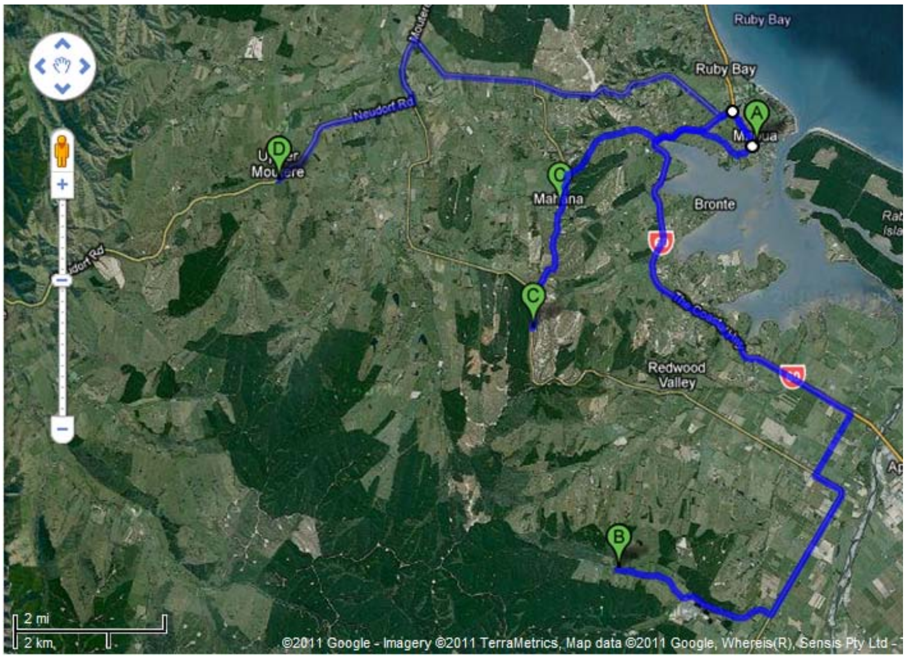

Figure 36. Approximate location of alternative treatment sites for Mapua contaminated soil.

However, disclosure of the consideration of alternative treatment sites immediately resulted in public outrage from communities which were possibly affected. The technology vendor suggested that residents acted as though the remediation was going to be “a Chernobyl located among an orchard” (Collett 2001). For project managers, the outrage of the satellite communities, combined with the relatively amenable disposition exhibited by Mapua residents proved to be sufficient for on-site treatment to be targeted. In late 2002, Thiess and EDL thus decided to treat all contaminants on site and began the process for full scale operation.

8.3.4 Preparation of the implementation plan

Tasman District Council deemed that the construction of plant on site and associated full scale treatment trials did not require public notification and granted resource consent for discharge of contaminants to air. Full-scale plant was commissioned and a series of treatment trials were conducted. Firstly, a series of ‘dry’ runs confirmed mechanical performance; this was followed by input of small quantities of ‘wet’ i.e. contaminated soil. Wet trials enabled controlled tests to be conducted on known quantities of contaminant, thereby establishing the efficacy of the treatment technology. Although treatment trials were largely successful at reducing contaminant concentrations, early issues were highlighted surrounding vibration concerns and production rates (Barnes 2003).

Extensive community engagement occurred during this trial period, co-ordinated by a third-party consultant (Tonkin and Taylor). A telephone hotline was set up to respond to community concerns and inquiries. Site visits at periodic intervals enabled members of the public to see first-hand the technology. Information was regularly posted in community newspapers and regional newspapers consistently ran articles updating the broader community. Specific consultation occurred to various community groups and NGOs, in particular the local community association, local Iwi and Forest and Bird (whose original appeal was still in force) (T&T 2003c).

The engagement consultant systematically managed communication. Residents were separated into groups according to location, and substantial effort was made to ensure that they were aware of the proposal, kept informed of activities at the plant, and that any questions were quickly addressed. Residents criticised systematic approach, suggesting it was intended to “divide and rule” (Interview 3) the community. Nevertheless the strategy enabled the development of a rapport between citizens and project managers, or more specifically, their sub-contracted representatives from the engagement consultancy.

It is apparent that for the most part the community consultation was intended to disseminate ‘facts’ established by project managers, the community consultation appendix to the Assessment of Environmental Effects (AEE) states (T&T 2003b): “a key goal of the consultation process for this project is to disseminate clear and factual information to minimise the potential for uninformed and irrational objections to the project.” Residents were kept well informed and encouraged to ask questions, and were directly exposed to the competence of highly trained remediation staff.

8.3.5 Public comment and review

In mid-2003, Thiess submitted an application for a series of resource consents to enable full-scale operation of the plant including an assessment of environmental effects. Seven consents were required for discharges to air, land, sediments, surface water, earthworks and coastal disturbance, and to divert (and intercept) groundwater (RM030521-7). In accordance with Section 94 of the RMA the application for consent was publicly notified. An advertisement was placed in the Nelson Mail on 25 June 2003. In addition, TDC wrote to 112 individuals and organisations notifying them of the application for resource consent submitted by Thiess. An Executive Summary of the applications was included in the notification letter, the full AEE was also sent to immediate neighbours, statutory agencies and interested groups.

A total of 38 submissions were received. 12 submissions fully supported the proposed resource consent applications; 14 submissions supported the applications subject to some suggested amendments, 10 submissions opposed the applications but suggest conditions that would make them acceptable (i.e. hours of operation, monitoring and compliance of nuisances such as dust, noise, and vibrations); 2 submissions opposed to the applications.

8.3.6 Resource consent hearing

At the resource consent hearing, representatives from Thiess, EDL, TDC, and MfE presented a unified voice illustrating the process that had led up to the preferred technology selected as well as the controls which would be implemented to minimise effects. A Proof of Performance (PoP) phase was advocated to better assess technology efficacy. Particular emphasis was placed on the air emissions control equipment and limits placed on the soil drier. To assuage NGO fears of possible dioxin production in the drier, assurances were made that running temperatures would not exceed 120^{o}C. To guarantee protection of human health, a Total Hazard Index (THI) was advocated (T&T 2003b). The THI was based on environmental monitoring data collected from deposition units and routine stack testing. Exceeding a certain value (0.5) warranted further investigation into the process or immediate shutdown (1.0). Furthermore, assurances were made that no odour, dust, particulate, smoke, ash or fume considered noxious, dangerous, offensive or objectionable would be discharged beyond the boundary of the site. Indigenous input was to be mediated through the Iwi monitoring protocol. Community liaison was advocated through continuation of the freephone number, a system for registering complaints, regular news updates and regular meetings. Furthermore, an overview panel, analogous to the Mapua Task Force was advocated to fully integrate community concerns into routine operational decision making. At this stage, advocates suggested the project would take 18 months to complete.

On the basis of this evidence the commissioners granted resource consents. By and large the commissioners adhered to the conditions sought by the applicant. Commissioners however acknowledged the complexity of the remediation effort and requested that further controls were put in place to manage it. A significant difference between the proposal and the commissioners' ruling was the replacement of the overview panel with an expert Peer Review Panel (PRP) which would oversee the project and provide advice to the consent authority. This replacement demonstrated a perception by consent commissioners that the overview panel would be less competent in detecting and addressing concerns relevant to the project than a panel of experts. The resource consent commissioners' report states (Johnston et al. 2003):

> *Greenpeace's concerns in part arose from what they felt was inadequate documentation of the MCD method in the AEE. Certainly there were gaps in the AEE but at the hearing a considerable amount of information was presented and it would appear that the concerns of Greenpeace in relation to such matters as to the release of dioxins were largely satisfied. Greenpeace's and others concerns that the MCD method might not live up to expectations is not an issue that needs to be addressed by the Commissioners. Provided sufficient conditions to ensure that the site is not left in a state worse than it is at present, along with conditions to ensure that the applicant's activities are not detrimental to the environment and adjoining residents, then consents can be granted. However, from the trials to date, coupled with the endorsement from the MfE and the manner in which the applicant intends to undertake the remediation, we have no reason to believe that remediation to the standards sought can not be achieved without undue risk.*

Rather ominously, the TDC Environment and Planning Manager noted (24 October 2003):

> *Some of the conditions are going to cause a problem if there is a point at which we come to some disagreement with Thiess... I include in this category the relationship between the Council's compliance co-ordinator, the site auditor and the peer review panel (which is uncertain in law and does have some cost implications on the project)... In the absence of an appeal we will have to achieve a workable understanding on these matters in the knowledge that legal action to force compliance (if such a step ever proved necessary), is unlikely to be available.*

Two Environmental NGOs, Forest and Bird and Greenpeace appealed the commissioners' ruling. Their primary concerns related to perceived inadequacies in monitoring, particularly during the proof of performance phase, a clarification and expansion of peer review panel responsibilities, and implementation of measures to ensure consent conditions were specific, clear and accurate to enable enforcement, especially in relation to air discharges.

A process of arbitration between Thiess, TDC, Forest and Bird and Greenpeace then ensued in a climate of high pressure and uncertainty. MfE had threatened to withdraw funding for the project unless appeals could be promptly settled (Interviews 2 and 17). The NGOs relented on certain key requests, in particular the inclusion of a member of Forest and Bird on the PRP, background tests for dioxin, the ability to review and comment on the process prior to Phase Three. It is evident that Forest and Bird and Greenpeace made substantial concessions in relation to their desired monitoring regime - it is clear that the NGOs, while not entirely convinced in the process safety, did not wish to be seen to jeopardise the project. Following arbitration, the Environment Court granted the consents, thus allowing full-scale implementation of the remediation plan to commence.

8.3.7 Detailed design, implementation and verification of works

The resource consents specified several mechanisms for assisting in eliciting and incorporating community perspectives. The first system mandated by the resource consent included face to face engagement with the community at regular intervals. Specific details listed in the consent follow ("Community Liaison"; Condition 7):

> *After one month's operation of the MCD Plant, and at three-monthly intervals thereafter, the Consent Holder shall hold or attend a public meeting with the local community to present the results of all environmental monitoring data. The meetings will also be an opportunity for the Consent Holder to receive comments from the community regarding their experiences of the site operations up to that point. These meetings must be well advertised locally.*

A second community participation system listed in the consent relates to a system for immediate feedback to and from residents. Still listed under "Community Liaison"; Condition 8 reads:

> *Prior to commencement of the works the Consent Holder shall appoint a person who can be contacted by residents of Mapua about any aspect of the remediation of the site. The name of the person and a contact phone number shall be contained in a notice displayed at the main entrance of the site. In the advent of the contact person being unavailable the Consent Holder shall ensure that an alternative person can be contacted.*

A third community participation component of the consent related to information disclosure to the community. Condition 13, "Reporting" states:

Throughout the duration of the remedial works, the Consent Holder shall provide a monthly progress report, including all environmental monitoring data required by this Consent to the:

- *Council's Compliance Co-Ordinator;*
- *Site Auditor; and*
- *The Peer Review Panel.*

Where necessary, each of these parties can request a meeting of all the parties to discuss the activities of the remedial works and their compliance with consent conditions and to make recommendations for amendments of the Plans...Any written recommendations and the monthly progress report shall be available for public inspection.

A fourth community participation section pertains to addressing community concerns. This section of the consent is entitled “Complaints Register”; Condition 14:

For the duration of the remedial works a register of complaints relating to noise, dust, odour, vibration and other nuisances from the site shall be maintained by the Consent Holder, and shall include:

- *Description and location of where the nuisance was detected by the complainant;*
- *Date and time when nuisance was detected by the complainant;*
- *If relevant a description of wind speed, wind directed and general weather conditions;*
- *The most likely cause of the nuisance detected; and*

Any corrective action undertaken by the Consent Holder to avoid, remedy, or mitigate the nuisance detected by the complainant.

The name, phone number and address of the complainant, unless the complainant elects not to supply these details; and

This register shall be provided in the monthly progress report for consideration as required in Condition 13.

Details of any complaints shall be provided to the Council's Compliance Co-Ordinator within 24 hours of receipt of the complaints.

A fifth form of community participation relates specifically to Tangata Whenua. Condition 15 states:

The remediation works shall be undertaken in accordance with the Protocol "Remediation of FCC Site Mapua – Cultural Heritage Protocol and Procedures" agreed between Council, Ngati Rarua Iwi Trust and other Iwi dated 22 May 2002 and any amendments to the map attached to the Protocol as agreed between Council, the archaeologist and Iwi parties to the Protocol.

If koiwi, taonga or other cultural/archaeological material is discovered in any area, the Site Manager shall ensure that the Iwi Monitor and Archaeologist nominated in accordance with the Protocol are immediately contacted and excavation work is stopped in that area to allow a site inspection by the Archaeologist and Iwi. This site inspection shall be carried out in accordance with the Protocol so as to ensure that the remediation works are not unnecessarily delayed. The site manager shall then consult with the Iwi Monitor and the Archaeologist on appropriate steps to recover or deal with the cultural/archaeological material in order that work can resume.

Other voluntary systems for engaging with the community participants were also available. Direct contact with local residents, web updates, mail drops, columns in the local news bulletin were all used at different times (Table 20).

Table 20. Additional strategies used by contaminated site managers for community consultation (Thiess 2004c)

Strategy	Description
Press releases	Infrequent press releases were prepared on the project for release through the principal.
Newsletters	Newsletters were prepared for information dissemination to the community. Information quality was assessed by the compliance team.
Web page	Material was included in the principal's web page providing a summary of commonly asked questions and answers.
Fact Sheets	A series of fact sheets outlining site health & safety, and environmental and remedial activities was prepared for public release.
Information board	A notice-board was placed adjacent to the FCC Mapua site office for informing the general public.

Due to the complexity of the clean-up, hearing commissioners requested that technical aspects of the project were to be reviewed by an expert panel. In early 2004 experts were selected by the TDC for membership of the Peer Review Panel (PRP). Selection of panel members was not an open process and appears to have been dictated solely by the TDC

Environment and Planning team. Since TDC was essentially required to pay for expert services, this may not be considered unusual. However, the selection of expert panel members has been the subject of considerable criticism, although consent conditions specified experts in noise, air quality, vibration, pesticide contamination (including Persistent Organic Pollutants), water resources and coastal ecology, no air quality expert was initially allocated to the panel (MoH 2010). This was to have significant implications.

The Proof of Performance (PoP) period began with a ‘shakedown’ test in December 2003 to confirm mechanical operability, followed up in February - April 2004 with a formal Proof of Performance test. The Environment Court ‘Memorandum in Support of Application for Consent Orders’ states (Environment Court 2003):

> *The POP period constitutes an integral component of the consent application during which the full remediation works, including typical operation of the MCD treatment plant and associated pre- and post-treatment processing will be undertaken. A comprehensive programme of monitoring will be completed during this period to confirm the levels of emissions and discharges are in compliance with appropriate compliance standards set out in the consent conditions*

The resulting PoP trial demonstrated several important aspects. Firstly, it indicated that the technology was capable of effectively eliminating the contaminants of concern. Secondly, it indicated that when functioning correctly, the technology was capable of meeting desired production rates and destruction and removal efficiencies (Thiess 2004a). However, the PoP also demonstrated that the technology was not entirely reliable, sustained production rates which met contractual targets were never attained (PCE 2008a). Furthermore, the technology had been demonstrated to be not entirely safe - there was clear evidence that, during a malfunction, quantities of dioxin had been discharged from the plant. Moreover, this incident also indicated reluctance by the technology vendor to report potentially hazardous events as at the time the compliance team do not appear to have been notified - the incident does not appear to have been investigated until it was noted in the PoP report (PRP 2004a).

The PoP report was not publicly released until September 2004. During the PoP trial, Thiess representatives attended two Residents and Ratepayers meetings and one meeting subsequent to the drafting of the report. There is no evidence to suggest that problems associated with the PoP trial were disclosed to community members during these meetings.

With minor amendments to the management plan, the PoP was signed off for TDC by the engineer to the contract (Fenemor and Easton 2004). Then, unexpectedly, the main remediation contractor, Thiess Services, withdrew from the project. Thiess and TDC agreed upon an Exit Deed, however this contract has never been publicly released.

The withdrawal came as a significant surprise to Community participants. One resident noted (DS300252 16:15):

> *It all seemed to be good communication, and then suddenly they just pulled out. No reasons why from the council. There was just a wall of silence, no communication at all.*
>
> *In Thiess's withdrawal, MfE and TDC were faced with a significant challenge. Much effort had already been expended by project managers: resource consents had been obtained; the site auditor and PRP had judged the treatment technology to perform adequately; community expectations were high; funding had been partially secured; and detailed remediation planning had been initiated. To prevent the project stalling, possibly indefinitely, project managers required action.*

8.3.8 MfE assumes site management role

MfE decided to take over management of the project and proceed with Phase Three. MfE and TDC met on 4 August 2004 in an attempt to negotiate a Mapua Financial Contribution Deed and a strategy for future management of the site. Notes from that meeting state "MfE to remediate the Mapua site to the agreed standards set out in the former contract between Thiess and TDC dated October 2001, and in the related resource consents" (Bell 2008). MfE would be the Consent Holder; the remediation resource consents to be transferred from Thiess. All intellectual property relevant to the project would be transferred to MfE. TDC attempted to limit their financial contribution to $2 million and desired that MfE indemnify them. This proved not to be acceptable to the MfE and formal agreement was not realised until long after the project was completed (Bell 2008). This would have repercussions on trust throughout the projects duration.

In August 2004 final works began and full scale soil processing started in September 2004. MfE appeared initially to place significant value on community concerns. Members of the MfE project team took part in Mapua Residents and Ratepayers meetings and updates were sent out to the local community. The first update sets expectations for the ensuing project, while TDC, EDL and MfE will work "in tandem", TDC will be responsible for ensuring the conditions of consent are complied with (MfE 2004b). The update goes on to suggest: "I am pleased to report that the project is on track and should be completed by the end of 2005" (MfE 2004b). However, there is considerable evidence to suggest the community were not satisfied with the level of competence of MfE staff. A resident noted (Interview 3):

> *I had bad vibes right from the beginning. These two people were so self confident of what they could do. They only talked to me to make themselves known, they visited to say "we're in charge of the site, we represent the Ministry for the Environment"*

After MfE took over the Mapua Task Force was devolved. TDC representatives suggested the reason was that the clean-up was "no longer a TDC project", however it was never publicly acknowledged. For task force members, the disbanding had considerable effects on trust. A resident who was part of the task force noted (Interview 3):

> *In retrospect I think I did a very silly thing by not asking why we devolved the task force. I should have insisted on some public reason for not having it. At the time I thought there was enough consultation with Thiess, I was getting on very well with them. They were the right people to manage the job.*

Initially, the level of control over operations appears to have been quite limited. Particularly challenging operational matters included soil drying, clogging of the steel balls with clay present in the soil matrix, vibration issues, understanding the relationship between reagent use and contaminant destruction, and maintenance of the air emissions control system (PCE 2008a). During the first few months of operation, little or no successful treatment appears to have taken place. While the peer review panel was intended to assist with the project, these were deemed operational issues for the technology vendor to resolve and were not discussed until much later in the project.

Questions immediately arose relating to the ability of compliance officers to adequately enforce resource consents. Air discharges from the site in particular were difficult to assess, and a large number of complaints from residents indicated that some of these emissions were at least objectionable. Further breaches were apparent in relation to noise and tracking dirt from the site. TDC's response to these apparent breaches of the resource consent was to express their concerns in writing to MfE. In general, the public was not informed although some correspondence was made available through monthly reports, posted in the local library, albeit at a much later date than when the violations actually occurred.

Possible health impacts were simplified through a Total Hazard Index (THI), developed by technoscientific experts (T&T 2003a). The THI was intended to provide a cumulative measure of the health risks to residents and to provide a means of ceasing operations if the risks became too severe. The PRP did not initially have the expertise to evaluate health concerns or the ability to evaluate the THI methodology. Initial reports indicated that the THI was well within safe limits and all parties privy to it appeared to be satisfied with this conclusion.

Serious concerns emerged in late 2004 about the technology vendor's ability to control operations and prevent toxic emissions from the plant. Most notably when the carbon filter failed in December 2004 and was repaired using chicken wire (TDC 2005a; Philip 2006). Over a period of approximately two years, this concern transcended into a wholesale debate between the TDC, PRP and MfE over the possible formation of contaminants within the soil dryer and the ability of the air emissions control equipment to prevent discharge (e.g. PRP 2005a, c, 2006). It was assessed that the dryer temperature as specified in the consent could not practically dry the soil (PRP 2006). The PRP wished to extend the contaminants of concern to include dioxin, however it appears that MfE considered investigation of dioxin would raise suspicions about the process. This is identified in MfE correspondence (MfE 2006b):

> *Continuing requests for investigations for dioxins implies that there is a problem. The requests and investigations can create concern when there are no grounds for concern. MfE will not assist with an approach which created unnecessary concerns over dioxins.*

Following extensive discussion by both the PRP and protracted negotiations by MfE and TDC, as well as delayed testing of the carbon filter for dioxin, in March 2007 an amendment was made to change the resource consents (Bush-King 2007a). The variation to the consent was not notified. In TDC's letter to MfE confirming the change of condition, TDC Environment and Planning Manager states (Bush-King 2007a):

...we have determined that no person, including any submitter to the original application, would be affected by the change as it is of a minor technical nature and the effect of the change of the condition is no more than minor.

However the effect was to change the resource consent from an avoidance of dioxin formation to mitigation and contravened environmental NGO assessments of risk. Operations continued while the debate ensued and the Community was not specifically informed.

Throughout the project complaints from the local community were consistently made pertaining to odour, dust, noise, and vibration as a result of site operations. Occasional complaints related to acute illnesses, e.g. Nosebleeds. As might be expected neighbours close to the site, exposed to the most effects were the primary complainants. Complaints were documented in the complaints register and listed in monthly reports.

Community liaison centred on project managers’ attendance at local residents and ratepayers meetings. Meetings were usually advertised in the TDC’s newsline magazine. During the early phases of the project, the contaminated site manager attended meetings on a monthly basis, however after February 2005 attendance was less regular.

Media reporting during the first two years of operation centred principally on reportage, generally with an optimistic tone relating to the end use of the site. Some articles featured reanalysis of costs but no strong critique of operations occurred. No mention was made of possible consequences to the health of local residents during the clean-up.

As the clean-up continued a small number of local residents began to believe that their health was being adversely affected by operations at the site. Requests for public health checks were repeatedly turned down by MfE. In 2005, one of the workers in the EDL lab had the sudden realisation that her job was making her sick. Workers and residents requested more information on the monitoring of discharges however these requests were not responded to the satisfaction of these parties. Having exhausted all other recourses for action, these residents and former workers turned to the Parliamentary Commissioner for the Environment (PCE), New Zealand’s environmental watchdog.

In late 2006, upon receiving four complaints, the PCE began an investigation into the management of the clean-up. This spawned detailed investigations into groundwater contamination and air discharges. Other independent investigations relating to public health and labour were conducted.

Media at this time could detect controversy, and turned from simply reporting to detailed investigation and critical analysis of the remedial operation. Repeated exposés, using information derived from multiple sources, painted the picture of a site which was poorly managed, improperly monitored and resulted in several resource consent breaches (e.g. Nelson Mail 2006; Philip 2006; NZPA 2008a). Possible consequences to human and environmental health were highlighted.

Being in the spotlight seemed to spur TDC and MfE into action. TDC issued its first abatement notice to the Technology Vendor in January 2007, MfE acceded to further dioxin testing with little argumentation (PCE 2008a). Community meetings, which had been largely neglected, were reintroduced. This was a phase of damage control.

The final PRP meeting ended with uncertainty surrounding whether subsequent meetings would occur. A representative of the PCE attended, who was investigating the management of the project. However, for the first time representatives from the Ministry for the Environment did not attend.

After nearly three years of full scale operation, works were completed in August 2007. A short time later, a re-interment ceremony was held by Iwi (tribal) groups for artefacts discovered during the clean-up. The final clean-up cost amounted to approximately $13 million (Cowdrey 2009).

8.3.9 Post cleanup evaluation

In July 2008, the PCEs report was released (PCE 2008a). Much of it was critical of MfE’s management, TDC’s efforts at compliance, and indeed critical of the decision to remediate the site in the first place (PCE 2008a). Moreover, it highlighted deficiencies in the monitoring of releases, and questioned the methodology used to determine public health impacts during the course of the project. Thus it raised significant concerns that the clean-up had potentially put the public at risk.

The PCE report generated a stern response by former Chief Executive of MfE, describing the managers as “heroes” and claiming that (Carbon 2008):

To me the clean-up was a victory of doing something over whinging about wrongs. It was a victory for persistence and courage over finding reasons not to do it. It was a victory for New Zealand technology and entrepreneurship when that of the big guys would not have been appropriate. Now the victory has been killed by the reports of the Parliamentary Commissioner.

Following the release of the PCE report, a significant meeting was held in the Mapua hall with approximately 50 attendees including the leader of the Green Party, the local MP for the district and other local politicians (Reade 2008). Residents were outraged that apparently serious failings in the technology and management had not been previously disclosed.

Subsequent to these reviews a site validation report was commissioned by MfE, followed by a site audit report also commissioned by MfE. The reports focused specifically on narrow remediation objectives as defined in the Remedial Action Plan. As such, they confirmed the suitability of future use and that most remediation objectives had been met (SKM 2008; PDP 2009). The site was signed off by the Ministry for the Environment and Tasman District Council.

There is no evidence to suggest any engagement with citizens during the choice of investigators, design of the study, conduct of the study and evaluation and release of the results. Release of one of the above MfE reports, on Christmas Eve, was greeted with much antipathy - the editor of the Nelson Mail describing it as a "cynical ministry move" (Nelson Mail 2009). For the most part, TDC and MfE continued to defend their positions and assert that community health had not been affected by the clean-up (Nelson 2008; NZPA 2008b).

While many of the public were pleased that the site had been deemed fit for use, a large number remained concerned about the possible health consequences as a result of site operations. In 2006, the PCE had referred public health issues to the Ministry of Health, and occupational health concerns to the Department of Labour, each conducted reviews independently.

The Ministry of Health (MoH) report was released, following substantial delays, in March 2010 (MoH 2010). The report was comprehensive in its indictment of MfE's practices and contained a suite of recommendations for future projects to avoid similar failures. Although the report itself reaffirmed potential threats to public health, particularly to residents adjacent to the site, the Ministry's press release largely downplayed this concern suggesting "it is unlikely there are adverse long-term health effects for local residents from the Mapua clean-up process." The MoH appeared to be more sensitive to the concerns of the community, and commenced a process of community engagement to gauge community concerns and preferences for next steps. A series of meetings confirmed that the community remained concerned about possible health implications.

The Department of Labour report on aspects related to worker health during the clean-up was released, following even lengthier delays, on 18 May 2012 (DoL 2012). The report identified a large number of managerial and technological failings during the clean-up including the failure to carry out a systematic hazard identification process at the start of the project, and failure to adequately protect workers from hazard. While the report was greeted positively by some of the workers involved, the extensive delay before release meant that affected workers had effectively been denied compensation.

The former FCC site at present (as of mid-2013) has the appearance of a park. A community-inspired plan for the redevelopment of the inlet side of the land has now been completed as a waterfront park. Nevertheless, community health remains a concern to some, and an epidemiological study of Mapua residents is currently being conducted (HRC 2011).

8.4 Case summary

Like many other large scale environmental clean-ups, the remediation of the FCC site proved to be far more complex and costly than originally anticipated. While on a world scale the volumes treated were moderate, the clean-up of the Mapua site took nearly 20 years, and the cost, not including overheads, totalled more than NZ$13million, more than triple the original budget. Despite the uniqueness of technology employed, the unusual scale of the problem within the New Zealand context and the difficulties encountered which have been highlighted in some reports published, the clean-up proceeded in a remarkably typical manner. Common to most contemporary environmental problem solving measures, the Mapua clean-up encountered a range of socio-political, technical and economic hurdles which were overcome, with varying degrees of success. As such, Mapua proves to be a typical case of environmental problem solving.

Following this rather protracted review of the case, we may now ask - how effective was Community-manager participation during the clean-up?

9 | Case Analysis of Events

If you don't have a seat at the table, it probably means you are on the menu

- Anon

9.1 Introduction

Did community-manager interaction during the clean-up of the contaminated site at Mapua demonstrate effective participation? The following two chapters seek to explore the use of the PERL framework to identify “shadow” elements of participation (elements which may have hampered participation) during the course of the clean-up. This chapter investigates 11 critical events and investigates the effectiveness of participation.

9.2 Critical events

The following subsections provide an analysis of 11 events deemed critical to understanding Community participation during the clean-up at Mapua. Critical events are presented in roughly chronological order.

9.2.1 Setting remediation objectives

Setting clean-up criteria is critical to the process of contaminated site clean-up (Chapter 2). Clean-up criteria are often considered as a trade-off between cost and risk – increased spending enables clean-up to a higher degree. If prescriptive legislation is not in effect defining necessary clean-up criteria, it is common to derive clean-up criteria from other countries, as was the case at Mapua. However, values for the protection of human and environmental health vary across the world, meaning the level of protection is quite subjective.

At Mapua, managers did not fully explain the trade-off between environmental risk and cost - in this instance risk was only made explicit in relation to broad categorisation. The Community were presented with three scenarios: open space/commercial, residential, and a mixture of residential and commercial. No discussion of the specific values attributed to these categories occurred. The result of this lack of openness during the crucial development of clean-up criteria phase was to have considerable effect on the remediation process. Firstly, it meant that clean-up criteria were not exposed to full and rigorous diverse enquiry. Although recommendations were peer reviewed, the peer review process did not fully consider localised issues. Secondly, lack of openness created a barrier to communication trust and generated an adversarial relationship at the later public defence phase - managers were forced to vigorously defend their choices relying primarily on the calibre of expert witnesses. As noted by a MfE representative assisting the project (Ellis 2003):

> *The risk to the project is that the SAC [Soil Acceptance Criteria] might be challenged by a submitter arguing that the SAC selected for the site clean-up are too permissive, as they are not as conservative as the USEPA [United States Environmental Protection Agency]. If this resulted in the Commissioners ruling that the SAC should be set at a more conservative level, then the economics of the project could change dramatically.*

Finally, not being open potentially degraded trust, for it enabled Community members to question the motives of council and their desire to minimise costs at later stages. For example, environmental NGOs at the resource consent hearing questioned the managers' rationality regarding soil acceptance criteria. At each inquiry the standard response from managers was to defend their choice and cite the experts they had employed.

Setting of clean-up objectives is an essential stage in contaminated site clean-up. At Mapua, remediation objectives were established through expert consultation with little substantive community input. The shadow operating here is two-fold: 1) That experts and those controlling the funding have the knowledge and prudence to understand the most appropriate level of risk; and 2) That other less rational perspectives are likely to cause delays and difficulties for the project if opinions counter to those of experts are proposed. The first of these shadow elements is paternalistic and exposes managers to conflicts of interest (cost versus risk) if not openly disclosed, the second demonstrates a lack of empathy, constrained rationality, and focus on disempowerment.

While some trust may have been generated on the basis of expert credibility, other, more open methods which established community needs, enhanced mutual understanding, and empowered a range of perspectives may have benefited participation. The process taken at Mapua differs strongly with the approach taken by authorities in Oak Ridge City, US, who encouraged citizens to enquire into the specific values for clean-up criteria associated with a Superfund site (Wolfe and Schweitzer 1996). In contrast to what might be suspected, citizens repeatedly encouraged the adjustment of scientifically derived risk values and legitimately disputed the risk claims of scientists to amend clean-up costs. Such an approach enabled the development of mutual empathy, empowered local citizens and enabled the development of mutual understanding.

9.2.2 Closed technology selection system

Technology selection is a crucial stage in the management of contaminated sites, establishing which technology is to be adopted for clean-up. At Mapua, decision heuristics were employed to justify technology selection, developed at the discretion of a consulting engineer. There is no evidence to suggest that Community discussion occurred relating to the engineer's criteria weighting and method of aggregation.

The principal reason for utilising a multi criteria decision making method appears to be for defensibility purposes. Being able to justify how the contractor was selected was necessary for later public defence phases. The engineer's decision model proved a convenient method for demonstrating impartiality, however, as illustrated above it contained implicit biases which were not explicitly noted. While the decision heuristic helped to generate a defensible method for selecting a preferred remediation contract it did little to generate alignment between project managers and those most affected.

While a potentially useful tool, decision heuristics can be the source of unacknowledged bias. The selection of criteria and method for combining weights influence overall outcome and how strongly they are trusted. At Mapua, the method employed did little to encapsulate process uncertainty, placing only a minor percentage (15%) on risk management. In general, citizens have been demonstrated to place significant emphasis on risk factors, particularly when those risks are outside of their control or if they are associated with extremely dangerous events (Slovic 1993). The criteria employed and weighted scheme adopted therefore may have been biased to under-represent the perceptions of local Community participants.

Furthermore, comparisons between vastly different technologies present challenges for this type of heuristic. While comparisons between the treatment technologies, the originally proposed containment option, and the default option of leaving the site untreated may have been useful, the decision heuristic precluded such a comparison. By omitting comparisons with the two other clear options, the decision heuristic failed to fully accommodate Community concerns.

Decision heuristics were used to justify technology selection at Mapua. While decision heuristics were useful for providing an account of some technoscientific concerns, due to implicit bias it may not have fully encapsulated the needs and requirements of Community participants. Thus, application of the decision heuristic may have disempowered local residents and environmental NGOs.

A variety of alternative methods for technology selection have been developed, which seek to enhance mutual understanding, and generate a fairer context for decision making. Morgan (2006a) and Linkov et al. (2006) developed a participatory multicriteria analysis tools to promote discourse on the establishment of criteria and the allocation of weights. Tools such as these enhance mutual understanding and allow for the testing of intuition.

9.2.3 Outrage of adjacent residents at alternative treatment location

Selection of a treatment location proved to be a controversial component of the clean-up at Mapua. Following a truncated process which generated outrage from satellite communities, the decision was made to treat the contamination in a residential area. A number of later reports have questioned the decision (e.g. PCE 2008a; MoH 2010).

The reaction by Mapua satellite communities may be considered typical of Not In My Back Yard (NIMBY) conflicts (Pol et al. 2006; Guidotti and Abercrombie 2008). Superficially, these residents had strong self interest in blocking alternative proposals; they appeared to pay little heed to the exposure of residents at Mapua and the implications for them. These citizens however had legitimate reasons for concern. Treatment off site generated new risks - contaminated soil would need to be relocated by heavy vehicles and residents on transportation routes strongly objected to being exposed to new risk. Furthermore, the proposed treatment technology had yet to be proven at full scale and residents of satellite communities were rightfully concerned with possible transfer of contamination and potential effects on health, ecosystems and property values. These concerns presented challenges to the establishment of trust between the project managers and satellite citizens.

Residents adjacent to proposed treatment sites expressed a variety of concerns about technology competence – they questioned whether the technology would work. These residents required proof that the technologies would work, and effective measures would be in place to guarantee that the land would not deteriorate, resulting in a reduction of property values. Environmental managers co-ordinating the project possessed little evidence of technology efficacy aside from small scale trials in EDL's Auckland plant. Consequently, managers could not demonstrate technology capability to the degree of rigor required by these residents, thus, challenges to the competence of TDC in awarding the contract to an unproven technology were made. Epistemological limits meant that these challenges to competence could not be readily disputed – TDC's assertions were considerable extrapolations.

Satellite residents were also concerned about possible exposure to environmental toxins. Proposed sites had been carefully selected because of their remoteness, supposedly limiting these arguments. Furthermore, some of the sites were already degraded due to historic use for timber treatment or refuse disposal, thus, for TDC and the technoscientific perspective, additional risk would be insignificant.

However, for adjacent residents any additional risk constituted new risk. Technology vendors argued that soil could be treated safely yet they did not have conclusive evidence to demonstrate this. Residents argued that if the technology was as good as managers suggested there should be no problem treating the soil on site. These communities, unlike those in Mapua, had no history of interaction with council staff, therefore had little established trust. By focusing on rigid understandings of risk and failing to empathise with adjacent residents of proposed sites, project sponsors were unable to generate trust.

In contrast, Mapua residents possessed little agency to challenge the treatment location. The contaminants had been produced within their community and the problem was fairly well localised. There is no evidence to suggest that Mapua residents reacted to the outrage of their satellite communities. While residents immediately adjacent to the site expressed concerns about the possible implementation of an unproven technology, these citizens were unable to generate sufficient support to oppose the site selection for the trial technology. Mapua residents simply wanted to have the hazard removed and appeared to become resigned to the fact that treatment would have to occur within their community and that a certain amount of inconvenience would need to be tolerated.

Selection of a treatment location was a controversial part of the clean-up process at Mapua and provides an example of a common stalemate in environmental problem solving. It has the appearance of a NIMBY conflict in which all parties appear self-interested and fail to address wider considerations. However, an alternative analysis suggests that this reaction was not senseless, and that the process of investigating an alternative treatment location was based on technoscientific understanding and had failed to consider the needs of satellite residents. As a result, satellite residents reacted with outrage, leaving managers to treat the soil at the default location.

The strategy employed by project managers at Mapua contrasts with methods used to site hazardous waste facilities in Canada, which follow an open process consisting of the following seven stages: (1) establish general environmental criteria, (2) broad public consultation, (3) invitation to participate, (4) consultation with interested communities, (5) site investigations, (6) community referendum, and (7) site decision (Kuhn and Ballard 1998). In contrast with the Canadian open consultative approach, residents of adjacent communities at Mapua were simply told that their location was being considered as a treatment site. Rather than building trust, as in the case of the Canadian system, the project managers' tactic at Mapua demonstrated a lack of empathy toward both citizens adjacent to the original site, and those of satellite communities.

The reaction by local residents to the siting of the technology in their town demonstrates both loyalty and resignation (Laurian 2004), both signs that empowerment was lacking. Local residents appeared unable to fully express their own needs, instead reluctantly accepting their neighbourhood as the primary treatment location. Conversely residents adjacent to contaminated sites elsewhere have reacted in significantly different ways. For example residents adjacent to the Orica site in Botany, Sydney, successfully argued that since they had been exposed to contamination hazards further exposure to hazard during remediation was not ethically appropriate (Grace 2009). In the Botany case residents were highly distrustful that managers were considering their needs. On the other hand, most Mapua residents, especially those associated with the Mapua and Ruby Bay Residents Association appeared to be highly trusting of the motives of project managers.

9.2.4 Non-notification of resource consents

Technology implementation began with a series of treatment trials which were authorised by the Tasman District Council through a non-notified resource consent. Under New Zealand legislation, project managers require resource consents for activities which have the potential to generate adverse effects. Section 104(1) of the Resource Management Act 1991 (RMA) sets out the factors that consent authorities must have regard to when considering resource consent applications. Specifically, s104(1)(a) requires consent authorities to have regard (subject always to Part 2 of the Act) to 'any actual and potential effects on the environment of allowing [an] activity'. Sections 95 to 95F of the Resource Management Act 1991 set out the requirements for notification of a resource consent application. In accordance with s95A, an application for any type of activity must be publicly notified if:

- the activity will have or is likely to have adverse effects on the environment that are more than minor; or
- the applicant requests it; or
- a rule or national environmental standard requires public notification.

In addition, the council may choose to publicly notify the application if:

- regardless of any other matters, there are special circumstances (s95A(4))
- a notification decision has not been made and a further information request is not responded to before the deadline concerned or the applicant refuses to provide the information requested (s95C).

Determining whether effects are 'more than minor' is a controversial element of New Zealand resource management law. Some regard this capacity as undermining participatory processes and excessively empowering councils (Salmon 1998; Grinlinton 1999; Gunder and Mouat 2002). Nevertheless non-notified consent processes are widely endorsed due to perceived cost reductions and faster speed of processing. Recent amendments to the RMA (The Resource Management (Simplifying and Streamlining) Amendment Act (RMAA 2009)) have strengthened opportunities for non-notified consent (Forest and Bird 2009).

The decision by the project team to choose to apply for a non-notified resource consent demonstrates limited empathy toward other parties. Non-notification chiefly empathised with those residents who were concerned that the remediation effort was slow, thus responded to a need for action. However, non-notification failed to consider the need for involvement of other parties, particularly environmental NGOs and indigenous groups. Furthermore non-notification resulted in other needs not being met, such as the need for a rigorous examination of the technological risks prior to implementation. Consequently, non-notification resulted in many residents, NGOs and indigenous groups disempowered and distrusting the project.

9.2.5 Information disclosure during Proof of Performance (PoP)

The Proof of Performance (PoP) phase of the project was a critical context in that it had to be passed for the project to proceed. The primary aim of the proof of performance was to establish the technology capability and safety during full-scale operation. However, results from the PoP identified that significant quantities of dioxin had been emitted (Thiess 2004a). The emergence and management of the dioxin issue is enlightening and is worth elaborating on since it provides useful insight into the community participation and the relationships between groups.

Two questions arise which are critical to understanding the context. Firstly, was denovo synthesis of dioxin completely unexpected? The response to this question provides insight into rationality. Secondly, if denovo synthesis was known to be possible, was this disclosed? The response to this question provides insight into the level of empathy.

The possibility of dioxin formation was heavily debated at the resource consent hearing. Environmental NGOs were concerned that dioxin could be produced in the drier, a necessary component of the soil treatment cycle. To assuage fears the resource consent specified that the drier temperature should not exceed 120^{o}C - too low for denovo synthesis to occur. All parties, including NGOs, community submitters and TDC resource scientists appeared to accept that the likelihood of dioxin formation under these conditions would be negligible.

However, there is evidence to suggest that dioxin production may have come as less of a surprise to the remediation company, Thiess. Thiess conducted a hazard operability study (HAZOP) in December 2003 on the remediation technology vendor's equipment (QEST 2003). HAZOPs are a systematic method for qualitatively assessing process risks to ascertain where preventative action is necessary. It is known that the HAZOP identified issues which required action to reduce risk to an acceptable level for Thiess (and probably to Thiess's insurers). Emissions from the dryer were indeed highlighted as a possibility in the HAZOP, which would seem to indicate that the HAZOP was conducted in a professional, competent manner.

The HAZOP was conducted in December 2003, after the resource consent hearing (EDL 2003), but does not appear to have been disclosed in full to the PRP, the site auditor, or the TDC compliance team. There is evidence however, to suggest that members of the MTF, the site auditor, and the PRP were aware that such a document existed. For example, a HAZOP is mentioned in MTF minutes for December 2003, “There is a lot of goodwill by all parties, e.g. Thiess have carried out a HAZOP analysis for EDL.” (MTF 2003). In January 2004, a PRP member mentions in an assessment of site management plans that “the Risk Assessment HAZOP for MCD Operation has not been sited [sic] yet” (Callender 2004). Later in August 2004, the site auditor, in an email to the POP’s expert on the PRP mentions that a HAZOP has been carried out (Nadebaum 2004).

As mentioned in Chapter 2 the disclosure of high consequence, low likelihood risk may be suppressed to avoid possible increases in monitoring costs. At Mapua, it was in the interests of remediation providers Thiess and EDL to avoid acute risk disclosure for immediate financial reasons, and for project funders TDC and MfE to ensure that the project progressed, failure was politically untenable.

While the formation and release of dioxin may not have come as a complete surprise to the remediation providers if it had been highlighted in the HAZOP, there is evidence to suggest that dioxin emission was surprising for the experts on the PRP. Substantial discussion appears to have been dedicated to the issue in the post PoP meeting (PRP 2004a):

> *The dioxin recorded from the stack on one of the sampling rounds caused concern. Queried whether lab result was accurate. If so, why was the dioxin formed, and why didn’t the drier turn off at high temperatures in the soil, and why didn’t the filters prevent it from discharging? Thiess have asked EDL for an explanation. The reporting and explanation of this situation will be significant for the completion of the PoP... PCB results seemed variable too*.

There is no evidence that the community were made aware that dioxin was emitted during the PoP period. In fact there is strong evidence to suggest that environmental NGOs were systematically excluded from access to information. Correspondence from a Forest and Bird representative to the PRP chair states (Campbell 2004a):

I continue to be dismayed at the lack of communication that F & B have with you... we have not ever been kept informed. This seems to me to be particularly crucial in view of the laxness in the conditions and the huge "trust" we gave in relation to the Proof of Performance and standard setting. Please advise where these standards now are at; and progress to date. Obviously we would like to have copies of formal reports rather than verbal briefings.

In response to this enquiry the Forest and Bird representative was sent a copy of minutes from the first two PRP meetings. Crucially however, the paragraph quoted on p176 was systematically excised, thus preventing Forest and Bird access to technical discussion of dioxin formation until the formal PoP was released.

It is evident that the release of the PoP was of considerable concern to project managers. There was significant discussion of the form and content of the release of dioxin discharge information. As noted by a MfE and PRP representative (Ellis 2004b):

In respect of reporting a non-standard emissions issue, there is a damned if you do/don't dilemma. My assumption is the PoP report will need to be released at some stage and that therefore it is best to be upfront with drawbacks.

In its present form, the PoP report is ambiguous or at least confusing in its description of the Dioxin release issue...and this may be commented on and much made of it.

It is reasonable to inquire why information was systematically suppressed to NGOs by members of the PRP. The answer is not clear.

The defined intention of the PRP by resource consent commissioners was to provide TDC with independent expert advice - it was not to inform or include the perspectives of interested and affected parties, it was simply to help TDC. It is evident that members had been handpicked by TDC representatives and that most members had a long connection with the site and TDC's management team. Whether the PRP provided TDC with *independent* advice is thus questionable.

Furthermore, how sensitive information was managed by the PRP was not made explicit during the initial meetings. There is no evidence to suggest that the PRP had formal procedures or guidelines for information disclosure. However, there is evidence that in the meeting subsequent to the above incident of information suppression, issues of confidentiality were discussed. This question of information suppression and screening would become even more apparent during later phases of the project.

The fact that dioxin was produced was damaging to technoscientific credibility. Since assurance had been made at the resource consent hearing regarding the improbability of dioxin release, the fact that it occurred would cast doubt on the entire technoscientific evaluation process. PRP representatives may have felt it necessary to protect technoscientific competence by suppressing obvious incompetence.

Moreover, dioxin production was politically sensitive at a National level; New Zealand was in the process of ratifying the Stockholm Convention on Persistent Organic Pollutants (ratified on 24/09/2004), disclosing uncontrolled dioxin release at this time would have been politically embarrassing. At this time MfE were partially funding the project and PRP representatives may not have wished to potentially compromise this. Furthermore, an MfE representative was present on the PRP, creating a potential conflict of interest.

The restricted release of information to environmental NGOs by PRP representatives is indicative of a low level of empathy. It is possible that the PRP did not trust a scientifically rational response to the dioxin issue from environmental NGOs, and therefore the information was suppressed. Furthermore, it indicates a strong empathic relationship between the PRP and project managers.

For the manager and the technology vendor, denovo synthesis of dioxin was embarrassing - it indicated that a serious malfunction had occurred. Thus admitting dioxin release would be tantamount to admission of incompetence. Additionally, admission of dioxin release may have had consequences on the ability of the managers to obtain public liability insurance – insurance during the PoP phase had been withheld from the technology vendor although it was supposedly required as part of the remediation contract (MTF 2003). It is unsurprising that project managers were not quick to release this information.

The effect of limited information disclosure had far reaching consequences. For environmental NGOs, limited information essentially muted them. Since environmental NGOs were unable to adequately examine the efficacy of the clean-up regime, they were unable to either challenge the management regime or to endorse it. Thus, lack of information disclosure limited the extent of diverse and competent criticism. For local residents, limiting awareness of problems created the perception that the technology was safe. Since the technology was being reviewed by a panel of trusted experts, local residents were assured that their interests were protected. For the remediation company, Thiess, limited disclosure meant uncertainty. For Thiess, clear evidence of technology shortcomings likely raised suspicions surrounding the competency of the remediation technology provider. Furthermore, there is evidence to suggest that incidents were not immediately disclosed by EDL to Thiess, suggestive of a low empathy relationship (PRP 2004a). Since technology inadequacies were not disclosed to anyone in the community, yet clear evidence proved inadequacies existed, uncertainty surrounding the reaction of these parties once information became available would have been a source of concern for Thiess.

Dioxin formation during the PoP phase of the project highlights a critical context. Firstly it identifies that the technology was not well understood, and that uncertainties were not widely disclosed to Community participants. Thus, in addition to the lack of understanding by managers, an understanding of the risks was not conveyed to Community participants. Furthermore, this context illustrates a fundamental concern of project sponsors for continuity, and a lack of empathy to Community members, particularly Forest and Bird and Greenpeace. In effect, a patriarchal approach was adopted, involving deception, which disempowered members of the Community. While this approach was effective in the short term in that it allowed the project to proceed, it does not represent effective Community participation. It was definitely not a collaborative approach and in the long-term it compromised overall trust between all project participants and may have contributed to the withdrawal of the main contractor.

9.2.6 Substitution of local expertise with formal expertise

Effective Community participation in complex clean-up projects requires empowerment of Community perspectives and close linkages to develop with managers. During the clean-up at Mapua close linkages between the Community and the project originally occurred through the Mapua Task Force, however, after the resource consent hearing, the MTF was effectively replaced by an expert panel. The reasons for this breakdown in communication are worth exploring.

The foundations of the PRP began with an acknowledgement by the resource consent applicant in the efficacy of the Mapua Task Force, and in particular, a substantial role of meaningful community representation. It is evident that the TDC project management placed significant emphasis on meaningful community engagement, the Officer's Report acknowledges the important role of the community in helping to develop and enforce resource consent conditions (PDP 2003):

> *...there is a balance to be struck between tight controls aimed at avoiding adverse effects and allowing the Applicant sufficient flexibility to complete their work in the most efficient manner. As most of the adverse effects will be directly experienced by neighbouring residents (noise, vibration, dust, odour) it will be highly desirable for the Applicant and their contractors to develop an open and co-operative working relationship with the community that is hosting their activities. Therefore, the conditions that are recommended in this report should be seen as an initial framework around which the activities should be managed. The conditions recommended in this report advocate the creation of a review panel to give flexibility to vary the management of the activities to best suit the needs of the Applicant and the community, within the constraints of avoiding any significant adverse health or environmental effects.*

Thus, original proposed consent conditions state:

> *Prior to the commencement of any works the Consent Holder must arrange for the Tasman District Council to appoint a Review Panel who will be responsible for review of the detailed design and implementation of the remedial works. The Panel members will be selected in consultation with the Mapua Residents and Ratepayers Association and will include:*
>
> - *the nominated representative of the Environment and Planning Manager of the Tasman District Council;*
> - *at least one independent person with relevant expertise;*
> - *one member of the local community.*
>
> *The role of the review panel will be to review and comment on monthly monitoring reports and to discuss and facilitate the resolution of any issues with the Consent Holder and the local community. The Consent Holder will fund the operation of the review panel.*

The original proposal for a review panel therefore had some community focus. However, the Planning Commissioners noted that "because of the complexity of the remediation works proposed, it is appropriate that the proposed management plans and monitoring data are regularly reviewed by relevant experts". Clearly the Planning Commissioners assumed that a community oriented panel would be inadequate to sufficiently understand the complexities of the project and desired an expert panel to review progress.

It is evident from the commissioners' ruling that the intention of the PRP was to assist TDC in fulfilling their obligations to protect human health and the environment as an advisory arm to TDC. The initial commissioners' decision states (Johnston, Burden et al. 2003):

> *The role of the Peer Review Panel shall be to review the management plans listed in Condition 44 and comment on monitoring reports to the Tasman District Council's Environment & Planning Manager*

Greenpeace's appeal suggested that the PRP needed to be expanded from the commissioners' original composition to include additional expertise (Greenpeace 2003). Similarly, Forest and Bird's appeal argues for a much expanded role (F&B 2003):

- *Review and recommend changes to all the management plans and the Remedial Action Plan prior to the commencement of consents;*
- *Review monitoring reports and recommend changes;*
- *Changes should be recommended to both the Tasman District Council's Environment and Planning Manager and the Compliance Co-ordinator;*
- *Recommendations and minutes of the Peer Review Panel shall be publicly available and sent to Forest and Bird.*

The final role of the PRP as indicated following Environment Court mediation states the role of the PRP as (Section 6):

a) *meet during the Proof of Performance Period to review, comment and make recommendations on the management plans (including the Remedial Action Plan);*
b) *meet after the Proof of Performance Period to review, comment and make recommendations on any changes to the management plans (including the Remedial Action Plan) and monitoring reports listed in Condition 13;*
c) *meet at no less than three monthly intervals; and*

d) *any recommendations of the Peer Review Panel shall be made to the Council's Environment and Planning Manager and the Council's Compliance Co-ordinator. The Consent Holder will fund the operation of the Peer Review Panel.*

An analysis of the discourse pertaining to the review panel reveals important insight. Most critically, community representation has been systematically replaced with expertise - the discourse, due to apparent complexities, shifts away from community concerns to a reliance on the integrity of the technoscientific regime, the emphasis on experts in the protection of public and environmental health. It appears that the Commissioners believed in a clear divide between the expert technoscientific discourse and the community rationality. Furthermore, it appears that the Commissioners believed that technoscientific rationality in this instance superseded community rationality.

Following the hearing it is evident that both appellants endorsed the idea of an expert panel to oversee the clean-up, however, Forest and Bird's submission in particular placed more emphasis on the openness of discourse. It appears that the Commissioners believed in a value-free technoscientific rationality and that Forest and Bird disputed the value-free nature of the recommendation. While NGOs possessed sufficient knowledge and resources to challenge the Commissioners' ruling, community groups either lacked knowledge, resources or motivation to challenge what was in effect a ruling which seriously undermined community influence.

Some MTF members believed that PRP would effectively replace it. One member commented (DS300252 11:00):

> *I wasn't too worried that the task force wasn't around any longer. I felt that all the checks and balances were there so I just let them get on with it.*

However, MTF members later regretted the undermining of community influence.

The emphasis placed on the technoscientific regime by the environmental justice system is perhaps indicative of systemic biases toward technoscientific treatment of risk. During the major phase of public involvement (i.e. Resource Consent Hearing), submitters were presented with proposed conditions which systematically included public input. However, resource consent commissioners removed this system, replacing it with a system of expert assessment. This system had the effect of reducing substantive public involvement and information disclosure. The environmental justice system's allegiance to the technoscientific regime may mean that such biases are pervasive.

Substitution of a proposed community empowered review panel with a formal expert oriented Peer Review Panel was intended to enhance the understanding of the project. While it may have indeed assisted the project in this manner, it severed intensive links between managers and the Community, eliminating conduits for empathy, Community rationality, and Community empowerment.

9.2.7 Technology overconfidence

It is useful to consider the technology vendor's understanding of their own technology for cleaning up the site. It is evident that the technology was novel, innovative – the technology was repeatedly described as a "world-first" (Carbon 2008). However, it is also evident that only limited testing had been performed to establish the precise technology capabilities and limitations. At the time of technology selection, very limited analysis of technology performance had been conducted; the author has been unable to identify any peer reviewed documents by the technology proponents at this time.

Although the ball milling process was fairly well understood, it had never been proven at a commercial scale. A 1996 review by a National Research Council panel does not identify it in its list of 'Alternative Chemical Disposal Technologies' (NRC 1996a). In 2004, the Scientific and Technical Advisory Panel of the United Nations Environment Programme still listed it only as a "Promising Technology" for the treatment of POPs waste (STAP 2004). A NATO report states (Vijgen 2003):

> *Ball milling is a highly interesting technology with a lot of potential for the future for the treatment of pesticides, however it will probably take some years before the technology is full scale applicable and sufficient experiences have been gained.*

However, there was clearly significant hubris surrounding the technology capability at this time. Figure 37 & Figure 38 show a rival technology vendor's description of the process as a very simple method for destroying toxic POPs and rendering them harmless.

$$R{-}Cl + Mg + \text{"}H\text{"} \Rightarrow R{-}H + MgCl_2$$

(PCB)	*Base Metal (Magnesium)*	*Hydrogen-Donor*		*Biphenyl*	*Salt*
TOXIC			$\Rightarrow$	**HARMLESS**	

Figure 37. Very simplified dehalogenation process as described by a competitor to the technology vendor (Birke 2001).

Figure 38. Overview of the ball milling process as defined by a technology vendor. Simplicity and the ability to turn toxic substances into harmless products is emphasised (Birke 2001).

Similar arguments about technology simplicity, capability and safety appear to have been made at Mapua. For example, evidence from the site auditor at the hearing states (Nadebaum 2003):

> *I am satisfied that the treatment method can destroy the DDT and dieldrin+aldrin contaminants which are of most importance at the FCC site. Important evidence of this was analyses of the treated soil showing that the chloride content of the soil increased as the pesticide content decreased with treatment. This confirmed that the organochlorine pesticides were broken down converting the organically bound chlorine to the chloride anion.*

EDL's engineer states (Oakley 2003):

"On the basis of the extensive research that has been undertaken into the MCD reaction, and the sound engineering and use of common and well-understood process unit operations that underpins the remainder of the proposed facility, I consider the process to be very safe, workable and effective for the task required of it."

Clearly, the process was initially believed by the technology vendor, parties involved in decision making and their technical advisors to be relatively simple. However, there is evidence to suggest that during the early phases of full scale implementation the technology vendors possessed limited process control. It is clear that the technology vendor repeatedly experimented with reagents to facilitate effective destruction, substrate characteristics which had not been foreseen were affecting process performance (PRP 2004b). In the initial meeting of the PRP, conducted during the Proof of Performance, a member even questions whether "it should be called the PoP if it was still experimental" (PRP 2004b). Later correspondence between the site auditor and an MfE representative provides useful insight into how technology understanding evolved:

Note that general experience is that developing any new process is far more difficult than expected at the outset – in hindsight what we are seeing here is not unexpected, and the need to keep doing tests and adding safeguards and process steps is probably not unexpected (although the process did appear delightfully simple at the outset).

For the technology vendor, the technology represented both a glowing example of 'kiwi ingenuity' and a potentially valuable asset. By the beginning of the PoP phase, significant resources had been invested into the technology; in addition to resources contributed by the company more than $450,000 had been contributed by the New Zealand Government through the Foundation for Research, Science and Technology (PCE 2008a). The investment had caused some financial difficulties and the company at this stage was having trouble servicing its debts (TDC 2004). Thus, financial pressures likely contributed to the non-disclosure of any technological concerns discovered.

In contrast however, environmental NGOs were more circumspect (Neal 2003c):

Greenpeace...believes the technology to be used is not fully tested, is not suitable for the treatment of metal contaminants, and may be as harmful to public health and the environment as the existing site.

Technology overconfidence is common among those parties proffering technologies. The case above demonstrates that highly trained, rational scientists may be as guilty of being overconfident in technologies as the vendors themselves. To correct this cognitive bias requires broad disclosure of claims in public fora and opening up those claims to criticism.

9.2.8 Withdrawal of remediation provider

During a critical time in the project, immediately following the PoP, the main contractor, Thiess, withdrew. Thiess's withdrawal had several significant effects on perceptions of project management. Firstly, the reasons and cause of withdrawal were never publicly debated. Thus affected and interested parties were unsure exactly what went wrong and this uncertainty manifested in distrust in the TDC project management. Residents and Ratepayers Association Chairman stated (Huband 2004a):

> *I think the public have a right to know. The council needs to stand up and be honest about what is happening.*

A letter to the editor from Forest and Bird's local representative demonstrates the extent of this frustration (Campbell 2004b):

> *Why did the successful tenderer and subsequent contractor, Thiess Pty Ltd of Australia, pull out of the contract?...We assume that other penalties, bonds and assurances existed with Thiess (but were never made available due to "commercial sensitivity"). Have there been variations to the original consents? If so, what are they? Can anyone give honest, comprehensive responses to these critical questions?*

Secondly, it deteriorated empathic connection between the community association and other affected and interested parties. The community association had been told about the withdrawal several weeks before the broader public were officially notified. Thus while communication trust was partially enhanced between TDC managers and the community association, it was simultaneously degraded between these parties and those most affected and interested parties.

Why Thiess withdrew has been the source of much speculation. There is no evidence to suggest that a protracted process of negotiation occurred. It is likely there were multiple reasons and that the decision was difficult for the company to make. A large, well known company such as Thiess does not simply remove their services without due consideration.

Thiess never released a formal public statement to fully explain their reasons. The only information arises from the site engineer who suggested “It was a decision made above me and I can’t say any more than that” (Huband 2004a) and Thiess’s CEO who contended the withdrawal was due to a “shift in priorities” (Huband 2004c). The actual reasons may never be known

As has been indicated by MfE, exchange rates may have been significant (Bell 2008). The Australia - New Zealand exchange rate had deteriorated since Thiess was awarded the contract. Thiess, an Australian company may not have adequately factored this adjustment into pricing calculations. Other financial considerations may also have contributed. It is understood that Thiess undertook an examination of alternative treatment methods and suggested the mechanochemical destruction technology would not compete with other options if the project was to be re-tendered. Additional safeguards required in the implementation of new technology can add substantial cost.

Structural financial issues may have also contributed. The lump sum contract meant that any variations would have to be individually argued and negotiated. Thiess may have predicted the difficulties associated with such a system and decided to avoid them. In fact, following the issuing of resource consents, additional costs were added to the project. TDC project staff managed to negotiate these down from $2.4 million to $0.88 million. The TDC project manager later admitted that this may have contributed to Thiess’s decision to pull out (Interview 2).

However, it is likely that financial considerations were not the only determinant in Thiess’s decision to withdraw. Thiess is a large company quite capable of absorbing substantial losses in order to maintain their reputation. The fact that Thiess is an Australian Company and that New Zealand does not have an enormous contamination problem may have influenced Thiess’s decision. Thiess had little to gain by absorbing substantial losses in New Zealand. Furthermore, the uncertainty surrounding minimal disclosure of technology inadequacies may have contributed. Moreover, there may have been complexities associated with obtaining public liability insurance for a novel technology. Additionally, Thiess may have distrusted the technology capability and the vendor’s ability to maintain safe operation. It is understood that Thiess carried out a HAZOP check on EDL’s technology, and that EDL chose not to implement all of the recommendations. Whatever the reason for withdrawal of the principal remediation company, the effect on the remediation project was considerable.

The above analysis begs two questions, "could the community have been involved in a more substantive manner?" and "how might community involvement have contributed to trust enhancement, learning, outcome quality and conflict reduction between the project partners?" Evidently increased involvement of the community was possible during the PoP stage of implementation. As noted, original resource consent applications contained a substantive, advisory role for community members. While it is possible that the involvement of members of the community would have had negligible effect, it is also possible that involvement would have substantially modified trust, learning, outcome quality and conflict.

It is evident that withdrawal of the primary remediation contractor had considerable implications for the overall quality of the clean-up and Community empathy, understanding and empowerment toward managers. The justification for inquiring into the reasons for withdrawal is therefore to establish whether a different level of involvement of the community may have altered Thiess' decision. In other words, if the community were involved more substantially would the outcome of the Proof of Performance have improved?

While a definitive answer is obviously unobtainable, and a number of different valid reasons have been highlighted for the withdrawal, several lines of evidence are suggestive that enhanced involvement may have been beneficial for retaining project continuity. Firstly, it is evident that information was being withheld from the community and that information would have been a source of uncertainty and ambiguity for Thiess. If the community were involved more substantively, it is likely that such ambiguity would not have existed. Secondly, the terms of Thiess' withdrawal were closely guarded through a confidential exit deed. Community involvement would have at worst provided a quality check on the fairness associated with preventing access to information, and at best acted as deterrent to withdrawal. With a closed, confidential exit agreement, Thiess were able to withdraw with minimal reputational concerns, however, if withdrawal required open and comprehensive disclosure of concerns, management may have been more circumspect. Thirdly, issues between the main contractor and the technology vendor were known to have been tense, chiefly due to difficulties in forming consensus over the terms of a contract between the two (Interview 1). At first, the contribution of the community to commercial contracts may appear limited, however, inclusion of community members as facilitators of the contractual negotiation process would likely reiterate the chief purpose of the remediation - to serve the community.

Such objectives sometimes get lost when financial negotiations are taking place and having community mediation may have moderated strategic behaviour.

Could more substantive involvement of the community have contributed to mutual learning? Inevitably, more substantive involvement would have contributed to mutual learning. Two primary mechanisms are evident. Firstly, tacit knowledge can only be transferred through close association (Nonaka and Konno 1998; Nonaka and von Krogh 2009). Thus a distinctive form of knowledge transfer and mutual learning was omitted through lack of involvement. Secondly, mutual learning may have benefitted through substantive contributions to the decision making and empathy toward project managers.

Thiess' withdrawal had a substantial impact on project planning and continuity, and came as a surprise to technical overseers and compliance officers, as well as the community. Withdrawal appears to demonstrate solely self-interested motives and little regard for the other parties involved and the community. However, there is considerable evidence to suggest that Thiess were dissatisfied with their relationship with the technology vendor, and that mutual empathy, rationality and empowerment was low. Their response to these difficulties appears to have been withdrawal.

9.2.9 MfE assumes project management responsibility

Why MfE took over responsibility for the project is not well understood. As noted above, MfE were placed in an extremely difficult position. It is evident that MfE considered a number of options but quickly discounted the option of a third party "turn key'' operator because of the delays and expense that such a transfer would inevitably incur. Instead, two options were prioritised: TDC "runs the show" or MfE "runs the show" (Ellis 2004a). While there appears to be substantial consideration of cost and management responsibilities, there appears to be little discussion of crucial issues of indemnity and funding. Although Chris Bell's later review of MfE's actions notes that "the strategic intent was to build the Ministry as a more action-oriented and responsive agency" (Bell 2008), this argument does not appear to have been used in initial justification for assuming responsibility. Instead it is more likely that MfE, faced with a precarious situation, decided that for the benefit of New Zealand and to enable the project to proceed in a timely manner, taking over the project was the only real option.

MfE taking over responsibilities impacted the project in a variety of ways, some unforeseeable. First, it allowed the project to proceed in an instance where it otherwise probably would have stalled. MfE's responsibility assured that sufficient funding would be available to complete the project. This meant that the project was able to continue despite escalating costs. Furthermore, it allowed the project to proceed without indemnity being clarified. This highly unusual situation would have been impossible had a private company been responsible.

Second, it transferred responsibility away from local representatives in several distinct ways. Prior to MfE's involvement, TDC had maintained project management responsibility as the land owner, principal, and partial funder. When MfE took over the site management, and verbally agreed that TDC's financial responsibility would be limited, TDC decided that its role no longer entailed project management responsibility. A consequence of this decision was to dissolve the Mapua Task Force and to essentially remove residents from an active decision making role. Furthermore, it transferred management of the site from representatives living locally and working on site, to representatives living in Wellington and only visiting the site occasionally.

Third, it created issues for TDC compliance. Initially, TDC believed that MfE could be held liable for breaches of the resource consent (Fenemor and Easton 2004), however MfE later used Crown immunity to avoid prosecution (PCE 2008a). Thus the transfer created limited opportunities for local authorities to exert influence on the project.

Fourth, it transferred operational responsibility from a company highly experienced in contaminated site remediation to an entity with no previous experience. This does not appear to have been discussed in extensive detail by TDC project staff, nor does there appear to have been any robust assessment by third parties to evaluate the repercussions of project handover. When the contract was initially awarded, a thorough review by a consultant had been conducted as identified in Section 9.2.1, however no such assessment appears to have been undertaken prior to transfer. There was no special meeting of the Mapua Task Force to discuss the possible implications of handover on local residents. *For TDC the most significant factor appears to have been financial risk.* Mayor John Hurley stated (Huband 2004d) *"We are hoping to limit our exposure through risk management. There's certainly an element of risk. That's where the council is looking at."* Council appeared concerned with the possibility of incurring extra costs and encouraged MfE to take over management of the project, the Mayor stating (Huband 2004c):

> *The unknown will be taken out of our hands*

MfE's acceptance of financial risk appears to have been sufficient to justify project handover.

Fifth, it transferred a conflict of interest issue present in the multiple "hats" worn by TDC. As stated in a later review (PCE 2008a):

> *TDC's initial position was not straightforward because it (as consent authority) was setting controls on a remedial exercise that it was part funding (as landowner). In theory, TDC was in a position where it could have minimised compliance costs associated with the remediation, and hence minimised its own expenditure... Conversely, once MfE became responsible for remedial works, in theory TDC could have optimised the environmental benefit to its land at the Crown's risk and expense, by its interpretation and enforcement of conditions of consent.*

MfE's assumption of project management responsibility had wide ranging consequences for empathy between project managers and Community members. Firstly, completely new management took over responsibility of site operations, with whom Community members had no prior interaction, thus the empathic bonds which had built up between Thiess representatives and these parties was lost. Although an MfE representative promoted the continuance of project staff to maintain trust (Ellis 2004a), enacting these ideas proved impractical or unfeasible.

Secondly, it undermined effective rationality. Project staff had no previous experience in running a remediation process and it is likely that interested and affected parties were able to detect this. Anecdotal evidence suggests that adjacent residents were underwhelmed by MfE's competence (Interview 3, 7, 8), especially given the previous professional approach taken by Thiess. MfE project staff met early with local residents, who undoubtedly made assessments of competence based on comparisons with previous management.

Thirdly, the transfer undermined effective communication between Community and project managers – managers could not be present. The most obvious difficulty related to management of the project, 'remotely', from Wellington, which created delays in communication – the ability of MfE to give and receive feedback and to convey information in a timely manner. Although this mostly affected operational issues, it also damaged communication with residents and other interested parties. Issues not addressed in a timely way may cause deterioration in competence trust or effective rationality (the perception being a competent overseer is a decisive one). Furthermore, delays may cause accumulation of issues which follow a non-linear relationship. Delays may lead to synergistic negative impacts.

9.2.10 Disbanding of the Mapua Task Force

Another critical event in the project related to the change in project management was the disbanding the MTF, historically an important bridging organisation between the community and project managers. While evidently previous project management placed a high value on the input of citizens to the extent of creating special positions which empowered them, the new management appeared to value local input less. As well as establishing the character of the new management regime i.e. less concerned with local empowerment, disbanding the MTF removed an element of local project ownership and responsibility. *Summed up in an email from a Forest and Bird representative (Ballance 2004):*

> *We find it disturbing that there should be an apparent loss of local input and feedback. It is the locals who have to live with the finished product.*

Thiess' withdrawal from the project had implications on community participation. TDC no longer held an active project management responsibility, MfE were now "running the show" - TDC's role was thus clarified, they became principally compliance oriented (Ellis 2004a). Not retaining management of the project resulted in the exit of the principal TDC project manager, thus the rapport that had developed between TDC and the community was reduced. Furthermore, TDC decided to disband the MTF which terminated a historically effective institution for community engagement. Thus MfE's appropriation of the project had significant consequences on engagement between TDC and the Mapua community.

Disbanding the MTF was an act which disempowered the Community and removed linkages for development of mutual empathy and shared rationality. MfE's decision to remove active community involvement is indicative of a shadow which suggests conceitedness - "we know what is best", which was detected by some Community participants (Interviews 3, 6, 7).

9.2.11 Resolution of ambiguous consent conditions

A further critical event in the exploration of participation at Mapua relates to consent conditions which were ambiguous. These ambiguous conditions were a source of debate and the manner of their resolution is helpful for illuminating participation challenges. The primary source of contestation related to air discharges which contained two apparently contradictory clauses in the consent conditions.

Air discharge consent (RM030523) states quite clearly in condition 19:

> *There shall be no odour, dust, particulate, smoke, ash or fume caused by discharges from the site that is noxious, dangerous, offensive or objectionable beyond the boundary of the site.*

Yet condition 20 places substantially different obligations on the consent holder in relation to fugitive dust emission:

> *The Consent Holder shall adopt the best practicable options to minimise the discharge of fugitive dust from the site. These shall include, but are not limited to, wet suppression, minimising storage pile heights, the use of temporary covers, mobile wind breaks at working faces and restrictions on vehicle speed.*

It is evident that prior to the Hearing, airborne emissions were of great concern to most Community participants. During the Hearing project managers appeared to place significant emphasis on their ability to control airborne emissions from the site. It appears that in order to assuage a concern of these parties condition 19 was inserted to specify that as a priority, discharges from the site should be avoided. However, it appears that the project managers also stressed that certain discharges could not be avoided, thus condition 20 was inserted to ensure that adequate mitigation measures were introduced to control these inevitable emissions.

While apparently logical, the ambiguity arising from the Hearing and these seemingly contradictory conditions subtly affected engagement. There is no evidence to suggest that these conditions were clarified in an open manner, to ascertain what action should be taken in the event that Best Practicable Options were not being applied and noxious, dangerous, offensive or objectionable emissions were being discharged beyond the boundary of the site.

Firstly, some arguments by the project managers made prior to and during the Hearing appear to have set expectations which were not entirely fulfilled. For example, after the Hearing some residents believed that site operations would be halted during strong wind (Interview 3, 6 & 7). However, consent conditions did not specify such action; instead, in line with Resource Management Law in New Zealand, consents specified the prevention of adverse effects and the imposition of Best Practicable Options to mitigate fugitive dust emissions. Thus, ceasing operations simply because of strong wind would have been entirely voluntary by the consent holder. While expectations appear to have been raised during the build-up and subsequent Hearing, this expectation does not appear to have been fulfilled.

When complaints were made about these matters, it was difficult for the compliance team to enforce the consent conditions and for the site management team to fully allay concerns. In this instance, Community needs were not in alignment with management needs, and these differences were not effectively communicated. Thus, differences in expectations as a direct result of consent ambiguity affected engagement.

Ambiguous consent conditions appear to have been partially resolved between the TDC compliance team and the site management team. To ascertain whether a particular odour was "noxious, dangerous, offensive or objectionable beyond the boundary of the site", extensive discussion between the site manager and the compliance team resulted in subjective assessments being employed to assess compliance. The compliance officer states (TDC 2005a):

> *The assessment of odour is made by 3 of us [EMS Site manager, an Assistant Manager and the TDC Compliance Officer]. We have decided that cooked earth odour by itself is acceptable. The treated fines and/or stack sometimes discharge an acrid odour which you can taste in the back of your throat, and this is offensive and objectionable so not permitted. Similarly ammonia from the MCD is not permitted beyond the boundary. Whether there are potentially toxic compounds in these odours we don't know.*

Critically these subjective assessments were principally devised by and enforced by the compliance team. Under the Resource Management Act 1991, consent authorities have the obligation to enforce conditions, therefore this arrangement is unremarkable. As explained in an appropriately titled article "Clearing the Air on the FCC Site" by the compliance officer:

In spite of all the dust suppression and odour control at the site there is some odour and dust leaving the site. There are three monitoring gauges in the neighbourhood and the quantity of dust and toxicity of the dust and air are all measured daily and monthly and they meet the conditions in the Resource Consent to protect (residential) human health. There is also a general condition for the air discharge from the site not to be offensive, objectionable, noxious or dangerous beyond the boundary. Three of us assess this rather subjective condition. The odour can be unpleasant and it depends on frequency, intensity, and duration as to whether it triggers the consent condition. I live in Tahi Street so I am very aware of the impact the remediation is having on the neighbourhood, and I can assure you I am monitoring the consent diligently.

Whether subjective assessments by site staff and compliance officers fully incorporated the range of effects which were detected by the community is highly questionable. Susceptibility to environmental toxins is modified by a number of factors, for example, age, gender, genetics, general health and wellbeing can all significantly alter physiological reactions (British Toxicology Society 1990). Furthermore, duration of exposure can alter subjective assessments of effects, for example, short periods of annoying noise may be tolerated but over longer time periods may have psychologically damaging effects (MoH 2010). There is evidence to suggest significant adverse reactions were felt by affected parties, for example, there were complaints relating to upper respiratory tract irritation, skin reactions, nose bleeds, eye problems, wheezing, thyroid disorders, tinnitus and/or headaches, nausea, stress and anxiety, cancer, hypertension and a range of other conditions (Complaints Register; MoH 2010). Noise, air discharges including dust and odour concerns were problematic throughout the course of the project. While measures could have been implemented to include community input into how they were to be resolved, community outreach appears to have been limited.

If ambiguous consent conditions had been further developed in open fora, as was originally specified in the proposed consent conditions (see chapter 8), it is possible that differences in expectations may have been overcome. However, because the primary system of engagement does not appear to have been effective for discussing, negotiating, and incorporating community perspectives (MTF was disbanded, community meetings were irregular), expectations do not appear to have been openly discussed and resolved. With differences in expectations evident throughout the project, it is understandable that complaints from residents surrounding the discharge of dust continued until project completion.

Ambiguous consent conditions (differences in rationality) that potentially affected Community participants were resolved chiefly by the compliance team and the site management team. This method of dispute resolution disempowered Community perspectives and, when problems continued, reduced empathy.

9.3 Summary

This chapter has explored 11 critical contexts of participation. Although it is evident from project reports that project managers undertook substantial effort to understand and manage the remediation process, the analysis above suggests that for all of the critical contexts investigated, Community participation could have been conducted more effectively. To further explore this assertion, it is helpful to investigate the interactions and systems in place at Mapua, the subject of the next chapter.

10 | Case analysis of interactions and systems

"My weaknesses... I wish I could come up with something. I'd probably have the same pause if you asked me what my strengths are. Maybe they are the same thing."

- Al Pacino

10.1 Introduction

The previous chapter provided an investigation of critical events during the clean-up of the former FCC site at Mapua to ascertain, using the PERE framework, the effectiveness of participation. This chapter continues with a similar exploration of group dynamics and systematic interaction. Again the PERE framework is used as a method of inquiry.

10.2 Interactions with participant groups

The following subsections provide an analysis of interaction between participant groups (local communities, environmental NGOs, and indigenous representatives) and project managers.

10.2.1 Participation with the local community

Engagement between managers and the most directly affected people associated with a contaminated site is usually a complex relationship. However, this complexity makes the relationship particularly helpful for exploring effective participation. As detailed in chapter 8, project managers at Mapua implemented a wide range of strategies for consultation with the local community during the selection phase of operations. Open days were held; meetings were conducted; extensive dialogue occurred between site management and local, directly affected residents; individual and group consultation was conducted; intensive input was obtained through members on the Mapua Task Force (MTF). But how effective were these mechanisms?

Firstly, it must be pointed out that the local community in Mapua is not a homogeneous entity. The community consists of renters, holiday home owners, businesses, and people who own their own home. People do not participate in community affairs equally; for example, some local community participants were heavily involved in the community association, whereas others were reluctant to participate. Locals had different attitudes to the contamination threat and to the remediation plan. Furthermore locals had different needs: some were particularly concerned with health implications, some highlighted property value concerns, and others were most interested in the future of the site and the long-term status of the community.

From this variety of voices three principal mechanisms were available for substantive input into the decision making process: through direct contact with project managers, through community members on the Mapua Task Force (MTF), and through the Mapua and Ruby Bay Residents and Ratepayers Association (MRBRRA).

Direct contact with project managers enables concerns to be expressed and empathic connections to develop. It is evident that some strong ties emerged between local citizens and project managers. One heavily engaged site neighbour commented (DS300251 12:00):

> *Thiess knew what they were doing, they were so professional. Thiess went overboard to make sure that I was informed about everything. They did everything by the book, I couldn't fault them.*

However, direct contact also highlighted differences in cognitive style between the technoscientific regime and citizens. For instance, during early trials significant problems emerged with vibration in the plant which caused a nauseating effect on some of those residents near the site. Following a complaint from a local resident, a TDC representative explained that vibrations could not be determined 'objectively' by the scientists:

> *I fully understand that vibration is something that would be difficult to tolerate. However, I am told that it is also something which is very difficult to measure and quantify accurately. Plus it is even more subjective and personal than people's reaction to noise in the environment*

Such a response demonstrated little empathy toward the affected resident and emphasised epistemological dominance of the technoscientific regime. Epistemological conflict is evident in the resident's response:

> *I wasn't suggesting there were a way of dealing with the problem of vibrations, merely that those affected have good reason to feel concerned... I can tell you that remarks about the level of vibrations being experienced being a "subjective" matter goes down about as well as a lead balloon. Our lives are all "subjective" matters...We just won't let the project go ahead onsite unless we can be sure we can all live with it.*

The MTF constituted an import conduit for community concerns. Three community members were present and attended approximately quarterly meetings. One member resided adjacent to the site, enabling the concerns of those most affected to be empowered. Community representatives performed roles of relaying information to project management and informing members of the local community association. As such they provided a link between project managers and the community.

The effectiveness of the MTF as a Community participation mechanism requires exploration. While community members on the MTF conveyed many local issues and thus assisted in the management of the project, meeting minutes show that participation mostly consisted of relaying information rather than substantive inquiry. Meeting minutes demonstrate that at no time were air emissions discussed, which were important to some members of the public. Furthermore, it is questionable whether community members were legitimate representatives of the local community; they were unelected, selected by TDC staff. Thus, although the MTF was effective at empowering some community perspectives and developing a mutual understanding on some issues, it may not have sufficiently represented the total community.

Through the long process of technology selection, strong links had developed between project managers and the local community association. The local community association was instrumental in petitioning for clean-up of the site, was consulted during the technology selection and had substantial influence in the determination of clean-up criteria. Mutual understanding between the community association and project managers centred on non-technical issues, such as the fate of the site. Significantly, community association representatives did not desire to inquire into the technical aspects of the clean-up. The community association appeared to implicitly trust the competence and benevolence of project managers. This implicit trust on technical issues was to have substantial repercussions later in the project.

During the Resource Consent application phase, although extensive community consultation had occurred, the proposal contained some substantially surprising elements. For local residents, the most surprising aspect of the resource consent application related to the hours of operation. During prior consultation, many residents had been adamant that operations should occur within normal business hours, however, the application specified 24 hour continuous processing, strongly contradicting residents' wishes. For project managers, continuous operation reduced completion time by an estimated three months and eliminated start-up and shut-down inefficiencies, however these aspects had not been discussed with community members prior to AEE release, and consequently stimulated outrage.

10.2.2 Participation with environmental NGOs

Generating and sustaining participation of environmental NGOs is essential for accommodating a full range of Community perspectives. Environmental NGOs provide an Arcadian perspective in contrast to the technoscientific modes of decision making. Thus they offer considerable insight into effective Community participation. Two environmental NGOs were most heavily involved at Mapua, The Royal Forest and Bird Protection Society, and Greenpeace. The two environmental NGOs had quite contrasting input so they are examined separately.

Forest and Bird had a long established relationship with the site and with project managers. In 1997 they had successfully appealed a proposed cap and bund solution. The appeal placed a mandate on TDC to regularly inform Forest and Bird of developments in the contamination investigation and associated remediation plan. Interaction between council and Forest and Bird was mediated by their lawyers. For the most part, however, communication represented a one-way flow of information from project managers to the NGO. There is no evidence to suggest representatives of Forest and Bird were afforded the capability of having substantive influence on the process until the second resource consent hearing commenced. Thus while a long-standing relationship was evident between project managers and Forest and Bird, the nature of this relationship does not appear to be of high empathy.

While it is evident that considerable effort was made by project managers to engage with Forest and Bird, prior to the second resource consent hearing, there is no evidence that suggestions made by Forest and Bird altered decisions about the clean-up strategy. Effectively, consultation appears to have been principally to gain an understanding of the concerns of Forest and Bird so that they could be rebutted. Thus, formal participation prior to the hearing appeared to disempower the NGO.

Greenpeace, in contrast to Forest and Bird, had very limited interaction with project managers prior to the second resource consent hearing. Greenpeace were neither involved in the establishment of clean-up criteria, nor in the assessment of options. Prior to the second resource consent hearing, Greenpeace were consulted by subcontractors Tonkin and Taylor but a good rapport does not appear to have been established. Concerns were expressed surrounding clean-up criteria and effectiveness of the technology. In similarity to Forest and Bird, these concerns could not be addressed. Thus, mutual rationality and understanding could not be established between Greenpeace and project managers.

For environmental NGOs, the resource consent application provided insufficient information on the process and how potential effects would be controlled. Although some pre-hearing consultation had been conducted, extensive questions remained. Detailed questions were hampered by commercial sensitivities surrounding process reagents and the lack of thorough analysis available – the technology represented a world first, hence comparison was impossible. Thus questions arising from the NGOs could not be fully answered. Furthermore, NGOs, in particular Forest and Bird, disputed the end point of treatment and the vision desired by project managers. Instead they advocated an alternative vision, suggesting that ‘clean-up’ should constitute full and final soil treatment which would essentially eliminate the contamination entirely. This conflict of vision was never successfully resolved.

While environmental NGO perspectives were marginalised during the establishment of environmental effects, they were empowered to express their concerns at the second resource consent hearing. However, at this stage they were placed in a ‘no win’ situation. Both environmental NGOs held clear reservations toward TDC regarding aspects of the clean-up method and the vision which was being proposed. Yet environmental NGOs were perceived by the public to have prevented the previous ‘cap and contain’ proposal from proceeding, thus additional perceptions of further blocking progress would be potentially damaging. At this stage, the majority of the public simply wanted to see the project go ahead. Thus, although the resource consenting process empowered environmental NGOs, it counteracted efforts by environmental NGOs to act in the interests of the public.

Although environmental NGOs have specific mandates regarding environmental wellbeing, the relationship of environmental NGOs and the public is complex (e.g. Wapner 1996; Hamad et al. 2003). On the one hand NGOs mostly rely on the public for funding, Greenpeace for instance markets itself as completely reliant on donations. Thus it is in their interests to conduct campaigns which will be at least well-received by likely donor cohorts. On the other hand, environmental NGOs must conduct campaigns which constitute their core purpose as advocates of human health, social welfare or environmental protection. Occasionally, in pursuing their purpose as advocates, unpopular campaigns may be conducted.

To further empower their understanding of the problem, both environmental NGOs appealed the subsequent decision to the Environment Court. Environmental NGOs were concerned with the extent of monitoring, particularly during the Proof of Performance. This meant that they were strongly concerned with the safety of the local community. However, they had established only weak links with the local community, as a result, this empathic connection did not appear to be strong. Furthermore, local citizens were disempowered by the appeal. The Mapua residents group simply wanted the project completed and viewed the appeals as threatening the overall viability of the clean-up and simply as a means for attaining publicity. As the President exclaimed: “People have no faith in Forest and Bird anymore” (The Leader 2003). Thus, while the appeal empowered environmental NGO perspectives, it disempowered community perspectives and reduced trust between local community members and environmental NGOs.

The way that arbitration proceedings were conducted affected trust between environmental NGOs and project managers. As noted in Chapter 8, arbitration was conducted in tense circumstances; there is reason to suggest that central government imposed significant influence on the arbitration process (Interview 4, 9). MfE’s substantial financial contribution to the project was threatened to be withdrawn if issues could not be rapidly resolved (Neal 2003a). The process was adversarial and time pressure meant that substantive inquiries could not be addressed. Some environmental NGO representatives suggested that this affected their decisions to accept the terms of project managers, even though significant questions remained about the enforceability and robustness of the consents. While neither Greenpeace nor Forest and Bird were satisfied with the arbitration process, they appeared to principally accept the amended consent conditions on the basis of trust in the TDC compliance team.

Limited engagement with environmental NGOs occurred throughout the selection process at Mapua. While some interaction occurred between project managers and Forest and Bird, engagement was insufficient to garner mutual understanding. Empowerment of Environmental NGOs was chiefly restricted to the resource consent hearing in which two NGOs – Forest and Bird, and Greenpeace – appealed the decision. Appeals appeared to manifest widespread distrust. Environmental NGOs felt disempowered by threats to withdraw funding, members of the public were disempowered by a perception that environmental NGOs were delaying the project. The arbitration process resulted in unclear conditions which meant environmental NGOs were forced to trust compliance officers' interpretation.

10.2.3 Participation with indigenous representatives

Indigenous perspectives provide an alternative viewpoint, in contrast to the standard problem solving associated with the technoscientific paradigm. How indigenous perspectives are included in project implementation is therefore insightful for generating an understanding of effective Community participation.

New Zealand law acknowledges the special status of indigenous people. 'The relationship of Māori and their culture and traditions with their ancestral land, water, sites, wāhi tapu, and other taonga' is considered a matter of national importance which must be recognised and provided for by decision makers (section 6(e)). Furthermore, the RMA provides for the following:

- 'The protection of historic heritage' which includes 'sites of significance to Māori, including wāhi tapu' from inappropriate subdivision, use, and development is a matter of national importance which must be recognised and provided for by decision makers (section 6(f))
- The protection of recognised customary activities is a matter of national importance which must be recognised and provided for by decision makers (section 6(g))
- 'Kaitiakitanga' is a matter which decision makers must have particular regard to (section 7(a)). It is defined in section 2 as meaning 'the exercise of guardianship by the tangata whenua of an area in accordance with tikanga Māori in relation to natural and physical resources; and includes the ethic of stewardship'.

- All persons exercising functions and powers under the Act must 'take into account the principles of the Treaty of Waitangi (Te Tiriti o Waitangi)' (section 8)

The Resource Management Act 1991 mandates consultation with Iwi, principally to ensure that indigenous perspectives are included within resource management decision making, in accordance with Tiriti o Waitangi. Consultation with indigenous groups at Mapua offers some insight into the functioning and efficacy of resource management legislation.

There is some evidence to suggest a relationship of low empathy between the Crown (i.e. TDC) and indigenous groups regarding the contaminated site at Mapua had been established prior to the first resource consent hearing. At that time Iwi groups expressed considerable disregard for the process by which they had been consulted. Specific criticism related to what was perceived to be rushed and hasty consultation, and thus the inability for Iwi groups to meaningfully comment on the proposal (Interview 10).

In 2001, project managers began consultation with various indigenous groups. There is no evidence to suggest that indigenous groups were involved in the establishment of a remediation vision prior to the selection of a remediation strategy. Indigenous representation was neither present on the Mapua Task Force, heavily involved in setting the vision, nor on the Local Residents and Ratepayers group, influential in advocating soil treatment. Instead, consultation involved informing indigenous representatives of the hazardous nature of the site and the steps proposed to eliminate the threat. Specifically, that the treatment method proposed required excavation and disturbance of land at a site known to be previously inhabited and culturally significant. Destruction of significant cultural artefacts, history, and human remains (koiwi) was most likely to occur (TDC 2002).

As kaitiaki (guardians), indigenous representatives have responsibilities to protect the taonga (treasures) within their rohe (territory). Thus, the remediation option being offered represented a compromise. On the one hand, if the remediation proceeded as highlighted by project managers, it would likely generate improvements to the land, the estuary and consequently to the ocean. As a local Iwi representative remarked:

> *"Whatever happens ends up in the domain of Tangaroa"*

However, on the other hand, the remediation method involved excavation of contaminated soil and processing which would irreversibly destroy potentially significant cultural artefacts. The decision of whether to endorse the remediation was therefore a difficult one.

In an effort to mitigate concerns raised by the destruction of a culturally significant site, project managers worked with indigenous groups in the development of an Iwi monitoring system. An archaeologist investigated the likelihood of potentially significant archaeological areas of the remediation site and designated areas of the site into four categories: i) Likely; ii) Possible; iii) Less Likely; and, iv) Unlikely. Only areas deemed ‘Likely’ or ‘Possible’ were marked for Iwi monitoring. For these areas Iwi representatives were to monitor the excavation and halt progress upon the discovery of any artefacts. Iwi representatives would be remunerated for their time. Hence, the Iwi monitoring protocol guaranteed indigenous input in site operations.

However, genuine empowerment of indigenous perspectives in regard to the development of the protocol appears to be limited. There is little evidence that efforts were made to engage with tangata whenua in relation to the archaeological site designation map. Although a monitoring protocol was developed between council and tangata whenua, the degree to which it enhanced trust between the council and tangata whenua has been disputed (Interview 10).

While the proposal partially empowered indigenous representatives in monitoring artefacts, it had at least three other consequences. Firstly, the proposal disempowered Iwi groups from contesting the vision by presenting them with a solitary option. There is no evidence to suggest that alternative treatment methods were conveyed at this time which both ensured the health of residents and the estuary and effectively protected the cultural significance of the site. Thus acceptance of the proposal represented tacit approval of the manager’s vision for the site and for the overall remediation strategy.

Secondly, the Iwi monitoring proposal stimulated claims of mana whenua (territorial rights), and accentuated already apparent antagonism between the Iwi groups. Iwi indigenous groups at this time were somewhat fragmented, six separate tribal groups exhibited claims to mana whenua. Instead of unifying indigenous perspectives around a common problem, it provoked disharmony and difference by requiring a single Iwi monitor to fulfil the duty.

Thirdly, the proposal disenfranchised Iwi groups. The terms of the proposal (‘the designated areas’) were developed with minimal consultation from local indigenous representatives.

Although emphasis was placed on the “tentative” map being “imprecise and very preliminary” (Young 2002), it nevertheless created the foundation for determining the extent of Iwi involvement. The designation proved controversial at later stages of the remediation.

The fact that tangata whenua had negligible input in the initial designation of parts of the site likely to contain culturally significant artefacts is indicative of the difficult relationship between councils, the Historic Places Trust, the archaeological community and tangata whenua. Disclosure of sites of significance by tangata whenua has been hampered by an inability of councils to guarantee information protection and non-disclosure (Interview 10). There are fears amongst tangata whenua that open access to knowledge about wāhi tapu (sacred sites) may lead to the desecration of these important sites (especially by “trophy hunters”), and it is their preference that knowledge of these sites is retained only by people of sufficient mana to ensure adequate protection (PCE 1998). There thus exists a barrier to empathy between tangata whenua and the crown system for the protection of culturally significant taonga because of conflicting needs.

Fourthly, the proposal defined a specific role for indigenous groups outside of general discourse. The indigenous perspective was thus defined as highly remote from the technoscientific assessment of risk and protection. This division of the discourse into distinct technoscientific and Maori elements created further barriers for involvement of indigenous perspectives and mātauranga Māori.

The marginalisation of the Iwi perspective is evident in the TDC Officer’s report, after concerns were raised that the technology would not be able to adequately destroy the contamination (PDP 2003):

> *It is important to recognise that the MCD process is a new technology that is unproven at a commercial scale. Therefore there is a risk that it will not achieve the level of contamination reduction that is sought. This is a risk that the applicant is taking, and it is not a reason to decline the consent conditions...the important issue regarding this application is to ensure that any consents that are granted, are done with appropriate terms and conditions to ensure that no adverse effects will occur that could constitute unsustainable resource management.*

For Iwi representatives, the risk lay not solely with the applicant, it resided with them as well as kaitiaki (guardians) of their rohe (territory). Iwi representatives had to consider the destruction of important taonga (treasures) as a trade-off for improvements in environmental health (Neal 2003b).

Perhaps unsurprisingly, project managers had considerable difficulty engaging with Iwi groups and most were reluctant to endorse the proposal. One indigenous group did sign and was allocated Iwi monitoring responsibility. Another indigenous group placed a late submission which was not accepted. The consultation process, while ostensibly involving indigenous groups, does not appear to have meaningfully included full indigenous input.

Following the second resource consent hearing, tangata whenua assumed their role as ‘Iwi monitors’. In this role it was anticipated competent Iwi representatives would inspect excavations to partially mitigate the effects of archaeological site destruction for the purposes of soil remediation. However, the introduction of Iwi monitors also provided a vehicle for tangata whenua perspectives to be included within the remediation proceedings.

It is evident that tangata whenua continually questioned the adequacy of the archaeological map, upon which their presence was dictated. The fact that Iwi were not involved in the development of the archaeological map infuriated some representatives. One representative noted (Interview 10):

> *If you took an overview of the whole area, Mapua, there’s find spots all over it. We could tell you where kāingas [homes] were, where we buried people there... They wouldn’t believe us but we know those sorts of things*

By not including tangata whenua perspectives in the development of the archaeological site map, it is understandable that tangata whenua believed the map to be inadequate. Although the archaeological map was “tentative”, “imprecise and very preliminary” it was nevertheless used to justify whether Iwi monitors should be present on site.

Tangata whenua ability to exercise their authority as treaty partners and kaitiaki also appears to have been hampered. In particular, tangata whenua appear to have strongly questioned aspects of the scope of the project (Interview 10). Two particular incidents regarding the discovery of significant quantities of pesticide under the wharf area, and visually apparent contamination in a drain on the outside of the site demonstrate these kaitiaki constraints. A tangata whenua representative noted:

> *It became a standing joke, all the contractors on site would say the same thing. Clean up to that line there and then the same dirt is on the other side of the line but we don't clean that, 'cause that's not part of it.* (31:50)

Nevertheless, in general, the role of Iwi monitors appears to have been beneficial to the project. Iwi monitors were a relatively novel approach to resolving developmental issues where potentially significant artefacts would have to be disturbed. However, aspects of the process indicate that Iwi monitors may not have been able to fully vocalise concerns nor were empowered to exercise their role as kaitiaki.

How could consultation with indigenous representatives have been undertaken more effectively? PCE (1998) contains a set of guidelines for consultation with tangata whenua. Firstly, timeframes should be mutually understood and timely practices adopted. Secondly, consultation should begin early, allowing tangata whenua to comment on proposals before they have been fully formulated. A corollary to this point is there should be a willingness to consider change and review options. Thirdly, Tangata whenua should assist with information and interpretation of technical data. Fourthly, regular monitoring of the consultation process and relationships should occur, to be present. Finally, there should be an acceptance of diversity in needs and requests. Consultation according to PCE (1998) provides a basis for needs to be inquired into, genuine empowerment to occur, and mutual understanding to develop.

10.3 Systems of participation

The following subsections provide an analysis of systems for enhancing participation during the clean-up at Mapua.

10.3.1 Limitations of community meetings

Regular community meetings were identified as a major mechanism for involvement of the community. In theory, the system of community meetings specified in the consent may have provided a useful method of participation. Specified as well-advertised, interested and affected parties would be informed and free to attend if they wished. Specified as being held at regular intervals, the community meetings would establish a routine forum for discussion regarding the site. Specified as hosted at a location near the site, those most affected would have the greatest opportunity to attend. Specified as an exchange, interested and affected parties could express their opinions on the clean-up and receive updates from the remediation contractors, thereby enabling substantive issues to be openly discussed and management of the project to be modified if necessary. In this way trust is thought to be enhanced - through open and interactive dialogue, mutual competence exchange, and cross character evaluation.

However, the system implemented at Mapua did not appear to function as effectively as the above theoretical evaluation would predict. Firstly, anecdotal evidence suggests that many residents were not aware of the meetings (Interview 11, 12, 14). There appears to have been no assessment by the compliance team or the consent holder regarding the adequacy of meeting advertisements to establish whether advertisements were effective (PCE 2008a).

Secondly, although meetings began in accordance with consent conditions, during the course of the project, community liaison meetings became less frequent. Table 21 provides an account of the community liaison meetings as evidenced in the PoP report and MfE's monthly reports. Meetings were not held regularly, as specified in the consent, varying between one and nine month intervals. Because meetings were not at the specified intervals, it is likely that meetings did not become part of community members' regular routine, thus attendance is likely to have been compromised.

Table 21. Record of meetings between the consent holder or their representative and the Mapua community

Date	Location	Present	Interval (Months)	Source
Feb-04	Mapua and Ruby Bay Ratepayers Association	Thiess site management		PoP Report
Mar-04	MRBRA	Thiess site management	1	PoP Report
Jun-04	MRBRA	Thiess site management	3	PoP Report
Sep-04	MRBRA	MfE Project Management team	3	MfE Monthly Report
Oct-04	MRBRA	MfE Project Management team	1	MfE Monthly Report
Nov-04	MRBRA	EMS site management	1	MfE Monthly Report
Dec-04	MRBRA	EMS site management	1	MfE Monthly Report
Feb-05	MRBRA	EMS site management	3	MfE Monthly Report
Jul-05	MRBRA	EMS site management	4	MfE Monthly Report
May-06	MRBRA	EMS site management	9	MfE Monthly Report
Oct-06	MRBRA	EMS site management	5	MfE Monthly Report
Mar-07	MRBRA	EMS site management	4	MfE Monthly Report
Aug-07	MRBRA	EMS site management	5	MfE Monthly Report

Thirdly, community liaison meetings were never conducted exclusively for the contaminated site, instead they were attached to Residents and Ratepayers meetings. Consequently, the issues relating to the contaminated site comprised only a small proportion of what could be extensive community meetings. For some interested parties not specifically attached to other community issues, these meetings were considered tedious, and unnecessarily time consuming (especially if they resided a considerable distance from the site) (Interview 15). These factors appeared to be sufficient to discourage the involvement of environmental NGOs, thus criticism on technical grounds was compromised.

Furthermore, for some community members, the Residents and Ratepayers group was not considered a neutral host. For some of the most affected parties, who were opposed to the clean-up method, the Residents and Ratepayers group had let them down by aligning with TDC visions for the site and method of clean-up. For these individuals, the Residents and Ratepayers group appeared to be more concerned with the long term benefits to the Mapua Community than with the immediate health consequences of the clean-up. For example, the Residents and Ratepayers group acknowledged during RMA consultation that "short term pain for long term gain" was required (T&T 2003c). For some of the most affected residents, the Residents and Ratepayers group were perceived as allied to TDC and incapable of receiving substantive project criticism. Thus, some of the most affected parties appear to have been subtly excluded from the meetings.

Additionally, the relationship between the Residents and Ratepayers group and TDC had other subtle repercussions on attendance. It is evident that a close trust relationship had developed between the TDC and the Residents and Ratepayers group. For example, when Thiess pulled out, the Residents and Ratepayers group were provided confidential information by TDC which was withheld from the community for several weeks. For some parties this withholding of information represented a breach of empathy and eroded trust in the Residents and Ratepayers group. Moreover, for those parties who lacked empathic connection with TDC, the close association between TDC and the Residents and Ratepayers group eroded, by virtue of association, trust between them and the Residents and Ratepayers group. Thus, individuals and groups who did not have an established trust relationship with TDC (vocal opponents of the project) were less likely to attend the meetings.

Thus, community meetings hosted through the Residents and Ratepayers group appeared to reduce the ability of potentially dissenting voices to be heard, i.e. those with alternate rationality. Likely spheres of dissent within the community and from interested parties outside the community were systematically impeded, thus community liaison meetings appeared not to fulfil their purpose as the principal means for establishing and maintaining trust between the community and project managers.

Fourthly, effective participation relies on high quality interaction between relevant community members and appropriate project personnel. As noted above, community representation may not have encompassed a full range of community views, especially those views which were liable to challenge the status quo; therefore the extent of relevant community representation is questionable. Whether relevant project staff attended and were able to incorporate community based information to appropriately modify management of the site is more challenging to establish.

Initially, management of the project was through Thiess representatives present on site and able to modify site operations or openly discuss community expectations. This system presented a relatively robust method for enhancing ‘presence’. Empathetic exchanges were established through direct engagement, competence was demonstrated by representatives with considerable expertise, communication trust had developed over the two-three year period that Thiess had already been involved in the project. Thus during Thiess’ period of project management, trust was high and community meetings were constructive.

Prior to taking over the project, MfE’s role in community engagement was negligible. MfE’s principal role was as part funders, with the exception of a contractual condition to ensure that local residents were afforded some influence in end-use decisions. Although representatives of MfE visited the site (even occasionally the CEO and the Minister), it was not until MfE took over management of the project that an active role in engaging with the community of Mapua was assumed. Staff who had never before interacted with the Mapua community took over management of the project.

MfE’s decision to take over the management of the project had considerable impact on community engagement. At first, MfE managed the project from Wellington, and although MfE representatives originally attended community liaison meetings, it is unlikely that their attendance contributed significantly to the enhancement of trust and community engagement. As noted in Chapter 9, anecdotal evidence suggests that local residents were disappointed by the perceived level of competence of MfE project management staff. Furthermore, communication and character trust had not been established. Naturally residents compared

MfE's initial project management team with Thiess', and understandably judged them as being less competent, thus interaction was likely to be not of high quality.

In late 2004, MfE appointed a permanent site management team. Following this appointment a representative of the contracted site management team took over community liaison responsibilities until the completion of the project. The principal contact person from the site management team was contactable via the freephone number, approachable, and a remediation expert. Anecdotal evidence suggests he quickly developed a rapport with local residents and responded constructively to most enquiries and complaints (Interview 3,12).

This appointment and transfer of responsibility had both constructive and adverse effects on engagement. The appointment of a site management team for community engagement created a barrier to development of empathy between project managers and interested and affected parties. Community concerns were moderated through a third party, reducing mutual empathy and creating communication difficulties. Furthermore, it created a barrier to evaluations of competence and rationality, since although the contracted representative had significant expertise, his decision making ability on issues of significant community concern was effectively impotent (many actions had to be vetted by MfE's public relations team). This meant his competence would be continually questioned by the community.

One of the principal engagement functions of the site manager was to attend community meetings. Anecdotal evidence supports the notion that meetings were primarily for the site manager to update the community on site management issues. This evidence suggests that for the most part, community meetings encouraged limited critical discussion and feedback. Furthermore, there is little evidence to suggest that when community concerns were voiced at the meetings they were always acted upon. MfE monthly reports do not demonstrate how community meetings affected the running of the project; it is likely that if community meetings did have a substantive contribution, this contribution would have been noted. Furthermore, the ability of the site manager to make decisions regarding the management of the project, especially when decisions were likely to have significant cost implications, appears to have been seriously constrained. Thus, while community meetings could have presented an effective means of engaging with the community it appears that for the most part high quality interaction was lacking.

Several factors compromised the principal community liaison system specified in the resource consents. Meetings do not appear to have been sufficiently advertised, meaning many residents were not aware of them. Furthermore, meetings were not conducted according to consent requirements regarding regularity, meaning engagement did not occur for long periods and that attendance was potentially affected. Moreover, they were not held in a neutral forum and solely for the purposes of the contaminated site clean-up, thus compromising the attendance of NGOs and those most affected. Finally they did not include project staff with authority to make substantial decisions. Thus, while roughly in accordance with the consent conditions, the system implemented to facilitate community participation does not appear to have been effective.

The effectiveness of the system of meetings to enhance community engagement does not appear to have been reviewed. These issues demonstrate the necessity of formative evaluation of participation mechanisms (of 'being present'), so that adaptive management techniques may be implemented to amend or otherwise modify them. Reviews undertaken by project managers and moderated through a bridging organisation such as the MTF would likely have significantly benefited engagement.

10.3.2 Limitations of site management engagement

The second system of engagement mandated in the consents related to the appointment of a permanent contact person for the site. In theory, this may have helped the representative to 'be present' and enabled any affected and/or interested party to enquire directly, facilitating immediate dialogue and potential modification to site operations. Thus, a permanent contact person could have enabled useful feedback to site management, enhancing management of the site.

However, this system of engagement did not appear to function as effectively as theoretical enquiry would predict. Firstly, for high quality engagement, the system relied on effective communication between enquiring citizens and the contact person. Effective communication requires: a) a conduit for communication; b) sufficient mutual empathy and security to promote the expression of their beliefs openly and honestly; c) a system of information exchange and feedback to further enhance trust and communication. Thus, effective communication is a dynamic property of engagement.

There are many modes of communication: non-verbal, visual, written and oral. While it is evident that the consent prioritises oral communication via telephone over other modes, specifying telephone contact as a permanent mode of information exchange, it is apparent that during the course of the project all modes of communication were utilised. Thiess ensured that multiple modes of information exchange could be used by situating a contact person in a nearby rented property and making it known that the contact person was available whenever needed. While MfE was responsible for site management, face to face modes of communication were largely impossible – coordinating site activity from Wellington precluded many modes of information exchange, thus during MfE's initial period of project management, engagement may have been constrained by communication limitations. Furthermore, the MfE contact person for the site does not appear to have always been available, which was particularly apparent during the initial months of take-over, and when sub-contractors worked after hours. Engagement during these periods was therefore impossible. Thus, while the resource consent conditions did not specify multiple modes of information exchange in relation to direct contact with site management, it appears that the systems implemented by Thiess provided for greatly enhanced dialogue through utilisation of a full range of communication options.

The level of empathy between two parties affects their ability to effectively communicate. High empathic connections facilitate open and honest dialogue whereas low empathy is more likely to induce risk-averse communication. Following the Resource Consent Hearing, Thiess and their sub-contractors had established considerable empathic bonds with Community members, and open dialogue appears to have been valued between the site contact person and affected and interested public. However, after MfE assumed responsibility for the project, it appears that less emphasis was placed on open communication exchange. Repeated changes to the management of the project and the contact person for the site had implications on empathy between the allocated contact person and interested and affected individuals. Furthermore, as noted in section 10.3.1 the ability of the MfE contact person to communicate in an open way with citizens was constrained by the system of sub-contracted positions - the sub-contracted representative responsible for mediating dialogue between Community members and MfE does not appear to have always had sufficient authority to enact substantial changes to the management of the site to effect citizens' concerns.

Anecdotal evidence appears to support the suggestion that empathic connection and trust between citizens and the contact person deteriorated during the course of the project, in part due to the perceived impotence of the contact person to remedy all citizens' issues (Interview 3). Anecdotal evidence suggests that some residents simply halted dialogue, and did not present their concerns openly to the contact person (Interview 6, 7). Thus, as trust deteriorated, communication was further compromised.

An essential component of empathic bonds and mutual understanding is the ability to give and receive feedback. During the early phases of full scale operation significant effort appears to have been placed on maintaining information exchange through the conduit of the contact person. Neighbours were regularly visited to proactively obtain feedback, furthermore, at the beginning of operations, residents regularly visited the site or called the contact person out of curiosity. Thus, information exchange appears to have been initially high.

10.3.3 Limitations of the complaints register

A third mechanism for engagement between project managers and affected parties was through the development of a 'Complaints Register'. In theory, the Complaints Register would provide a means of documenting concerns raised by affected parties so that action could be pursued to remedy them. Furthermore, the Complaints Register was to be included in monthly reporting so that complainants could obtain feedback on how the issue had been resolved. Thus, in theory, the Complaints Register formed a system for adaptive management of the site and to promote learning about thoughts and needs between citizens and the project managers.

The Complaints Register concept was developed by Thiess and its consultants prior to the Resource Consent Hearing (PDP 2003):

> *The Applicant recognises that the proposed remedial works have the potential to generate dust, emissions, odours, noise, vibrations, and other potential adverse effects. As a result, detailed conditions and monitoring are an essential part of any consents granted. To ensure that the proposed activities do not cause adverse effects on the surrounding environment and community, the Applicant proposes that a Complaints Register will be required to be kept by the Site Manager, and a*

> *Compliance Coordinator will be appointed by the TDC to ensure compliance with the consent conditions, and record any issues that may arise from the remedial works.*

The TDC Officer's report further states that the Complaints Register "will provide a useful database for discussions between the consent holder, the site contractor, the community, the TDC Compliance Coordinator, the Site Auditor and the Review Panel" (PDP 2003).

At the Hearing, project managers appeared to emphasise possible effects resulting from site activities. However, there is no evidence to suggest that the project managers advised that effects on interested and affected parties would be anything more than a nuisance. Consequently, the Complaints Register was included in consent conditions to cater for recording and ameliorating these "nuisance" effects.

It is evident that, after the Hearing, emphasis was placed on the complaints register by the compliance team and members of the Peer Review Panel and some effort was made to develop a robust system for recording and actioning complaints. For example, after the first monthly report, a PRP representative comments (Callander 2004):

> *The complaints register could be improved by providing a greater level of detail. In particular, some information regarding what action was taken to resolve each complaint would be helpful.*

The Peer Review Panel appears to have been instrumental in the development and modification of the Complaints Register. However, there is no evidence to suggest that interested or affected parties were involved in the development and modification of the system. Thus, while intended as a means of incorporating community concerns, the Complaints Register system appears to have been developed with very little community input.

There appears to have been systematic under-reporting of complaints. For example, an incident occurred in January 2005 resulting in a discharge of steam and contaminated dust. MfE's monthly report for January states "there was one complaint received for a consent breach which occurred on 13 January involving the release of steam and soil...Several complaints were received by both the TDC Compliance Officer and the MfE Site Manager". However, only one complaint was included in monthly complaint statistics.

The Complaints Register, as the name suggests, focused solely on complaints. Helpful feedback was deliberately omitted from the register, for example, an email between the site manager and the TDC compliance team notes “I am not putting this into the “complaint” log since it was not a complaint but more a helpful heads up” (Roosen 2004). There was no facility for documenting and reviewing positive feedback (while there was no system for recording positive feedback it did not stop the MfE later suggesting “there has been more positive feedback than negative”). As a result, the complaints register could not ascertain directly whether operations were improving or otherwise - improvements were inferred by complaints reducing, not by direct sampling of citizens opinions. Thus, the Complaints Register, by focussing solely on negative aspects of the remediation process, omitted potentially important data for documenting, reviewing and reporting on site operations.

The Complaints Register was also constrained by other aspects of scope, and therefore did not include data which could possibly be deemed complaints. The Complaints Register did not include complaints received through other means, for example through opinion columns in newspapers or complaints received at monthly meetings. The Complaints Register was limited to site operation and did not include aspects such as information disclosure or non-disclosure, time taken to respond to general enquiries, complaints regarding the perceived competency or incompetency of management. For example, immediately following implementation residents requested health checks over concerns for possible health impact. This was not included in any formal complaint documentation. The Complaints Register did not encompass complaints relating to project scope, instead focussing solely on site operations. For instance, citizens were aware of pesticide dump sites in other parts of the district and periodically appealed for these to be included in the clean-up, however, these appeals were not deemed to be complaints and were thus excluded from the Complaints Register.

The Complaints Register does not appear to have been critically reviewed on a regular basis. MfE monthly reports indicate that the Complaints Register was primarily a reporting tool, there is no evidence to suggest that the Complaints Register was reviewed periodically to verify that concerns were being adequately captured and addressed. The final MfE Monthly Report provides an indication of how complaints were interpreted during the course of the project:

For the period of 34 months of remediation, there have been 107 complaints. The majority of these complaints are from a small number of persons. The closer the proximity to the site, the greater the concerns relative to site noise, dust and odour. The Site Management Team considers complaints to be their top priority (other than health and safety issues). They attend to any complaint made immediately with a variety of responses.

Thus, while complaints may have been addressed at the time, there is little evidence to suggest that complaints were used to extensively modify site operations or for inclusion in adaptively managing the site.

10.3.3.1Summary and recommendations

The complaints system did not appear to be an effective mechanism for the development of trust between project managers and Community participants. To be an effective system to facilitate presence, empathy, rationality and empowerment, the system needed to:

a) Be sufficiently well advertised so that potential responders would be aware that such a system existed
b) Include citizens sufficiently well engaged with the project to provide honest feedback
c) Effectively record the feedback
d) If negative feedback:
    a. Effectively convey the negative feedback to competent investigating personnel
    b. Effectively investigate the negative feedback
    c. Take appropriate measures to avoid, remedy or mitigate the subject of the negative feedback
    d. Feedback amelioration measures to initial responder
    e. Obtain feedback from initial responder to verify the effectiveness of amelioration measures
e) If positive feedback:
    a. Effectively convey the positive feedback to management personnel
    b. Effectively relay positive feedback to appropriate personnel
f) Periodically review feedback to understand general trends and whether amelioration measures were successful or whether further adaptive management was required and convey these trends in an impartial way to interested and affected parties

g) Periodically review and evaluate feedback capture system to establish whether improvements or adjustments were required to fully encapsulate the range of community concerns
h) Using feedback from interested and affected parties, make adjustments to, and verify the effectiveness of site processes and the feedback system

If the complaints register had operated as above, it would have served as a useful tool for incorporating citizens' concerns into routine and strategic site decision making. Furthermore, such a system would have benefitted trust between the consent holder and the Community. The system which was introduced as part of the consent conditions appears to have omitted several important components of a feedback and review system, thus, the Complaints Register system did not perform as effectively as might be predicted.

10.3.4 Limitations of monthly reporting

A fourth mechanism for engagement between project managers and affected parties was through the development of a 'monthly reporting' system. In theory, the monthly reporting would provide a means of informing Community participants as well as the Peer Review Panel about operations at the site and the results of environmental monitoring. Thus, in theory, the Monthly Reports formed part of a system for transferring information from site operations to other parties and may have enhanced trust between project managers and citizens.

To be effective, the Monthly Reporting system relied on:

a) Data being available;
b) Data being competently interpreted;
c) Knowledge being effectively conveyed;
d) Reports being accessible;
e) A system in which enquiries stemming from the reports could be resolved.

However, there is evidence that many of these conditions were not met during a considerable portion of the Mapua clean-up. Firstly, there were delays in the release of the monthly report, release varied between two days and approximately five months after month end. Secondly, there were omissions in critical portions of the report due to data being unavailable. Laboratory delays caused substantial monitoring data to be excluded. For example, Thiess' initial Monthly Report for March 2004 does not contain laboratory results for dioxins, furans, PCBs, HCB and Lindane (Thiess 2004b). The TDC compliance team appear well aware of the issues that delays in analysis were causing, the compliance report for August 2005 states (TDC 2005b):

> *The labs and consultants are still slow with the results. This is true for soils, air and groundwater and, for example the ambient air report for April was issued 27 June and arrived at TDC 6 July. The last groundwater report I received was for the March sampling, and it arrived mid May. This makes it hard to assess the current situation and respond to trends in a timely manner*

Furthermore, important and potentially significant information appears to have been routinely excluded from or misrepresented in Monthly Reports. For instance, when the carbon filter failed entirely in December 2004 and March 2005 neither incident was reported. Another incident in January 2005 was described by a local resident:

> *I was in Mapua today with my family getting fish and chips from the naturesmoke shop at the wharf a bit after 5pm today when the whole area was covered in a great big cloud of dust for [sic] the toxic dump site. It was incredibly thick, stunk of chemicals and lasted for about 5 minutes. It was pretty gross and unpleasant.*

Other complainants concurred with the above description, citing a huge cloud which drifted over the wharf and appeared to be very poisonous. An immediate TDC inquiry noted the following:

> *After extensive investigation found cloud due to hole cut into feeder pipe on reactor. Pipe was thought to be clogged with dust and actually filled with steam and contaminant*

However, the technology vendor appeared reluctant to admit that the incident did occur, and disagreed that material was released outside the site boundary. A response from the technology vendor regarding the incident illustrates how monitoring data was prioritised over information provided by affected parties (EDL 2005):

> *If our assumption is incorrect then any soil release will show in the north eastern TSP ambient monitor situated adjacent to the laboratory. We regret this release but respectfully point out that there has been on a number of occasions some difficulty*

with residents to differentiate between; dust, steam with some dust particles, and steam.

The monthly report contains some reference to these events, relating to this event states (MfE 2005c):

There was one complaint received for a consent breach which occurred on 13 January involving the release of steam and soil. EDL acknowledges the breach, but believes that the discharge did not extend beyond the FCC boundaries. The incident involved a discharge of steam and soil from the infeed pipe to the MCD which caused a plume to form. Several complaints were received by both the TDC Compliance Officer and the MfE Site Manager. An investigation was conducted as to the cause and a Non-Compliance report was filed.

Perceptions of obfuscation in the reports appeared to be widespread among Community members. No interpretation of monitoring results was provided (PCE 2008a), nor were reports reviewed by their intended audience (Community members) prior to release. A citizen opined (Dickinson 2007):

These reports present a sanitised version of the monitoring results in very technical lingo. Do they mention the obvious breaches of the resource consent? No. Do they explain the significance of the monitoring results and exceedences of guidelines? No....Local folks want to know what 172,454 g/m2/month of DDT means. Should our children be outdoors breathing this stuff?

It does not appear that monthly reports or monthly reporting strategies were ever discussed with the people they were intended to serve, the Community. If a strategy which incorporated feedback from participants had been in place, one would have expected enhancements to reader-friendliness throughout the project. Instead however, the inverse is apparent, with reports becoming more obfuscated and less helpful to Community participants as the clean-up progressed. For example, the complaint system was initially quite descriptive, helpful for citizens in understanding what had happened and what action had been taken to remedy it (Table 22). However, later reports are more quantitative, and no longer describe responses so are likely to be less helpful to Community participants (Table 23). Furthermore, later reports show % Complaints / Area Population, which may have been intended to demonstrate that the number of complaints was relatively small, but may have also had the effect of blaming the small number of people who did complain. Whatever the reason, by adding such a column, MfE demonstrated a distinct lack of empathy toward those most affected.

Another concern regarding dissemination of reports to the Community related to access. Monthly Reports were placed in the local public library but there is evidence to suggest that many Community members were unaware of this. Furthermore, anecdotal evidence suggests that some interested parties in particular found it difficult to access these records due to limited library hours (PCE 2008a). There is no evidence to suggest that MfE performed any investigation to establish whether there were barriers to the uptake of the reports.

Table 22. Complaint Section of January 2005 Monthly Report

Date / Time	Complaint	Address	Details	Response
0830 14 Jan	103	FCC	On 13th Jan, a discharge of steam and soil occurred from the EDL plant causing a plume of steam and soil.	EDL failed to notify Site Management and the TDC Compliance personnel. When notified, a detailed investigation occurred as to the cause (human error) and prevention. Interaction with many nearby residents was conducted.
1315 20 Jan	104	Coutts Place	A dust generation complaint was received.	The Water truck was called to spray the piles on FCC West.
1400 24 Jan	105	Tahi	Fertilizer smell especially in afternoon.	Discussion with EDL on use of fogging system and covering piles as soon as possible. Have now done reconfiguration of venting and use of carbon filters to prevent odours.
1400 28 Jan	106	Tahi	Vibration issues inside house.	Discussion with EDL re: altering harmonics of reactor. EDL will try this.

Table 23. Complaint Section of August 2006 Monthly Report

Month	Total * Complaints	Noise	Dust	Odour	Vibration	Outside of Hours	Other	% / Area Population
Oct 04	4	3	2	1	3			1.33
Nov 04	7		5	1		1	1	2.33
Dec 04	3		2			1		1.00
Jan 05	4		1	1	1		1	1.33
Feb 05	11	4	4	8	1	1		3.67
Mar 05	7	1	3	6	1	1		2.33
Apr 05	5	2	3	1	2		2	1.67
May 05	9	5	2	2	4			3.00
Jun 05	2	2	1		1			0.67
Jul 05	1	1	1	1	1			0.33
Aug 05	2		2				1	0.67
Sep 05	3					1	1	1.00
Oct 05	5			4	3			1.67
Nov 05	6	1	3	5				2.00
Dec 05	3	1	1	1				1.00
Jan 06	2		1				1	0.67
Feb 06	3	2		1	1			1.00
Mar 06	5	1	3		2			1.67
Apr 06	1				1			0.33
May 06	0							0
Jun 06	1				1			0.33
Jul 06	0							0
Aug 06	2			2				0.67
Total	86	23	34	34	22	6	7	

10.3.4.1 Summary and recommendations

Monthly Reports provide an opportunity for broad engagement between Community participants and project managers. However, at Mapua Monthly Reports were viewed with scepticism. Information provided did not facilitate mutual understanding and didn't sufficiently respond to the needs of Community participants. Instead, monthly reports appeared to be an attempt at empowering the project managers' perspective.

To represent an effective conduit for effective participation, Monthly Reports needed to:

a) Provide a comprehensive overview of the previous month's activities at the site;
b) Provide a comprehensible overview of the previous month's activities at the site;
c) Be independently audited to provide assurances of accuracy;
d) Include input from affected and interested parties regarding operations at the site;
e) Include reviews of the monthly reporting process to ensure that the monthly reports were serving their purpose.

10.3.5 Limitations of external expertise

Common to most complex environmental problems, external expertise was extensively adopted at Mapua. An external consultant was employed in the development of risk-based soil acceptance criteria (EGIS 2001). The use of external consultants for the development of risk based end use criteria has substantial implications for Community participation.

The specific attributes of the external consultant who developed risk based selection criteria for Mapua had repercussions on mutual empathy development and mutual understanding. Firstly, the consultant chosen was a worldwide expert on contaminated site remediation from a reputable environmental engineering firm. These two attributes enhanced belief in competence among the Community. Secondly however, the consultant was based in Australia creating a barrier for communication and raising issues of competence in the local context and understanding of the needs of the Mapua Community. Finally, selection of the consultant was at the sole discretion of the MfE, thus engendered the values of MfE at the possible expense of the most affected parties. Thus the selection of the consultant by the MfE was based principally on rationality reasons at the expense of empathy and local competence.

External consultants are principally relied upon to enhance trust due to perceived independence, thereby enabling concrete identification of risk concerns and clean-up criteria, however, they are susceptible to a variety of challenges. Firstly, as identified in Chapter 2, risk criteria are heavily context dependent, values vary widely across the world as different safety factors are used for protection of human and environmental health. Thus, selection of clean-up criteria is directly related to value choices explicitly or implicitly made by the consultant. Trust in the character of the consultant (that the consultant has similar values to those parties affected by the contamination) is therefore required for recommendations to be acknowledged and accepted.

Secondly, external consultants do not have an established rapport with local citizens and other affected or interested parties. Furthermore, consultants are principally concerned with client interests, thus may be unlikely to expend energy building and maintaining communication with other parties. Moreover, external consultants may be spatially disconnected from the site, and therefore are less able to communicate directly. Without conduits to build and maintain communication, external consultants may be perceived by Community participants as either immune or unresponsive to their concerns.

Thirdly, as identified in Chapter 9, external consultants may possess inferior knowledge of local contextual considerations. This matter is particularly evident when overseas consultants are seconded to assess local issues. The transfer of scope may for some Community participants annul claims of expertise. Thus, the supposedly superior rationality of external consultants may be questioned.

While external consultants may allay some concerns surrounding impartiality, there may be challenges in establishing trust and building and maintaining good communication linkages. Furthermore, they may be perceived to possess inferior levels of competence in relation to local contextual issues.

External technical expertise was employed at Mapua to set risk-based soil acceptance criteria. Being a credible overseas expert engendered a certain amount of competence trust based on understanding. However, emphasis on the expert for assessing local characteristics, and being closely linked to MfE reduced community influence and disempowered local perspectives. Thus, the predominant use of an external consultant reduced the ability of Community participants to meaningfully participate.

10.3.6 Limitations of compliance engagement

Following the departure of Thiess, engagement between the community and the TDC was principally through TDC's role in enforcement of resource consents. For reasons that are not immediately apparent, TDC did not host a meeting subsequent to Thiess' withdrawal explaining the new arrangement directly with the community to develop a strategy for ensuring continuity. This appears to have been a major oversight. In fact, at no time subsequent to MfE taking over the project did TDC specifically arrange meetings with citizens in Mapua to discuss the clean-up. Thus, TDC appears to have retrogressed from active community engagement to passive/reactive engagement.

Community participation in compliance related issues was moderated through three distinct mechanisms. Firstly, community members were able to complain using usual council compliance channels. Secondly, community members could freely write their opinions of the project in local and regional newspapers, which, if a compliance issue, would usually be followed up by a compliance representative. Thirdly, due to somewhat unique circumstances at Mapua, a local resident was also a member of the compliance team. This final mechanism had several consequences on the establishment and maintenance of trust and is useful to explore in greater detail.

The local resident [henceforth referred to as QW] performed in numerous roles. QW was an active member and well-known within the community as a TDC representative; a member of the TDC project management team; a member of the TDC compliance team; a member of the MTF; and was present on the PRP as notetaker. Potentially this enabled transfer of community concerns to all of these bodies. However, these multiple roles never formally established QW as a community representative, all professional roles were in QW's facility as a technoscientific expert. Thus, although ostensibly enabling community input, the extent of genuine two way interaction is worthy of investigation.

Firstly, local representation on the compliance team meant that compliance could be especially vigilant. By residing close to the site, prompt feedback could be obtained relating to site operations, thus any instances of suspected non-compliance could be readily investigated. This overlap had some interesting consequences, for example, after initial complaint to the site manager which resulted in no action being taken, QW issued a noise complaint to the compliance officer (self); action was then taken to enforce compliance. Following this incident, the consent holder accused QW of having a "conflict of interest".

Secondly, as a member of the TDC project team, the TDC enforcement team and an unofficial participant in PRP meetings, QW could actively promote community concerns and suggest consent conditions which benefitted the community. It is evident that QW argued strenuously for certain consent conditions to be enforced and that if consent conditions did not appear to be satisfying community requirements, QW often requested reviews of the consent. For example, QW successfully argued that a tonal component should be added to the consent when it became obvious that tonal noise was affecting community well-being.

However, there is evidence to suggest that QW had difficulty in fully empowering community concerns. Without additional community support, QW may have found it challenging to adequately argue community concerns. This is further supported by the fact that the number of local representatives on the Mapua Task Force was increased from one to three to enhance community representation. Furthermore, with neither official sanction from the community nor from TDC, QW was put in a tenuous position – QW was employed to act in the role of a scientist rather than a community representative. Thus, it is understandable if QW's professional role took precedence. At certain times this indeed appeared to be the case. For example, as a PRP note taker and compliance team member QW held information potentially significant to community concerns, however, there is no evidence to suggest that QW disclosed confidential information at any time during the project. Withholding information from the public, immediate neighbours and friends, likely resulted in substantial internal conflict and stress, especially if it pertained to possible health effects. By not disclosing confidential information QW was actually prioritising professional accountability over Community.

Thirdly, as TDC's unofficial representative within the community, QW became the focal point for dissent between TDC and the community. During the course of the project, QW's attendance at community meetings gradually decreased. Withdrawal of involvement in community affairs relating to the site conveyed to the community, rightly or wrongly, a sense of distrust in the TDC's role in protecting the community.

QW had multiple roles which potentially enabled community concerns to be included in substantive project discussion. At times it appears that QW's status as a local resident substantially benefited project planning and compliance. However, there is evidence to suggest that barriers existed for QW, thus preventing unrestricted flow of information and knowledge between the community and TDC. It seems that the resident neither desired nor was offered the role of community mediator, yet was effectively the de facto local protector of human and environmental health - without sufficient authority to support this responsibility. Thus the resident/TDC representative was placed in a very unenviable position. Whether QW's managers should have placed QW in a situation of conflict is questionable, and demonstrates limited empathy.

10.3.7 Limitations of potential Community intermediaries

Effective Community participation requires mutual exchange of information. As identified in Chapter 3, Danielson et al. (2008) suggests that intermediaries or "trust bridges" can be effective for mediating between conflicting parties. Were intermediaries of information exchange effective at Mapua? As has already been identified, there are reasons to suggest that information wasn't effectively transferred to Community representatives. Three specific parties, the PRP, the site auditor, and the compliance team may have served as conduits between project managers and the Community. Investigation of the disclosure or non-disclosure of information regarding the PoP is useful for examining these potential "trust bridges", and is performed below.

10.3.7.1 Failure of compliance team to act as intermediary

Community participants interviewed largely expressed considerable distrust in the compliance team at TDC. The reasons for this distrust stemmed from a perceived inability to adequately meet their needs and competently enforce the resource consents. The TDC compliance team were, as may be guessed, placed in a very difficult position. Firstly, it is evident that the compliance team appears not to have had sufficient resources to successfully fulfil compliance obligations (PCE 2008a); a proportion of the compliance management was originally contracted to an engineering consultant. While this is probably not unusual for a relatively small unitary authority faced with a large complex novel problem it likely had some consequences on communication within the compliance team.

Secondly, although having some expertise, the compliance team lacked sufficient specific knowledge on large scale contaminated site remediation to evaluate the technology's performance on their own. Hence, they were likely to rely heavily on the experience of the site auditor and PRP. However, as demonstrated above, both the PRP and the site auditor do not appear able to have provided independent, sufficiently robust advice to compel the compliance team to challenge the technology performance.

Conversely, it is evident that some aspects of the consent, in particular the conditions in relation to air discharge, were difficult to enforce. Following the initial hearing, the TDC compliance team received advice "that the conditions are technically unsound or meaningless and will need to be addressed" (Bush-King 2003). For reasons which are not known, this advice does not appear to have been embraced.

Thirdly, complicating factors relating to funding of the project may have compromised the compliance team's desire to restrict progress to Stage 3. In order to "keep the wheels on the project" MfE and TDC provided an advanced payment to the technology vendor, thus TDC had a vested interest in ensuring the project went ahead (TDC 2004). If there had been a clear separation of roles between the project staff responsible for compliance and the project management team, this conflict of interest may have been avoided. However, no such separation is apparent.

10.3.7.2 Failure of the site auditor to act as intermediary

A second potential intermediary between the engaged citizens and project managers was the site auditor. As specified in resource consents, the site auditor is:

> *The person appointed by the Council and the Ministry for the Environment to provide independent advice on the remediation of the site and associated matters including setting the Soil Acceptance Criteria for the end uses of the site proposed by the Council.*

As already discussed in Section 10.3.5, an overseas site auditor was contracted to MfE and TDC earlier in the project for the purposes of providing independent expert advice on the remediation effort and in particular setting soil acceptance criteria. Subsequent to attaining resource consents, this same individual was further employed to provide advice during the clean-up process. Again, distance created a disconnection between the site auditor and affected and interested parties. Furthermore, the site auditor was contracted to TDC and MfE, and was not directly accessible to others.

Why the site auditor did not actively and publicly endorse the PoP is also challenging to explain. The reasons are similar to those presented above in relation to the Peer Review Panel. Being heavily involved in previous phases of the project, 'independence' may have been compromised, in fact, if the site auditor had adhered to his own ethical code of conduct he probably shouldn't have assumed an ongoing role (PCE 2008a). Additionally, the site auditor's role was also unclear; much legal uncertainty was present surrounding the extent of liability associated with recommendations. As above, failure to endorse the PoP, avoided potential liability concerns. While the PRP's silence in relation to the PoP likely constituted tacit endorsement to the community, the site auditor's silence probably had little effect.

10.3.7.3 Failure of PRP to act as intermediary

The PRP constituted a third potential intermediary, capable as acting as a bridge between project managers and the Community. As identified in chapter 9, the PRP was widely known by Community members who thought all the "checks and balances were there" (Interview 3). Again, the intermediary capacity will be investigated through the circumstances surrounding the PoP.

Specifically related to the PRP capacity to be an intermediary, it is interesting to note that at no time did the PRP specifically endorse the clean-up technology as being suitable for stage three of the project. Neither did they express concerns surrounding MfE's capability in assuming the project. However, it is evident that the PRP had concerns about the technology, they were still questioning the PoP long after it had been approved by the engineer to the contract (Ellis 2004b). It appears that the PRP was unwilling or unable to provide advice to TDC which would cause delays to the project for the benefit of increased understanding or which were likely to create public unrest.

This lack of precaution by a team of experts is puzzling yet may be readily explained by a relatively small number of factors. First, the PRP by its very nature was composed of expert scientists, familiar with the risks associated with new technology. Thus the emission of dioxin, while surprising, was not of immediate concern, the malfunction represented a 'teething' problem with a new technology (Ellis 2004b). It is possible that all PRP members were comfortable with the technology's performance and that they understood any future problems could be easily remedied.

But this explanation does not clarify why the PRP did not actively endorse the project and did not seem to adequately consider community concerns. Three intertwined questions arise relating to the legal position of the PRP. What was the role of the PRP? Who was the PRP responsible to? Were PRP representatives liable for any errors of omission or commission?

Section 10.3.7.3 highlighted the role of the PRP as being an advisor to TDC, and Section 6(d) of the resource consent appears to suggest that recommendations are solely to the Council. However Section 13 (monthly reporting) states:

Throughout the duration of the remedial works, the Consent Holder shall provide a monthly progress report, including all environmental monitoring data required by this Consent to the:

- *Council's Compliance Co-Ordinator;*
- *Site auditor; and*
- *The Peer Review Panel.*

Where necessary, each of these parties can request a meeting of all the parties to discuss the activities of the remedial works and their compliance with consent conditions and to make recommendations for amendments of the Plans cited in Condition 9 to the Consent Holder.

Any written recommendations and the monthly progress report shall be available for public inspection.

This would seem to suggest that recommendations from the PRP, the compliance co-ordinator and site auditor were to be made publicly available. Thus, while the role of PRP was chiefly as a quality control mechanism for technical aspects of the management for TDC, it also could have served as a bridging organisation between the affected public and project managers.

The specific tasks performed by the PRP were never clarified. It is evident that the Peer Review Panel represented a considerable legal challenge, the TDC Environment and Planning Manager noted the legal uncertainty that such a panel represented (Bush-King 2003). Uncertainty resulted from the obligations of the consent holder to ensure resource consents were adhered to and the obligations of the District Council to sufficiently enforce resource consent conditions. Thus, the Commissioners' ruling on the instigation of an expensive panel of experts, paid for by the applicant, essentially in a role which the TDC should have performed anyway.

Another clear insight of the discourse relates to the Commissioners' obvious concern for fairness - that expertise to ensure public safety should be paid for by the project managers. The fact that the applicant did not appeal the Commissioners' ruling for an expert panel is probably indicative of the unique circumstances at Mapua. Due to the 'unforeseeable' nature of the Commissioners' ruling, the applicant was able to claim the additional expense as a contractual variation, hence, the expert panel, far from being paid for by the consent holder, was in fact paid for by TDC, with the assistance of MfE. Therefore, while the funding arrangement was quite complex, the Peer Review Panel was rather consistently an additional and potentially valuable instrument of the TDC.

While the PRP carried an advisory status it had no legal responsibility. As such, the panel was not strictly accountable to the TDC or to the applicant. In theory, this meant that the PRP could be free to make any recommendations relating to the project for the purposes of ensuring public safety and upholding environmental health. However, it also meant that recommendations would not necessarily be implemented – the advisory panel possessed no 'teeth'. Furthermore, the panel could not be held liable for errors of omission or commission, which may have impacted on the depth of enquiry pursued. However evidence suggests that PRP inquiries were in general very thorough, and that the major impediment was costs and delays procuring sufficient data (PCE 2008a).

In its role as an advisor to TDC, the PRP possessed no specific requirement to endorse the PoP. However, if they had publicly endorsed the PoP they may have been legally bound by that decision and potentially liable in the event of any subsequent failure. Thus it is quite understandable that the PRP failed to endorse the technology.

Why the PRP failed to initially suggest recommendations which could delay or arrest the project is more challenging. The recommendation for a full engineering review on the technology is an obvious omission which cannot be readily explained. The answer probably lies in simple human factors related to the selection, composition and functioning of the panel. Many members, for continuity reasons had been carried over from previous phases of the project. This meant a subtle conflict of interest - to raise questions which could compromise the project would also be challenging their own status as competent experts. Furthermore, it is likely that PRP members were emotionally attached to the project and simply wanted to see it through to completion. Recommendations which could seriously undermine the project were unlikely to be made. However, for affected public, silence represented tacit approval by a team of experts.

10.3.8 Limitations of health reporting

Human and ecological health risk was the primary justification for undertaking the project at Mapua. The approach originally taken by consent applicants to monitoring health risk concerns was a technical one, through the calculation of a Total Hazard Index (THI) (T&T 2003a). A THI is a way of expressing the potential for adverse health effects from exposure to a group of substances at the same time (cumulative effects). The steps in calculating the THI are (T&T 2003a):

- Calculate an intake factor for each exposure pathway, e.g. inhalation or ingestion
- Calculate the Chronic Daily Intake of each substance (the average amount that a person would be exposed to each day) using the intake factor and the concentration in the appropriate environmental media, e.g. in air for inhalation exposure.
- Identify the appropriate toxicity factor from published data (e.g. World Health Organization). The toxicity factor is expressed as a Tolerable Daily Intake
- Divide the Chronic Daily Intake by the Tolerable Daily Intake for each substance. The result is known as the Hazard Quotient.
- Add the individual Hazard Quotients together to give the THI.

The resource consent (RM030523) notes that "The advantage of assessment using the chronic tolerable intake methodology is that the total hazard index can be derived for the exposure to all the contaminants that can potentially be discharged from the remediation site". No disadvantages are noted of using the THI. There is no mention of other possible indices.

The THI was intended to provide both a mechanism for a) monitoring health hazards during the clean-up; and b) providing a measurable and enforceable tool which could estimate health effects, and thus serve to shut down the plant if risks were deemed too great. In 2008, the PCE report reminded that to be an effective measure of likely health risk to people from airborne toxins, the THI must (PCE 2008b):

- include all relevant toxins
- include all relevant exposure pathways.
- be calculated with robust and valid input data

Following an extensive review of possible airborne contaminants, the PCE (2008b) concluded that there were notable omissions, especially concerning was the omission of dioxins and mercury compounds. PCE (2008b) notes: "the very serious concern is that these other substances were neither measured, nor included in the THI, so it is impossible to work out what exposure (if any) people had to them".

Furthermore, to be an effective instrument for sensemaking the THI must:

- be calculated in a matter which enables timely assessment
- compare background risks with those generated from remediation activities
- be accepted as a good estimate of risk.

Monitoring the type of toxins for the THI is generally subject to the law of diminishing returns. The approach usually taken is to identify contaminants that are most likely to be present and most likely to add to chronic health effects. The degree of THI robustness depends on the monitoring conditions imposed as part of the resource consent.

At the resource consent hearing, previous reports detailing known soil contaminants were used to defend the monitoring of a small suite of contaminants. Exposure pathways were restricted to inhalation and ingestion of organic and metallic compounds. Factors used in calculating the inhalation and ingestion indices were not made explicit, they were to be developed as part of an Environmental Management Plan, to be submitted to the Site Auditor and TDC Compliance Officer prior to commencement of Works. It appears that the Resource Consent Commissioners placed significant trust in the expertise of these parties.

Forest and Bird appeared to sense the complexity and significance of the THI and requested an additional advice note on how the THI would be calculated as part of their appeal, the result of which was the clarification of compounds for determining the THI. This clarification appears to have been deemed sufficient for Forest and Bird and Greenpeace even though it contradicted other parts of the resource consent. The appellants too appear to have placed significant trust in the competence of the compliance officer and Site Auditor.

Following the granting of consents, THI calculation was conducted by experts at Tonkin and Taylor. The first calculation was part of the Proof of Performance document, but very little information is provided on how calculations were performed and assumptions which were made. The THI calculation was technically demanding, meaning only those with considerable expertise were capable of understanding it.

THI calculations did not initially appear to meaningfully represent health risk. During PoP testing the Air Emissions Control System was shut down and dioxin was known to be emitted in significant concentrations, yet in relation to the THI, the PoP report states simply "The THI is four orders of magnitude less than acceptable value of 1.0" (Thiess 2004a). The full calculation table is provided in Table 24. Clearly this demonstrated early example of incongruence, yet does not appear to have been detected by the expert panel, the compliance officer or the site auditor. In another instance one year later, the same month that various breakdowns occurred including baghouse failure, carbon filter collapsed, and the stainless steel screen encasing the carbon disintegration (MfE 2005a), the THI was recorded as being two to three orders of magnitude less than acceptable value of 1.0. The PRP (2005b) reports “the high levels could be caused by the faulty carbon filter, however the Total Hazard Index limits in the consent are still being met.” There is no evidence of further discussion, particularly either querying the conceptual model, the quality of the model inputs or the result obtained from the model. It seems during the early phases of the project the PRP and Site Auditor lacked the necessary expertise to query the THI (PCE 2008b).

Table 24. Calculation of the Total Hazard Index during the PoP (Thiess 2004a)

Organochlorines		**Trace Metals**		**Total Hazard Index**
Inhalation	Ingestion	Inhalation	Ingestion	
7.76E-06	3.42E-05	1.57E-07	1.19E-06	4.33E-05

During the initial phases of clean-up calculation of the THI was delayed by lack of expertise and data availability. Environmental monitoring was haphazard, and Hivol samplers were changed with PUF samplers in an effort to provide more robust data. It was not until January 2005 that sufficient data was available to calculate the THI, and not until March 2005 that THI calculations were released as part of monthly reporting.

Adjustments were made to the THI calculation several times. Original resource consents provided contradictory information on the calculation, and exposure pathways were later deemed to be insufficient (PCE 2008b). Recalculations occurred in 2005, when SKM took over from original air quality consultants K2; in 2007, when an air quality expert was added to the PRP; and 2007 following further reviews by the same expert (PCE 2008b). Reviews undertaken after the completion of the project suggested an insufficient suite of toxins was being monitored, monitoring sites which were insufficient to provide representative analysis of exposure, and monitoring equipment that could not produce robust data (PCE 2008b), confirming that the THI was not representative of the possible hazard.

It is debatable whether the original monitoring requirements were sufficient to provide a robust understanding of contaminants being emitted from the site. No statistical analysis was ever conducted, in part no doubt because the small number of sampling sites would have rendered such analysis meaningless. Because of this lack of robustness it seems that the THI was not a useful method of accounting for public health concerns.

From the perspective of the public, the THI provided an indicator that the remediation process was “safe”. Undermining this trust was the repeated alterations and recalculations that occurred. After each recalculation (which progressively involved revising the THI upward), invariably a statement from the managers was made about the THI still indicating a ‘safe’ level. An example from MfE’s quarterly report for March-May 2005 states:

> *The THI values were recalculated due to a reporting error by Sinclair Knight Merz, the consultants responsible for ambient air monitoring at the site. Despite the recalculation the THI values have remained well below the critical shutdown value of “1”*

Such alterations to correct previous errors or omissions, to the public however, constituted a breach of trust in scientific rationality and fuelled uncertainty in the competency of authorities charged with maintaining public health. Graphical representations in Monthly Reports demonstrated the magnitude of adjustments to the THI (Figure 39), which were a source of comedy to some residents (Interview 3) and horror to others (Interviews 6,7, 13). Reporter Sally Kidson’s inquiry summarises public concern well (Kidson 2007):

> *“You mentioned the Total Hazard Index has not exceeded 1 during the entire operation. Why has the peer review committee asked for a review of the methodology of forming the THI? What does it want done differently? How sure can you be the public has not been exposed to harmful discharges from the clean-up in the past if the THI is under review?”*

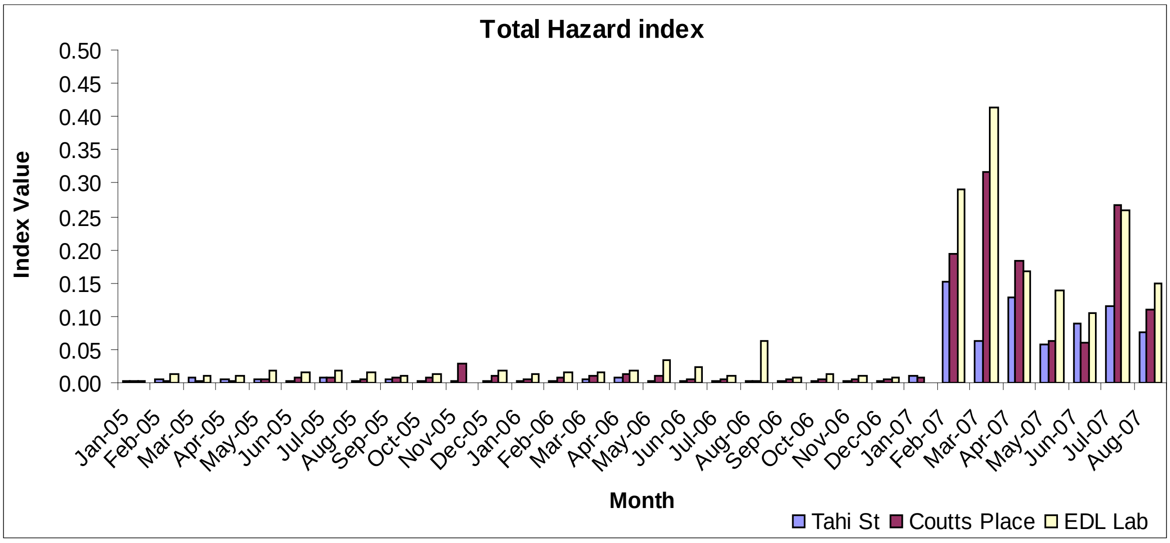

Figure 39. MfE THI calculations as shown in Monthly Reports. Jan 2005 – February 2007: Calculated using amended calculation to include ingestion of recently deposited dust, amended tolerable daily intakes and correction of the tolerable daily intake for manganese and chromium. March-August 2007. Calculated using further amended calculation with chromium tolerable daily intake for chromium III (MfE 2008).

In retrospect, the Total Hazard Index may be considered an example of 'cheap closure' on the assessment of possible health impacts during the remediation (Hunter, Thorpe et al. 2007). Insufficient expertise was available to query the application of the THI for the protection of public health during the hearing and following appeal at the Environment Court. A small suite of compounds were used for monitoring. Although there were known issues associated with the methodology, at the end of the project TDC were still committed to the THI as a compliance tool (Bush-King 2007b):

> *The council is satisfied with measures put in place by the Ministry for the Environment, as consent-holder, to ensure there is no unacceptable risk to public health as a result of the clean-up project. DDT values are included in the total health index (THI) used to determine there is no health risk and the THI has been complied with.*
>
> *The council has responded to noise and dust complaints in its compliance role, but these emissions have not posed a risk to the public health of residents.*

The THI was intended as a robust method to ascertain safety. However, subsequent analyses by the Parliamentary Commissioner for the Environment have questioned the validity of the THI as an indicator of health risk (PCE 2008a). The highly technical methodology disenfranchised those most affected. The THI undermined the development of empathy between project managers and Community participants because it indicated compliance even when malfunctions were occurring. Managers appeared to use the THI as a defence of poor process control. Amendments to the THI contributed to dissatisfaction regarding rational competence of those managing the project. Overall, the THI disempowered and confused Community participants and proved an inadequate method of assessing health risk.

Safety concerns of Community participants are of paramount importance during contaminated site clean-ups. To sufficiently encompass safety concerns Community participants required mechanisms to help empower their perspectives. Augmenting technical assessments of risk with other measures, for example real time reporting and the development of visual cues which may be seen by affected parties, and community compliance measures can aid Community empowerment.

10.4 Summary

Applying the PERE framework, an investigation into broader characteristics of participation was performed. Exploring the interaction between project managers and Community members (local communities, indigenous representatives, and environmental NGOs) reveals opportunities for substantial improvement in the effectiveness of participation, particularly in the development of empathy and empowerment. An investigation of 8 participatory 'systems' suggests that at Mapua, a management tendency to focus on the very complex technical problem that emerged and de-emphasise Community participation may have been counterproductive. We now turn to the major opportunities for learning that may be harvested from the case.

11 | Conclusion

Ring the bells that still can ring

Forget your perfect offering

There is a crack in everything

That's how the light gets in

- Leonard Cohen

11.1 Introduction

In Chapter 1 the question orienting the research was identified as: "How can effective manager-community participation be generated and sustained during contaminated site clean-up?" To respond to this question Chapter 2 investigated the challenges that have faced multiparty involvement in contaminated site clean-up. Chapter 3 explored the effectiveness of existing approaches to participation between communities and managers during contaminated site clean-up. Chapters 4 & 5 helped to understand the central characteristics of effective participation between communities and project managers during contaminated site clean-up. Chapter 6 fulfilled the primary research purpose of developing a strategic framework for participation between managers and Communities during the clean-up of contaminated sites. Finally, Chapters 7, 8, 9, & 10 related to a retrospective analysis of the clean-up of the former Fruitgrowers Chemical Company site at Mapua, New Zealand.

11.2 PERE framework conclusions

The outcome of Chapter 6 was the development of the Presence, Empathy, Rationality, Empowerment (PERE) framework. Based on the research, four specific but interwoven components enhance Community-manager participation. The first is developing Presence among participants – the ability to focus deeply on what is truly happening. Secondly, an expanded sense of Empathy is suggested – self-care as well as concern for other parties. Thirdly, project managers and Community participants must develop shared rationality, through the development of a high level of understanding of themselves as well as external factors relating to the contaminated site clean-up. Finally, project sponsors and Community participants must be willing to Empower the perspectives of others as well as their own perspective. The framework is theoretically derived and has been specifically developed with the most salient aspects of participation during contaminated site clean-up in mind.

The PERE framework is intended for use in contaminated site remediation projects. A focus on presence helps participants to really observe "what is" and pay attention to the changes that may be occurring at the contaminated site or to the other participants. Empathy is the ability to relate to oneself and others, and is of primary importance in environmental problem solving. Every individual in a collaborative process has a need for his or her perspective to be heard fully by others and is bound by a human need to be understood at an emotional level. Tragically, emotional connection is frequently forgotten in the haste to analyse the problem and develop solutions. Empathy extends to a deep emotional connection of oneself and the future feelings that one is likely to develop. Such emotional understanding is difficult to fully comprehend and uncover yet remains at the core of environmental problem solving. The development of mutual empathy generates authentic connections between parties.

Rationality relates to the analysis of the collaboration context – the environmental problem and the people involved in attempting to solve it. While understanding has historically been confined to the technoscientific examination of problem components, taking a cognitive-behavioural approach to collaboration involves extending this perspective of understanding to include the other people involved in the group problem solving endeavour and to self understanding – the recognition of persistent thought patterns. Highlighting understanding enables options to be investigated thoroughly from diverse perspectives and uncertainties thoroughly examined.

Empowerment relates to the ability to act. Traditionally empowerment has been principally viewed as primarily a self-driven pursuit. However, empowerment in the context of collaborative problem solving also relates to the empowerment of other perspectives. Empowerment of other perspectives is an act of service to ensure that accurate portrayals of all relevant perspectives are included in the problem solving process.

Investigations into presence, empathy, rationality, and empowerment at Mapua have demonstrated that the PERE framework may be used to look for elements counterproductive to effective participation.

11.2.1 Comparison with other approaches

Previous studies of participation have tended to focus on “participation” mechanisms such as meetings, task forces, and citizens advisory groups. While this focus is useful for investigating the efficacy of these mechanisms, it leads to the notion that participation is an add-on to environmental problem solving. Hence historically public participation has been considered effective if particular mechanisms are conducted with fairness and competence.

In contrast, this research suggests that for public participation to be effective it must be considered throughout the problem-solving process and embedded within the decision framework of all project representatives. This transfers the emphasis from a legislative necessity (a task that has to be done due to legislative requirements) to an indistinguishable component of good project planning. Presence, empathy, rationality and empowerment change throughout the course of a project, and with appropriate planning can foster trust and enhancement to mauri. Thus effective public participation may be judged by its tangible and intangible outcomes.

While the framework of effective Community participation in contaminated site clean-up developed in Chapter 8 is a simplification, it presents a novel approach to planning efforts for Community participation. The PERE framework diverges strongly from the three major approaches to public participation –Arnstein’s (Arnstein 1969) empowerment model, Rowe and Frewer’s (2004) information flow model, Webler’s (1995) deliberative model; more closely resembling the dual process model of conflict resolution. Theory integration, coupled with extension based on case and collaborative inquiry data has produced a new and theoretically robust framework of manager-Community participation.

While the PERE framework is novel in its application to contaminated site clean-up, it has resemblance to other models of collaboration. Most fundamentally, in characterising effective participation as a relationship between the internal (self) and external (others) the PERE framework resembles Goleman’s (2005) model of emotional intelligence. Based on an investigation of effective management practices, Goleman (2005) contends there are five aspects to emotional intelligence: self-awareness, self-regulation, social skill, empathy and motivation. These characteristics superficially resemble the PERE framework and although they are likely to be important to Community participation, they fail to encapsulate the concept of presence and empowering others. Furthermore, Goleman's (2005) emotional intelligence model simply presents a number of different characteristics. In contrast, the PERE framework is more integrated, demonstrating how the three attributes of empathy, rationality and empowerment, emerge from, and flow into, the concept of presence. Hence the PERE framework aligns with some of the central tenets of emotional intelligence, but represents a much more integrated understanding.

11.2.2 Questions and criticism

Does the framework present a valid representation of how to generate and sustain effective participation during contaminated site clean-up? The PERE framework has been developed from theory and has a high degree of correspondence and internal validity. The framework is not intended as a representation of present reality, but is aspirational and therefore provides a target to aim for. Whether the four characteristics are all that is required for effective participation will only be discovered as efforts are made to reach these targets. It is possible, indeed highly likely that other aspects of participation may be added to the framework as understanding of effective processes mature.

While it is not possible to confirm the validity of the framework, there is some evidence to suggest correspondence is high. Using the framework to inquire into participation during the clean-up of the former Fruitgrowers Chemical Company suggested that lack of presence, empathy, rationality, and empowerment were indeed significant factors in limiting effectiveness. Further investigations would assist with understanding validity.

Is the framework likely to be useful for helping clean-up participants effectively engage with one another? While there is significant guidance regarding how contaminated site clean-up should be performed, there is less information regarding how Community participation can be integrated into the process. The PERE framework serves to assist project managers meaningfully includes Community participants in the process by fundamentally reframing participation from a tactical consideration, to a strategic feature of the project as a whole.

Furthermore, it provides project managers with a discrete list of items to monitor which impact trust, robustness and collaboration during contaminated site clean-up. For example, project managers may establish that empathy is lacking and establish sub-projects where diverse Community participants are able to work together. Another analysis may identify that one perspective is being marginalised and counter-measures may be implemented to empower that perspective. As such, project sponsors may use the framework to improve the effectiveness of their projects.

11.2.3 Further research

Although this research has been developed theoretically and verified by experienced facilitators it is yet to be tested on a contaminated site clean-up. Testing will require adoption of the framework by all project participants (project managers and Community participants) and moderation by experienced facilitators. Real-time longitudinal studies are likely to also contribute to refinement of the framework. Methodological tools such as participant (perspective) journaling combined with self-assessments of presence, empathy, understanding, and empowerment of both the journaler's perspective and other perspectives is likely to provide a detailed account of personal enhancements in these areas. Action research would be a suitable strategy for further verification.

While the framework emerged from contaminated site project investigations, it is likely the framework is applicable to other settings. As detailed in Chapter 6, the framework appears to encompass the desirable elements of environmental problem solving. Further research investigating application of the framework to other environmental problem solving contexts is desirable.

The research presents an idealised framework of effective Community participation; however, it is evident that in most environmental problem solving contexts, there are impediments to presence, empathy, understanding and empowerment. Further research into these impediments is likely to generate problem solving contexts closer to that proposed. Firstly, individual factors such as ideology and cognitive biases can distort effective participation. Secondly, structural factors such as legislation can create barriers. In the Mapua case, legislation generated empowerment for environmental NGOs during the resource consent phase but simultaneously disempowered community perspectives. The role of the media as a moderator between perspectives also needs to more rigorously analysis.

Cross cultural studies are also highly recommended to establish the veracity of the framework in other contexts. Since the framework was verified by participants of the collaborative inquiry from around the world there is some evidence of cross-cultural applicability.

However, implementation of the framework is other cultural contexts would clarify broad applicability. Again, an action research approach would be suitable.

Investigations into specific contextual attributes are also likely to be revealing. The role of 'bridging' organisations has been highlighted in the literature as potentially significant (Danielson, Santos et al. 2008), yet the specific reasons for the efficacy of bridges have not been well understood. The PERE framework illustrates why 'bridges' can be effective, but also how caution must be exercised. The PERE framework demonstrates that bridges are important in the facilitation of empathy and understanding between parties, but may also create considerable difficulties, when empowerment issues must be determined. The Mapua case demonstrated the difficulties in the 'bridging' of local, council and technoscientific perspectives. While the individual was capable of empathising and understanding all perspectives, considerable dilemmas accompanied this understanding and empowering the local perspective proved to be difficult. Further investigation into the efficacy of such bridges and the psychological effects which are associated with the cognitive dissonance that is particularly prevalent for these actors will be useful.

11.3 Recommendations

The PERE ideology may be regarded as an idealised participant (project sponsor or stakeholder) with the characteristics of high presence, empathy, understanding and empowerment of self and others. Clearly however, such a person rarely exists. In view of this deficit how can stakeholder participation be managed?

Chapters 9 & 10 identified aspects of the Mapua clean-up that contributed to less than optimal EPC participation. Engagement systems during selection failed to adequately generate mutual empathy, understanding and empowerment. External expertise was relied on heavily, contributing to a detached reasoning process and negating potential knowledge contributions from local community participants and indigenous representatives. A closed technology selection system was employed, de-emphasising the needs of local participants and environmental NGOs. A closed contracting process chiefly focused on the needs of the project sponsor and primary contractor, with little emphasis on those most affected. Non-notification of resource consents disempowered environmental NGOs and indigenous representatives. The ideological conflict between project sponsors and environmental NGOs which played out through the courts damaged empathic development and led to a distorted problem understanding which marginalised local community perspectives.

Engagement systems during implementation also demonstrated limited ability to sustain effective Community participation. The site auditor and compliance team provided to be inadequate conduits for development of mutual empathy, understanding and empowerment between project sponsors and Community participants. Understanding of technology capabilities by project sponsors was overconfident. Low levels of trust led to the withdrawal of the primary contractor. Community meetings conducted by the primary contractor failed to account for the needs of some local participants, environmental NGOs and indigenous representatives. Site managers were not adequately empowered to cater to the needs of affected parties. Ambiguous consents were resolved with little consideration of community perspectives. The complaints register served as a compliance tool, rather than a means of generating empathy between project sponsors and EPC participants. Monthly reports were of a highly technical nature and failed to generate mutual understanding. Expert assessments of risk failed to account for the needs of those most affected.

How could EPC participation have been performed more effectively?

1) Developing and sustaining mutual empathy through needs assessment

Decision making at Mapua focused almost exclusively on developing an external understanding of the problem. External problem understanding was thought to provide the most direct path to problem resolution. Hence external consultants were employed to get a better understanding of the problem.

However focus on external understanding neglected the needs of some Community participants, and culminated in the withdrawal of the main contractor. An emphasis on needs draws participants away from demands to focus on deeper issues and helps to avoid intransigent positions. Needs are the feelings, not necessarily associated with any particular goal or outcome. For example, the needs of environmental NGOs may have been "to feel that the community and estuary are safe", such sentiments would have been shared broadly, developing mutual empathy. Of course the level of safety expected is likely to differ between individuals; however in the initial stages of needs assessment such analysis should be avoided. For the maximum development of empathy it is best if needs are identified by a diverse range of Community participants in fora with maximum opportunities for listening. In this way a unified project list of needs may be compiled.

Needs are likely to change throughout the project, it is therefore essential that needs are revisited regularly and that linkages between Community groups and project managers are developed. At Mapua, the Mapua Task Force was an effective conduit between some parts of the community and project sponsors. However, task forces and similar citizens' advisory councils may not completely represent Community participants. For example the MTF did not include uninterested community members, environmental NGOs or indigenous representatives. A Community engagement strategy should be developed which caters to all Community participants, varying the type and intensity of engagement according to the needs of each group.

2) Developing and sustaining shared rationality

Once needs have been identified, efforts should be made to meet those needs. Deliberative methods have been extensively developed by Renn (1993), Webler (1995) and built on Carson (2009). The fundamental aspect of deliberative discourse is truthful communication, free from strategic behaviour. Mutual understanding involves investigating the strengths, weakness and uncertainties associated with options and discussing how they serve to meet or fail to meet particular needs. Through this process, participants are able to better understand external factors related to the problem, but also their relationship to the problem. Thus Webler (1995) suggests allocation of reflective time is essential during deliberations.

During a complex process such as the clean-up of a contaminated site, rationalisation of the problem as well as self-understanding is likely to change. Similar to development of mutual empathy, conduits must be established between project proponents and Community participants throughout the project. Without conduits, trust may be compromised. For example, at Mapua, comprehensive understanding of the drying system was only established after the project had been implemented. Mutual understanding that the dryer should not exceed 120^{o}C had to be amended. The mutual understanding was derived from a safety need of environmental NGOs, thus undisclosed amendments to this understanding compromised trust. With appropriate conduits for information flow distrust may have been avoided.

While reaching a consensus of understanding is desirable, it is of course difficult to attain. Reed (2008) warns of the dangers of pursing consensus at all costs. An emphasis on consensus can be used to strategically delay projects and in some instances may be unrealistic. However, with sufficient time and reflection, many seemingly intractable conflicts may be resolved by lateral thinking and focusing on meeting needs. If needs cannot be met directly, there may be possibilities of indirect fulfilment. For example, if an intractable conflict has arisen regarding the safety of a technology, fears may be able to be allayed through a comprehensive collaboratively developed hazard management plan with regular community audits.

3) Developing and sustaining empowerment

Empowerment is often considered in a competitive sense – That if one party is empowered, another party is disempowered. This need not be the case, in fact, rather counter-intuitively, high levels of empowerment are necessary for effective project implementation. Typically project managers have desired and attained control over contaminated site clean-ups, and, as demonstrated at Mapua, only relinquish control when legislation demands – the court hearing. This typically constricted focus of empowering Community participants can limit opposition to a narrow part of the project, but as we have seen at Mapua, can have deleterious effects on project robustness, trust, and collaboration.

To enact effective Community participation requires expanding the notion of empowerment; to not only empower one's own perspective but also to empower the perspectives of others. During the initial phases of the project, effort should be made to encourage others to speak up regarding their needs – providing assistance to ensure that less able members of the EPC are capable of attending meetings may be required. Shared decision making in the selection phase could be regarded as relinquishing power, but may be also and possibly more appropriately, considered as expanding responsibility. During implementation, a wide range of options may be considered to empower Community perspectives, for example Community task forces, Community compliance, collaborative public relations. Empowering perspectives other than the project sponsors provides opportunities for the development of mutual understanding and empathy.

4) Enlisting a skilled, independent process expert throughout the project

Effective Community participation must be coordinated efficiently, and will be compromised if the participation process is perceived to be biased or coercive. For these reasons, enlisting an independent process expert is advised. Independent process experts are distinguished from content experts, regularly employed in complex environmental problem solving, in that they are unattached to content – they simply provide the space for engagement between participants. Process experts are skilled at manifesting empathy between participants, working with conflict, and recognising and dispelling power inequities (Hunter, Thorpe et al. 2007). Thus process experts design participatory endeavours to maximise the development of trust and collaboration.

Independence of process experts is necessary for effective Community participation. At Mapua, process experts were enlisted to assist the primary contractor with public participation efforts. While these process experts professionally consulted EPC participants, disseminating information from project sponsors and gaining feedback, they were viewed with scepticism by some community participants – describing the consultation process as a "divide and rule" strategy. This scepticism was probably justified, since the process was chiefly intended to disseminate 'factual' information. The purpose of consultation appeared not to be for collaborative problem solving, but rather to perform the necessary requirements of legislation. Although an independent process expert may have conducted the process in a similar way, it is likely that responses would have been recorded and documented differently.

The timing of involvement of independent process designers is also important. At Mapua, process experts were only involved prior to the resource consent hearing. At this time, plans for implementation had already been devised; consultation was therefore restricted to a canvassing of opinion on whether the option presented was acceptable. Such a strategy allowed little time for the development of mutual empathy, understanding, and limited power of participants to oppose the proposal, rather than shape it. Early involvement of independent process experts provides opportunities for effective Community participation and genuine collaboration. Furthermore, at Mapua, after the hearing, participation was very poorly managed, with inadequacies in engagement as documented in Chapters 9 & 10. A process expert would have managed participation in a much more professional manner, establishing that the methods used for Community participation were effective. Thus, independent process experts should be involved throughout controversial contaminated site clean-up projects.

Enlisting a process expert is an expense for project managers, yet this expense must be considered in the context of the project as a whole. As Carson (2009) notes, if the project is controversial, expenses may be incurred through court costs, delays, or sabotage and readily offsetting cost of process experts. Furthermore, enlisting the help of a process expert increasing the likelihood that trust will be enhanced by the project, thereby improving the reputation of project sponsors. Enrolling process experts can therefore be justified by their effect on overall project planning.

Process designers are not a panacea to all problems associated with participation in project planning. There are likely to remain ideological conflicts, differences in problem understanding, and disputes over the equity of power relations. Nevertheless, process experts are capable of providing a fair and structured means of identifying needs, developing shared rationality, managing conflict and enhancing trust.

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Appendix 1: Online Workshop Participants

1. Secretary of the International Association of Facilitators (IAF) and Editor-in-Chief of the *Group Facilitation: A Research and Applications Journal* an international peer-reviewed journal for group facilitation practitioners. Stephen is also is a member of the E-Government Participation Community of Practice - part of New Zealand's E-Government strategy and on the Advisory Panel of the Global Facilitators Service Corps (GFSC).[Auckland, New Zealand]
2. Director, facilitator and programme leader. He is also the founder of The Zone, a human resources and organisational development company. The Zone works internationally supporting organisations to become values based with a unique and highly successful programme called goVBO! He has extensive experience in business management, change management, executive team development and coaching using a values based approach. [Basel, Switzerland]
3. Leader in the field of group facilitation and the author of the international classic The Art of Facilitation. She researches and promotes co-operative work and facilitates organisational development. Dale leads facilitator training workshops internationally, including many ground-breaking Master Classes which engage facilitators at their leading edges in their chosen field, method and practice. Dr. Hunter is a sustaining member of the International Association of Facilitators, a former board member and Vice Chair International (2001-2007) and was instrumental in the development of the IAF Code of Ethics for Group Facilitators. She facilitated at the World Summit for Sustainable Development Stakeholders Forum in Johannesburg in 2002. [Auckland, New Zealand]
4. Founding member of the Ethics & Values Think Tank (EVTT) which developed the International Association of Facilitators (IAF) Statement of Values and Code of Ethics for Group Facilitators. Joan works with business and community groups enabling participative planning. Her work supports sustainable and ethical change processes [Adelaide, Australia]
5. Principal in a management consultancy with an emphasis on assisting not-for-profit and public sector organisations to develop strategy and support their day to day business. Named as one of 22 leading Australian CEO's and thought leaders in CEO

Snapshot on Culture - a study published by Pricewaterhouse Coopers in 2001. [Melbourne, Australia]

6. Director of Non-governmental organisation specialising in building peaceful local, national and global communities. She arrived in New Zealand in July 2009 with her six years of management experience in not-for-profit organisations handling peace, development and environmental projects in Asia. [Auckland, New Zealand]
7. Certified professional facilitator. Director of a company specialising in organisational change and performance improvement [Ipswich, United Kingdom]
8. Professional engineer and project manager [Doha, Qatar]
9. Project co-ordinator and experienced facilitator at non-government organisation specialising in Sustainable land management through community involvement [Hamilton, New Zealand]
10. Company director, experienced Facilitator and coach with special emphasis on leadership development and organisational change [London, United Kingdom]

Appendix 2. Participant Information

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

Department of Civil and Environmental Engineering
School of Engineering
20 Symonds Street, Auckland
(09) 3737599 ext 88166

The University of Auckland
Private Bag 92019
Auckland, New Zealand

INTERESTED/AFFECTED PARTY INFORMATION SHEET (NZ)

Project title

Investigating the role and influence of interested and affected parties on technical aspects of contaminated site management.

Researcher introduction

Hi, I'm Dan Ducker, a PhD student at the Faculty of Engineering, University of Auckland. The purpose of my research is to develop an understanding of the role and influence of affected and interested parties on technical decisions during the process of cleaning up contaminated sites.

Interviews

You have been identified as an affected or interested party in a large contaminated site clean-up project. I would like to interview you to discuss how you have interacted with other parties on technical issues throughout the clean-up. Participation in this research is completely voluntary. Interviews will take approximately one hour, depending on how much information you provide. Interviews will be conducted at a time and place that is convenient to you. With your permission I will digitally record the interviews for transcription purposes as this will allow me to concentrate more fully on the interview. Please be assured that the digital recordings will not be used for any purpose other than this research project and no information will be reported in a manner that identifies its source. Digital recordings will be stored in a secure file on my computer and destroyed using secure destruction software after a period of six years. If a third party is employed to transcribe the interviews they will be required to sign a non-disclosure agreement prior to accessing the records to ensure your confidentiality.

Supporting Documents

In addition to the interview I would be interested in viewing any documents or archives that might provide me with further insights into how affected and interested parties have been involved in technical issues related to contaminated site management at large sites. For example, you may choose to show me a copy of meeting minutes, letters sent to other parties, or similar types of correspondence. Whether you provide me with such documents is completely up to you. If authorisation from employers should be required relating to any document disclosure, consent will be obtained prior to use within this research. Any copies of documents supplied to me will be stored in a locked cupboard and destroyed after a period of six years.

Anonymity and Confidentiality

Any information you provide me will not be given to any third party at any stage during this research with the possible exceptions of:

My supervisor, Dr Kepa Morgan;

Third party transcription services (having signed a full non-disclosure agreement).

The information you provide will be summarised and these summaries will be analysed using various coding and numerical analysis techniques. My supervisor and/or other independent reviewers may review this coding and analysis, however these reviewers will not know your identity or the identity of your organisation. Information you provide may be incorporated into a published document, however this will be done in a way that neither identifies you nor your organisation as the source.

Participation

Participation in this research is entirely voluntary and you may withdraw participation at any time without explanation. Copies of interview transcripts may be provided to you or your employer on request. Interview data may be amended or withdrawn from this study by you or your employer up to 1 June 2011. A summarised report of the research findings will be provided to you at the culmination of the study.

Further Questions

I would like to thank you in advance for allowing me to conduct this research. If you have any questions at any stage please feel free to contact me, my supervisor or the Head of the Department of Civil and Environmental Engineering.

Kind regards,

Daniel Ducker
Department of Civil and Environmental Engineering
The University of Auckland
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Auckland
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Email d.ducker@auckland.ac.nz

Supervisor:
Dr Kepa Morgan
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Head of Department:
Professor Bruce Melville
Department of Civil and Environmental Engineering
The University of Auckland

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Auckland

Phone 373 7599 ext. 88165

Email b.melville@auckland.ac.nz

If you have any enquiries regarding ethical concerns, please contact:
The Chairperson, The University of Auckland Human Participants Ethics Committee
The University of Auckland, Research Office – Office of the Vice Chancellor
Private Bag 92019, Auckland 1142. Phone 373 7599 ext. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 19 August 2009 for three years. Reference Number 2009 / 291.

THE UNIVERSITY OF AUCKLAND
NEW ZEALAND

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Auckland, New Zealand

CONSENT FORM

AFFECTED/INTERESTED PARTICIPANT

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project Title

Investigating the role and influence of interested and affected parties on technical aspects of contaminated site management.

Name of Researcher

Daniel Ducker

I have read the Participant Information Sheet, have understood the nature of the research and why I have been selected. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I agree to take part in this research

- I understand that I am free to withdraw my participation at any time, and to withdraw any data traceable to me up to 1 June 2011.

- I agree / do not agree to being digitally recorded.

- I wish / do not wish to have digital recordings returned to me.

- I wish / do not wish to receive the summary of findings.

- I understand that a third party who has signed a confidentiality agreement may transcribe the digital recordings.

- I understand that data will be kept for 6 years, after which they will be destroyed.

Name ______________________________

Signature ______________________________ Date ______________________________

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 19 AUGUST 2009 FOR 3 YEARS REFERENCE NUMBER 2009./291

Department of Civil and Environmental Engineering
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PARTICIPANT INFORMATION SHEET

Online Workshop Participant (Facilitator)

You are cordially invited to participate in an Online PhD research workshop.

Project title

A collaborative inquiry into citizen engagement during environmental problem solving.

Research purpose

The purpose this research is to understand what generates and sustains citizen engagement in collaborative environmental problem solving processes and to understand the long term effects of collaboration.

Workshops

To explore ways in which successful environmental decision making may be achieved, we would like to assemble a small group of diverse individuals for an online workshop. The program consists of a visioning exercise for investigating different notions of success, discovering commonalities and differences, and then uncovering how successful engagement may be achieved. We are looking for participants of diverse ages, ethnicities and socioeconomic backgrounds with facilitation experience. You bring a unique perspective to the challenge of engaging citizens and making good environmental decisions and we would hugely value your input.

Before deciding whether you would like to be involved, we would like to make you aware of a few considerations. First, please be aware that you do not have to commit to anything, participation in this research is entirely voluntary and you may withdraw participation at any time without explanation. Secondly in relation to your time contribution, the workshops will consume about four hours. Thirdly, there will likely be robust, and at times emotional, facilitated debate and dialogue. Finally, due to the nature of group work, if you would like to remain completely anonymous please be aware that your confidentiality cannot be totally guaranteed. We advise to all participants that for privacy reasons anyone and anything discussed in the workshop should not be talked about after it; however we cannot guarantee that participants will heed this advice.

We would like to assure you that data generated from the workshops will not be used for any purpose other than this research project. Your contribution will be coded to ensure you cannot be identified in any subsequent publications. Data will be stored in a secure file on my computer and destroyed using secure destruction software after a period of six years. Please note that the outcomes (i.e. group pathways, group success visions, etc…) of the workshops will be results of group work and you will not be able to claim individual ownership of these. The outcomes are likely to be discussed in the context of a research student – supervisor relationship and may be used in subsequent publications which arise from this research but you will not be personally associated with any discussion or publication.

If you decide to participate, we would like to make best use of your time and take full advantage of your contribution to the research; therefore we would ideally like to record some parts of the workshop. We would prefer to video record a few segments to gather information since it will allow us to concentrate more fully on you and other participants. If you don't feel comfortable about being recorded but would like to participate, just let us know in the Consent Form (CF) and we won't proceed with recording. Finally, if you would like to withdraw any or all of your contribution to this study, you may do so any time up to 1 January 2011. After this time we cannot guarantee data removal since we would like to use your contribution in future research publications.

At the completion of the workshop, you will be invited to provide feedback in the form of a questionnaire. The questionnaire will have no reference to you personally and will be completed online. It will be used for the sole purpose of improving subsequent workshops thus making the process better for future participants.

Finally, if you decide to participate you will become a significant contributor to my research. I thank you deeply and I would like to keep you updated on how your input has been used to better understand the process of citizen engagement. If you do not wish to be contacted in future and receive a summary of findings please note in the consent form.

Further Questions

If you have any questions at any stage please feel free to contact me, my supervisor or the Head of the Department of Civil and Environmental Engineering.

Researcher	Supervisor	Head of Department
Daniel Ducker	Dr Kepa Morgan	Professor Bruce Melville
Department of Civil and Environmental Engineering	Department of Civil and Environmental Engineering	Department of Civil and Environmental Engineering
The University of Auckland	The University of Auckland	The University of Auckland
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About me

I'm Dan Ducker, a PhD student at the Faculty of Engineering, University of Auckland. I am interested in improving methods for decision support in diverse teams, particularly in the realm of environmental management.

If you have any enquiries regarding ethical concerns, please contact:
The Chairperson, The University of Auckland Human Participants Ethics Committee
The University of Auckland, Research Office – Office of the Vice Chancellor
Private Bag 92019, Auckland 1142. Phone 373 7599 ext. 83711.

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 14 JULY 2010 FOR THREE YEARS. REFERENCE NO 2010/286.

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Auckland, New Zealand

CONSENT FORM

ONLINE WORKSHOP PARTICIPANT

THIS FORM WILL BE HELD FOR A PERIOD OF 6 YEARS

Project Title

A collaborative inquiry into citizen engagement during environmental problem solving.

Name of Researcher

Daniel Ducker (PhD Candidate)

I have read the Participant Information Sheet, have understood the nature of the research and why I have been selected. I have had the opportunity to ask questions and have them answered to my satisfaction.

- I agree to take part in this research and understand it will involve a four hour time commitment.

- I understand that participation is completely voluntary, I am free to withdraw my participation at any time and I may withdraw any data traceable to me up to 1 January 2011.

- I understand that I cannot claim ownership of the outcomes of the workshops and that the pathways and visions produced as part of the group work may be used in publications arising from this work.

- I agree that information discussed in the workshop should be kept confidential

- I agree / do not agree to being digitally video recorded. (*choose one*)

- I allow / do not allow photos involving me taken during the workshops to be used in any publication/presentation related to the research. (*choose one*)

- I wish / do not wish to receive the summary of findings. (*choose one*)

- I understand that data will be kept for 6 years, after which they will be destroyed.

Name ______________________________

Signature ______________________________ Date ______________________________

APPROVED BY THE UNIVERSITY OF AUCKLAND HUMAN PARTICIPANTS ETHICS COMMITTEE ON 14 JULY 2010 FOR 3 YEARS REFERENCE NUMBER 2010/286

The End

Love Dan