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'The straw that broke the camel's back'

An Evaluation of the Practice of Cumulative Effects Assessment at six Local Authorities

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Abstract

Abstract of a thesis submitted in partial fulfilment of the requirements for the Degree of M.Appl.Sc.

'The straw that broke the camel's back'

An Evaluation of the Practice of Cumulative Effects Assessment at six Local Authorities in New Zealand

by

S. C. Thompson

Cumulative effects are incrementally additive effects which become significant at a certain point. Cumulative effects assessment (CEA) is the process of assessing the cumulative effects of a project or policy. Such cumulative effects currently form a major environmental issue in New Zealand, as does the process of CEA. The literature surrounding CEA shows in explicit detail that it is a very challenging process, fraught with difficulties. Cumulative effects are inherent within the Resource Management Act 1991 (RMA) and are required to be addressed by local authorities when; developing plans, assessing resource consent applications, and undertaking other tasks in order to prevent the cumulative degradation of our country's resources. This research undertaken in this dissertation investigates the different approaches that six local authorities have taken towards addressing cumulative effects and explores the constraints that each of those local authorities face.

A multiple case study approach was adopted that involved semi-structured interviews with both a policy planner and a consent planner from each of the following case study local authorities: Environment Canterbury, Otago Regional Council, Christchurch City Council, Dunedin City Council, Waimakariri District Council and Queenstown-Lakes District Council. These interviews provided a valuable insight into the practice of CEA at the local authority level, despite the limited generalisability of the case study approach.

Literature surrounding the CEA process was reviewed throughout the research aspect of this dissertation, and the common themes and constraints of CEA practice were compared to form an evaluative framework that presented the findings. The findings showed that the primary approach adopted is the strategic setting of qualitative and quantitative standards through plans (both regional and district). There is a clear difference between the local authorities in the level of consideration that each gives to cumulative effects within their own various plans. From primary consideration at the plan development stage, down to the inclusion of specific rules and assessment matters and project level CEA. The lower the level of consideration within a plan the more likely it is that project level CEA is carried out hence more specific, detailed CEA is promoted.

Throughout the local authorities studied, a range of methods for regulating adverse cumulative effects were adopted. A major weakness of practice is the lack of thresholds (or means) for determining when an increment will become significant and be 'the straw that broke the camel's back'.

This determination of cumulative significance forms the crux of the difficulties surrounding CEA. The 'case by case' approach adopted by judicial determinations stemming from the RMA makes assessing individual applications for their contribution to cumulative effects a major challenge. Proving any cause-effect linkages of a significant cumulative effect is also difficult when dealing with small scale increments. The interpretation of the precedent effect and permitted baseline issues provide other factors that add to the complexity of CEA practice.

The consideration of cumulative effects in plans down to the low policy level should be emphasised as a practical means of enhancing CEA by both applicants and local authorities when assessing applications. The use of checklists, specific to cumulative effects, should be promoted and adopted to ensure that sufficient consideration is being given to cumulative effects. Planning practitioners need guidance on the most effective approaches to adopt.

As a result of this dissertation, it was concluded that the RMA should be amended in order to place a stronger emphasis on cumulative effects in both district and regional plans and assessments of environmental effects (AEEs). Research should be undertaken into the practical effectiveness of strategic tendering for resources susceptible to cumulative degradation, and also into the outcomes of the various approaches to CEA examined in this dissertation. CEA is a practice that needs to be constantly developed and reviewed in order to promote effective outcomes.

Acknowledgements

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Contents

List of Acronyms

AEE = Assessment of Environmental Effects

CEA = Cumulative Effects Assessment

CEAA = Canadian Environmental Assessment Agency

CCC = Christchurch City Council

DCC = Dunedin City Council

EIA = Environmental Impact Assessment

ECan = Environment Canterbury (Canterbury Regional Council)

MfE = Ministry for the Environment

ORC = Otago Regional Council

PCE = Parliamentary Commissioner for the Environment

RMA = Resource Management Act 1991

SEA = Strategic Effects/Environmental Assessment

TLA = Territorial Local Authority (City and District Councils)

QLDC = Queenstown-Lakes District Council

WDC = Waimakariri District Council

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1 Introduction

Sustainable development has become a major global objective over recent years. The overall search for sustainability has emphasised the importance of assessing the environmental effects of development. This has driven a substantial body of literature on Environmental Impact Assessment (EIA): a process for predicting the potential impacts that an activity, policy or plan is likely to have on the bio-physical, socio-economic and cultural environment.

EIA is widely used to aid all levels of decision-making and has the purpose of protecting the environment from actions that will have a significant adverse impact; consequently promoting sustainability. EIA considers a range of different types of effects, including; direct, indirect, secondary, positive, adverse, temporary, permanent, past, present, future, and cumulative effects (Dixon & Montz, 1995; Morgan, 1998; Wood, 1995).

Cumulative effects involve the gradual addition of incremental adverse effects. In New Zealand, cumulative effects are becoming an increasingly significant and prevalent environmental issue. Issues involving cumulative effects include the loss of amenity through subdivisions and marine farms, the decrease in water quantity from too many abstractions, and decreasing air and water quality due to too many diffuse discharges. In order to achieve future environmental sustainability it is imperative that cumulative effects are addressed effectively.

Cumulative effects are particularly difficult to assess due to their incremental nature (CEAA; 2007; Morgan, 1998). Therefore it would be appropriate to investigate how cumulative effects are currently being addressed in New Zealand, as the last significant reviews in this area were over a decade ago (PCE, 1995; Dixon and Montz, 1995). The predominant purpose of this research is to attempt to address this gap by providing a recent thorough evaluation of some of the CEA approaches being taken, and looking into the practical issues associated with addressing cumulative effects.

1.1 Dissertation Structure

This research begins with a review of the general literature on the various methods used for undertaking CEA and the issues associated with such assessment. Chapter 2 follows with an outline of the context for addressing cumulative effects in New Zealand, by providing the legislative and administrative background for resource management in New Zealand and the common issues experienced. This leads on to Chapter 3 which details the rationale and specific research aims, objectives and questions that drove this research. The research methodology undertaken and the empirical results are then set out in Chapters 4 and 5, respectively. This is followed by a discussion of the findings in Chapter 6, which focuses on the broader context of CEA in New Zealand, and which then ties into the conclusions drawn on the research questions at Chapter 7.

1.2 Environmental Impact Assessment

The EIA process involves a range of steps, of which screening and scoping are the first. The screening stage is where the proposal is initially assessed in terms of its

scale of potential effects in order to determine the level of information required. The scoping process is typically based on data collection and public consultation, and involves identifying key issues that should be focused on at the appropriate level of detail that corresponds to the scale and significance of the proposal (Morgan, 1998). This is followed by impact identification which predicts the likely effects of the proposal.

Public consultation should occur throughout the process as it helps to scope potential issues, obtain public views and educate the public about a proposal. The significance of the predicted impacts is evaluated based on the views of the public, experts and institutions such as local authorities. The EIA report is then reviewed by decision-makers by assessing the merits of the application along with the significance of its potential impact in order to consider whether or not the proposal and its effects should be permitted.

1.3 Cumulative Effects

Cumulative effects arise through an additive or interactive process that is triggered from multiple activities of either: the same or a different nature, or from a single activity over time (Glasson, Therivel, & Chadwick., 2005; Peterson, 1999; Spaling & Smit, 1993). These can be incrementally damaging since individually they may seem small, minor or insignificant but collectively they can result in a significant adverse effects (Spaling & Smit, 1993). There are an array of specific types of cumulative effects outlined in Table 1; however, most are of either an additive or interactive nature.

Table 1: Specific types of cumulative effects discussed in literature (Carroll & Turpin, 2002; CEAA, 2007; Glasson et al., 2005; Harrop & Nixon, 1999; Kotzé, 2001; Mitchell, 2002; Morgan, 1998; Peterson, 1999)

Type of Cumulative Effect	Description
Additive	Many small or insignificant activities can add together to result in a collectively significant or large impact
Time Crowding (additive)	High temporal frequency of impacts or an accumulation of impacts over time
Space Crowding (additive)	High spatial density of impacts or an accumulation of impacts within a certain area
Synergistic (interactive)	An interaction of effects that result in a new effect
Time Lags	Temporal delays in experiencing impacts; another form of time crowding
Extended Boundaries	Impacts that occur away from the source location; another form of space crowding
Triggers and Thresholds	Significant disruptions of an environmental system due to a threshold or critical trigger being reached
Patchiness/Fragmentation	Fragmentation of a resource – namely ecosystems/habitats (specific type of space crowding)
Growth Inducing	Changes that allow other processes to occur
Nibbling/Incremental Erosion	The slow, gradual degradation of a resource; through either time or space
Bio-magnification	Movement of contaminants up a food chain where they have a significant effect

The nature of a cumulative effect differs depending on whether it is affecting the social or biophysical environment. Social effects include health, cultural and economic effects and are similar to bio-physical effects in that they both vary in scale, severity, duration (Burdge, 1998). The attitudes and perceptions held by society is a fundamental consideration in social impact assessment (Burdge, 1998). Social impact assessment should consider equity and give consideration to whether the effects will

be cumulatively adverse or mutually balanced in that an adverse effect is off-set by a positive effect (Burdge, 1998). The nature of the effects are important considerations in assessing cumulative effects, as social impacts require a more qualitative approach than biophysical impacts.

1.4 Cumulative Effects Assessment

Cumulative Effects Assessment (CEA) is a branch of EIA that attempts to identify and analyse the nature and extent of any potential cumulative effects, including the consequences, sources and pathways that may arise from multiple activities (Dixon & Montz, 1995; Kotzé, 2001). CEA can be applied at different scales: the project level, where the cumulative effects of an individual project are assessed, and at the policy/plan level, where cumulative effects of a policy or plan are assessed (Kotzé, 2001; Therivel, 2004). It can also be applied at different geographical scales (*e.g.* regional or district) (Canter & Kamath, 1995; Morgan, 1998; Taylor, Bryan, & Goodrich, 1995).

1.4.1 Cumulative Effects Assessment – A Methodological Perspective

While there is no universal method for CEA, there are a selection of essential elements common in the literature, including the following: the setting of spatial and temporal boundaries for the analysis, using thresholds that a set limit and using tools such as matrices, network diagrams, checklists, overlays or modelling to help identify and consider possible effects (Table 2) (Canter & Kamath, 1995; Carroll & Turpin, 2002; CEAA, 2007; Harrop & Nixon, 1999; Kotzé, 2001; MacDonald, 2000; Morgan, 1998; Spaling & Smit, 1993). CEA methods need to be capable of addressing multiple

developments and interactions within different spatial and temporal boundaries in order to determine the overall impact on a resource (Spaling & Smit, 1993).

Table 2: Common CEA Tools
(Canter& Kamath, 1995; CEAA, 2007; Dixon and Montz, 1995; Harrop & Nixon, 1999; Morgan, 1998; Therivel, 2004; Therivel & Ross, 2007)

CEA Tool	Brief Description
Matrices	Tabular format for organising and quantifying complex information. Comprehensive but does not deal with time and space issues or cause-effect linkages. Can be specific to a certain activity (*e.g.* hydro dam) and includes a list of potential effects and a list of the potential affected parts of the environment in order to aid determination of cumulative effects.
Network and System Diagrams	Graphical visualisation of cause-effect linkages; has ability to consider indirect effects and helps to conceptualise complex relationships, however, temporal and spatial considerations are challenging and prior knowledge is required. Professional judgement is needed when tracing and selecting significant causative factors and pathways.
Checklists	List of potential effects provides a systematic, concise approach. However it fails to address interactions among effects or cause effect relationships.
Overlays	Spatial information of a resource, such as land use, is overlaid to provide an overview of an action. This frequently involves the use of Geographic Information Systems (GIS). Some systems can include the impact and take into account the disturbance and recovery rate.
Modelling	Input-Output Analysis is a complex form of modelling that is used primarily in the economic context for analysis of cumulative effects.

The basic process for CEA involves firstly identifying any key issues of concern; these can be any part of the environment that is recognised as important or sensitive to

change (Berube, 2007; CEAA, 2007; Morgan, 1998). Once identified, spatial boundaries should be set in order to ensure the resource in its entirety is taken into consideration; thus the study area can end up being much larger than the area of the development (Berube, 2007; CEAA, 2007; Lawe & Wells, 2005; Morgan, 1998; Spaling & Smit, 1993; Taylor et al., 1995). Once the study area is identified, all relevant past, present and likely future actions that could potentially affect the resource need to be considered in order to address potential interactions, pathways and causative factors (Berube, 2007; CEAA, 2007).

CEA analysis can also require the setting of temporal boundaries within which cumulative effects will be considered (Taylor et al., 1995). An analysis of baseline conditions is also important followed by an assessment of the incremental, additive impact of the development(s) (Berube, 2007; CEAA, 2007). The significance of these potential cumulative effects are then evaluated in terms of their scope (*i.e.* the local, regional and national extent of the effect), duration, magnitude, sensitivity and recoverability of the environment and likelihood of it occurring (Berube, 2007; CEAA, 2007). Morgan (1998) highlights that cumulative effects are sometimes disregarded or considered insignificant in the scoping phase.

The anticipated effects are also compared to any relevant thresholds or standards set for the resource; which are an essential component to effective CEA (CEAA, 2007). The fundamental difference between a standard and a threshold is that a standard describes a certain condition or state that a resource should be in; while a threshold describes a limit or a certain number of uses or developments that a resource can assimilate or withstand before the effect becomes significant.

Once identified, the actions causing the potential cumulative effects need to be avoided, remedied or mitigated (Berube, 2007; CEAA, 2007). Monitoring the state of a resource is an important component of ensuring cumulative effects are identified before they become significant and it is too late to take mitigating actions. The incremental nature of cumulative effects means that cumulative solutions are needed as it ultimately comes down to managing the effects of multiple activities, not just a single action (Therivel & Ross, 2007).

Cumulative effects should be considered in social impact assessment. Both Burdge (1998) and Taylor et al (1995) recognise the importance of investigating potential cumulative social impacts. However, while Taylor et al (1995) highlights the value of taking a regional focus, neither discuss in any detail how CEA should be carried out in a social context.

1.4.2 Strategic Level Cumulative Effects Assessment

It is widely recognised that cumulative effects need to be addressed at a strategic level due to their broad, incremental nature (Barrow, 1997; Berube, 2007; Carroll & Turpin, 2002; CEAA, 2007; Glasson et al., 2005; Jones et al., 2005; Morgan, 1998; Wood, 1995). Plans and policies provide a means for this strategic approach where Strategic Effects Assessment (SEA), the process of assessing the effects of a policy or plan, should be adopted. The literature frequently highlights the ability of SEA to address cumulative effects (Barrow, 1997; Carroll & Turpin, 2002; Dalal-Clayton & Sadler, 2007; Harrop & Nixon, 1999; Jones et al., 2005; Kotzé, 2001; Lawe et al., 2005; Memon, 2007; Mitchell, 2002; Morgan, 1998; Peterson, 1999; Therivel, 2004; Wood, 1995).

The rationale for this is the broad context of SEA that avoids the piecemeal approach can result in cumulative effects escaping consideration. SEA provides a means of coordinating activities at a higher level and scale; by essentially streamlining project level assessments by considering the effects that certain activities or zones set out in a policy or plan have at a higher, broader level (Hanna, 2005; Harrop & Nixon, 1999; Peterson, 1999). However, despite the theoretical praise for SEA to address cumulative effects, Dalal-Clayton and Sadler (2007) state that it is rather difficult in practice and Therivel (2004) states that SEA predictions can often be limited by high uncertainty due to the broad nature of policies.

1.4.3 Cumulative Effects Assessment – Generic Issues

CEA is riddled with major methodological issues due to the complexity of predicting cumulative effects. Thus, it is widely recognised to be a problematic area in EIA (Barrow, 1997; Dixon & Montz, 1995; Kotzé, 2001; Morgan, 1998, 2000; Peterson, 1999; Wood, 1995). The fundamental driver of these generic issues is the complex, uncertain and incremental nature of cumulative effects. Identifying cause-effect linkages can also be very difficult; equally as challenging is establishing thresholds (Dixon & Montz, 1995; Hanna, 2005; Harrop & Nixon, 1999; Morgan, 1998; Peterson, 1999).

Another difficult aspect of CEA is defining spatial and temporal boundaries within which to analyse the potential effects (Carroll & Turpin, 2002; MacDonald, 2000; Taylor et al., 1995). One issue with defining spatial boundaries is that they are typically confined to local scales within a project or jurisdictional context, when in some instances the effects can spread outside of these boundaries; hence the

boundaries of an environmental context are important to establish (Barrow, 1997; Glasson et al., 2005; Harrop & Nixon, 1999; Spaling & Smit, 1993).

Temporal boundaries can also be too short, as they are typically set in relation to a project's lifecycle thus they can ignore recovery rates of the affected environment (Spaling & Smit, 1993). Incorporating estimated recovery rates into temporal analyses adds to the complexity (Barrow, 1997; Lawe & Wells, 2005). Therefore, a limited spatial and temporal context can narrow the analysis to disregard more complex types of effects such as long term processes, lags and cross boundary impacts (Spaling & Smit, 1993).

Another reason for the difficulties faced with CEA is because of a varied interpretation of what exactly is meant by a 'cumulative effect'. On occasions the term can be used too loosely or within a particular ambit, and other times there may be confusion about the various types of cumulative effects (Berube, 2007; Cooper & Sheate, 2002; Dixon & Montz, 1995; Morgan, 1993; Morgan, 1998). There is, generally, a lack of guidance and expertise in carrying out CEA, along with an uncertainty of the regulatory requirements regarding cumulative effects (Berube, 2007; Cooper & Sheate, 2002).

Another constraint is related to how EIA is typically required at the project-level while cumulative effects should really be evaluated at a larger scale. Thus, project specific CEA can be too narrowly focused as cumulative effects are more appropriately considered a broad issue. Therefore, analysis needs to be at a larger scale in a holistic, integrated and inclusive manner (Carroll & Turpin, 2002). Piper

(2002) highlights the importance of policy CEA level (SEA) rather than project level as it has more capacity for considering alternatives. However, it is also suggested by Schmidt, Joao, & Albrecht (2005) that cumulative effects should be considered at every EIA level.

Another key issue is the difficulty individual applicants face when assessing the collective impact of their project combined with other projects (Morgan, 1993). There is uncertainty in terms of who should be responsible for assessing cumulative effects, as it is typically required at the project level but should be addressed at the strategic level (PCE, 1995). The regional level is frequently argued to be the most suitable context for CEA; however this is questionable as surely if an issue is prevalent at the district or national level it would not make sense to address in a regional context (Taylor et al., 1995; Therivel, 2004).

CEA clearly faces some major challenges in implementation. There is a need for better methods at both the policy and project level. CEA practitioners generally include; developers, consultants and local authorities; all of whom need to gain greater expertise in CEA (Dixon & Montz, 1995). This subsequently raises the fundamental philosophical question of whether or not is it actually possible to do complete and appropriate CEA.

2 Cumulative Effects Assessment in New Zealand: Administrative and Legislative Framework

Since this research will focus on the practice of CEA in New Zealand it is essential to outline the administrative and legislative frameworks that form the context for CEA in New Zealand. Therefore, the purpose of this chapter is to provide a background to the New Zealand resource management regime and highlight relevant aspects that relate to CEA.

This overview consists of an outline of the main piece of legislation, the Resource Management Act (RMA) and its approach to cumulative effects. The administrative structure for resource management in New Zealand, in terms of the functions of local authorities, is also set out. This is followed by a discussion of both regional and district plans in the resource management framework and their importance for addressing cumulative effects. Section 32 analysis, which is a form of SEA in the RMA, is then briefly outlined. The resource consent process is described in the context of cumulative effects, and this is then followed by a discussion of; the permitted baseline, the existing environment and precedent effect as these are all important and contentious aspects that effect CEA.

The chapter then concludes with an analysis of the generic issues affecting CEA under the New Zealand resource management system. The introduction and development of the RMA has been a highly litigious process. Key case law decisions relevant to CEA forms part of the context of this research as such decisions and interpretations of these can influence CEA practice.

2.1 The Resource Management Act 1991

The RMA is the primary legislation for planning and managing the use of natural resources (other than fisheries) in New Zealand. It is an 'effects-based' regime that focuses on regulating the effects of an activity, as opposed to regulating the actual activity; in order to promote the sustainable management of natural and physical resources (Section 5, RMA). A central component of the RMA framework is EIA. Resource consents require an 'Assessment of Environmental Effects' to be completed; the content of which is outlined in the Fourth Schedule to the RMA.

The Fourth Schedule outlines the assessment required and lists the various areas of effects, such as socio-economic or cultural effects. However, the actual *types* of effects are not outlined as this is done in the Interpretation section of the RMA (Section 3). Section 3 defines the meaning of an 'effect' in terms of the various types and includes cumulative effects. Cumulative effects are inherent in the entire RMA due to their inclusion in this definition.

Section 3 of the RMA defines the meaning of 'effect', as follows:

3. Meaning of 'effect'

In this Act, unless the context otherwise requires, the term "effect" …includes –

(a) any positive or negative effect; and

(b) any temporary or permanent effect; and

(c) any past, present, or future effect; and

(d) any cumulative effect which arises over time or in combination with other effects – regardless of the scale, intensity, duration, or frequency of the effect, and also includes –

(e) any potential effect of high probability; and

(f) any potential effect of low probability which has a high potential impact.

These section 3 effects are relevant and 'reasonably necessary to have regard to' (*Jennings v Tasman District Council*) (Brookers Database, 2007). As shown in section 3(d), cumulative effects are inherent in the RMA; with additive and interactive cumulative effects in the context of both time and space alluded to. The term "*other effects*" in section 3(d) includes any effects from other activities, adverse or not (PCE, 1995). Therefore cumulative effects must be considered throughout the decision-making processes of the RMA.

Dye v Auckland Regional Council deemed a cumulative effect as something that will occur rather than with something that may potentially occur. Section 3(d) also covers the concept of 'de minimis' which is related to small contributions that are not 'vanishingly small', yet add to a cumulative issue; such as global emissions (*EDS v Taranaki Regional Council*) (Brookers Database, 2007).

Cumulative effects include the combined impact of all adverse effects from the proposal and existing effects (*i.e.* existing uses, consented uses or probable uses) (*Outstanding Landscape Protection Soc Inc v Hastings District Council* and *Unison Networks Ltd v Hastings District Council)* (Brookers Database, 2007; Williams, 2007). If several applications are required for one development the AEE should consider the cumulative effects of the project in its entirety (*Burton v Auckland City Council)* (Brookers Database, 2007). Adverse cumulative effects are significant when

they breach a threshold (*W&E Goodwin & Others v Auckland City Council* (MfE, 2007).

The purpose of the Act is a vital consideration of the RMA and forms the environmental bottom line that cannot be breached (*Stanford v Kaikoura District Council)* (Brookers Database, 2007). Williams (2007, p. 12) highlights the point made by the Environment Court that *"if a consent authority could never refuse consent on the basis that the current proposal is…the straw that will break the camel's back, sustainable management is immediately imperilled"* (*Outstanding Landscape Protection Soc Inc v Hastings District Council*).

2.1.1 Administrative Structure under RMA

Under the RMA regime, administration is devolved to local authorities. Regional councils are appointed in each region to manage the natural resources while territorial local authorities (TLAs - City and District Councils) manage the land use of their specific territory. Regional councils must identify key issues for their resources (namely; water, air, soil and the coastal environment) and develop policies for addressing and managing these issues through their Regional Policy Statement and Regional Plans (Morgan, 1995). TLAs manage land use within the regional framework via district and city plans and policies (Morgan, 1995).

2.1.2 Plans

The consideration of cumulative effects is best achieved within a strategic framework (CEAA, 2007). Local authorities should prepare 'effects-based' plans for their district or region that sets a framework that dictates what activities require resource consents

(Figure 1). An area can be divided into zones, with each zone containing a certain characteristic of effects in relation to the activities allowed (*e.g.* rural vs. residential zones). Since cumulative effects are inherent in the RMA they should be considered when local authorities are developing plans (CEAA, 2007).

Identified thresholds for a critical resource are valuable in order to evaluate the significance of activities and if possible these thresholds should be included in a plan. (MfE, 2007). Regional councils typically set more quantitative standards while TLAs set more qualitative standards. PCE (1995) states that in the absence of such a measure for evaluating whether a proposal will be 'the straw that broke the camels back', two approaches can be evident. These are either, a very restrictive approach following the precautionary principle or, on the other end of the spectrum, a more liberal approach which may result in significant cumulative effects frequently arising (PCE, 1995).

The level of consideration given to cumulative effects can be at the high policy level during the plan development/change process. Then there is the consideration of cumulative effects at the objective and policy level, followed by rules, then the inclusion of cumulative effects in assessment matters at the lowest end of the policy level. Outside of the policy level is project level CEA which involves the assessment of cumulative effects for single proposals by both an applicant and a local authority when considering an application.

In good practice, plans should include assessment matters that outline the critical considerations for the relevant zone or activity. This acts as a guide for both the applicant (in preparing their application) and the local authority (when reviewing the

application). Dixon and Montz (1995) emphasise the importance of a specification of what constitutes a significant adverse effect so that applicants are aware of matters that will be under particular scrutiny.

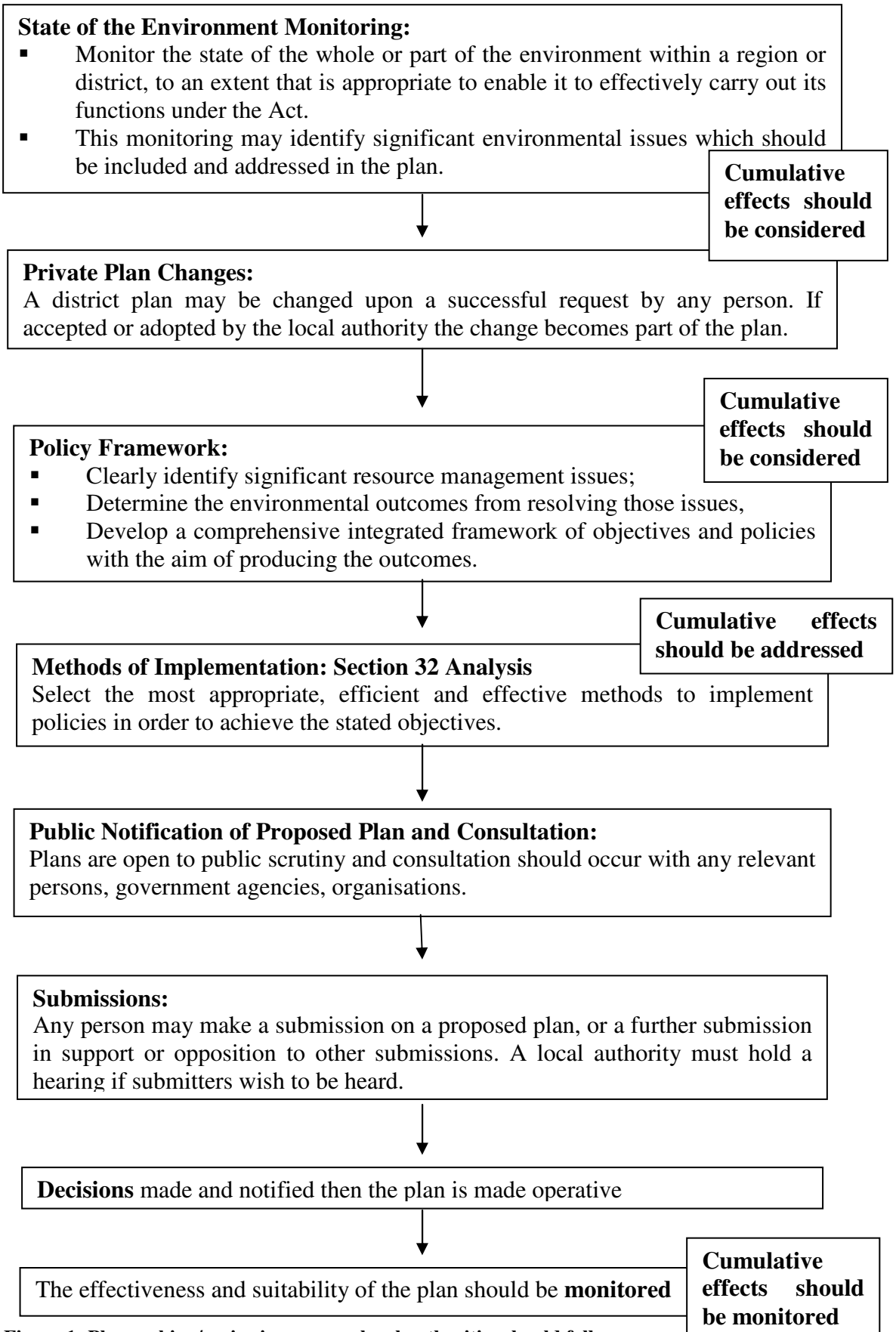

Figure 1: Plan making/reviewing process local authorities should follow when preparing or reviewing a plan. CEA should be carried out at the stages indicated in order to ensure cumulative issues are addressed in the plan (adapted from Quality Planning (2007))

2.1.3 Strategic Effects Assessment within the RMA: Section 32 Analysis

Section 32 provides the main SEA component of the RMA; however it does not explicitly require SEA. Section 32 instead has a focus on cost-benefit analysis and requires an evaluation of how well a plan's objectives achieve the purpose of the Act and the efficiency and effectiveness of the policies, rules and methods (Fookes, 2000; Jackson & Dixon, 2006; Memon, 2007; Peterson, 1999). A range of multi-dimensional analytical planning tools exist for evaluating the costs and benefits of a plan or policy; these include planning balance sheets and goals-achievement matrices and modelling (MfE, 1996).

Section 32 takes a precautionary approach where it requires an evaluation of the risk of acting, or not acting, on an issue where there is significant uncertainty (Memon, 2007). Memon (2007) states the benefits of section 32 analysis include; better outcomes, minimisation of costs to the community, plan provisions that are robust, an improved rationale for monitoring and assistance in the implementation and review of the plan. In *Suburban Estates Ltd v Christchurch City Council,* the Environment Court noted that the cost-benefit analysis in section 32 is the most powerful mechanism for TLAs in addressing cumulative effects and one of the few quantitative measures in the RMA (Brookers Database, 2007).

2.1.4 Resource consent process

CEA is theoretically required in the resource management framework both within an applicant's AEE and when a local authority reviews an application (Figure 2). The local authority can request further information if required (Figure 2). If the activity is

anticipated to have effects that are more than minor then the application must be publicly notified. The diffuse nature of cumulative effects means that affected parties may extend beyond the adjacent landowners. The Parliamentary Commission for the Environment (1995) suggests making plans require public notification in cases where cumulative effects are considered significant even if the effects appear minor on first analysis. This is the approach taken by the Marlborough District Council for coastal permits (PCE, 1995). However, if this approach was taken for all small-scale proposals it is likely that public notification would be required for a large proportion of applications and result in the processing time being delayed; hence only critical areas should require this.

The reviewing process by a local authority involves determining the likely effects of a proposal through analysing the applicants AEE, any submissions made, site visits if possible and compliance with the relevant plans and policies; this process can be subjective and influenced by staff experience (Morgan, 2000). Reviewing the adequacy of CEA within an AEE can require special skills; which if not available in the local authority external experts can be commissioned, however this is rarely done (PCE, 1995). Staff should prepare a section 42A report which is a compilation of information regarding the application for decision-makers and should technically include a consideration of the cumulative effects.

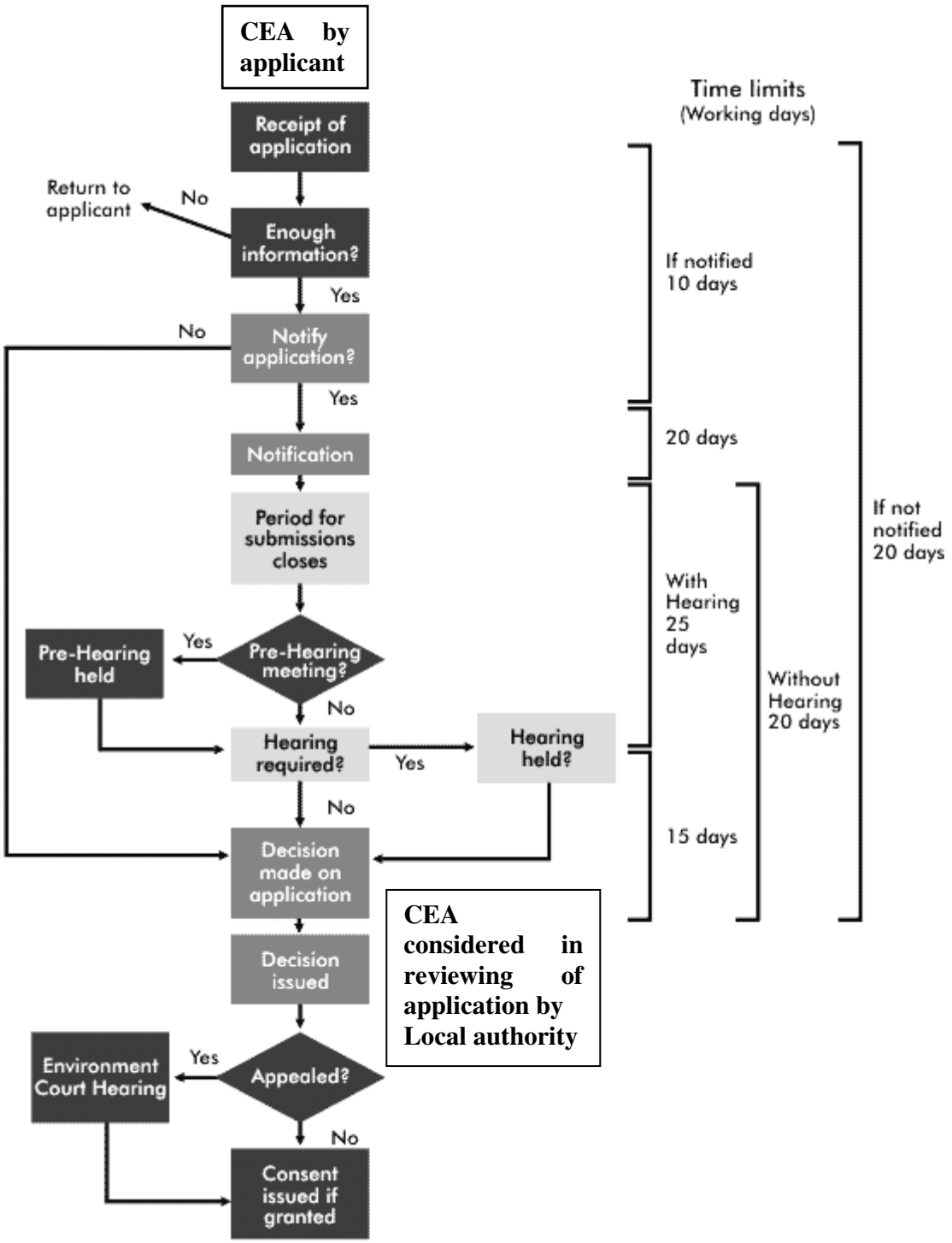

Figure 2: Resource Consent Process
CEA is theoretically required both within an applicant's AEE and when the local authority reviews the application (Adapted from Environment Waikato (2007))

2.1.5 Permitted Baseline and the Existing Environment

There are a number of relevant considerations for cumulative effects within the provisions of the RMA. The 'permitted baseline' concept involves determining the

relevant effects to be taken into consideration when evaluating an application and is a central component for considering cumulative effects.

The permitted baseline effects are the effects within a residual existing environment above what is permitted by a plan. This involves discounting the effects permitted by the plan (not being fanciful) and existing effects (*Arrigato Investments Ltd v Auckland Regional Council; Bayley v Manukau City Council* and *Smith Chilcott Ltd v Auckland City Council)* (Brookers Database, 2007; Palmer, 2005; Williams, 2007). This is on the basis that since such activities are permitted by the plan their effects are essentially already affecting the environment, thus only the additional effects of the activity above what is permitted should be considered (Brookers Database, 2007; Palmer, 2005; Williams, 2007).

The concept relates to both notification matters in section 94A (for determining whether effects are minor and thus what type of notification is required (Figure 3)) and decision-making matters in section 104(2), 104D(2) and 105 *(Smith Chilcott Ltd v Auckland City Council*) (Garbett & Jones, 2006; Palmer, 2005; Williams, 2007). The Resource Management Amendment Act 2003 amended section 104(2), and 104A-106 so that it is now discretionary, not mandatory, for consent authorities to disregard permitted activities (Garbett & Jones, 2006; Williams, 2007).

s.94A Notification PB = (Proposals Effects) – (Effects on Affected Party who has Written Approval (*mandatory*) + Effects of Non-Discretionary matters (*mandatory*) + Effects Permitted by Plan (*discretionary*))

Figure 3: Permitted Baseline for s.94A notification decisions

One debatable aspect of the permitted baseline is whether or not to discount the effects of unimplemented consents. A potential undesirable outcome of including unimplemented consents within the permitted baseline is known as 'environmental creep'. This involves applying for consents one after another in order to reduce the effects above the permitted baseline each time, so that a larger than anticipated development is allowed (Garbett & Jones, 2006; Williams, 2007).

As a result of 'environmental creep', the Courts decided in *Arrigato Investments Ltd v Auckland Regional Council* and *Queenstown-Lakes District Council v Hawthorn Estate Ltd* to leave the determination of the permitted baseline up to the consent authorities discretion (Williams, 2007). Barton (2006) points out that in landscape cases it can be the first development on a landscape that has the most significant impact since the 'first cut is the deepest'; thus additional developments may proceed with less scrutiny since the environment has already been degraded (Williams, 2007).

Overall, following *St Lukes Group v Auckland City Council*, the permitted baseline can be determined by comparing the proposed activities effects with what is lawfully being done on the land, what is permitted by the plan and any unimplemented consents when appropriate (Figure 4) (Brookers Database, 2007).

s.104 PB = (Proposals effects) – (Effects Permitted by Plan (*discretionary*) + Effects from Unimplemented consents (*when appropriate*) + Existing Effects)

Figure 4: Permitted Baseline for s.104 Decisions

There is uncertainty regarding the scope of the permitted baseline as to whether it should be applied to the subject site only or beyond the subject site to the wider

surrounding receiving environment (Palmer 2005 & Williams 2007). Essentially the permitted baseline should be applied to the subject site, and once these residual effects are determined, their impact on the wider existing environment (including the likely future state if unimplemented consents are involved) can then be considered. This then provides the correct scope for consideration of cumulative effects.

2.1.6 Precedent Effect

The precedent effect is a matter frequently used alongside, or confused with, a cumulative effect. It is related to the issue of whether granting a consent will set a standard for allowing other similar applications to be granted in the future (Williams, 2007). It has the potential to result in cumulative effects if such proposals are approved in such a manner that the local authority does not have fair grounds for refusal (Palmer, 2005; Williams, 2007). It is therefore important that a 'true exception' is established in order to be able to distinguish between similar applications and maintain plan integrity (*Blyth v Tasman District Council* and *Batchelor v Tauranga District Council)* (Brookers Database, 2007; Palmer, 2005). The Court of Appeal noted in *Dye v Auckland Regional Council* that the precedent effect has no formal legal backing; it is more of an informal matter for ensuring consistent decisions (Williams, 2007).

Therefore the precedent effect is a relevant matter that can be considered under section 104(1)(i), but it is not a mandatory consideration. In comparison, the consideration of cumulative effects is mandatory and is limited to granting the subject proposal *(Rodney District Council v Gould* and *Dye v Auckland Regional Council)* (Palmer, 2005; Williams, 2007).

There is no onus on an applicant or a local authority to carry out an area-wide investigation into potential future applications (*Dye v Auckland Regional Council*) (Brookers Database, 2007). Consideration of future applications as a potential cumulative effect wrongly implies that local authorities will not apply any form of control once a precedent is established (*Wellington RC (Bulk Water) v Wellington Regional Council*)(Brookers Database, 2007).

The Court is clearly grappling with this issue as there are a number of cases where conflicting decisions have been made regarding cumulative and precedent effects (Table 3). Essentially, cumulative effects are the actual adverse environmental effects and the precedent effect can be the driver of these effects.

Table 3: Summary of conflicting case law decisions relating to precedent and cumulative effects (Brookers Database, 2007)

Case	**Relevant decision**
Heigl v Porirua City Council	Rural subdivision could inevitably result in cumulative effects; thus cumulative effects include inevitable effects that would arise if a certain consent pattern was created.
Baker v Franklin District Council	Fragmentation of high class rural soils through subdivision was a cumulative effect.
Aubrey v Tasman District Council	A rural subdivision would have a precedent effect.
*Jennings v Tasman District Council (*2003 and 2004 Appeal) *Blyth v Tasman District Council*	Fragmentation of rural land through subdivision. Actual adverse effects were cumulative however in the long term the fragmentation was due to a precedent effect.
Pigeon Bay Aquaculture Ltd v Canterbury Regional Council	A major rise in marine farms was related to precedent rather than cumulative effects.

2.2 Generic Issues with Cumulative Effects Assessment in New Zealand

The literature discusses a range of common issues with CEA in New Zealand. Consideration of cumulative effects while considering past, present and possible future effects is very difficult (Williams, 2007). CEA is technically inherently required in an AEE; however it is not well defined or clear on how it should be carried out. Dixon and Montz (1995) consider that the devolution of resource management to the regional level sets a good framework for CEA.

Major constraints with CEA found in New Zealand literature include; a lack of knowledge about causative relationships, the difficulty in accurately predicting the collective pressures on a resource, the scarcity of methods that properly consider temporal and spatial effects, and the question of who exactly is responsible for an adverse cumulative effect (Dixon & Montz, 1995). Furthermore, applicants fall into two distinct types: either small scale applicants who have little experience in AEE's; or large scale applicants who typically invest in specialists to assist in their applications (PCE, 1995). This raises the issue of the viability of expecting small scale applications to complete a CEA (Dixon & Montz, 1995; PCE, 1995).

The reviewing process is clearly a cornerstone of EIA however it is hindered by a lack of a clear specification and guidance on how to carry it out. As a result, local authorities must develop their own processes; which can lead to inconsistent and variable outcomes (Morgan, 2000; PCE, 1995). The evaluation of cumulative effects is a specialised and critical area in the reviewing process, however studies done many years ago indicate that little attention is given to cumulative effects (Morgan, 1993; PCE, 1995).

The quality of an AEE is imperative to sound decision-making. Therefore, the local authority must review the accuracy of both its content and coverage (PCE, 1995). However, Morgan (2000) found that staff were not reviewing AEEs in terms of adequacy but more in terms of compliance with their plan. The study done by the Parliamentary Commission for the Environment (1995) found that the training of staff was a factor in the quality of reviewing.

The strict time frames set out in the RMA (Figure 1) put pressure on staff and deter the reviewing of applications in an integrated, non-sectorial manner due to the added complexity (Morgan, 1995). Morgan (1995) found that very few councils attempted integrated reviewing; the few that did established a group of staff responsible for considering cumulative effects.

Dixon and Montz (1995) concluded that while consideration of cumulative effects is technically required when evaluating applications, the state of knowledge and methods were not readily applicable to decision–making, especially for small-scale proposals. Small scale proposals are also unlikely to be scrutinised as much in cumulative terms yet their potential for incrementally causing adverse effects is the crux of cumulative issues; hence addressing such issues strategically through plans is imperative (Morgan, 1995).

The review of both international and New Zealand specific CEA literature, along with the administrative and legalistic context for CEA in New Zealand, set the basis for the following research rationale, aims, objectives and questions that drove this research.

3 Research Rationale, Aims, Objectives and Questions

Chapter 1 explored the literature on CEA, identifying various methods and common issues associated with the practice of CEA. Chapter 2 then focused on the context of CEA in New Zealand by discussing the administrative and legislative framework of the New Zealand resource management regime, its relevance to CEA and the common issues with practice. This analysis allowed for the identification of gaps in the literature and hence a rationale for this research surrounding the practice of CEA in New Zealand. This chapter consequently outlines this research rationale, followed by the aims, objectives and the specific research questions that this research will address.

3.1 Rationale

Cumulative effects are currently a significant and increasingly prevalent type of environmental issue in New Zealand. Consideration to such effects should be given through CEA, an important component of EIA. However, both applicants and local authorities appear to be struggling to carry out sound CEA due to the complexity involved. Thus, adverse cumulative effects are likely to continue to degrade the New Zealand environment.

The review of the literature suggests that the reviewing process, in which local authorities consider consent applications (Figure 2), and plan development processes (Figure 1), which sets out the framework for addressing adverse effects, are arguably some of the most important steps in the resource management process. This is because these processes determine whether the relevant and significant issues have been addressed, including cumulative effects.

Therefore, a review of the approaches used by local authorities in considering and addressing cumulative effects would provide valuable insight into the current practice of CEA. It would evaluate the effectiveness of these methods and prioritise areas for future research. An investigation into the constraints local authorities face in CEA would also be valuable since it is frequently discussed by the literature to be a problematic process.

3.2 Research Aims

- Evaluate the methods of CEA practiced by local authorities; and
- Investigate the constraints of CEA faced by local authorities.

3.3 Research Objectives

- Review relevant literature extensively to enable the development of an evaluative framework of CEA best practice to compare:
    - the practice of CEA at local authorities; and
    - the constraints local authorities face in doing CEA.

3.4 Research Questions

The following research questions were formulated based on the literature review:

- What approaches do the various case study local authorities use to consider and evaluate the cumulative effects and why?
- What are the strengths and weaknesses with the current practice shown at these case study local authorities?

- What are the key constraints in addressing cumulative effects?
- How could CEA within local authorities be improved?

The next chapter outlines the research approach that was adopted to investigate these research aims, objectives and questions.

4 Methodology

In order to investigate the research aims, objectives and questions, set out in Chapter 3, the following research approach was adopted. A central component to the methodology involved the development of an evaluative framework to compare empirical findings relating to the approaches taken in the practice of CEA to those approaches discussed in the literature. A similar framework was also used for comparing the issues or constraints highlighted in the research findings, with those discussed in the literature.

The research approach was determined through an analysis of the literature on social science research methods. This chapter discusses the rationale for the research approach adopted by outlining the various methods available, then explaining the rationale for the selection of the multiple case study approach and the most appropriate methods for data collection. This chapter then discusses the methods undertaken for selecting research participants and the structure of the interviews.

4.1 Evaluative Framework

An evaluative framework was developed that enabled the research findings relating to CEA practice in New Zealand to be compared to the elements of CEA best practice distilled from the literature review in the Chapter 1. While the literature highlighted that there is no universal method for CEA, many common elements were found, along with a more formalised method from the Canadian Environmental Assessment Agency (2007) (as Canada appears to be on the forefront of CEA research). These formed the 'Best Practice' evaluative framework.

The types of cumulative effects that this evaluative framework considers are those required by section 3 of the RMA; additive and interactive effects over both space and time (Table 4). Some key components of CEA derived from the literature include; identifying issues of concern in a cumulative sense, setting spatial and temporal boundaries, thresholds, considering past, present and likely future actions that could potentially affect the resource, avoiding, remedying and mitigating any adverse effects and monitoring to ensure that effects are under observation (Table 4). The literature mentioned a range of tools for CEA (matrices, network/system diagrams, checklists, overlays and modelling) however these tools do not assist in the analysis of cause-effect linkages and spatial and temporal factors (apart from overlays which are useful for spatial analyses) (Table 4).

Table 4: Evaluative framework of CEA developed from themes in literature for analysis of research findings

CEA methodological components in literature	Research findings
ID Issues	
Cumulative issues identified	
Cumulative effect types: additive, interactive (time and space)	
Processes	
Spatial boundaries set	
Temporal boundaries set	
Standards set	
Thresholds set	
Consider past, present and future actions	
Avoid, remedy, mitigate adverse effects	
Monitoring	
Tools for CEA	
Matrices	
Network/System diagrams	
Checklists	

Overlays	
Modelling	

A major theme of the literature on CEA was its implementation difficulties. These difficulties or constraints include: the complex, uncertain and incremental nature of cumulative effects, the identification of cause-effect linkages, the setting of thresholds that indicate when the effects will become significant, estimating recovery rates, defining spatial and temporal boundaries, the varied interpretation of what cumulative effects actually constitute, the lack of guidance and expertise, uncertainty of regulatory requirements, confusion regarding who is responsible and the issue of addressing CEA at the project level when the policy level is more suitable (Table 5). Furthermore, the New Zealand literature suggests that the permitted baseline and precedent effect are relevant considerations that relate to cumulative effects and that their varied interpretation can cause confusion. As a result these two factors are considered to be further constraints to CEA. Also, the direction given by the Courts in decisions in case law decisions relating to cumulative effects was also considered a constraint.

Table 5: Key CEA constraints in literature for analysis of research findings

Constraints of CEA in literature	Research findings
Complex, uncertain, incremental	
Identify of cause-effect linkage	
Setting thresholds	
Estimating recovery rates	
Defining spatial and temporal boundaries	
Varied interpretation of cumulative effects	
Lack of guidance/expertise	
Uncertainty of regulatory requirements	

Who is responsible?	
Project level vs. policy level	
Precedent confusion/interrelation	
Permitted baseline interpretation	
Court/Case law direction	

4.2 Research Approach

There were a range of approaches available in qualitative research for investigating the research objectives set. One approach would have been to survey all local authorities in New Zealand which would provide significant breadth in findings, however it would not provide the desired depth and insight due to its rigidity (Gillham, 2000). A longitudinal approach would have involved an investigation of CEA practice over a certain time period to analyse change and hence was not suitable for these research objectives (Bryman, 2004).

A case study approach was also plausible; in either single or multiple form. Case studies are an exploratory method that provide in-depth and rich data that give insight into the 'how' and 'why' enquiries of an investigation (Adams & Schvaneveldt, 1985; Yin, 2003). They offer limited representativeness, especially a single case study, thus would further limit the validity of generalisations (Bryman, 2004; Gillham, 2000). A single case study approach could possibly have given biased results as it would have only explored a specific local authority. A multiple case study therefore provides greater breadth than a single case study while still providing depth.

A combination of both a survey approach and a multiple case study approach would have been the ideal methodology for this investigation as it would have provided good

breadth and depth, however temporal and logistical constraints limited the viability of such an approach. Therefore, the compromise of a multiple case study approach was chosen. This approach was used in the study by PCE (1995) where three TLAs were selected for case study purposes which provided interesting and intuitive results and was likely to provide the suitable depth and breadth required for this investigation.

A major limitation of this approach was its inability to make robust generalisations (Adams & Schvaneveldt, 1985; Babbie, 2007). Therefore, it was acknowledged that this investigation would not provide representative results that can be generalised to all of New Zealand's local authorities, however it can still offer valuable insights when analysed tentatively.

4.2.1 Multiple Case Study Framework: The Cases

Each local authority was effectively a case in itself. Consideration was given to the maximum number of local authorities it would be advisable to investigate within the constraints of the research. It was decided that a total of six would provide sufficient breadth and depth. At least two regions were to be involved in order to provide relative breadth and ensure results were not restricted to one region. A regional, city and district council was required within each region as they are the primary types of local authorities in New Zealand (with the exception of unitary authorities which are uncommon). Areas that were known to be experiencing rapid growth and land transformation were of most interest as that indicates high potential for cumulative effects.

The case study local authorities were selected using the following criteria:

- The local authorities must be located in the South Island for logistical reasons;
- There must be two regions involved;
- There must be a regional, city and district council within each of the regions;
- The areas within the local authorities should be undergoing growth and change in land use.

Following these criteria the local authorities in Table 6 were selected for the case study research.

Table 6: Case study local authorities' population and growth figures (Local Councils, 2008).

	Canterbury Region	**Otago Region**
Regional Council	Environment Canterbury	Otago Regional Council
2006 Population	521 832	193 800
Rate of Population change (2001-2006 data)	1%	-0.1%
City Council	Christchurch City Council	Dunedin City Council
2006 Population	343 435	118 683
Rate of Population change (2001-2006 data)	1.5%	0.7%
District Council	Waimakariri District Council	Queenstown-Lakes District Council
2006 Population	42 834	22 959
Rate of Population change (2001-2006 data)	3.2%	6.9%

The Queenstown-Lakes District Council was selected as it manages an area dominated by outstanding natural landscapes currently under strong development pressures and therefore faces cumulative degradation. The Waimakariri District Council also faces growth and manages both a rural and peri-urban environment (the Selwyn District Council had a growth rate of 4.6% but was unavailable during the

time of research due to an office relocation thus Waimakariri was selected). The Christchurch City Council and Dunedin City Council were both selected for their large city sizes within their region and their inclusion of Banks Peninsula and the Otago Peninsula within their jurisdiction respectively, which incorporates a rural environment into the city environment. Environment Canterbury and the Otago Regional Council were selected for their large jurisdiction within the South Island.

While selecting only two regional councils may seem a small sample the collective area of the Otago Regional Council and Environment Canterbury represents 35% (95264 km^2) of New Zealand's total land area (270000 km^2). Thus their practice has a potentially significant impact on a third of New Zealand. The collective area of the four TLAs jurisdictions represents 6.1% (16525 km^2) of New Zealand's total land area for TLAs (Local Government, 2007a, b). Figure 5 and Figure 6 show the location and jurisdictional boundaries of the case study local authorities selected (Table 6) in the Canterbury and Otago region respectively.

Figure 5: Jurisdictional boundaries of local authorities in Canterbury Region (Source: (Local Government, 2007a)

Figure 6: Jurisdictional boundaries of local authorities in Otago Region (Source: (Local Government, 2007b).

4.2.2 Data Collection Method

There were a range of techniques for collecting information under this research approach. These included; observation, questionnaires, interviews, and the analysis of documents (Adams & Schvaneveldt, 1985; Bryman, 2004; Hay, 2005). Observation was not considered a suitable method for this research as it would not provide appropriate insight into the practice of CEA by the practitioners. This was due to the professional nature of their occupation and the difficulty of completing this within the research timeframe. Questionnaires would have enabled a greater number of participants to be included in the investigation however the information can be rigid and lack sufficient depth, insight and flexibility due to the standardised nature of questionnaires (Babbie, 2007).

Interviews can range in nature from unstructured to structured; unstructured interviews offered the ability to achieve a narrative however they can be long and difficult to manage (Gillham. 2005). While structured interviews are efficient and straight forward, however are criticised for their superficial nature (Gillham, 2005). Semi-structured interviews involve open-ended questions and provide flexibility and balance between structure and openness (Gillham, 2005; Hay, 2005). Babbie (2007) states that semi-structured or unstructured interviews are based on a set of topics to be discussed in depth and therefore provide more interaction and insight; however they are more time consuming and would therefore have limited the number of participants that could have potentially been involved in the research. Hay (2005) highlights the importance of avoiding leading questions in order to ensure that the response is not overly directed.

Analysis of documents can provide tangible insight into actual practice (Adams & Schvaneveldt, 1985). In the context of this research, analysis of documents could have involved evaluating the consideration given to cumulative effects in a range of documents (such as section 42A reports and resource consent applications). This technique would have provided material information however it would have been specific to the particular documents' details (*i.e.* consent) and thus would not have provided a general reflection on CEA practice, especially non-documented processes. It would also have required analysis of a large number of documents which time constraints would not have allowed. Other key documents available for analysis were the plans and policies of the local authority; these documents set out important frameworks for CEA practice and were expected to provide valuable information and guidance for CEA in a broad, general nature. Analysis of such documentation

provided an accessible, stable and unobtrusive source of evidence in a broad position representative of the whole council, not just the interviewees (Yin, 2003).

Semi-structured interviews were therefore selected as the most appropriate technique for this investigation as they provided an efficient, in-depth and insightful reflection on general matters of CEA practice. The findings should not be considered completely representative of council practice as all staff involved in CEA were not interviewed due to the reasons discussed below.

Content analysis of plans and relevant policies of the local authorities can provide useful general information. Content analysis can involve either complex analysis or reflexive reading. Complex analysis was not considered appropriate given the generality of plans and the relatively limited role content analysis was intended to play in the research (Babbie, 2007). Plans were therefore analysed using reflexive reading for their consideration of cumulative effects; however this technique was secondary to the interviews. The principles of data collection highlighted by Yin (2003) involve using multiple sources of evidence as it allows a broader range of issues and provides for converging lines of enquiry. Thus, by adopting interviews and content analysis these principles were satisfied.

4.2.3 Ethics

Ethical approval was not necessary for this research given that the investigation involved interviewing participants within their professional capacity.

4.2.4 Selecting the participants: local authority practitioners

Given the time allowed, the appropriate number of staff able to be interviewed at each local authority was two. Because CEA should occur at both the policy and resource consent level it was intended to interview one staff member in each role in order to gain a perspective of CEA at the two levels.

In order to ensure a broad discussion on the topic it was intended that these participants would be in positions that would enable them to draw on a wide range of cumulative effects (i.e. cumulative effects related to air, water and land), and that they were the most knowledgeable practitioners on the topic at each respective case study local authority. This approach helped to improve the representativeness of the data, in terms of CEA practice at the local authority (Gillham, 2000).

Thus the following criteria was developed for selecting participants and arranging interviews:

- the manager or director of the relevant department was requested;
- the research topic and objectives were explained and the most knowledgeable person about this topic, ideally a senior member of staff, was requested to be spoken to.

A consent planner at Environment Canterbury that did not specialise in a certain field was unable to be found. Therefore, in order to ensure broad findings, two consent planners were interviewed; one who specialised in air quality matters and the other in water. Thus it was considered that together their responses would provide the broad overview that was required. Thirteen participants were interviewed in total for this research (Table 7).

4.2.5 The Interviews

The interviews were carried out during the period of November 20th – December 17th 2007. Interviews were all intended to be conducted in person as it was considered this would generate the most interaction and discussion on the topic. However, of the thirteen interviews undertaken, eight were done in person while the remaining five were carried out over the phone (Table 7) due to logistical and temporal constraints. This reflected the limitations of interviewing over a period leading up to a major holiday season. This did affect the rapport between the interviewee and interviewer and limited the level of discussion (as discussed by Gillham (2005)), but not to the extent that it would have been necessary to follow-up with in-person interviews.

Table 7: Case study methodological framework
N.B. 'PI' indicates that the interview was done over the phone.

	Canterbury Region	**Otago Region**
Regional Council *Interviewee roles*	Environment Canterbury (ECan) Resource Consents (2) Policy/Planning	Otago Regional Council (ORC) Resource Consents (PI) Policy/Planning
City Council *Interviewee roles*	Christchurch City Council (CCC) Resource Consents (PI) Policy/Planning (PI)	Dunedin City Council (DCC) Resource Consents Policy/Planning (PI)
District Council *Interviewee roles*	Waimakariri District Council (WDC) Resource Consents Policy/Planning (PI)	Queenstown Lakes District Council (QLDC) Resource Consents Policy/Planning

4.2.6 Interview Details

The interviews were arranged at a time convenient for the interviewee and they were informed that the interview would take a maximum of thirty minutes. All of the in-person interviews were carried out privately in closed meeting rooms at the local authority buildings. While the research topic was outlined to the participants prior to the interview, the actual interview questions were not given in order to ensure that their response was spontaneous and not premeditated or overly directed, hence reflecting their more immediate view, what they recognise as the key matters and what they are most likely to do in practice. A weakness with this technique subsequently identified was that some aspects (*i.e.* boundary setting and discussion of interactive cumulative effects) did not 'fall out' in the interviews; thus making it difficult to determine whether they were not considered in practice or if it was just omitted in the interview.

All interviews carried out in person were recorded in order to ensure that maximum discussion and interaction could occur between the interviewee and the interviewer and that no points were missed. Participants were all asked permission to be recorded at the beginning of the interview. A weakness of recording is that the participants may have been more restrained in their response. However it was considered that this was not a major issue in this context and that recording would provide the advantages of being able to focus on the interview process and do repeated listening to clarify points after the interview.

Listening techniques discussed by Gillham (2000) (*e.g.* facial expression, eye contact, head nods and gestures) were employed to enhance interview effectiveness. Phone

interviews were not recorded however notes were taken during them and which were typed up immediately afterwards to ensure maximum recall.

4.2.7 Interviewees

In terms of the interviewee expertise, all were in senior positions within their organisations and held significant experience and knowledge on the topic. The senior policy planner at the Queenstown-Lakes District Council originally intended to be interviewed was unavailable at the time so another policy planner was spoken to instead who had only five months experience in New Zealand. This is not considered a major limitation to this research as their knowledge could indicate how inherent CEA is in council practice for new employees to adopt.

4.2.8 Interview Questions

Interview questions were key matters that relate to CEA based on the findings from the literature review and research objectives:

- How do you address cumulative effects at the policy/plan level or resource consent level?
- How do you establish thresholds for a resource beyond which more use or development would be significant?
- How well are cumulative effects addressed by applicants? (For consent planners only)
- What are the main constraints in addressing cumulative effects?
- How has any case law shaped your approach to addressing cumulative effects?

- What is your approach to determining the existing environment and permitted baseline?
- What is your view on the precedent effect vs. cumulative effects?
- The education and experience of the participants was also asked.

These were augmented by prompts and probing questions, often using hypothetical scenarios to clarify or extend the respondent.

4.3 Summary of Methodology

In summary, the research approach adopted involved a multiple case study of six local authorities (Table 7) that primarily involved conducting a semi-structured interview with an experienced and senior policy and consent planner at each local authority regarding their approach to addressing cumulative effects. Plans were also analysed for their focus on cumulative effects, as a secondary mechanism. This approach enabled a balance between generalisability and depth and appeared to have worked well in previous studies. It worked effectively with no significant difficulties eventuating. The results were then analysed in the following chapter against the evaluative framework developed from the literature review and interpreted accordingly.

5 Results

The purpose of this chapter is to outline the empirical findings of this research as a result of following the research approach detailed in the previous chapter. This was done by analysing the findings with the evaluative framework that was developed.

This chapter therefore begins with the comparison of the empirical findings of the approaches to CEA with the theoretical approaches discussed in the literature. This is initially summarised in a table format followed by a more detailed description of these findings within each of the various components of these approaches. This method is then similarly applied to the constraints associated with CEA in New Zealand practice.

5.1 Evaluative Framework Analysis

The findings from the thirteen interviews were compared with the evaluative framework which compares the findings relating to CEA methods and constraints in the literature (Table 8 and Table 9).

Table 8 shows that all interviewees recognised cumulative effects as an issue in their area. Setting of spatial and temporal boundaries was never explicitly stated but was alluded to in various cases. All interviewees discussed the use of standards for addressing cumulative effects, while most were struggling with setting thresholds. The consideration of past, present and future actions and the avoiding, remedying and mitigating of adverse effects was frequently discussed. Monitoring was discussed by

some interviewees as a good means of addressing cumulative effects, while the use of tools was seldom mentioned.

Table 8: Key components to CEA distilled from literature compared with approaches discussed at case study local authorities
('Policy' and 'Consents' refers to the policy planner and resource consent planner that were interviewed at each local authority; 'Yes' indicates the CEA component was discussed while 'N/E' indicates it was 'not explicitly' discussed but alluded to, a blank cell indicates that CEA component was not discussed at all)

CEA components in literature	District Council				City Council				Regional Council				
	WDC		QLDC		CCC		DCC		ECan			ORC	
	Policy	Consents	Policy	Consents	Policy	Consents	Policy	Consents	Policy	Consents	Consents	Policy	Consents
ID Issues													
CE issues identified	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
CE additive (inlc. time & space), interactive	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Processes													
SEA	Yes		Yes										
Spatial boundaries set	N/E	N/E	N/E	N/E	N/E		N/E		N/E	N/E	N/E	N/E	
Temporal boundaries set									N/E	N/E	N/E		
Standards set	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Thresholds set						Yes							
Consider past, present and future actions	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes		Yes	Yes	Yes	
Avoid, remedy, mitigate adverse effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Monitor	Yes	Yes	Yes						Yes		Yes	Yes	Yes
CEA Tools													
Matrices													
Network diagrams													
Checklists													
Modelling													
Overlays									Yes		Yes		

5.2 Approaches to Cumulative Effects Assessment at Case Study Local Authorities

5.2.1 Cumulative issues identified

All interviewees discussed the recognition of cumulative effects as an issue they deal with. City councils often referred to scenarios involving subdivisions and traffic flow, while subdivisions (including utilities such as stormwater) were the typical examples discussed at district councils. Regional councils typically referred to scenarios involving water takes and discharges to air and water. ECan also discussed forestry due to its cumulative effect of reducing water through evapotranspiration.

5.2.2 Types of cumulative effects discussed: interactive and additive (time and space crowding)

Most TLAs discussed what would be referred to as space crowding cumulative effects which are the effects of an accumulation of something in an area. Regional councils referred to time crowding (as well as space crowding), which involves the accumulation of an impact over time (*e.g.* water abstraction). Both of these types of cumulative effects are essentially additive - just of a different medium: space or time. Most interviewees referred to cumulative effects of the similar activities, not an interaction of different activities.

5.2.3 Spatial boundaries set

The setting of spatial boundaries was never explicitly stated. However the setting of zones or boundaries was typically referred to by the regional councils when discussing the allocation of ground and surface water, or by TLAs when discussing land use planning. Therefore, while this is not a form of project level spatial boundary setting, it is policy level, as it is limiting the areas in which certain resource uses can occur and therefore limiting the area for the development of certain cumulative effects.

The WDC policy planner commented that cumulative effects are considered at higher level matters such as plan development and changes; but once zoning is set cumulative effects are given little consideration as they are considered to be dealt with in terms of the zoning framework that sets out activities. The CCC policy planner commented on the value of using defensible boundaries for containing urban sprawl; similarly the QLDC policy planner discussed their recent growth strategy for the management of development pressures.

5.2.4 Temporal boundaries set

Similar to spatial boundaries, the setting of temporal boundaries were never explicitly stated. However regional councils effectively do this when putting time limits on the duration of consents that are of a continuous nature (*e.g.* a water take or discharge). The ECan consent planner discussed how they address temporal cumulative effects of water takes by analysing past climatic conditions and extrapolating them out in terms

of the worst case scenario (high water take and low water stores) to consider the potential effects that may arise from approving consents over a given time period.

5.2.5 Setting standards

It is important to note that when consent planners indicated their use of standards that these were the standards that set by the policy planners, not separate project specific standards developed by the consent planner.

Most local authorities were using standards for qualitative and quantitative measures (Table 8). Regional councils set standards for minimum river flows and general environmental quality (*i.e.* water, air quality, nutrient levels). TLAs set 'softer' standards for a zone in the form of a description of amenity characteristics, which are used as a measure to determine whether a development would maintain or detract from that amenity. Harder standards are set through the minimum subdivision lot sizes. Most assess whether an application's effects would be consistent, inconsistent or contrary to the objectives, policies, anticipated outcomes and any assessment criteria, set out in the plans and policy statements.

The QLDC planners discussed the specific assessment criteria relating to cumulative degradation in terms of the over-domestication of their rural-general zone that applicants must consider. These criteria were developed by the Environment Court in *Wakatipu Environmental Society Incorporated and Ors v Queenstown-Lakes District Council* The DCC policy planner and both QLDC planners discussed the use of landscape architects for determining the impact of an application on the amenity of an area.

Both regional councils discussed the use of guidelines or standards for air quality in air sheds for determining whether more discharge can take place. Cumulative effects of water abstractions were addressed by controlling activities and ensuring the minimum flow levels set for rivers are not breached. ECan allocates 50% of its groundwater (based on rainfall calculations) which could be classed as a form of standard; however groundwater users do not have to cease their use if groundwater levels become too low, which is quite different from the approach for surface water.

The ECan consent planner emphasised the importance of plans, as they set out and justify what can and cannot be done beforehand, which is a lot easier than arguing the point later on. The WDC consent planner noted the use of standards for stormwater and sewage. The ECan policy planner discussed the use of nutrient budgeting on farms for keeping nutrient levels at a tolerable level for groundwater.

5.2.6 Setting thresholds

Most local authorities were struggling with setting thresholds, however the CCC noted that they set maximum traffic flows which is a form of threshold. The policy planner at ECan mentioned the potential for setting thresholds for dairy farming in relation to nutrient levels. Such a threshold would involve calculating the maximum number of dairy cows allowed in a certain zone in terms of the nutrients produced per cow. However this approach was abandoned as it was too contentious.

5.2.7 Consider past, present and future actions

The ECan consent planner discussed how they consider past, present and future actions in terms of what is reasonable and do not include hypothetical future consents as that would be unfair. When asked how they manage a few similar applications within the same area at the same time, the CCC consent planner noted that they cannot be considered together until they are lodged and beyond appeal. The DCC consent planner discussed the importance of making robust and consistent decisions to prevent the precedent effect.

The ECan consent planner commented that when considering applications for water takes they should analyse the application in the context of applications that have gone before it and what water is now available. However he noted that this is very difficult in practice. ECan is dealing with the issue of the cumulative effects of afforestation by restricting forestry to 10% in sensitive catchments in order to minimise water loss through evapotranspiration.

5.2.8 Avoid, remedy and mitigate adverse effects

The regional councils discussed their approach to dealing with cumulative effects by regulating activities through rules in their plans and imposing consent conditions. Measures at ECan to address cumulative effects of air discharges include placing rules on wood burners and the incentive 'Clean Heat' programme; thus the use of both 'sticks' and 'carrots'. The ORC policy planner discussed how they regulate the discharge of dairy-shed effluent by placing the onus on applicants to follow guidelines to ensure that they do not pollute waterways, instead of allocating the assimilative

capacity of a waterway. The ECan policy planner commented on the significance of the recent Court of Appeal decision *Coromandel Watchdog of Hauraki Inc v Chief Executive of the Ministry of Economic Development*, that ruled the prohibition of activities on a precautionary basis was allowed while waiting for more information.

The CCC policy planner commented on the lack of specific provisions in their plan for dealing with cumulative effects noting that their plan deals with general effects and each application is dealt with on its merits. Conversely, the QLDC requires specific consideration of cumulative effects through assessment matters in their rural-general zone. The DCC policy planner noted their approach of aiming to avoid, remedy and mitigate the adverse effects while the WDC policy planner discussed the consideration given to an area's sensitivity and ability to handle an activity. The WDC consent planner commented on the use of structure planning for ensuring integration of servicing.

5.2.9 Strategic Effects Assessment

SEA, in terms of section 32 analysis, was discussed briefly by the two district councils as a means for broadly taking into account the 'bigger picture' and the trends of the district, in order to determine the best densities. The difficulty of quantifying things for threshold tests was discussed. The WDC policy planner commented that the 'Greater Christchurch Urban Development Strategy' is essentially a strategic way of dealing with cumulative effects of traffic at a higher level as it provides areas with criteria that must be met and balanced with the surrounding environment.

5.2.10 Monitoring

The ECan consent planner highlighted the value in monitoring as it provides a basis for declining applications (*e.g.* if the ambient air quality is already above the recommended guidelines then declining even small applications is a lot easier). The WDC policy planner discussed how monitoring is a pragmatic way to approach CEA as it allows for adaptive management. The QLDC policy planner emphasised the importance of working towards establishing robust monitoring, including aerial photography, for ensuring awareness of gradual changes occurring in a broad context. This reflects the importance of preventing over-domestication of landscapes to the QLDC.

5.2.11 Tools – matrices, network diagrams, checklists and overlays

The ECan consent planner discussed the use of overlays (GIS) when analysing the existing environment for an application for spray painting. This involved analysis of a surrounding radius and modelling the discharge with existing ones to ensure the combined effect would not exceed guidelines. The DCC policy planner also discussed the use of modelling for analysing traffic capacity. Checklists specifically for cumulative effects were not used however city council interviewees mentioned the use of general checklists when assessing applications.

5.2.12 How well do applicants consider cumulative effects?

Consent planners typically commented that the quality of AEEs' is variable thus so is consideration given to cumulative effects. The ORC planner noted that a good AEE typically touches on cumulative effects but it is rarely a matter that is discussed in

detail due to the case by case nature of applications. The CCC planner discussed how small scale applicants do not need to consider cumulative effects while larger scale non-complying activities are more likely to comment on it. The DCC planner commented on how few applicants have a good understanding of what an environmental effect is – let alone a cumulative effect. While the QLDC planner discussed how applicants for the rural-general zone are generally quite aware of cumulative issues because of its inclusion in the assessment matters in the plan. However, outside of the QLDC rural-general zone, CEA is generally not done well, with many sticking to the rules in the plan (although an application for gravel extraction did recognise and address cumulative effects well).

The ECan planner discussed how CEA is generally very poorly done by applicants. However, in the case of surface water abstractions, cumulative effects are generally considered quite well because the applicants are aware of the significance of the minimum flow and point out how this protects the river from adverse cumulative effects and provides for existing users. The other ECan consent planner discussed how small scale applicants (*e.g.* spray painters) lodge AEEs of a poor quality and that very few would even know what a cumulative effect was, while large scale applicants are more aware of cumulative effects. Notably an application by an energy company for a large number of pellet burners successfully proved that the ECan projections for air quality were too cautious in relation to cumulative effects and consent was granted. The CCC planner discussed how sometimes it is through the submission process that cumulative effects are identified.

5.3 Constraints

Table 9 shows that the most common constraints present in the literature, as stated by the interviewees, included the incremental, uncertain and complex nature of cumulative effects, the identification of cause-effect linkages, the setting of thresholds or knowing when one more increment would result in a significant impact, and the issue of CEA at the project level (where it is required) versus policy level (where it is better placed). Constraints from the literature that did not come up in the interviews included; estimating resource recovery rates, defining spatial and temporal boundaries and uncertainty of regulatory requirements. Various other constraints outside the literature were also brought up by the interviewees.

Table 9: Key constraints distilled from literature compared with views on constraints found at case study local authorities
(N.B. 'Policy' and 'Consents' refers to the policy planner and resource consents planner interviewed; 'Yes' indicates it was brought up in interviews while a blank indicates the constraint was not brought up in the interview)

Literature Constraints of CEA	District Council				City Council				Regional Council				
	WDC Views		QLDC Views		CCC Views		DCC Views		ECan Views			ORC Views	
	Policy	Consents	Policy	Consents	Policy	Consents	Policy	Consents	Policy	Consents	Consents	Policy	Consents
Complex, uncertain, incremental	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	
ID of cause-effect									Yes	Yes		Yes	
Setting thresholds			Yes	Yes	Yes			Yes				Yes	
Estimating recovery rates													
Defining spatial and temporal boundaries													
Varied interpretation of what CE means								Yes				Yes	
Lack of guidance/expertise						Yes		Yes					
Uncertainty of regulatory requirements													
Who is responsible?										Yes			
Project level vs. policy level		Yes	Yes	Yes	Yes			Yes		Yes	Yes		
Confusion with precedent effect					Yes			Yes				Yes	
Permitted baseline interpretation				Yes			Yes						
Case law/court direction									Yes				

5.3.1 Complex, incremental and uncertain nature of cumulative effects

The incremental nature of cumulative effects was the most common constraint discussed. The interviewees considered that determining whether a significantly adverse cumulative effect will occur from one more increment is an extremely difficult and subjective task as the increments are so small, negligible and sometimes immeasurable. They are often not considered high in priority as they are not immediate effects. The WDC policy planner noted the difficulty in quantifying things that are qualitative in nature. A consent planner at ECan mentioned how it is difficult to ask one applicant to consider the impact of their diminutive increment in terms of the wider context of the surrounding environment.

Similarly, the ORC policy planner noted the difficulty of incremental creep in informing applicants that their increment is the one that will make the collective impact significant (or more than minor), as a degree of certainty is needed to show that it will 'cross the magic line' which is often difficult. Both the ORC policy planner and the QLDC consent planner discussed how this difficulty is common in qualitative amenity cases - which are based more on values. They discussed how a lot of the time it is actually found in hindsight, once an application has been implemented, when 'the horse has already bolted', that that increment was shown to be 'the straw that broke the camel's back'. It was mentioned that this has happened on a number of occasions and resulted in a landscape's amenity level being downgraded due to the degradation that occurred.

5.3.2 Identifying cause-effect linkages

This constraint was common at regional councils and related to the ability to identify with certainty whether an individual application will be the one that will cause a collectively significant cumulative effect on a resource that is often very far away from the cause (*e.g.* linking the impact of a water take on groundwater levels that are far away from the water take). This notion is often contested at the Environment Court; attention was drawn to *Lynton Dairy Ltd v Canterbury Regional Council*, where it was unsuccessfully argued that the water takes would decrease spring flows and groundwater. The difficulty lies in proving to the Court the strength and clarity of the linkage of that one particular use to the cumulative effect. The ECan consent planner commented how this case, along with the interim decision on the application for water takes from the Selwyn-Rakaia Ground Water Zone, showed them that it is essential to get their science right for proving impacts in order to be able to prevent similar situations.

The ORC policy planner commented on how the Environment Court is often reluctant to 'run on a whim' and that there is a tendency of the Court to drive the RMA to be managed in a way that almost negates the precautionary principle. This is because a lot of the time the Court may grant consent and impose conditions along with a review in situations where the Council would prefer the application be declined.

5.3.3 Setting thresholds

The setting of thresholds, which indicates the point beyond which a significant cumulative effect will occur, was often referred to as the 'tipping point' or 'the straw

that broke the camels back'. Interviewees highlighted how they are so subtle, vague, subjective and riddled with uncertainty that often it is not obvious until afterwards when the environment is already degraded. The DCC consent planner noted how having an idea of the 'tipping point' would give councils the ability to draw a harder line on the issue of precedent. The CCC policy planner stated that the Environment Court appears confident that they can see when to stop but that this belief is opposed by many.

5.3.4 Estimating recovery rates, defining spatial and temporal boundaries and uncertainty of regulatory requirements

These constraints were not brought up in any of the interviews.

5.3.5 Varied interpretation of what cumulative effects mean

The ORC policy planner noted that cumulative effects are frequently mistaken for an *actual* effect, when really they are a *type* of effect generated from an accumulation of adverse environmental effects of any kind. For example, when dealing with subdivisions, the actual adverse environmental effect is the over-domestication of a landscape which is generated by the cumulative effect of too many subdivisions. The DCC consent planner mentioned how the legislative wording of cumulative effects should reflect the interpretation, and that a clear distinction between the precedent and a cumulative effect is important.

5.3.6 Lack of guidance

The CCC consent planner noted that there is a lack of guidance and training in CEA for planners. While the DCC consent planner noted how CEA is difficult for planners to get an understanding of, let alone non-professionals.

5.3.7 Who is responsible?

The ECan consent planner noted the issue of who should pay for the information that is needed to determine whether a cumulative effect will occur; the applicant or the tax payer. Applicants can feel that it is unfair that they acquire this level of information for such a negligible application.

5.3.8 Project level vs. policy level

The constraint of project level vs. policy level was typically referred to by the interviewees as the 'case by case nature of the RMA' which reflects the same issue. It relates to the difficulty in considering one application on its own merits without taking into account other applications that may be getting approved at the same time. The ECan consent planner and QLDC consent planner both noted that under the 'first in, first served' approach of the RMA it is far easier to deal with the acute effects of an individual activity on the receiving environment, rather than the overall effects. The DCC consent planner noted the challenge considering applications on a case by case approach has on codifying the nature of effects.

The case by case approach of the RMA was mentioned by the ECan consent planner as a reason for the difficulty in declining a single consent on the basis of cumulative

effects. The *Lynton Dairy Ltd v Canterbury Regional Council* case was drawn upon to illustrate the unsuccessful attempt ECan had at declining consent on this basis, despite the application being for numerous water takes not a single one.

5.3.9 Confusion with precedent effect

The interrelation and confusion of cumulative effects with the precedent effect was brought up in some of the interviews, namely with TLAs. The CCC policy planner discussed that while recognising that the issue of precedent relates to plan integrity and the issue of cumulative effects relates to an actual effect, it is still a challenge to draw a clear distinction. He stated that the driver of cumulative effects is the precedent effect and therefore great importance is placed on showing true exception between applications.

Similarly, the DCC consent planner noted the interrelation can cause confusion and drew attention to *Dye v Auckland Regional Council* where the Court ruled that the precedent effect was not part of the consideration of cumulative effects. He saw this ruling as an issue, since the precedent effect can drive cumulative effects. The ORC policy planner highlighted how while the precedent and cumulative effects are often confused; cumulative effects are matters that should be considered, while consideration of precedent is not.

5.3.10 Permitted baseline interpretation

The issue of unimplemented consents in the permitted baseline and existing environment was brought up as a constraint by both the DCC policy planner and the

QLDC consent planner. The QLDC consent planner discussed how including unimplemented consents in the permitted baseline is difficult when doing site assessments as the effects are not visible. Attention was drawn to *Queenstown-Lakes District Council v. Hawthorn Estate Ltd,* which involved a consent application to subdivide part of the rural-general zone where a number of subdivisions were unimplemented. This made it difficult to assess the effects of the new proposal against the actual existing environment that will be built in the near future.

5.3.11 Court/Case law direction

The ECan policy planner commented that sometimes it appears that the legislation is appropriate but that the direction given by the Court when interpreting case law can lead you onto the wrong path; so it is hoped that common sense ultimately prevails.

5.3.12 Other constraints brought up in interviews outside of literature

The ORC consent planner noted that finding sound data and information on a resource over a substantial historical period is a major constraint. The ORC policy planner discussed how, while regional councils deal with more quantitative matters (*e.g.* minimum water flow) which are perceived to be more 'black and white' than qualitative matters (*e.g.* landscape amenity), they are actually more subjective than most people would think. This is because the natural environment is not necessarily made up of homogenous units, but in many cases it is an ever-flowing continuum.

The policy planner at ECan noted the constraint of science, politics and economic effects when addressing cumulative effects, and also the mentality of decision-makers

and sometimes the Courts to be more inclined toward pro-development. The QLDC consent planner emphasised the risk that overlooking relevant information or proposals (for any reason) has on their decision; while the policy planner discussed the challenge in developing a framework that addresses cumulative effects. The WDC policy planner highlighted how assessing applications involves analysing a set of information at one point on time which can be subject to inaccuracies. This was supported by the CCC consents planner who noted the difficulty in accurately identifying effects.

The consideration given to cumulative effects varies among planners. The status of an activity can influence how much consideration is given, as it relates to the nature of the councils discretion with lower level consents typically assessed for their compliance with rules, while higher level consents (*i.e.* discretionary or non-complying) are where cumulative effects are more likely to be given consideration. However, it ultimately comes down to the objectives and policies in the plan. The DCC consents planner commented how often rules can fail as the nature of a problem being addressed can be oversimplified at the plan development stage making it difficult to anticipate how effects can incrementally occur over time. Rules may control an obvious effect, but they may also miss taking into account the incremental nature of effects.

5.4 Content Analysis of Plans

The resource management framework that local authorities set out in district, city and regional plans and regional policy statements is an important mechanism for strategic planning.

5.4.1 Environment Canterbury

The Regional Policy Statement includes various cumulative issues relating to water quantity and ambient air quality. The Natural Resources Regional Plan: 'Air Quality', 'Water Quality' and 'Water Quantity' chapters gives comprehensive coverage of cumulative issues, where they are frequently discussed in policies, rules and assessment matters for consent applications (Environment Canterbury, 2007). The 'Soil Conservation' chapter also considers cumulative issues but to a lesser degree than the chapters discussed above; this is considered to be due to cross-referencing with the water chapters. The 'Wetlands' and 'Beds and Margins of Rivers and Lakes' chapters did not address cumulative effects however this is because the issues are cross-referenced with the water chapters (Environment Canterbury, 2007).

5.4.2 Otago Regional Council

The Regional Policy Statement (which was unavailable online) contained minimal mention of the term 'cumulative' however some cumulative issues were discussed (ORC, 1998). The various regional plans were variable in their level of consideration to cumulative effects. The 'Air Plan' included cumulative effects on ambient air quality which was addressed through objectives, policies and assessment matters (ORC, 2003). The 'Coast Plan' did not discuss cumulative issues (ORC, 2001). The 'Water Plan' did not consider the cumulative effects of water takes (both surface and groundwater), but did address both cumulative water quality and river bed extraction issues however only at the policy level (ORC, 2004).

5.4.3 Christchurch City Council

Cumulative effects were not recognised as an issue for the city in any capacity – while it is alluded to in various contexts (*i.e.* urban growth or air quality), the term 'cumulative' was never referred to (CCC, 2005). Thus cumulative effects were not considered in the objectives, policies, rules or assessment matters. The 'Greater Christchurch Urban Development Strategy' (UDS) (a collaboration of surrounding local authorities and Transit New Zealand) addresses urban growth issues, many of which are cumulative in nature; however cumulative effects are given very little acknowledgement in this strategy (Greater Christchurch, 2007). Therefore, while the City Plan and UDS indirectly address cumulative issues - it is not explicitly stated.

5.4.4 Dunedin City Council

The City Plan addresses cumulative effects comprehensively through its objectives, policies, rules and in specific assessment matters for their rural zone (DCC, 2004). Residential and Activity zones receive similar attention while cumulative effects are a specific assessment matter in the following zones and sections: Industry, Ports, Townscape (however interestingly not in the 'Landscape' section), Indigenous Fauna and Vegetation, Subdivisions, Transportation and Utilities (DCC, 2004). Overall, the inclusion of the consideration of cumulative effects through the plan provides a sound basis for ensuring such issues are given appropriate consideration by both the applicant and the local authority.

5.4.5 Waimakariri District Council

Cumulative effects are given very little mention in the District Plan (which was unavailable online). It is mentioned in the policy explanation in relation to the development of new zones and also in a policy relating to the management of stormwater and sewage (WDC, 2005). Assessment matters specified for resource consent applications for subdivisions and land use do not include a consideration of cumulative effects (WDC, 2005).

5.4.6 Queenstown-Lakes District Council

The Queenstown-Lakes District Plan recognises cumulative deterioration of outstanding natural landscapes as a district wide issue (QLDC, 2007b). It has a policy for avoiding cumulative degradation that involves ensuring development benefits are outweighed by the adverse effects on over-domestication of the landscape and encouraging development sympathetic to rural areas (QLDC, 2007b). The rules and assessment matters for rural areas gives substantial consideration to cumulative effects, with a specific rule and assessment matter solely for cumulative considerations (QLDC, 2007b). The assessment matter is made up of certain criteria developed by the Environment Court in *Wakatipu Environmental Society Incorporated and Ors v Queenstown-Lakes District Council* (Appendix 1).

In addition, the rural area rules also include what is known as the 'Radius Criterion', which relates to considering the appropriateness of the form and density of development (Appendix 1). This was imposed by the Environment Court in *Queenstown-Lakes District Council v Lakes District Rural Land Owners Society Inc*

C75/01. It involves a 500m and 1100m radius around a proposed site which is analysed to consider alternative locations or methods that may lessen the impact of a development. The validity of this approach was challenged unsuccessfully in *Queenstown-Lakes District Council v Lakes District Rural Land Owners Society Inc* AP 33/01.

Rules for residential and township areas also consider cumulative effects, primarily relating to traffic. Cumulative effects of lake moorings and earthworks are also acknowledged issues (QLDC, 2007b). Rules for various other zones give adequate consideration to cumulative issues. Overall, the district plan gave good consideration to cumulative effects in terms of both breadth and depth. The QLDC also has a 'Growth Management Strategy' which, similarly to the UDS, does not mention cumulative effects however is essentially driven by the cumulative issues of development pressures (QLDC, 2007a).

5.5 Summary of Results

The results presented draw detailed attention to the findings from the various interviewees of the six case study local authorities regarding their approaches to addressing cumulative effects and the key constraints they face in CEA. These findings were compared to the CEA approaches and constraints commonly identified in literature. Content analysis of relevant plans, which are key documents for setting a resource management framework, also provided insight into the measures taken for addressing cumulative effects. The next chapter discusses these findings in relation to the theories and themes in the CEA literature in order to evaluate current CEA practice and discuss areas for improvement.

6 Discussion

The findings of this research provided a range of insights into the practice of CEA. A major aspect of CEA is the scale at which it is applied, policy (high versus low level) versus project level CEA, as this can influence the level of consideration given to cumulative effects. Geographical scale of CEA is also an important consideration. CEA practice within the case study local authorities are evaluated with relevant aspects of the literature. Various constraints to CEA are analysed, including the influence of the Courts, followed by a suggestion for a tendering approach for addressing cumulative effects.

6.1 Scale of CEA

The scale or level at which CEA is applied (*i.e.* extent of CEA in the high to low policy level and project level) is a crucial consideration in effectively addressing cumulative effects (CEAA, 2007; Harrop & Nixon, 1999; Marriot, 1997). The findings indicate high variability among the approaches taken at the six case study local authorities.

6.1.1 Approaches to policy level CEA

There were clear differences in the primary level of consideration given to cumulative effects at the various local authorities (Figure 7). The WDC and CCC primarily give consideration to cumulative effects at the plan development/change stage. This is done on the idea that once zones are set then it is considered that cumulative effects are addressed through the strategic zoning framework. ORC primarily addresses cumulative effects down to its objectives and policies while ECan, QLDC and DCC

consider cumulative effects down to assessment matters for various zones or activities.

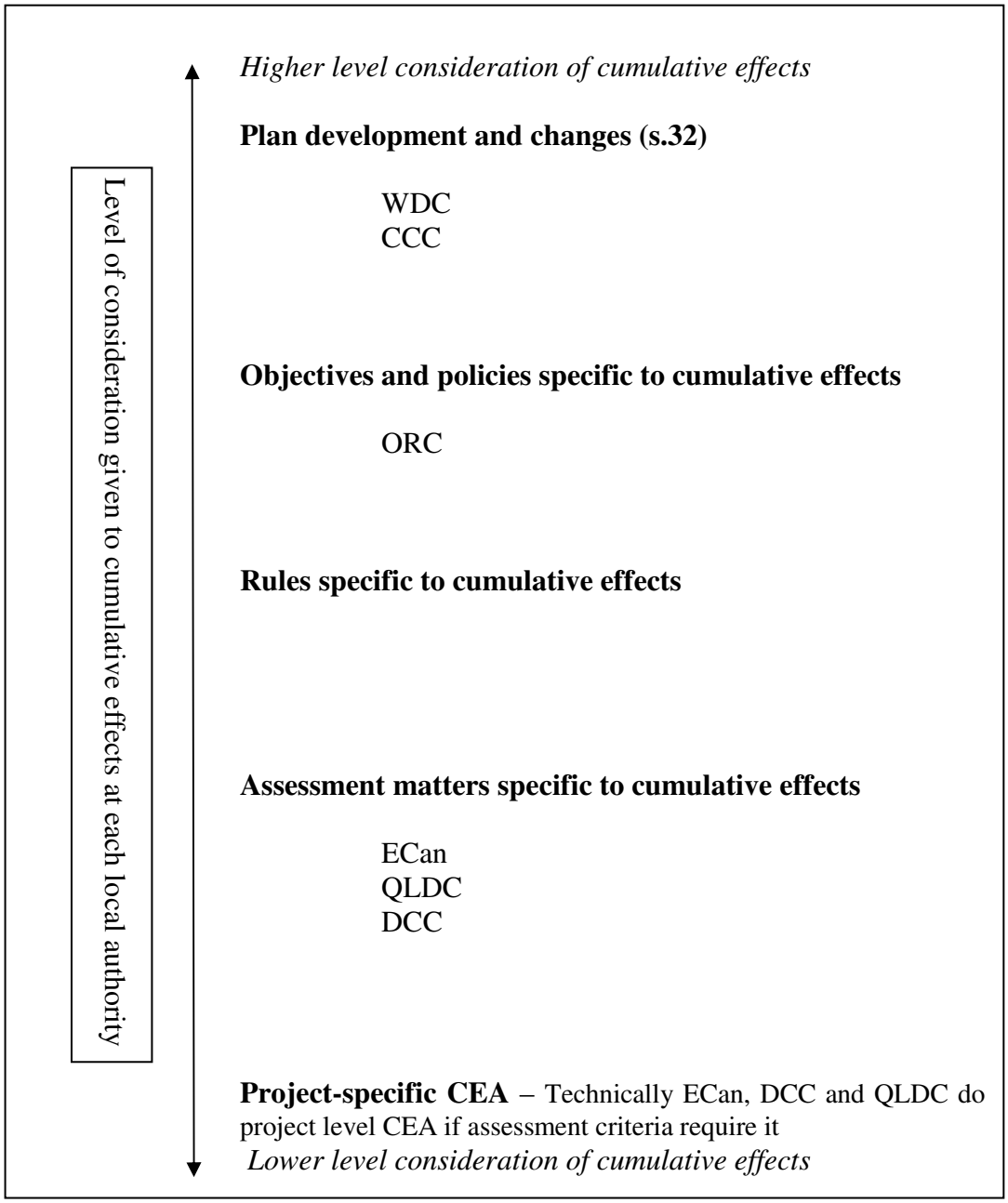

Figure 7: CEA Scale - level of consideration given to cumulative effects at the six local authorities investigated*

*In interpreting these results it is important to note that the local authorities who had adopted the lower policy level also generally carry CEA out at the higher policy levels (e.g. if it is in an assessment matter it is generally included in a rule and policy and so on).

In addition, the UDS and Queenstown-Lakes Growth Strategy are both strategic, high policy level mechanisms for addressing cumulative issues common with urban growth. It should be noted that the CCC consent planner did discuss the consideration of cumulative effects when assessing relevant proposals however their plan did not include any specific reference to this. Also, the ORC has cumulative specific assessment matters in their Regional Air Plan however the objective/policy level is the general level that cumulative effects are considered in the remainder of their plans.

It is interesting to note that within the Canterbury region, ECan addresses cumulative effects down to the low policy level while the two Canterbury TLAs: WDC and CCC, primarily address them at the high policy level. The situation in Otago is almost the opposite, with both TLAs: DCC and QLDC, considering cumulative effects at the low policy level while the ORC typically addresses them to the objective/policy level. The implications of these differing approaches within the regional framework will be discussed later.

Reasons for these differing approaches could be related to the significance of cumulative effects in each jurisdiction. ECan and QLDC clearly face major cumulative issues. The Queenstown-Lakes District is under high development pressures with growth of 6.9% (Table 6) hence cumulative degradation of their outstanding landscapes is a major issue. While the Canterbury region faces many cumulative issues primarily in relation to air quality and water quantity and quality. On the other hand, the DCC has relatively low growth (0.7% - Table 6), yet they are addressing cumulative effects at the low level. Growth for the Waimakariri District and Christchurch City is 3.2% and 1.5% respectively, yet they are only considering

cumulative effects at the high policy level; therefore growth does not appear to be a major driver in these cases.

The literature discusses the importance of; firstly, identifying key cumulative issues of concern that need to be addressed (Berube, 2007; CEAA, 2007; Morgan, 1998). Overall, the local authorities who have recognised cumulative effects as an important issue needing to be addressed (DCC, QLDC and ECan) are devising good approaches for this. While other local authorities (namely WDC and CCC), have not yet recognised cumulative effects to be significant in their area and have not yet established specific approaches. However, the DCC does not face significant cumulative issues in comparison to ECan and QLDC, yet has adopted a low level policy approach. This demonstrates the importance of taking a proactive, not reactive, approach in order to address cumulative issues before they become significant.

Therefore, perhaps a weakness of current practice at the CCC and WDC is the lack of acknowledgment of cumulative effects being an issue that should be addressed, and that once this is recognised practitioners may be competent at devising management strategies. In addition, it could be argued that a lack of recognition of such an issue could indicate poor practice in the first place; however exploring such issues goes beyond the scope of the current research.

6.1.2 Reliance on zoning framework

These differing approaches raise the question of how much reliance should be placed on the zoning framework for addressing cumulative effects. The literature only discusses the merits of policy versus project level CEA and does not discuss the

advantages and disadvantages of these alternative low and high policy level approaches. However reasons for both the high and low level policy approaches are apparent. It is important to note that zones form the spatial boundary for policy level CEA to some extent.

The RMA does not require the use of zones; however they are a practical mechanism adopted by local authorities for broadly categorising parts of the environment for management. This is based on the assumption that the overall, broad environment within a zone is homogenous, however in reality, a more detailed analysis would indicate that the environment within a zone can be rather diverse. If they were homogenous, then taking a broad high level approach to CEA would be adequate while environments that are more heterogeneous would receive better consideration of cumulative effects with a more project specific CEA approach.

The zoning framework addresses cumulative effects well where it places strong controls on certain activities (*i.e.* prohibition). It is in situations where there is a level of discretion as to whether a proposal can go ahead or not that cumulative effects can arise due to the subjectivity involved in determining its impact. The findings support the notion in the literature that small scale proposals, the fundamental driver of cumulative effects, are not given as much scrutiny, as their particular effects are addressed strategically through the zoning framework. Discretion is therefore limited to the matters outlined in the plan. Project-specific CEA is not carried in such a situation out unless otherwise required. Higher status consents such as discretionary and non-complying activities are given greater scrutiny.

Specific consideration to cumulative effects is essential at the higher policy level in order to ensure it is taken into account for both high and low status activities. This view is further supported by the DCC planner's comment that the plan development stage can sometimes overlook incremental effects, due to its tendency to oversimplify problems because of its broad nature and focus on more direct issues.

There is also the issue of cumulative effects that may occur across more than one zone (*i.e.* if a development is adjacent to a different zone it may still impact the other zone). The findings did not discuss this matter however, theoretically, if the existing environment is considered correctly then any adjacent affected areas should be considered regardless of the zoning. In reality however cumulative effects, particularly of an interactive nature, could be overlooked.

6.1.3 High policy level CEA

The justification for cumulative effects being primarily addressed at the high policy level is that if a zoning framework sets out certain activities allowed within a zone, then these effects should have been given consideration in the section 32 analysis, including their cumulative effect. Thus activities and effects are streamlined and coordinated in the broad context (Hanna, 2005; Harrop & Nixon, 1999; Peterson, 1999). If there is a proposal for an activity or effect that is not permitted within a plan then the application would typically involve either a non-complying activity or a private plan change. A private plan change is considered at the high policy level while non-complying activities require a consideration as to whether the effects are minor and contrary to the objectives and policies of the plan.

Thus, it could be argued that if cumulative effects are not considered in the objectives and policies, they could be overlooked. In some cases however, objectives and policies indirectly address them; for example, where a policy intends for a rural zone to maintain its rural amenity, which indirectly addresses cumulative degradation of a rural zone.

6.1.4 SEA and Section 32 Analysis

The findings gave little mention to SEA per se, with strategic approaches given more discussion. This highlights how strategic planning is the *actual* method of addressing cumulative effects while SEA is the process of assessing the effects of a plan, including cumulative effects.

There was also minimal discussion of how section 32 is used to assess cumulative effects within the plan development or change process. Section 32 does not explicitly state the need for SEA, or more specifically the need to consider cumulative effects (Jackson & Dixon, 2006). Therefore, it could be argued that while section 32 analysis is the primary means for SEA in the RMA, its ability to enhance sustainability of a plan framework, including the assessment of cumulative effects, is being overlooked to some extent. This proposition is supported by Memon (2007) where he discusses how section 32 is not being used to its full SEA potential in terms of how it can "*design and fine tune planning objectives and policies to promote the sustainability purpose of the Act"*. Training is needed so that the cumulative effects of plan frameworks are better assessed in the future. A more in-depth analysis of the effectiveness of section 32 analysis in terms of SEA goes beyond the scope of this research.

6.1.5 Low policy level CEA

The justification for taking CEA down to the lower policy level would be that cumulative effects are more directly addressed at this level, as both applicants and planners must consciously consider a specific proposal's effects in a cumulative context. This has the potential to illuminate issues that could have been overlooked with the broader, higher policy level approach (Peterson, 1999; Therivel, 2004). The findings suggest that the variable nature of an applicants' consideration to cumulative effects is influenced by the level of consideration given in the plan, hence specific assessment matters drives or enhances project level CEA.

A potential weakness of assessment matters could be that they have the potential to become rigid if they are followed closely and then less consideration is given to effects outside of the assessment matters. The assessment matters could also become a standard requirement as opposed to focusing on doing CEA as a part of good standard practice.

6.1.6 Low level policy CEA and project level CEA

If consideration of cumulative effects is required as an assessment matter, then project level CEA is inherently required (for both the applicant and the local authority when reviewing the AEEs adequacy). However, the level of project level CEA can also vary. A detailed project level CEA would follow the methods outlined in the Introduction chapter which would involve setting spatial and temporal boundaries and a detailed analysis of impacts. While a less detailed project level CEA would involve more of a consideration of the impact of the effects on a qualitative or quantitative

standard (*e.g.* 'it will not detract from amenity' or 'it will maintain the minimum flow') and this can be the extent of the consideration. The findings suggest that the latter approach is the most common with project level CEA.

6.1.7 Constraint of case by case approach

The constraint of policy versus project level CEA, often referred to as the difficulty of considering cumulative effects of proposals on a case by case approach, was clearly a major issue faced by practitioners. The findings suggest that vertically integrating CEA from the high policy level to the low policy level and project level is the most comprehensive approach of ensuring that cumulative effects are addressed. This allows for a continuing holistic, integrated and inclusive approach, as advocated by Carroll & Turpin (2002). However this approach itself is riddled with challenges in effectively assessing an individual application, in terms of accurately determining whether a specific increment will be 'the straw that broke the camel's back'. This shows the importance of measures such as; standards, establishing thresholds and robust monitoring that tracks incremental change to aid low level CEA.

6.1.8 Most effective policy level for CEA

The most effective level for applying CEA is disputed within the literature however the majority emphasise the importance of policy level CEA (Barrow, 1997; Dalal-Clayton & Sadler, 2007; Memon, 2007; Morgan, 1998; Therivel, 2004; Wood, 1995). Peterson stresses how high policy level SEA sets the context for lower level SEA and then for project EIA; while Dixon and Montz (1995) consider project level CEA too complex. Therivel (2004) criticises SEA for its potential to give limited predictions

due to the high uncertainty associated with broad policies. Schmidt, Joao & Albrecht (2005) state that CEA should be carried out at every EIA level.

The good practice guide to auditing AEEs by MfE (2007) emphasises the importance of CEA within the plan, highlighting how the issues and information requirements influence the quality of the AEE, thus omitting important issues can lead to applicants not fully considering all relevant effects. These findings support this statement, indicating that the scale of CEA is an influential factor as the level of consideration given to cumulative effects within an application is proportional to the level of consideration given to them within the plan.

Comprehensive consideration down to the low policy level is imperative in order to generate project level CEA and consequently more detailed consideration to cumulative effects. This approach supports the view of Peterson (1999) and Schmidt, Joao & Albrecht (2005).

6.1.9 Scale of CEA: regional versus district level approaches

Determining spatial boundaries for CEA is problematic; much of the literature advocates taking a regional approach (Dixon and Montz, 1995; Taylor et al., 1995; Therivel, 2004). However, rationally it should be carried out at the most appropriate context in terms of where the cumulative issue is prevalent; global (*e.g.* climate change), national, regional, district, catchment or landscape scale.

The statutory divisions of responsibility could potentially affect the quality of CEA and for this reason vertical integration is very important. The RMA primarily gives

land use control to TLAs and resource control to regional councils; which could restrict to a certain extent the level at which a cumulative issue is addressed (Dixon and Montz, 1995). Regional Policy Statements (RPS) should give effect to issues that are recognised in National Policy Statements (of which central government is only beginning to utilise), and District and Regional Plans should give effect to issues recognised in a RPS. If cumulative issues are recognised well then theoretically they can be vertically integrated to the appropriate level for applying control.

As discussed, there is a difference between the policy level consideration given to cumulative effects within the local authorities of the Otago and Canterbury region (Figure 7). In addition, the Canterbury Triennial Agreement, required under the Local Government Act 2002, has the function of providing intra-regional coordination and communication between Canterbury local authorities however contains no reference to management of region-wide cumulative effects (Environment Canterbury, 2005). The implications of this and the differences in CEA policy level consideration between the local authorities within each region are likely to be insignificant as the division of responsibilities still ensures relevant matters are addressed.

However, one scenario where such an issue could arise would be a land use issue that spreads over several districts, district councils may not address the wide spread issue to the full extent as it could seem insignificant within their individual district. However, cross boundary issues should be given consideration and most local authorities include reference to such matters in their plans.

Essentially, CEA should be integrated and devolved to the appropriate context for addressing an issue. The findings support the view that specific consideration given to cumulative issues in Regional Policy Statements (for both regional and district plans to address) is imperative for this integration to occur and would help promote CEA as part of everyday practice (Dixon and Montz, 1995).

6.2 Overall CEA Practice

Evaluating the findings in relation to the approaches in the literature indicates that local authorities are following a number of the CEA methods in the literature (Table 8 and 9). However, it is considered that this is more due to the logical nature of the methods as opposed to a conscious recognition of following actual CEA methods. While this may not seem to be a valid issue it does mean that they are missing out the more subtle, detailed methods that provide for more effective CEA (*e.g.* the setting of more specific spatial boundaries, determination of pathways, recovery rates and the use of the various CEA tools).

All case study local authorities have adopted a strategic approach for addressing cumulative effects; which is a highly regarded method discussed in the literature (CEAA, 2007; Kotzé, 2001; Lawe & Wells, 2005; Marriott, 1997; PCE, 1995; Therivel, 2004). Such an approach provides for the 'cumulative solutions' advocated by Therival & Ross (2007). The primary means of addressing cumulative effects was strategically through setting standards for both qualitative and quantitative measures in their plans. This is a major strength of current practice and provides a strategic, broad and justifiable approach.

Local authorities are however struggling with setting thresholds; which are a crucial component of effective CEA. However, standards can also be a backward way of setting thresholds for quantitative matters (*e.g.* if there is a minimum water flow then the surplus water can theoretically be divided up among the users). Standards for qualitative matters such as landscape amenity cannot be used in the same way (*e.g.* dividing 'surplus amenity' up among developments). Thus, determining the number of developments allowed while maintaining a certain standard would be a very subjective exercise due to the variation in values among different people (*e.g.* it is likely an artist and a developer would have differing views on how many developments would maintain a landscape's amenity).

The standards being used by the consent planners when assessing applications were the ones set out in the plans and therefore fairly generic and not project-specific. While this is the nature of strategic planning it also means that specific characteristics of a project or area could be potentially overlooked.

Therefore, policy level CEA dominates while project level CEA appears to be carried out less frequently by local authorities when reviewing applications. When project level CEA is done, it is not done at a detailed level. In addition, while local authorities assess the cumulative impact of an application to some extent when they consider the existing environment, they do not appear to follow any specific CEA process when doing it.

Spatial and temporal boundaries are set to some extent however this is, more indirectly, due to the use of zoning framework in plans and the requirements of the

RMA for setting consent durations. Temporal boundaries are an important consideration for cumulative effects that arise over time (CEAA, 2007). Temporal boundaries are more relevant for time crowding activities (*e.g.* water abstraction) as opposed to permanent activities (*e.g.* a subdivision). Hence regional councils who deal with more on-going resource uses, are more likely to set them as opposed to TLAs who deal with more permanent land uses.

As discussed, the RMA addresses this matter to a certain extent as activities with continuous effects have a maximum consent duration of 35 years. A review is needed to continue such a consent which requires local authorities to consider the merits of a renewal in terms of the effects on the environment. ECan's use of analysing past baseline conditions and extrapolating them out into worst case scenarios for water abstractions is advocated by the CEAA (2007) as a means of considering potential cumulative effects of a consent's duration. The findings show that the use of short consent duration followed by reviews is adopted when taking a precautionary approach . In addition, the duration of a plan is a form of temporal boundary in a strategic sense as it sets out the activities allowed until it is reviewed ten years after becoming operative.

Present and probable future (in the form of unimplemented consents) actions are given consideration by the local authorities while past actions are a relevant consideration in the context of monitoring. The use of CEA tools was minimal and should be promoted while avoiding, remedying and mitigating adverse effects as a key method adopted by local authorities.

Both regional councils were controlling point-source effluent discharges through regulations and guidelines set out in their plans. However ECan has also established an approach for dealing with non-point source nutrients through the use of nutrient budgeting; which is a form of setting a nutrient level not to be exceeded. The ECan policy planner discussed how the potential for the use of land use controls (under section 31C regional councils can control land use) in terms of the number of cows allowed in various groundwater zones was highly contentious and therefore abandoned. This would have formed a threshold approach if adopted.

Both regional councils take a regulatory approach to addressing ambient air quality restricting certain adverse activities, which is consistent with the literature (Marriott, 1997). ECan also uses incentives (*i.e.* Clean Heat Programme), which could be due to air quality being a significant issue in Christchurch. Water quantity is addressed through minimum flows in both regions and also in line with the literature (CEAA, 2007; Marriot, 1997). The ECan approach appears to be slightly more advanced with its use of allocation 'blocks' which is also likely to be related to the significance of water quantity to Canterbury in comparison to Otago.

6.2.1 Notification

The comment by the CCC consent planner regarding the identification of cumulative effects via submissions highlights the importance of public notification and participation in the consent process; especially if there is no other formal approach to CEA in the assessment. However, as already discussed, the issue lies with many small scale activities not requiring notification due to their 'minor' effects, yet it is these incremental, minor effects that collectively create significant cumulative effects.

Thus, as stated by Morgan (1998), cumulative effects can sometimes be disregarded at the scoping phase. Further underlining the importance of devising strategies with cumulative issues that are significant, to prevent this occurring.

The investigation by the PCE (1995) suggested notification where significant cumulative effects are likely even if effects initially appear minor. Dixon and Montz (1995) emphasise the importance of specifying what constitutes a significant adverse effect so that applicants are aware of the scrutiny their application will receive. However the findings from this research strongly indicate that determination of cumulative significance is extremely difficult particularly for activities that appear to be minor on superficial examination. One way of approaching this issue would be to emphasise the 'standard' that needs to be maintained for cumulative effects to not be considered significant. Another method would be to require a 'standard' of CEA within the applicants AEE that must be fulfilled; this would be similar to what is included within specific assessment matters.

Despite the difficulties in determining significance, this notification approach must be taken in cases where a significant cumulative effect is likely to result; but also, as the PCE suggests, notification should be required for activities that are of concern to the local authority in terms of their cumulative degradation. Using this approach alongside promoting public input into plan development (as plans ultimately set the framework for strategically addressing cumulative effects) would provide a comprehensive means of ensuring cumulative effects are given consideration by both the community and local authority.

6.2.2 Monitoring

The findings support the uses of monitoring for CEA advocated by the literature of establishing baseline data and analysing change (CEAA, 2007; Barrow, 1999; Therivel & Ross, 2007). Interviewees discussed its use in providing an evidential basis for declining further consents and as a pragmatic means of observing and responding to broad cumulative change. A vital component for stopping before the 'horse has bolted', as discussed by various interviewees, is comprehensive monitoring which is a key component of CEA in the literature.

Such monitoring would keep track of all consents as soon as they are granted (thus including unimplemented ones) and having relevant experts (*e.g.* landscape architects or scientists) to consider a proposal with reference to the current state described by the monitoring (*e.g.* aerial photograph with unimplemented consents graphically inserted on their site to indicate where the future development would be). This would help address the issue of consents being granted without full knowledge of the future state of the environment. The literature also emphasises the importance of baseline monitoring in CEA and to some extent this component is satisfied in the consideration of the existing environment; however the spatial boundaries of the receiving environment is a subjective matter that would influence this.

6.2.3 Types and interaction of cumulative effects

The term 'cumulative' essentially entails something that is collective or increasing; hence cumulative primarily refers to an additive effect. The inclusion of interactive cumulative effects should theoretically be considered more of an indirect effect. Much of the literature, however, puts them under the umbrella of a 'cumulative effect'.

The findings suggest that the cumulative effects currently being addressed by local authorities are of an additive nature. Interactive cumulative effects appear to be discussed more in the literature than in practice. Addressing interactive cumulative effects would require high levels of interdisciplinary collaboration; something that could be difficult as most local authorities have experts in certain fields. For example, at ECan, the consent planners had an area of specialisation (*e.g.* air, water). Therefore considering possible interactive cumulative effects when necessary would require a significant integration of expertise. Such integration was argued by Morgan (1995) to be hindered by the strict time frames of the consent process and could therefore be overlooked, especially for minor projects.

In addition, the findings also seemed to discuss social cumulative effects more in relation to a bio-physical effect (e.g. traffic flow or landscape amenity), not so much in terms of cumulative social effects on society and economy, although the findings did touch on economic effects in relation to water takes. This deficiency could be due to the dominance of other types of cumulative impacts. Another possible reason for this could be that the social wellbeing component of Part II of the RMA is being overlooked.

6.2.4 Influence of Council attitude

The QLDC consent planner discussed how the previous Mayor was liberal and pro-development while the present Council is a lot more conservative. The district is still seeing the effects of the previous Councils' decisions with various developments approved in that period still being implemented. Thus the stance of a Council in

determining its approach towards development has a strong influence on outcomes. Such influences, if significant, should be limited by central government intervention.

6.2.5 Influence of the Courts – for better or for worse?

The decisions of the Courts clearly have an influence on the approaches taken for CEA. Local authorities have articulated concern that the Court is making decisions which go against good environmental practice (*i.e.* applying the precautionary principle) (*Lynton Dairy Ltd v Canterbury Regional Council*). The mentality of the decision makers and sometimes courts to be more inclined toward development than the precautionary principle was discussed in the findings. This highlights how the rational tools of section 32 cost-benefit analysis are possibly either: not be being utilised correctly, or are not effective, at rebalancing such matters.

Such decisions being ruled by the Courts not only results in poor outcomes but could also potentially result in practitioners who take a formulaic approach to practice subsequently applying similar decisions in the future. This is because decisions set a form of precedent for future interpretation.

Jenkins (2007) criticises the RMA for its growing inclination towards an adversarial court based decision-making approach for making decisions on cumulative effects that are based on legal principles of persuasive evidence. This is instead of adopting the precautionary principle and adaptive management, which are based on environmental decision-making principles (Jenkins, 2007). The RMA is argued to be inherently precautionary (*Shirley Primary School v Telecom Mobile Communications Limited*); however Jenkins (2007) believes that it does not provide the statutory

support needed for applying these principles. Therefore, it could be argued that this adversarial use of the RMA is overriding good practice.

Despite various 'un-precautionary' decisions, the Courts have also made some valuable decisions in relation to protecting the environment from cumulative degradation. For instance, the Environment Court developed criteria for considering cumulative effects in *Wakatipu Environmental Society Incorporated and Ors v Queenstown-Lakes District Council* and the inclusion of these in the district plan appears to have improved CEA in the vulnerable Wakatipu Basin (Appendix 1).

Also the development of the 'radius criterion' in *Queenstown-Lakes District Council v Lakes District Rural Land Owners Society Inc* C75/01 was aimed at addressing cumulative degradation (Appendix 1). The precautionary principle was supported by the Court of Appeal's decision in *Coromandel Watchdog of Hauraki Inc v Chief Executive of the Ministry of Economic Development*. Overall, the Environment Court has both its good and bad aspects in terms of the practice of CEA.

6.3 CEA Constraints

Discussion of constraints dominated many of the interviews which indicates just how problematic this wide array of constraints are for local authorities. Consequently these constraints need to be addressed in order for CEA to be improved.

6.3.1 Interrelation of constraints

The findings show there is a close interrelation between many of the constraints to CEA; in particular the incremental nature of cumulative effects, identifying cause-effect linkages, the setting of thresholds and the case by case nature of the RMA. These all fundamentally relate to the difficulty of determining when a cumulative effect is, or will be, significant. This constraint is undoubtedly the biggest issue in CEA. The findings indicate that such significance is frequently not known until after it has occurred when the 'horse has already bolted'. Hence the findings strongly support the view of Jenkins (2007) that states that a major limitation of the RMA is its focus on managing the adverse effects of individual applications not combined effects.

6.3.2 CEA Methods

The findings did not state the actual lack of readily applicable CEA methods as such (particularly that deal with spatial and temporal factors), which was emphasised by Dixon and Montz (1995). However, the constraints of identifying cause-effect linkages and determining significance (including setting thresholds) were major constraints and are clearly related to CEA methods, hence methods were discussed in that sense (Hanna, 2005; Morgan, 1998; Peterson, 1999).

The findings did not support two of the constraints relating to methods outlined in the literature; estimating recovery rates and the setting of spatial and temporal boundaries (Carroll & Turpin, 2002; Lawe & Wells, 2005; MacDonald, 2000; Taylor et al., 1995). The lack of discussion of these constraints suggests that practitioners are not

practicing CEA to this level of detail. Dixon and Montz (1995) stressed that the intent for CEA in the RMA was ahead of its means for practice; this appears to still be the case particularly in terms of determining incremental significance. It is interesting that the constraint of an uncertainty of regulatory requirements was not mentioned at all; this indicates that practitioners are aware of their requirements under the RMA to consider cumulative effects.

6.3.3 Precedent and existing environment

The precedent effect was frequently highlighted as an issue for generating cumulative effects. However, on reflection, technically there should be no grounds for the issue of precedent as each time a consent is granted, the existing/receiving environment changes to a more developed/built/degraded state so grounds for refusal can be based on cumulative effects. However the problem with this is that local authorities are struggling to ascertain when the critical threshold/saturation point is reached.

In addition, the precedent effect was more common at the district/city plan level which reflects the more qualitative and therefore subjective nature of district planning. Hence precedent was less of an issue at the regional level due to the more quantitative framework.

6.3.4 Cause-effect linkages

The constraint of identifying cause-effect linkages was most common at regional councils which reflects their more scientifically based framework. They face the

challenge of proving with strong science whether an increment will cause an adverse cumulative effect (Hanna, 2005; Harrop & Nixon, 1999).

Both the *Lynton Dairy Ltd v Canterbury Regional Council* case (where ECan unsuccessfully argued that the water takes would adversely impact on lowland waterways and users about 40km away) and the 'Selwyn Rakaia Groundwater Zone' water take applications interim decision *(*where ECan was also unsuccessful in proving movement between aquifers) were significant decisions in terms of cumulative effects in Canterbury.

Rennie (2007) discusses the challenge in proving the strength and clarity of such cause-effect linkages to the Court, emphasising the importance of applying the precautionary principle when there is not enough certainty on each side of an argument. The precautionary principle was not expressed by the Court in either of these cases. The findings support the view of Rennie (2007) as various interviewees expressed their preference for applying the precautionary principle in situations of uncertainty however that the difficulty lies in proving reasons for this to the Court.

6.3.5 Responsibility for CEA

Dixon and Montz (1995) believe it is unrealistic to expect a small scale applicant to have the resources and expertise for CEA, putting the onus on local authorities. Similarly, Morgan (1993) believes individual applicants may not be best placed to consider the collective impact of their proposal; therefore this raises the question of who should be responsible for assessing cumulative effects. The findings indicate that local authorities should be responsible for setting a good framework for addressing

cumulative effects. While applicants should be responsible for considering the cumulative effect that their individual application would have on the receiving environment. Applicants should be given guidance via the plan on the standard of a CEA required. The local authority must then review the adequacy of this assessment. This process provides for comprehensive CEA.

In addition, the issue of who should pay for the information required to assess the cumulative impact of a negligible application also needs to be addressed. It ultimately comes down to either the applicant or the local authority (and therefore tax payer). Applicants feel it is unfair however a lot of the time they will be receiving economic benefits from the granting of consent (particularly water abstractions – a public resource) so in reality it is equitable that they should be responsible for financing such an investigation. Such matters should be laid out in plans in order to deal with this matter proactively.

6.4 Tendering approach

A major flaw of the RMA is it's 'first in, first served' approach (Rennie, 2007). The ECan consents planner discussed the difficulty of the 'case by case' nature of the RMA in addressing cumulative effects, criticising it for the lack of a mechanism for selecting applications. It was commented how cumulative effects could be better managed if they had the foresight of all the applications for any given period all at once (noting that plans do effectively do this to some extent by setting out what can and cannot be done in the future). The concept of tendering for a resource (*i.e.* air, water) was mentioned as a means of dealing with this issue by providing a way that a

whole group of applications could be considered at one point in time and consent given to the best options available.

This concept is available but has yet to be implemented in aquaculture with 'Aquaculture Management Areas' (AMAs) with the intention of addressing cumulative effects and allowing the most efficient use of a resource. The concept of 'air tendering' was discussed by the ECan consent planner where all discharges to air would be registered then based on how much 'air' is left in terms of air quality, then the surplus 'air' would be allocated on the basis of efficiency. Similarly the concept for allocating wind farms was hypothesised to involve seeking out who would want a wind farm over a certain period and then selecting the best ones. Research directed toward the merits of such a tendering system for other resources, similar to the approach taken for AMAs, would provide insight into the effectiveness of adopting such an approach for other prevalent cumulative issues.

7 Conclusions

This research has provided a valuable insight into the practice of CEA at local authority level, despite its limited generalisability. The CEA methods practised by the case study local authorities and the constraints that each face in CEA practice have been evaluated with respect to the common themes taken from CEA literature. Thus over a decade after the last significant reviews in this area, this investigation has enabled an evaluation of current practice of CEA to be completed. This investigation has enabled the following conclusions to be drawn with respect to the research questions set at chapter 3:

- **What approaches do the various case study local authorities use to consider and evaluate cumulative effects and why?**

The primary approach adopted by the case study local authorities for addressing cumulative effects is strategic planning through the setting of both qualitative and quantitative standards. This provides a strategic, justifiable and proactive approach to CEA. Plans address cumulative effects with varying levels of detail. Some local authorities consider cumulative effects in their plans at high policy level (during the plan development or change process) while some integrate this down to lower levels (such as the objective, policy, rule and assessment matters level). The lower the level of consideration within a plan the more likely that project level CEA is carried out, therefore this approach enhances the practical implementation of CEA.

The zoning framework forms a spatial boundary, but not in a project specific way, while the existing/receiving environment forms a project specific boundary. The

duration period for a resource consent forms a temporal boundary. Local authorities have adopted a range of primarily regulatory methods, which are set out in their plans, for avoiding, remedying and mitigating adverse effects that generate cumulative effects. Present and future actions are taken into consideration, with the 'future' typically referring to unimplemented consents. Monitoring takes past actions into account and provides a basis for considering applications and keeping track of trends.

- **What are the strengths and weaknesses with the current CEA practice shown at these case study councils?**

The strengths of current CEA practice, in the plan development and consent reviewing processes, are; the use of standards, as these standards provide the strategic, broad approach that is needed for addressing cumulative effects due to their diffuse, incremental nature. Consideration of cumulative effects at the low policy level within plans was also a major strength of CEA practice at some of the case study local authorities, as it promotes the practice of project-level CEA by providing the required 'standard' of CEA in an AEE.

A major weakness of practice is the lack of thresholds or mechanisms for determining when an increment will be the 'significant' straw that '*will break'* the camel's back. A further weakness was the lack of consideration given to cumulative effects within the plans of some of the local authorities. The many determinations of the Environment Court in relation to CEA have provided both positive and negative interpretations for CEA. The positive developments being the specific assessment criteria for the Wakatipu Basin in the Queenstown-Lakes District Plan, and the

negative developments being un-precautionary decisions regarding the significance of cumulative effects.

- **What are the key constraints in addressing cumulative effects?**

CEA is riddled with an array of difficulties, many of which are based around the fundamental problem of accurately determining which increment will cause a significant cumulative effect. Therefore, as discussed, local authorities are struggling to set thresholds that outline the maximum number of incremental uses a certain resource can handle before causing a significant cumulative effect. This relates to the challenge in assessing applications under the RMA on a case-by-case approach while still considering the overall impact an individual application would have in a wider context.

Effectively proving cause-effect linkages is also a major challenge, primarily for regional councils, as strong and clear evidence is needed to base such an argument. Confusion with the precedent effect and what exactly constitutes the permitted baseline also adds to the difficulty of accurately considering cumulative effects. In addition, a lack of guidance and some determinations by the Courts can hinder good CEA practice. Developing successful CEA strategies in light of these many constraints is essential.

- **How could CEA within local authorities be improved?**

The consideration of cumulative effects down to low policy level within plans through inclusion in objectives, policies, rules and assessment matters is an effective mechanism for enhancing the consideration given to cumulative effects by both applicants and local authorities. Thus such inclusion should be promoted as a form of good practice. A certain required standard of CEA should be outlined in order to promote the comprehensive consideration to cumulative effects in AEE's that is based on sound information. In addition, the notification of applications should be made mandatory for activities that generate significant cumulative issues in an area.

There is a lack of guidance and training for practitioners in CEA which needs to be addressed. More than a decade after Dixon and Montz (1995) highlighted the need to develop CEA expertise, no significant progress is evident. The only notable practical CEA progress that has been developed has been through the Environment Court in the form of assessment matters for the Wakatipu Basin.

Practitioners need guidance and training from central government on effective approaches, including the more subtle aspects of CEA and SEA. This would help improve all round practice and reduce the high variability in CEA among local authorities. Practitioners should be given clarification on what constitutes the precedent effect, the permitted baseline and existing environment so that any confusion surrounding these matters will no longer contribute to poor CEA.

The use of specific checklists that include consideration of cumulative effects would provide value in the SEA process when developing objectives, policies, rules, assessment matters and monitoring laid out in the plan to ensure cumulative issues are

consciously addressed. Such a checklist, as suggested by Kotzé (2001), includes: whether cumulative issues are mentioned and whether the spatial and temporal boundaries are appropriate, whether standards are set and whether establishing thresholds is possible. This checklist however, is very broad and does not go into the specific detail of how CEA should be done.

Coupling checklists with guidance and direction from central government, including specific CEA training addressing cumulative effects in the plan development process, is imperative. In addition, practitioners need to be trained in the use of section 32 analysis in terms of its SEA potential in considering cumulative effects. Other CEA methods such as overlays and modelling should also be promoted. Comprehensive monitoring provides an effective means of tracking change and should be further promoted for its value in CEA.

Future research should offer an evaluation of how the CEA approaches of local government examined here are actually delivering their intended outcomes. Such research would assist in providing an important insight into the effectiveness of the current practice of CEA. Such an investigation is outside the scope of this research as it is difficult to accurately determine at present whether the cumulative effects that currently exist are due to the current methods or previous methods that have now been amended.

Detailed examination and modelling of the use and efficacy of tendering, including AMAs, in addressing cumulative issues are also needed. In addition, an examination of the CEA approaches taken at *all* local authorities would show how CEA is

currently being developed and practiced throughout New Zealand. In particular, Marlborough District Council's approaches to addressing the cumulative issues of marine farms would provide considerable insight.

CEA, as it currently stands, has been largely driven and developed by the Courts. The judicial influence so far has had both its positive and negative impacts on the practical development of CEA. Ultimately, it is better to diminish the influence of the adversarial litigious approaches to RMA development and attempt to improve and develop CEA without the Courts involvement. The RMA should be amended to better emphasise the importance of addressing cumulative effects in both plans and AEE's. Both the Fourth Schedule and section 32 of the Act should include explicit references to the consideration of cumulative effects.

Sections 62, 67 and 75, which outline the contents of regional policy statements, plans and district plans respectively, should include specific reference to cumulative effects. The inclusion of cumulative effects right down to low policy level in assessment matters for relevant activities is imperative, as these findings indicate that this appears to be an effective mechanism for ensuring project-level CEA. This is because the level of consideration to CEA in an AEE is relatively proportional to the level of consideration to CEA in a plan.

It is essential that local authorities continue to develop and improve their practice of CEA so that cumulative effects are effectively addressed and not ignored. Due to their indirect and incremental nature the practical acknowledgment of CEA in New Zealand can be ineffective. Cumulative effects are a major environmental issue that is

currently assisting in degrading the environment in New Zealand, so much so that their management is now imperative. Applying the precautionary principle has become very important where there is any uncertainty of an outcome either way. The challenge lies in local authorities developing innovative and proactive ways of determining when a cumulative effect will become significant to ensure that appropriate measures can be taken before it is too late and the horse has already bolted.

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Appendix 1: Assessment Matters in Queenstown-Lakes District Plan Rural-General Area Rules

The following criteria are from the Rural Areas Rules in the partly operative Queenstown-Lakes District Plan June 2007. The assessment matters relevant to cumulative effects in these rules are in Section 5.4.2.2(1)(e), 5.4.2.2(2)(c) and 5.4.2.2(3)(d) which relate to cumulative degradation Outstanding Natural Landscapes (Wakatipu Basin) and Outstanding Natural Features – District wide, Outstanding Natural Landscapes (District Wide) and Visual Amenity Landscapes respectively and Section 5.4.2.2(3)(c) relates to the 'Radius Criterion'.