ORIGINAL

Decision No. C 102 /2005

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| IN THE MATTER | of the Resource Management Act 1991 |
| AND | |
| IN THE MATTER | of appeals pursuant to section 120 of the Act |
| BETWEEN | ALEXANDRA DISTRICT FLOOD ACTION SOCIETY INCORPORATED (RMA 809/03) |
| AND | CENTRAL OTAGO DISTRICT COUNCIL (RMA 800/03) |
| AND | HAWEA COMMUNITY ASSOCIATION (RMA 801/03) |
| AND | QUEENSTOWN LAKES DISTRICT COUNCIL (RMA 803/03) |
| AND | SOUTH ISLAND EEL ASSOCIATION INCORPORATED (RMA 811/03) |
| AND | BARRY JAMES DOUGLAS (RMA 815/03) |
| AND | CONTACT ENERGY LIMITED (RMA 820/03) |
| AND | ALEXANDRA RATEPAYERS AND RESIDENTS SOCIETY INCORPORATED (RMA 823/03) |
| | Appellants |
| AND | OTAGO REGIONAL COUNCIL |
| | Respondent |

BEFORE THE ENVIRONMENT COURT

Environment Judge J R Jackson

Environment Commissioner M Oliver

Deputy Environment Commissioner R Grigg

Emeritus Professor I R Wood as special advisor under section 259 of the Act

Hearing at Alexandra on 7 to 10 March, at Wanaka on 15 to 17 March, at Alexandra on 30, 31 March and 1, 4 to 8 April and at Cromwell on 11 to 14 April 2005.

THE SEAL OF THE ENVIRONMENT COURT OF NEW ZEALAND

Appearances:

Mr T P Robinson and Mr K G Smith for Contact Energy Limited

Mr A J Logan for the Otago Regional Council

Mr G M Todd, Ms J Macdonald and Ms K Rusher for the Central Otago District Council, the Queenstown Lakes District Council, the Hawea Community Association and for the following section 274 interested persons: Glen Dene Limited, E and A Rowley, E and D Mead, and D M Cochrane

Mr S Randle for the Alexandra District Flood Action Society Incorporated

Dr B J Douglas for himself

Mr P Buxton for Sanford (South Island) Limited under section 271A of the Act

Mr T P Robinson for the Director-General of Conservation under section 271A of the Act

## INTERIM DECISION

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## *[A] Introduction*

[1] Contact Energy Limited ("Contact") wishes to obtain new resource consents allowing it to dam, divert, take, use and discharge water so as to generate electricity from the Clutha River in the Otago region. Contact currently operates an integrated hydro-electric generation system based on Lakes Hawea, Dunstan (the Clyde dam) and Roxburgh.

[2] On 10 September 2003 independent Commissioners appointed by the Otago Regional Council granted, on conditions, the following resource consents under the Resource Management Act 1991 ("the Act" or "the RMA"):

*(Relating to Lake Hawea)*

Water Permit to Dam No. 2001.383

Water Permit to Divert No. 2001.389

Discharge Permit to Discharge Water No. 2001.392

Discharge Permit to Discharge Stormwater and Drainage Water 2001.395

Water Permit to Take and Use No. 2001.399

Gladstone Gap Water Permit to Dam No. 2001.384

*(Relating to the Clyde Dam and Lake Dunstan)*

Water Permit to Dam No. 2001.385

Water Permit to Divert No. 2001.387

Water Permit to Take and Use No. 2001.390

Discharge Permit to Discharge Water No. 2001.393

Discharge Permit to Discharge Stormwater and Drainage Water No. 2001.396

*(Relating to Lake Roxburgh)*

Water Permit to Dam No. 2001.386

Water Permit to Divert 2001.388

Water Permit to Take And Use 2001.391

Discharge Permit to Discharge Water No. 2001.394

Discharge Permit to Discharge Stormwater and Drainage Water No. 2001.397

Land Use Consent to Alter Lake Roxburgh Lakebed and Lower Manuherikia Riverbed No. 2001.398.

For the reasons given in the remainder of this decision we confirm that all the water permits sought should be granted, albeit subject to different conditions.

[3] The Commissioners' report is 350 pages long. It is a thorough and well-balanced decision. Where we differ from that report it is for three principal reasons: first because we have read fuller, more focussed evidence; secondly we have heard cross-examination of the relevant witnesses, and thirdly because we do not consider the legal doctrine of the "permitted baseline" has anything to do with these proceedings – there are no relevant permitted activities. As a consequence we have not had to consider the impractical scenario of dewatering of the dams which appears to have concerned the Commissioners.

[4] During the hearing and our deliberations we have been greatly assisted by Emeritus Professor Wood who was appointed as a special advisor under section 259 of the Act by the Principal Environment Judge. To our knowledge that is the first time a special advisor to the Court has been appointed. We considered it was necessary in these proceedings because the Court needed some engineering expertise. However all the Environment Commissioners with engineering qualifications have previously given advice on one or more aspects of the Clutha hydro scheme and so had to disqualify themselves from sitting in these proceedings.

***Background : the Clutha River and the three dams***

[5] The Clutha River/Mata-Au[1] is the largest river in New Zealand with a mean flow at the Clyde dam of 510 cubic metres per second ($m^3$/sec or cumecs). It drains the largest catchment – over 20,000 $km^2$ – area of any river in the country. In contrast, the Waikato River, which is the longest in the country, drains a catchment of about 14,000 $km^2$. The Clutha catchment includes Lakes Wakatipu, Wanaka and Hawea, all of which are fed by waters from the main divide. We attach as Figure 1 (on the next page) a topographical map[2] of the catchment showing its main features. Downstream of those lakes the waters of the Clutha River (which begins at the outlet to Lake Wanaka) are swollen by the Hawea River, draining from the lake of the same name, and the Kawarau River (from Lake Wakatipu) as well as the Shotover, Arrow, Nevis, Cardrona, Lindis, Fraser and Manuherikia Rivers. Downstream of Roxburgh there are other tributaries not relevant to this proceeding.

[6] Since 1950 three dams have been built across the Clutha River or its tributaries. Furthest upstream is the control structure across Lake Hawea's outlet, then the Clyde dam has formed Lake Dunstan, and downstream again the Roxburgh dam has formed the lake of the same name. Almost all of the issues we have to resolve relate to these three lakes.

*Lake Hawea*

[7] Lake Hawea is a natural lake about 42 kilometres long. It is contained by parallel mountain ridges on either side, and occupies a valley carved out by a glacier in the last ice age(s). A moraine wall left by the glacier forms the southern end of Lake Hawea. The natural outlet to the lake was, until recently, at the western end of that wall, at the start of the Hawea River. That outlet was dammed in 1959 by an earthen gravity dam which causes the lake to operate between 10 to 18 metres above natural lake levels. Prior to the damming, Lake Hawea's average level was 327.6 metres above sea level ("masl"). Since 1984 Lake Hawea has not been below its pre-1959 range. Generally the lake has operated up to a flood maximum of 346 metres above sea level.

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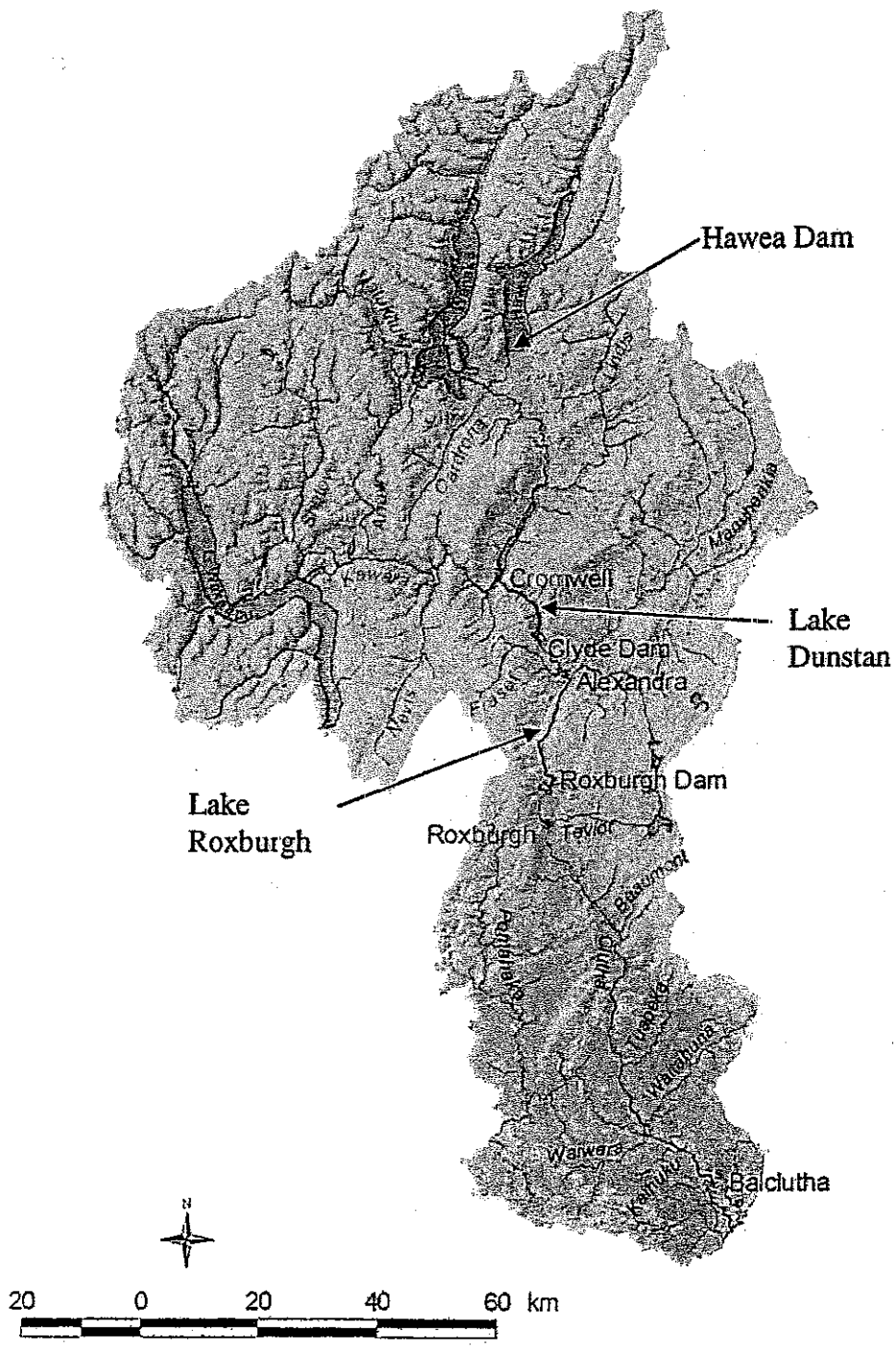
1 For convenience we use the shorter and better known English name in this decision. That should not be taken as any sign of disrespect for the Kai Tahu name for the river: Mata-Au. To the contrary that is a more imaginative and interesting name altogether

2 From P J Foster's, Evidence-in-chief Figure 2.1.

Figure 1

The Clutha Catchment



[8] There is also a stopbank across a low point in the moraine wall – an old river channel called the Gladstone Gap. This stopbank serves a primary purpose of increasing the flood storage for Lake Hawea at 350.5 masl, about 4.5 metres above the normal operating maximum, and a secondary purpose of being an emergency outlet for the Hawea dam. The idea is that if lake levels threaten that dam, then the Gladstone Gap stopbank will be overtopped first. Any escape of water through the gap will flow across farmland on an old flood plain, and back to the Hawea River.

[9] The principal issues at Lake Hawea are the effects of Contact's operations – erosion, dust nuisance, and effects on visual and recreational amenities. A positive aspect of the dam at Lake Hawea is that during floods the outlet can be closed, thus reducing outflows by 250 to 300 $m^3$/sec. That reduces flooding at Alexandra by 40 to 60 centimetres.

*Lake Dunstan*

[10] This lake was filled when the Clyde Dam was completed in 1992. Water in the dam can be 60 metres higher than the level of the downstream tail race. The lake is managed within a one metre range above 193.5 masl. That means it has very limited storage and largely operates as a 'run of the river' scheme. The flow through the turbines, and over the spillways, is the same as the flow into the head of the lake. The dam generates 432 megawatts ("MW") of electricity.

[11] Lake Dunstan has three arms centred on Cromwell: the wide Clutha arm stretching down from Bendigo; secondly the Kawarau arm from where the Kawarau River debouches from its gorge above Bannockburn; and thirdly, the Cromwell Gorge, which is a long thin section which is the flooded Cromwell Gorge through the arid thyme-covered slopes of the mountains between Cromwell and Clyde.

[12] There are three principal issues at Lake Dunstan: the spread of the weed *Lagarosiphon* in the lake, the filling of the Kawarau arm with sediment; and the effects on amenities.

*Lake Roxburgh*

[13] This is held back by the oldest dam on the Clutha River – it was commissioned in 1956. It operates with a range of less than two metres about 130.15 masl, and it too has limited storage.

The dam generates 320 megawatts. From the Roxburgh dam the lake stretches back through a spectacular gorge for 28 kilometres to Alexandra; then the lake turns west towards Clyde. At its most narrow point, appropriately called the Narrows, about 17 kilometres upstream from the Roxburgh Dam and 11 kilometres downstream from Alexandra, the river is less than 100 metres wide. The lake is so thin that in fact it looks more like a slow moving river than a reservoir. Water backs up to the foot of the Clyde Dam so that even if the control gates of the latter are shut (as they often are at night), the Clutha River/Lake Roxburgh never runs dry at Clyde.

[14] The contested issues in relation to Lake Roxburgh in this proceeding are first the major issue of flooding at Alexandra, and the effect on amenities. The principal difficulty with the Roxburgh dam is that the effects of sediment washed into and trapped by the dam are more far-reaching than apparently anticipated when the dam was built. Added to the one metre rise in water level at Alexandra expected as a backwater effect from the dam, the sediment build-up – especially above the Narrows –had exaggerated the backwater effects thus causing flood levels to rise at Alexandra to a point five metres higher (for the same flow) than before the dam was built. It is also important to understand that, because the sediment build-up at the Narrows has a damming effect, or more precisely a backwater effect, of its own, flooding at Alexandra cannot simply be resolved by lowering the lake at the Roxburgh dam by 10 metres, quite apart from the fact that would put the turbines out of commission since the lowest lake level at which they can take in water is 125.75 masl[3].

[15] As a consequence of three successively larger floods of the Clutha River in the 1990s – in 1994, 1995 and 1999 – which flooded properties in Alexandra, a stopbank has been built along the river at Alexandra at a height of 143.25 metres above sea level.

***The obligation to obtain resource consents***

[16] None of the applications for resource consent is for a completely new activity on the Clutha River. The Roxburgh and Hawea dams were built under the Public Works Act 1928. The authorisations under that statute were converted into "water rights" under the Water and Soil Conservation Act 1967 and then were deemed to be resource consents under the RMA by the

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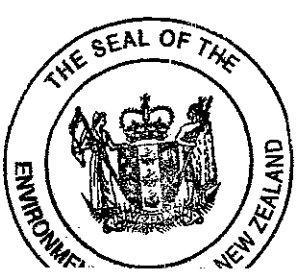
3 P F Foster, evidence-in-chief para 4.45.



transitional provisions of that Act. The deemed resource consents had an expiry date[4] of 1 October 2001, that is ten years after the RMA came into force.

[17] The Clyde dam was authorised by the constitutionally controversial Clutha Development (Clyde Dam) Empowering Act 1982 by which Parliament in effect bypassed the decision of the Planning Tribunal in *Annan et ors v National Water and Soil Conservation Authority and Minister of Energy (No. 2)*[5]. Parliament exercised its unbridled powers to deem that water rights were created which were to expire in 2003. Those deemed water rights were subsequently converted into deemed resource consents under the RMA[6].

[18] On 30 March 2001 Contact applied for the new resource consents we have described in order to replace the (then) shortly-to-expire deemed resource consents. Until the new applications are disposed of, Contact has authority under section 124 of the Act to continue to exercise the old (deemed) water permits.

***The parties and their cases***

[19] Many people were not happy with aspects or all of the Regional Council's decision to ratify the Commissioners' decision. Sixteen appeals were lodged with the Environment Court. They are, emphasising those which were still alive at the hearing before us:

| | |
|---|---|
| RMA 753/03 | New Zealand Nut Producers Limited v Otago Regional Council |
| RMA 790/03 | Central Otago Whitewater (Incorporated) v Otago Regional Council |
| RMA 791/03 | Reginald Albert Walker and Lena Hazel Walker v Otago Regional Council |
| **RMA 800/03** | **Central Otago District Council v Otago Regional Council** |
| **RMA 801/03** | **Hawea Community Association v Otago Regional Council** |
| **RMA 803/03** | **Queenstown Lakes District Council v Otago Regional Council** |
| RMA 804/03 | Ripponvale Irrigation Company Limited v Otago Regional Council |
| RMA 805/03 | Colin Pledger v Otago Regional Council |
| RMA 806/03 | Kawarau Arm Siltation Action Group Incorporated v Otago Regional Council |
| RMA 807/03 | D J Jones Family Trust v Otago Regional Council |
| **RMA 809/03** | **Alexandra District Flood Action Society Incorporated v Otago Regional Council** |
| RMA 810/03 | New Zealand Recreational Canoeing Association v Otago Regional Council |

4 Section 386 of the RMA.
5 (1982) 8 NZTPA 369.
6 Section 386 of the RMA.

RMA 811/03 South Island Eel Association Incorporated v Otago Regional Council
**RMA 815/03 Barry James Douglas v Otago Regional Council**
**RMA 820/03 Contact Energy Limited v Otago Regional Council**
RMA 823/03 Alexandra Ratepayers and Residents Society Incorporated v Otago Regional Council

[20] After the appeals were lodged there were various prehearing conferences and procedural arguments and decisions, and a good number of fruitful discussions directly between the parties so that by the time the appeals were set down for hearing many issues had been resolved. The appellants who were parties to those resolutions had lodged notices of withdrawal or consent memoranda with the Court. The consent memoranda could not of course be issued as orders of the Court since there were outstanding appeals on the same or related issues. We will ask the parties to check the compatibility of the "agreed" conditions when they come to insert the avoidance, remedial or mitigating conditions proposed by this decision.

[21] The appeals relating to irrigation issues in the Kawarau arm of Lake Dunstan were resolved by separate agreement just prior to the hearing. Those parties:

- New Zealand Nut Producers Limited (RMA 753/03)
- Ripponvale Irrigation Company Limited (RMA 804/03)
- Kawarau Arm Siltation Action Group Incorporated (RMA 806/03)
- D J Jones Family Trust (RMA 807/03)

-- withdrew their appeals. We note however that the three remaining interested parties – the CODC, the ORC and Contact agreed an amended condition 13 to Permit 2001.385 (water permit for the Clyde dam) in order to resolve irrigation issues in the Kawarau arm of Lake Dunstan.

[22] The three appeals relating to recreational interests in the Hawea River were also withdrawn immediately before the hearing. They are the appeals by:

- Central Otago Whitewater (Incorporated) (RMA 790/03)
- Reginald Albert Walker and Lena Hazel Walker (RMA 791/03)
- New Zealand Recreational Canoeing Association (RMA 810/03).

[23] Finally, the South Island Eel Association Incorporated (appellant in RMA 811/03) reached agreement with all relevant parties. Since we are to confirm the grant of consents, then a condition will be added as agreed.

[24] At the hearing the parties who actively presented evidence and submissions were:

- the Central Otago District Council ("CODC") as appellant in RMA 800/03;
- Hawea Community Association Incorporated ("HCA") as appellant in RMA 801/03;
- the Queenstown Lakes District Council ("QLDC") as appellant in RMA 803/03;
- Alexandra District Flood Action Society Incorporated ("ADFAS") as appellant in RMA 809/03;
- Dr B J Douglas as appellant in RMA 815/03

- in addition to the applicant, Contact Energy Limited ("Contact") and to a lesser extent the respondent, the Otago Regional Council ("ORC").

[25] Because the appeals by the CODC, QLDC, HCA and ADFAS requested the Court to overturn the ORC's decision Contact felt obliged to put up a full case. Consequently we read the evidence of 18 witnesses whose evidence was entered into the Court's record. In fact a number of Contact witnesses were not cross-examined because no party mounted a strong evidential case that the consents sought should be refused.

[26] The evidence for the other parties was more confined. The appellant, CODC, called three witnesses – the mayor of the District, Dr M Macpherson; Mr W D Whitney, a resource manager and planner; and Mr D J Hamilton, an engineer. The appellants, QLDC and HCA, mounted a joint case, calling Mr E W Carr, President of the Hawea Community Association, Ms V S Jones, a resource manager for the Council, and Mr P K Wilson, a recreation manager for the Council, in addition to Dr M B Single, an expert in erosion management.

[27] The ADFAS called Mr W S Randle as a ratepayer and landowner, and Mr N P Johnstone, an engineer. Dr B J Douglas, a geologist, gave evidence for himself on his case principally on erosion issues at Hawea, but also on sedimentation and flooding issues at Alexandra.

[28] Finally the ORC called only three witnesses, its General Manager, Mr G M Martin; a witness on sediment sampling, Ms L Stevens, and Mr J W Donaldson an expert on the weed *lagarosiphon*.

[29] We have carefully read what counsel have said about the expert witnesses and their objectivity or lack of it. We had already noted when we read the evidence of most witnesses that there were various signs that they were struggling to be truly independent and objective. Other signs of the same problem came out in cross-examination, although possibly not as many as counsel expected. Having seen and heard all the important witnesses answering questions we can state that most came across during the hearing as sincere and genuinely desiring to help the Court with careful and balanced answers. Indeed, one or two were more professional under cross-examination than their evidence statements had lead us to believe they could be. We do not intend to make many findings of credibility as between competing expert witnesses first because, as it happens, it is largely unnecessary, and secondly because on the subjects where the experts disagree, there is not a single witness all of whose evidence we accept without some qualification.

***The legal tests to be applied***

[30] It should be noted that all the resource consents sought are under section 14 of the Act. No resource consents are needed under section 13 for the placement of structures on riverbeds or lakebeds because the structures are already there under lawful authority. To put matters beyond doubt (in this jurisdiction) Contact holds certificates of compliance for all its structures at Hawea, Clyde and Roxburgh.

[31] Since the applications were made by Contact, the RMA has been amended by the Resource Management Amendment Act 2003 which came into force on 1 August 2003. In a procedural decision in these proceedings[7] - *New Zealand Nut Producers Limited v Contact Energy Limited* - the Court determined that these proceedings should be decided on the basis of the law as it was prior to the 2003 amendment. All references to the RMA in this decision are therefore to the pre-2003 Amendment Act.

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7 Decision C99/2004.

[32] In deciding the applications we must, subject to Part 2 of the Act[8], have regard to (relevantly):

- the effects on the environment of allowing the activities for which resource consents are sought[9];
- the provisions of the Otago Regional Policy Statement[10] and Plan[11];
- the provisions of the Central Otago and Queenstown-Lakes District Plans[12]; and
- any other relevant matters[13];

– and then feed those assessments into our overall assessment under section 105 of the Act (pre-2003 amendment).

[33] The structure of the remainder of this decision is first to outline the relevant objectives, policies and methods for achieving them as set out in the relevant plans (part [B] of this decision); then to consider the effects of the proposed activities on the environment (parts [C]-[F]). We consider Part II of the Act in part [G] of this decision. , We consider various matters which are relevant under section 104(1)(i) of the Act[14] to answering the question "What standard of flood protection is Alexandra entitled to?" in Part [H] of the decision. Then we turn to the proposed conditions generally and as to financial contributions (Parts [I] and [J]), and the term (part [K]) of the consents, before stating the interim outcome (part [L]).

## *[B] The statutory instruments relevant to the proceedings*

*The regional policy statement*

[34] The first relevant statutory document is the regional policy statement ("RPS") which came into force on 1 October 1998. Since flooding is a "natural hazard" as that term is defined[15] in the Act, flooding is one of the subjects of Chapter 11 (Natural Hazards) of the RPS. One of the objectives of the RPS is[16]:

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8 By virtue of the introductory words to section 104(1).
9 Section 104(1)(a) and (i) of the RMA.
10 Section 104(1)(c) of the RMA.
11 Section 104(1)(d) of the RMA
12 Section 104(1)(e) of the RMA
13 Section 104(1)(i) of the RMA.
14 Prior to the 2003 Amendment.
15 Section 2 of the RMA.
16 Objective 11.4.1 (RPS p. 156).

> To recognise and understand the significant natural hazards that threaten Otago's communities and features.

*The explanation*[17] *for the objective describes "flood-plain" mapping as an example of this type of* identification process. The witnesses produced minimal flood-plain mapping to us in respect of Alexandra, where flooding is a crucial issue. Mr Martin produced[18] (at our request) a map which showed the extent of flooding in 1999 but nothing else for Alexandra. By contrast downstream Balclutha has more detailed maps[19].

[35] Another relevant objective of the RPS is[20]:

> To avoid or mitigate the adverse effects of natural hazards within Otago to acceptable levels.

The explanation states:

> The system of floodbanks in the lower Clutha [i e. below Roxburgh] River area .. [is] designed to avoid or mitigate the adverse effects of heavy rainfalls by ensuring that the waters do not flood adjacent land. Wherever practicable, natural hazards should be avoided or mitigated to levels acceptable to Otago's communities.

The involvement of the CODC and ADFAS in these proceedings is to argue the risk of flooding of Alexandra is not being avoided or mitigated acceptably to the community of Alexandra.

[36] The policies in the RPS to implement the objectives are mostly well meaning but rather general phrases. Nor is there any more guidance in Chapter 6 (Water) of the RPS. On the subject of water the RPS has been largely superseded by the next document we describe. To the extent it is still particularly relevant we refer to its policies in the appropriate places.

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17 RPS p. 156.
18 G M Martin, exhibit 31.2.
19 G M Martin, exhibit 31.5.
20 Objective 11.4.2 (RPS p. 156).

*The regional plan*

[37] On 1 January 2004 the ORC's Regional Plan: Water ("the Regional Plan") came into force. It contains 22 chapters. In order they are[21], with the chapters relevant to these proceedings emphasised:

1. Introduction
2. Legislative and Policy Framework
3. Regional Description (noting this case is concerned principally with the Lakes and Central Otago subregions)
4. Kai Tahu ki Otago: water perspective
5. **Natural and Human Use Values**
6. **Water Quantity**
7. Water Quality
8. **The beds and margins of lakes and rivers**
9. Groundwater
10. Wetlands
11. Introduction to the rules
12. **Rules: Water use and management**
13. Rules: Land use on lake or river beds
14. Rules: Land use on other than on lake or river beds
15. Methods other than rules
16. Information requirements
17. **Financial Contributions**
18. Cross-boundary issues
19. **Monitoring and review**

20-22. Schedules, **Glossary** and Appendices

[38] The objectives and policies most relevant to this case start in Chapter 5 (Natural and Human Use Values). The first seven objectives[22] largely reflect sections 5 and 6 of the RMA. Objective 5.3.8 is of general relevance, because it relates to flooding hazards. It is[23]:

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21 Taken from the "Table of Contents": Regional Plan pp. vi et ff.

22 Objectives 5.3.1 to 5.3.7 [Regional Plan pp. 37-40].

23 Regional Plan p. 40.

To avoid the exacerbation of any natural hazard or the creation of a hazard associated with Otago's lakes and rivers.

[39] All the objectives are implemented by a portmanteau policy[24] which integrates achievement of the first seven objectives and highlights the implementation of objective 5.3.8. The policy is:

5.4.2 In the management of any activity involving surface water, groundwater or the bed or margin of any lake or river, ***to give priority to avoiding***, *in preference to remedying or mitigating:*

(1) Adverse effects on:

(a) Natural values identified in Schedule 1A;

(b) Water supply values identified in Schedule 1B;

(c) Registered historic places identified in Schedule 1C, or archaeological sites in, on, under or over the bed or margin of a lake or river;

(d) Spiritual and cultural beliefs, values and uses of significance to Kai Tahu identified in Schedule 1D;

(e) The natural character of any lake or river, or its margins;

**(f) Amenity values supported by any water body; and**

**(2) Causing or exacerbating flooding, erosion, land instability, sedimentation or property damage.**

[Our emphases]

Since amenity values, erosion, sedimentation and flooding are important issues in this case this policy of avoidance rather than remedying or mitigation is a key policy.

[40] Aspects of amenity and public access are re-emphasised by further policies which we quote because their wording may be quite important when it comes to financial contributions as sought by some of the appellants:

5.4.6 Legal public access to and along the margins of lakes and rivers will only be restricted where necessary:

...

(c) To protect the health or safety of people and communities;

(d) To ensure a level of security consistent with the purposes of a resource consent; or

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24 Policy 5.4.2 [Regional Plan pp. 41-42]

(e) In other exceptional circumstances sufficient to justify the restriction notwithstanding the national importance of maintaining that access[25].

5.4.7 Where existing public access to or along the margins of Otago's lakes and rivers is restricted by activities in, on, under or over the bed or margin, the provision or enhancement of alternative access:

(a) May be required with respect to the restriction of existing legal public access; and

(b) Will be promoted with respect to the restriction of informal access arrangements[26].

5.4.8 To have particular regard to the following features of lakes and rivers, and their margins, when considering adverse effects on their natural character:

(a) The topography, including the setting and bed form of the lake or river;

(b) The natural flow characteristics of the river;

(c) The natural water level of the lake and its fluctuation[27].

5.4.9 To have particular regard to the following qualities or characteristics of lakes and rivers, and their margins, when considering adverse effects on amenity values:

(a) Aesthetic values associated with the lake or river; and

(b) Recreational opportunities provided by the lake or river, or its margins[28].

[41] Chapter 6 (Water Quantity) contains the objective[29]:

**6.3.2 To provide for the water needs of Otago's primary and secondary industries ....**

The explanations for the objective expressly refer to ... "hydro-electric power generat[ors] and other non-consumptive users"[30]. Relevant policies include[31] a recognition of existing dams. Policy 6.5.2 is particularly applicable to Lakes Hawea, Dunstan and Roxburgh in this case[32]:

6.5.2 Where lake levels are already controlled, to recognise and provide for the purpose of that control if limits are to be placed on operating levels.

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25 Regional Plan p. 45.
26 Regional Plan p. 46.
27 Regional Plan p. 46.
28 Regional Plan p. 47.
29 Regional Plan p. 56.
30 Regional Plan p. 56.
31 Regional Plan pp. 76-77.
32 Regional Plan p. 76.

Explanation

Some of Otago's lakes are controlled through the use of dams for specific purposes, storage for irrigation supply and electricity generation for example. The purposes of any existing controls are to be recognised and provided for when considering resource consents that affect lake levels. Limits on operating levels may be imposed, where necessary, in accordance with Policy 6.5.3.

Principal reasons for adopting

This policy is adopted to ensure that the purpose of controlling any lake where such control already exists is not unduly compromised. Given the investment in dams and associated structures, it would be inappropriate to prevent the use of the dammed water for the purpose for which it was dammed.

The phrase at the beginning of the last sentence is irrational: we think that past expenditure should be ignored as sunk costs. On the other hand each dam is a physical resource so its existence and potential are still important considerations when achieving sustainable management.

[42] Qualifying that policy is the next[33], which is:

6.5.3 *To limit the operating levels of any controlled lake, where appropriate,* to avoid or mitigate adverse effects on:

(a) Natural and human use values identified in Schedule 1;

(b) The natural character of the lake;

(c) The amenity values supported by the lake;

(d) Lake margin stability; and

(e) The needs of Otago's people and communities

[43] In Chapter 8 (The Beds and Margins of Lakes and Rivers)[34] there is one particularly relevant objective which is[35]:

8.3.1 To maintain:

(a) The stability and function of existing structures located in, on, under or over the bed or margin of any lake or river;

(b) The stability of the bed and bank of any lake or river; and

(c) The flood and sediment carrying capacity of any lake or river

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33 Regional Plan p. 76.

34 Regional Plan p. 102.

35 Regional Plan p. 105.

[44] The related policy is[36]:

> 8.4.1 When managing activities in, on, under or over the bed or margin of any lake or river, to give priority to avoiding changes in the nature of flow and sediment processes in those water bodies, where those changes will cause adverse effects:
>
> (a) On the stability and function of existing structures located in, on, under or over the bed or margin of any lake or river;
>
> (b) Arising from associated erosion or sedimentation of the bed or margin of any lake or river, or land instability; or
>
> (c) Arising from any reduction in the flood carrying capacity of any lake or river.

That policy is stated at a disquieting level of generality. It clearly recognises, if only implicitly, that entrapment of sediment is a real problem in the Clutha River catchment. That is, as we shall see, particularly so at Alexandra which is at risk of greater flood damage because the sediment build up at the Narrows in Lake Roxburgh reduces the "flood carrying capacity" of the lake. Stating that priority is to be given to avoiding floods may look satisfactory, but there is no suggestion as to how that may be achieved. Nor is there any recognition of the fickleness of nature and any possible increase in randomness as a consequence of climate change (a subject to which we return later); or of what parameters – past flood levels? annual exceedance probabilities? costs? context? or a combination of these into a risk analysis? – will guide attempts to avoid rather than to mitigate or remedy flood damage. Further the policy appears to protect the existing environment as at 2004, when the Regional Plan came into force. Only changes to flow and sediment processes are to be avoided. We doubt if that is consistent with Part 2 of the Act[37].

[45] Policy 8.4.2 authorises[38] financial contributions to be made to offset or remedy adverse effects of damming on (amongst other things) amenity values or heritage values.

[46] The methods (Chapters 11-15 and 17) to implement those policies are not of much assistance either. Rules are not of much help to avoid floods, since nature tends to mock such attempts, as it did those of King Canute. As for mitigation and remedial work, the rules do authorise imposition of conditions such as those imposed by the Commissioners. Some of them, because they are the subject of unresolved appeals, we will discuss later.

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36 Regional Plan pp. 106-107.

37 See the introductory words of section 104(1) of the Act: 'subject to Part ....'.

38 Regional Plan p. 107.

*The status of the consents applied for*

[47] In relation to the rules in Chapter 6 (Water Quantity), none of the activities for which Contact sought resource consents are permitted activities under the Regional Plan. Nor of course are they allowed under the RMA directly[39]. Instead all the activities for which resource consents are sought are discretionary, except that the use of the water of the river may be an innominate activity. That is the odd result of the fact that while section 14 of the RMA restricts the taking or using (inter alia) of water, the rules in the regional plan under the heading 12.1 (The taking of surface water)[40] only govern the taking of water, not its use. The implication is that the use of water is governed by section 14 of the Act and not under the Regional Plan.

[48] For the sake of completeness on the status of the consents applied for we should record that in a separate proceeding[41] – an application by Contact for declarations – the Court issued[42] declarations about sediment in the dams:

> (1) That any alteration in the distribution of alluvium which results from the damming or discharge of water under the terms of a water permit granted by the Otago Regional Council does not require a land use consent under section 13(1)(b) or (d) of the Act because the consent holder is neither disturbing the bed of the lake formed by the damming nor depositing alluvium on the river or lake bed.
>
> (2) That under sections 105(1) and 108 of the RMA, as it was prior to the Resource Management Amendment Act 2003, conditions may be imposed on any water permits for damming (if granted) where appropriate to avoid, remedy or mitigate any adverse effects of the uneven or unnatural distribution of alluvium that result from the damming.

*The district plans*

[49] There are various transitional district plans for the CODC's district which should theoretically be had regard to[43]. However the proposed CODC plan is effectively operative and it would be the guiding territorial document in the event of any conflict. Mr W D Whitney, the planning witness called for the two district councils and an expert with probably unique knowledge of the CODC plan succinctly summarised the proposed plan's relevance as follows[44]:

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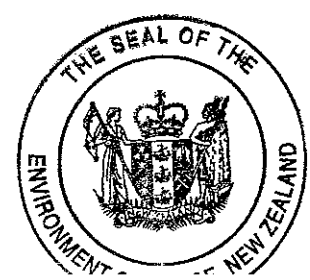
39 Section 14 of the RMA.
40 Regional Plan p. 158 et ff.
41 ENV C86/04 (see Interim Decision C116/2004).
42 Final Decision C127/2004.
43 Section 104(1)(e).
44 W D Whitney, evidence-in-chief para 78.



> The Proposed Central Otago District Plan was publicly notified in July 1998. The Proposed District Plan was amended by decisions on submissions in July 2000 and is now at an advanced stage in the reference process. The Proposed District Plan recognises the existing power stations at Clyde and Roxburgh as scheduled activities, and applies such status to various other areas of land utilised for associated purposes. The environs of Lake Dunstan are identified in the Proposed District Plan as an Area of Outstanding Landscape Value and land subject to the Lake Roxburgh and Lake Dunstan Operating Easements is identified in Schedules 19.12 and 19.13 of the Proposed District Plan as a matter of public information.

[50] Mr Whitney did not identify anything in the Queenstown Lakes District Plan which became partially operative on 11 October 2003 which might be relevant to the proceedings.

### *[C] Effects on the environment*

*Submissions on the meaning of "the environment"*

[51] At first sight, granting "renewal" applications in these proceedings will not have any (different) effects on the environment since the dams are operating now, each with its suite of permits to dam, divert, take and discharge water which run on until new consents are finally granted or refused. It was the case for Contact that only refusing the applications would have different effects, and that they might be worse. Contact drew a contrast between allowing the existing operations to continue on slightly amended terms, and opening the sluice gates at the Hawea control structure and on the Clyde and Roxburgh dams and letting the years of accumulated sediment rip down the Clutha River. The evidence was that it might take decades for the lakes and river to recover[45] ecologically and visually. Each of the Contact witnesses dealing with effects had been briefed to compare the ongoing operation of the dams on Contact's conditions with an "open the sluices" scenario. Mr Todd colourfully called this the "Armageddon" scenario.

[52] An alternative scenario – hinted at by Mr Randle in his submissions – was what might be called, continuing the biblical analogy, the "Eden" scenario. That envisages, hypothetically, the return of the waters, bed (and possibly the margins) of the Clutha River to their pre-human state, or at least to their state before the dams were built. Given the immense importance of the Clutha

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45 P F Foster evidence-in-chief para 3.2 and 3.4.

hydro-electric scheme (of which more later) we cannot, with respect, perceive that scenario as a realistic one in these proceedings.

[53] As for Contact's scenario, we hold a consent authority should not compare the existing environment and the effects of new (renewed) water permits with a hypothetical situation which might result in a consequence of ceasing the existing activities. There are four reasons for our conclusion. The two general reasons are:

(a) the "Armageddon" situation is not being applied for and it is difficult to imagine when it would be;
(b) cessation would normally, as good practice, be managed by conditions, although in these proceedings there are none for the expired, deemed water permits.

There are also two specific reasons in this case:

(c) since the dam structures still exist, if the lakes were to be drained, then the structures would still dam and divert water[46], and thus water permits would be required before the sluices could be opened;
(d) opening the sluices may be precluded by section 17 of the Act which imposes a duty to avoid, remedy or mitigate any adverse effect on the environment arising from an activity carried out by or on behalf of that person, regardless of authorisation to carry out the activity.

*The requirements of section 104(1)(a) and (i)*

[54] The starting point is that, subject to Part 2 of the Act, we must have regard to the effects[47] of each activity for which consent is sought on the environment. That usually involves four steps. The first two steps relate to the "environment" in which a proposed activity is to take place. The steps are:

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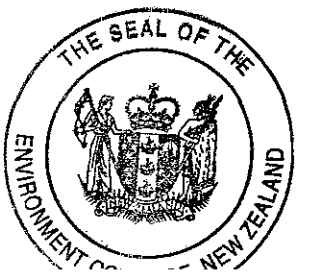
46 See Mr Logan's submissions at para 3.29 to 3.31.
47 *Sections 104(1)(a) and (i) of the (pre-2003) Act*



(1) to describe the existing environment;

(2) to identify any likely, unfanciful future activities (other than that applied for) which are permitted, controlled[48] or consented to on the relevant site (*Arrigato Investments Limited v Auckland Regional Authority*[49]) and/or in the neighbouring area (*Wilson v Selwyn District Council*[50]) and then modifying the "environment" to be considered in the light of these.

The next two steps relate to the "effects" of the activity. They are:

(3) to identify all the possible, but more than minimal, positive and negative effects of the proposed activity and, in particular, their scale and the probability of occurrence; and

(4) to identify methods of avoiding, remedying or mitigating those adverse effects.

[55] Our reason for stating that all relevant effects have to be had regard to is that, while section 104(1)(a) of the pre-2003 RMA enjoins a local authority to have regard only to "actual and potential effects" – which the Court of Appeal has held excludes other kinds of effects: *Dye v Auckland Regional Council*[51] - section 104(1)(i) allows consideration of "any other matter the consent authority considers relevant and reasonably necessary" – which includes any other kind of relevant effects: *Stalker Family Trust v Queenstown Lakes District Council*[52].

[56] The conclusions from the four-step analysis are then carried forward to the overall assessment or weighing under section 105[53] of the (pre 2003) Act as to whether the purpose of the Act is achieved by granting consent. Some assistance in identifying "effects" and "environment" is given by sections 3 and 2 of the RMA respectively. Section 3 of the Act defines "effect" in this way:

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48 There is still some doubt about this.

49 [2001] NZRMA 481; (2001) 7 ELRNZ 193; [2002] 1 NZLR 323; at para [38] (CA).

50 HC, Christchurch CIV 2004-485-720, Fogarty J, 24 August 2004 (this decision is apparently on appeal to the Court of Appeal).

51 [2001] NZRMA 513 at para [41].

52 Decision C40/2004.

53 Since 2003, under section 104(1)(c) etc.

> **3. Meaning of "effect"**
>
> In this act, unless the context otherwise requires, the term **effect** ... includes –
>
> (a) Any positive or adverse 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.

[57] Section 2 of the Act defines:

> **Environment** [as] includ[ing] –
>
> (a) Ecosystems and their constituent parts, including people and communities; and
>
> (b) All natural and physical resources; and
>
> (c) Amenity values; and
>
> (d) The social, economic, aesthetic, and cultural conditions which affect the matters stated in paragraphs (a) to (c) of this definition or which are affected by those matters:

[58] In assessing what the effects of an activity on the environment are in any given case the Court of Appeal stated in *Arrigato Investments Limited v Auckland Regional Council*[54] that:

> ... assessments of the relevant environment and relevant effects are essentially factual matters not to be overlaid by refinements or rules of law.

[59] Normally of course where a new activity is being applied for, the "environment" to be considered is the environment of the application site as it is at the date of hearing. However, there are exceptions to that approach. The first is well known: in *Arrigato Investments Limited v Auckland Regional Council*[55], the Court of Appeal confirmed that when defining the relevant environment the consent authority may take into account the imagined effects of an existing (but unexercised) resource consent for the site[56]. Secondly the High Court has applied the same

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54 [2001] NZRMA 481; (2001) 7 ELRNZ 193; [2002] 1 NZLR 323; (CA) at para [38]. Strictly speaking this statement was obiter, but it is still authoritative.

55 [2001] NZRMA 481; (2001) 7 ELRNZ 193; [2002] 1 NZLR 323; (CA) at para [38].

56 [2001] NZRMA 481; (2001) 7 ELRNZ 193; [2002] 1 NZLR 323; (CA) at para [38].

principle to unexercised resource consents i.e. future activities, on land adjacent to the site which is the subject of an application: *Wilson v Selwyn District Council*[57]; *Queenstown Lakes District Council v Hawthorn Estate Limited*[58]. A similar approach had already been taken by the Environment Court in cases such as *Cashmere Park Trust v Canterbury Regional Council*[59]; *Stalker Family Trust v Queenstown Lakes District Council*[60]; and *Kuku Mara Partnership v Marlborough District Council*[61]. *Freilich v Tasman District Council*[62] discusses *Wilson* and adopts a similar approach. Another reason to look into the future was shown by a case that is particularly relevant to these proceedings because it also was concerned with water permits under section 14 of the Act: *Contact Energy Limited v Waikato Regional Council*[63]. In that case the application was to establish a new activity, drawing and using geothermal fluid. The Court held[64]:

> ... that consideration is to be given to the effects on the environment as it actually exists now, including the effects of past abstraction of geothermal fluid from the system, whether by Contact or anyone else. In considering the effects in the future of allowing the proposed abstraction, we hold that we have to consider the environment as it is likely to be from time to time, taking into account the further effects of past abstraction, and effects of further abstraction authorised by existing consents held by Contact or by others ...

[60] There may also be reasons to look at aspects of a **past** environment. For example, if an application has been made retrospectively to justify an illegal land use. In that case the consent authority is usually given evidence about what the environment was before the illegal activity started. Another example is where the activity is for the renewal of a suite of consents earlier granted (as in these proceedings). In such a case the environment to be considered may need to reflect improvements and (or) detractions made by some of the suite of consents. We were referred to two decisions of the Environment Court which concerned that situation.

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57 HC, Christchurch CIV 2004-485-720, Fogarty J, 24 August 2004 (this decision is apparently on appeal to the Court of Appeal).

58 HC, Christchurch CIV 2004-485-1441, Fogarty J, 17 December 2004 (this decision is also apparently on appeal to the Court of Appeal).

59 Decision C48/2004 (Judge Jackson).

60 Decision C40/2004 (Judge Jackson and Commissioner Manning).

61 Decision W39/2004 (Judge Kenderdine).

62 Decision C15/2005 (Judge Sheppard).

63 Decision A04/2000.

64 Decision A04/2000 at para [38].

[61] The most relevant to these proceedings is *Sampson v Waikato Regional Council*[65]. There the Environment Court considered applications for the "renewal" of water permits for damming, diversion and taking of water at three control gates in the lower Waikato River[66]. The water permits were for part of the existing flood scheme which included the control gates and also various other structures including stopbanks and works in the main channel of the river to improve its flow[67]. Mr Sampson and neighbours sought the addition of a condition that the Regional Council erect a stopbank to mitigate flooding of their property. In describing the relevant environment, the Court found[68] that:

> ... the "existing environment" is the Waikato River, its tributaries, streams, wetlands and the catchment configurations that all contribute to the river's hydrological and hydraulic components. This includes the stopbanks and main channel works that have been completed under the scheme. It does not include the community structures which are subject to the consents under appeal.

We note that there were two hypothetical elements to the "environment" as defined in that case. First the Court said that it ignored the physical structures whose operation (to dam, divert etc) was the subject of *Sampson*. That seems to have no effect on the decision so far as we can see. Secondly, however, it did look back to the environment before the flood scheme was built in one significant way.

[62] There was no disagreement between the parties in *Sampson* that if the control gates were closed during floods so that water could no longer flow into the swamp then the river would rise, and flow over its banks and onto the appellants' land, which would flood. At first sight that flooding looked like an adverse effect which should be avoided, remedied, or mitigated. However, part of the flood scheme had been the main channel works. The Regional Council's witness, who was preferred by the Court, stated that the channel work in the main river had the net effect of reducing the flooding by 25 to 50 cms[69]. The Court found that[70]:

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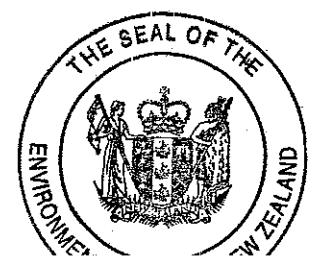
65 Decision A178/2002 (Judge Whiting).
66 Decision A178/2002 at para [14].
67 Decision A178/002 at para [24].
68 Decision A178/2002 at para [34].
69 Decision A178/2002 at para [52].
70 Decision A178/2002 at para [36].



> In considering effects on the existing environment, we agree with Mr Lang that we should balance any reduction in river level resulting from the main channel works against the rise in river level resulting from the operation of the gates during flood conditions. We so find because to do otherwise would:
>
> (i) Arbitrarily and [il]logically separate the various components of the scheme;
>
> (ii) Separate the works out from part of the purpose they were intended to serve – the main channel works were carried out with the objective, in part, of mitigating the ongoing effects of other scheme components, including the operation of the gates and water management at the Whangamarino wetland;
>
> (iii) ... result in over-mitigation of the effects caused by the operation of the gates.

[63] The Court concluded[71] that the control gates' adverse effect on the appellant's land would be offset by the past positive effects of the main channel works. The Court stated that[72]:

> The main channel works are part of the overall flood protection scheme. They were implemented for the purpose of reducing the overall potential for flooding of flood-prone land in the Lower Waikato – including the land of the appellants. They are accordingly a mitigation measure, designed to more than offset any adverse effects arising from the operation of the gates.

While that outcome seems very sensible it is hard at first sight to reconcile the Court's approach with its description of the environment as including the main channel works (which had been completed many years before the applications for water permits). The Court has implicitly either qualified the "environment" so that it is considering a past, pre-flood scheme environment, or taken a past effect[73] into account. That is, it has had regard to the fact that the main channel works are a past effect of the scheme (that is, of the suite of resource consents) which should be taken into account as a positive effect which outweighs the adverse effect to create a net benefit.

[64] The second relevant case we were referred to is *Tainui Hapu v Environment Waikato*[74]. There the Environment Court was concerned with resource consents required for[75] "a proposed upgrade of the existing wastewater treatment plant at Raglan". The District Council proposed improving the operation of the two existing sewage ponds in various ways, and constructing two

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71 Decision A178/2002 at para [83].
72 Decision A178/2002 at para [83].
73 See section 3(c) of the Act.
74 Decision A063/2004 (Judge Sheppard).
75 Decision A63/2004.

new ponds and wetland system to ensure[76] that effluent met bathing-water guidelines, shellfish gathering quality[77] and to meet tangata whenua sensitivities. The effluent was then to be piped through a new outfall to a new discharge point in the main channel of Raglan Harbour's estuary. When defining the environment to be considered the Court referred to *Aley v North Shore City Council*[78] and the *"Fast Ferries"* case[79] as authorities for its proposition that[80]:

> ... the Court has to have regard to the effects of allowing the proposed discharge on the environment as it exists at the time of the appeal hearing; and that it is not appropriate to judge the application by reference to the effects it would have on the environment as it existed at a halcyon time in the past ....

We agree, which is why the Edenic scenario which Mr Randle appeared to seek is not appropriate for us to consider.

[65] In the *Tainui Hapu* case the Environment Court then turned to the question[81] whether the existing discharge to Raglan was an element of the environment that might be affected by the proposed activity. It stated[82]:

> However in this case, the existing treatment plant and discharge were lawfully being continued throughout the period of the appeal hearing. The environment that existed at the time the Court has to assess the effects of allowing the activity was an environment affected by those activities.
>
> The proposed treatment plan and discharge now sought are intended to replace the existing treatment plant and discharge. But, as counsel for the Regional Council pointed out, the Act makes no provision for renewal or rolling over existing consents. The District Council's applications are for fresh consents.
>
> Even so, in practice replacement of the existing plant and discharge could not happen immediately on the giving of a decision on this appeal confirming or modifying the consents granted by the Regional Council. The new treatment plant would have to be designed in detail, constructed, and commissioned – a process likely to take at least a couple of years or so.

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76 Decision A63/2004 at para [46].
77 Decision A63/2004 at para [2].
78 [1991] 1 NZLR 365; [1998] NZRMA 361; 4 ELRNZ 227 (Salmon J).
79 *Marlborough District Council v NZ Rail* [1995] NZRMA 357 (PT – Judge Treadwell).
80 Decision A63/2004 at para [103].
81 Decision A63/2004 at para [104].
82 Decision A63/2004 at paras [105] – [108]

> We also accept that it would be impracticable to suppose what the environment would be like if the existing treatment plant and discharge were discontinued before there is a replacement system in place for treating and disposing of the wastewater from Raglan. It would be fanciful to suppose that the inhabitants would be left to make their own independent arrangements for disposal of wastewater. Even a night-cart collection system (scarcely acceptable in a New Zealand town in the 21st century) would require sanitary disposal of the waste collected. The variety of other more sophisticated treatment and disposal methods and sites is such that the adverse effects on the environment cannot ... even be guessed.

The Court concluded that[83]:

> ... it would not be practicable to have regard to the actual and potential effects of allowing the proposed discharge on an environment without the existing discharge.

In other words, in *Tainui Hapu* the Court looked firmly at the environment as it was at the time of the hearing.

[66] In summary, each case turns on its facts and there is no invariable principle as to how to describe the 'environment'. Usually under section 104(1) of the Act a consent authority need only look at the existing environment and the future effects of proposed activities. It is normally necessary only to look forward at the possible effects of the proposed activity on that environment. In order for the consent authority to check that it is looking at the (ac)cumulative effect of all the possible effects of the activity[84], it may be necessary to envisage and describe the resulting "environment", although that is usually a task that would be undertaken when making the overall assessment under section 105 of the (pre-2003) Act. At that later stage the existing scenario is compared with a notional environment which includes the proposed activity and all its positive and adverse effects. If there is not a 'net conservation benefit' to use the phrase in *Baker Boys Limited v Christchurch City Council*[85] - with the addition of the proposed activity, then it may be useful to make successive comparisons between:

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83 Decision A63/2004 at para [110].

84 This is a different class of (ac)cumulative effects from those considered in *Dye v Auckland Regional Council* [2001] NZRMA 513 which appears to relate the class only to other possible applications by other persons.

85 [1998] NZRMA 433 at para [98].

(a) an amended application with either more positive effects to be created to mitigate the adverse effects (as environmental compensation) and/or with the adverse effects to be avoided or remedied with

(b) a "without" scenario, that is, contemplating that the resource consent is refused.

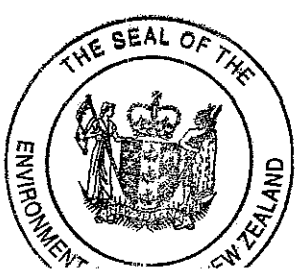
Sometimes a consent authority does need to consider a future environment – being the existing environment modified on site by proposed future activities under an existing resource consent, or modified off-site by activities permitted by a plan or under a resource consent on adjacent land. On other, rarer, occasions the consent authority will need to consider a past environment before modifications were made to it. This may be one of those cases.

*What environment is to be considered in the Clutha River catchment?*

[67] We briefly discussed the Armageddon and Eden scenarios above. If an analogy is apt at all, then a humbler simile is more appropriate. "Renewing" a resource consent is like obtaining a lease where there is no right of renewal. The tenant, like the applicant for renewal of water permits, in effect has to ask for a new lease. If the landlord considers that the conditions of the last lease were disadvantageous to the landlord because they allowed the tenant to leave sand and stones on the landlord's land and/or to cause flooding on a neighbour's land then the landlord can write into the new lease a condition controlling these matters and even add a condition that past sediment be removed. Then the tenant can take – perhaps negotiating a lower rent – or refuse the new lease on these terms.

[68] A regional council may look at "past effects" of the former activity and (subject to reasonableness, efficiency and other tests we come to later) add conditions to control future adverse effects, and in some cases to clean up the effects of past activities by the consent-holder which were not covered before. It should go without saying that the latter conditions will be scrutinised very carefully by the Environment Court to make sure they are efficient, and pass the *Newbury* tests as to validity (which we come to later).

[69] We hold that in these proceedings we are generally to consider the environment as it was during the hearings, but allowing for seasonal variations as they come and go.



[70] The important point is, in our view, that a consent authority considering an application for resource consent does not usually compare "environments", it usually compares "effects" on one environment. That is because effects are effects **on** someone or something.

[71] Further, adverse effects do not count if they are accepted by that person – or internalised, in economic jargon – on their land. That is implicit in the scheme of the Act. However it goes further: section 104(6) of the RMA[86] provides that a consent authority shall not have regard to any "actual or potential" effect on any person who has given a written approval to an application. We were not advised of any written approvals in these proceedings. Thus real adverse effects may be deemed by the law not to be adverse effects – unless they are so severe that they are caught by section 17 of the Act[87] or, outside the jurisdiction of the RMA, by the law of nuisance. It may be important, in order to achieve a relatively whole picture of the relevant environment, to identify that in fact there may be adverse effects which are allowed (not forbidden) by the Act[88] or permitted by a plan[89] or by a resource consent, or simply overlooked. Such an existing adverse effect – although it is disregarded as adverse as a matter of law: *Arrigato Investments Limited v Auckland Regional Council*[90] – may be discontinued as the result of a proposed activity, which would count as a positive effect or benefit of the proposal.

[72] Or, as in the situation that concerns us with the flooding of Alexandra by the presence of the Roxburgh dam, an adverse effect may exist but the right to impose it on the environment may cease, in which case it may be had regard to again.

*Effects on and adjacent to the Clutha River*

[73] Specifically on the facts of these proceedings, the flooding of the bed of the former Clutha River (and adjacent land) underneath what are now Lakes Roxburgh and Dunstan is not an adverse effect in itself because the Crown and Contact as owners of the bed and adjacent land, respectively agree[91] to the flooding. However flooding of land owned or occupied by other persons **is** an adverse effect which needs to be taken into account. The question is to what standard such persons should be protected against the adverse effect: see Part [H] of this decision.

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86 That is, prior to the Resource Management Amendment Act 2003 and subsequent amendments.
87 Headed: "Duty to avoid, remedy or mitigate adverse effects".
88 Section 9 of the RMA.
89 E.g. Section 14.
90 [2001] NZRMA 481; (2001) 7 ELRNZ 193; [2002] 1 NZLR 323; (CA) at para [38].
91 An operating easement for Lake Dunstan was produced to us. Evidence of Mr G N Martin, Attachment [illegible]

[74] We must have regard to both the positive and negative effects of the proposed activities. The question of 'negative compared with what?' is important in this case and we address it shortly. However we should note first that there are some strong positive effects of the proposal – the contributions the Clutha hydro scheme makes to the New Zealand and Otago economies. Because the evidence of positive benefits was not challenged – indeed it was acknowledged by the other parties – we see no need to describe it here, but do so later, in Part [G] of this decision. As for the potential adverse effects, for convenience we consider those in relation to each lake in turn in the following three parts of this decision.

## *[D] Lake Hawea*

*Erosion*

[75] Before the Hawea dam was built, the average lake level was 327.6 masl, and the seasonal range, caused by inflow fluctuations, was about 1.5 metres. Since the lake was filled to its new levels in 1961 the average level has been 342.9 masl and the seasonal range, caused by inflow **and** outflow (electricity generation) fluctuations, has increased to an average of 6.5 metres. The differences are that the average level of Lake Hawea has risen by 15.3 metres and the seasonal range has increased[92] by five metres on average, that is an increase of 250%.

[76] When the Hawea dam was built shoreline erosion was expected by the Ministry of Works until new beaches stabilised at the higher lake level. Land was purchased to allow for filling and erosion of the lake. In fact the rate of erosion was greater than expected. The shoreline retreat over the 30 years from 1966 to 1996 has been estimated[93] at 17.6 metres along some southern cliffs. Elsewhere on the southern shore there are advances due to gravel accumulation. Consequently more land has been purchased by Contact as successor to the Ministry of Works to ensure that it is Contact's land which is being eroded.

[77] Complexities in management of the lake were described by Dr D M Hicks, who was called by Contact. Dr Hicks is an engineer who is an expert in coastal processes, river geomorphology

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92 D M Hicks, evidence-in-chief para 3.17.

93 D M Hicks, evidence-in-chief para 3.17, referring to a report by Professor Kirk and others (1996).

and sediment transport. He wrote that[94] "... shoreline adjustments may require anywhere from decades to thousands of years to naturally attain an equilibrium state". Further it appears that[95] "most of the shoreline adjustment occurs during relatively short events that reoccur about once per decade". Dr Hicks described[96] how rock revetments[97] which were placed along the southern shore have failed twice – during the 1984/5 storm and again in the 1995/6 event. We should record that Contact has taken some responsibility for that. Immediately after the 1995/6 storm Contact carried out remedial work[98] by:

- rebuilding the retaining wall fronting Skinner Terrace at the edge of Lake Hawea township;
- adding rip-rap to the camping ground foreshore on the western side of the lake by the dam;
- building the backshore of Scotts Beach ; and
- trimming steep cliff faces.

[78] Unfortunately it is difficult to gain an accurate detailed picture of erosion at the southern end of Lake Hawea because the story of recording erosion data at Lake Hawea is rather dismal. It appears that monitoring pegs placed in the 1960s were lost without recording when. Later some of the pegs establishing profiles in 1996 (by Professor Kirk and others) have been similarly lost. We find that a monitoring programme is needed which:

(1) establishes and records lake shore profiles, and

(2) regularly – say every six months and after every significant flood event (exceeding one in 35 years AEP) – checks as to whether, and where, the lake shore has advanced or retreated;

(3) records wind speeds and direction at the southern end of Lake Hawea;

(4) records wave approach angles at the southern end of Lake Hawea.

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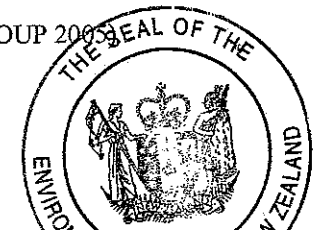
94 D M Hicks, evidence-in-chief para 3.9.
95 D M Hicks, evidence-in-chief para 3.8.
96 D M Hicks, evidence-in-chief paras 3.33 and 3.34.
97 A revetment is "a retaining wall or facing" : *The New Zealand Oxford Dictionary* (OUP 2003).
98 D M Hicks, evidence-in-chief para 3.36



[79] Dr Hicks described how in 1996 Professor Kirk – one of New Zealand's best-known experts on coastal erosion processes – was asked by Contact to advise how the erosion of the southern shoreline might be better managed. In their first report about the lake shore in front of Lake Hawea town Professor Kirk and his colleagues recommended (amongst other things)[99]:

- sediment conservation by recovering beach gravel from the lake outlet, where it creates a nuisance and has to be periodically excavated, and returning it to the shore further east; but otherwise not removing beach gravel from the shore;
- a structural approach involving first, building adequately designed protective batters against cliffs in selected locations (but not so as to isolate the shore from the source of material required to continue supplying gravel to the beach); and secondly building a groyne east of the outlet. The idea was to trap westerly gravel transport along the shore. That had the dual purpose of building a protective beach and stopping the gravel build-up at the outlet;
- sediment nourishment would include sourcing beach gravel from elsewhere, to speed up the accumulation of a protective beach;
- monitoring would check the success of the measures and track the progress to a stable configuration.

In a second report about the whole southern lake front Professor Kirk and colleagues calculated that[100]:

> ... the amount of gravel required to artificially nourish the shore, to offset lakeward losses of beach sediment, should be of the order of several thousand cubic meters per year.

[80] The HCA and QLDC are concerned about erosion of the lake shore caused by the artificially high water levels in the lake as a result of the installation of the Hawea control structure. Mr Carr, a resident of Lake Hawea township and president of the HCA wrote[101] that:

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99 D M Hicks, evidence-in-chief para 3 41.
100 D M Hicks, evidence-in-chief para 3 43.
101 E W Carr, evidence-in-chief para 7 28.

> summer storm events are accompanied by high rainfall and strong NW winds. The wind velocity is commonly in the range of 40-70 kph and mountain ranges on each side of the lake cause the wind to become northerly along the 20 km long main body of Lake Hawea, down to the southern foreshore. In summer storm events this strong northerly wind creates swells of two metres or more to surge destructively against the southern foreshore of the lake.

No party disputed this nor the more explicit evidence of Dr Douglas to the same effect. The HCA and QLDC want a high water level buffer between 344 and 346 metres over summer in order to minimise erosion. Contact's counter argument is that the lake shoreline will eventually find an equilibrium.

[81] Dr Hicks described how north-west winds funnel down the lake[102] "... so that the south shore of the lake is exposed to the largest wind fetches and to the greatest energy of wind generated waves". When the Hawea control structure raised the lake level by about 18 metres, that began a process of change of the lake shore. There appears to be maximum erosion rates at the eastern end of the southern shore of Lake Hawea, and the material that is eroded there is pushed west along the edge of the lake. Contact relies on the gravel produced, and on its long-shore drift to minimise erosion at Lake Hawea township. No witness or party seriously disputed Dr Hicks' findings. The issues are what the erosion rates are and whether such erosion could be seen as sustainable.

[82] It is important to note that no party is claiming that its land is being eroded by wave action of Lake Hawea. It appears that either the Crown – through Land Information New Zealand – or Contact own all land which is being eroded. One of the section 274 interested persons who appeared at the hearing – Glen Dene Limited ("GDL"), a farmer along the western side of Lake Hawea – was interested in erosion but our understanding is that Contact has purchased a slice of GDL land along the lakeshore so that the erosion is now Contact's problem as landowner. In any event GDL called no evidence.

[83] That purchase exemplifies Contact's primary technique for managing erosion around the shores of Lake Hawea: to let it happen, but only on land that Contact owns so that no other landowners' land is eroded. The criticisms by HCA, the QLDC and Dr Douglas are first that

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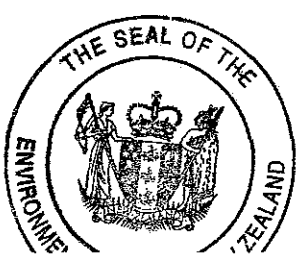
102 D M Hicks, evidence-in-chief para 3.2.



acquiescing in such active erosion is not sustainable management; secondly that it leads to unsightly cliffs and slips, and thirdly that at current rates, which are imperfectly known, both private property - especially in Lake Hawea township – and public infrastructure – the Timaru Creek Road - may eventually be affected by erosion.

[84] Amenities issues will be dealt with under that heading. Finally, whether a landowner's acquiescence to or encouragement of erosion can be seen as sustainable management will be left for consideration under Part 2 of the Act.

*Dust*

[85] Mr Carr gave evidence that[103]:

> Dust is a problem that becomes of increasing concern to the Hawea community as the lake level falls. Deposits of fine alluvial silt build up on the deltas of the tributary rivers of the lake when these are underwater during the summer months. This silt is a very fine glacial till which, when exposed to sun and wind as the deltas become dry at low lake levels, is easily carried into the air by strong NW winds. The dusty deltas occur only as a result of the lake level being lowered – they were not a feature of the landscape prior to the lake being raised. Of particular concern are the dust clouds raised from the Craig Burn, Timaru River and Dingle Burn deltas – as these are only 10-20 km upwind from the towns of Lake Hawea and John's Creek and the farm-lands of the Hawea valley. With wind strengths of 40-70 kph during NW wind conditions and with the surrounding mountains providing strong atmospheric up-life conditions, these airborne dust particles easily reach the populated areas and have a more than minor adverse impact on the quality of life and health of the Hawea community.

[86] Mr Carr also produced photographs of dust clouds downwind of the deltas of the Hunter River, the Timaru River and the Dingle Burn.

[87] To keep the silts which form the dust mainly underwater, he suggested that the lake operate between tight limits between 1 November each year and 31 March the following year, that is with:

| | |
|---|---|
| Maximum level | 344.0 metres above sea level |
| Minimum level | 342.5 metres above sea level |

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103 E W Carr, evidence-in-chief para 7.1.9

[88] Contact called the evidence of Mr A F Curtis, a qualified expert on air quality. He gave evidence that the dust samples he has taken from the shores of Lake Hawea at the deltas of the Hunter and Timaru Rivers and the Dingle Basin would not reach Hawea Township, because dust large enough to cause a nuisance is unlikely to be coming "from more than 500 metres away[104].

[89] The historical fluctuation of Lake Hawea was 1.5 – 2.0 metres, compared with about eight metres under the proposed regime. The Court's members know of dust problems from loess in other high country valleys[105] which do not appear to be man-made, so there may be an issue as to what proportion of any problem is caused by Contact. So it seems possible that an extra exposed area along the southern shore may exacerbate dust problems in Hawea. We have no way of knowing, but that is an issue which needs research. Mr G N Martin, the Chief Executive of the ORC, conceded that he had received complaints about dust in Hawea township, so it is of some surprise that the ORC has not undertaken any work on this issue.

*Effects on visual amenities*

[90] The QLDC and HCA raised an issue as to the effect of Contact's operating regime on visual amenity. The only expert on that issue called by any party was Mr F Boffa, a very experienced landscape architect. He analysed the effects of Lake Hawea's fluctuating levels on 21 viewpoints around the lake, and concluded[106] that in his opinion:

> ... the overall landscape effects of low lake levels [are] ... relatively minor in terms of natural character and visual amenity effects.

[91] Lake Hawea is drawn down over winter to meet the greater quantity of energy demanded, and so the lake tends to be at its lowest in later winter and early spring (before snow melt and nor-west rain start to refill it). Mr Boffa inspected the lake on 7 October 2004 (a weekday) and was surprised to see how few people were around or on the lake. He was criticised by Mr Todd, for the HCA and QLDC, on a number of grounds: that he had not been on the lake and seen the unsightly exposed gravel and silt beds, nor had he seen the lake being used at peak of the high

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104 Notes of evidence p. 209.
105 The Dart and Rees at Glenorchy, and the Rakaia Valley in Canterbury.
106 F Boffa, evidence-in-chief para 2.32.

season. Those are valid criticisms, but not important ones, for reasons which are largely covered in the next paragraph.

[92] We find, relying on Mr Boffa's uncontroverted evidence, that several aspects of perceptions of Lake Hawea are important: first, the lake is an expansive[107] landscape where detail is less important; secondly, that variations in lake level do not significantly detract[108] from that big picture; thirdly, visitors who travel beside the lake on the Haast Pass Highway (SH 6) are unlikely to be aware of the relatively large seasonal fluctuations in the lake level[109]; fourthly:

> farming practice around ... the lake has a smaller effect on natural character in that it too is ... controlled to the extent that its patterns appear ... to be different and high in contrast at different times of the year.

and fifthly, lake levels tend to be highest[110] (above 344 masl) and thus show the lake at its most attractive over the summer holiday period.

[93] Dr Douglas was concerned about the adverse effect of erosion on the visual amenity of the lake. Mr Boffa observed in his evidence-in-chief that along the southern lakeshore adjacent to the entrance to Lake Hawea township[111] and at the Neck – the low point between Lakes Hawea and Wanaka – which are areas used much more frequently – that some remedial landscaping is desirable. However he did not see the erosion elsewhere around the lake margins as detracting significantly from the lake's visual qualities, because the eroding areas are so small in comparison with the overall landscape. We generally accept Mr Boffa's evidence on landscaping issues, with one exception. While he stated there was a need to improve the landscaping of the entrance to Lake Hawea township from the west, we think he has underestimated the effect of the rather forlorn land between the water's edge and the private land at the southern end of the lake at Hawea township, and on John's Creek which is a hamlet at the south-eastern corner of the lake.

[94] Mr Carr wrote[112]:

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107 F Boffa, evidence-in-chief paras 2.28 and 2.33.
108 F Boffa, evidence-in-chief paras 2.16 to 2.31.
109 F Boffa, evidence-in-chief para 2.17.
110 F Boffa, evidence-in-chief para 2.8.
111 F Boffa, evidence-in-chief para 2.34.
112 E W Carr, evidence-in-chief para 7.13 10.

> Consequently, the southern foreshore land of Lake Hawea – in particular, adjacent to the Lake Hawea and Johns Creek townships and the boat launching ramp / holiday park areas – are all now seriously neglected and degraded. *Eucalyptus* and *Pinus* variety trees that were planted by NZED and ECNZ between 20 and 40 years ago are now mature and are generating a plague of wilding tree seedlings throughout these areas. Volunteers from the Hawea community spend countless hours each year trying to control and remove these wilding tree seedlings and other noxious weeds from the remaining areas of indigenous vegetation on the foreshore. This is really achieving nothing more than maintaining the status quo for these areas of indigenous vegetation.

He also told us[113] that the old Electricity Department and then the Electricity Corporation (both predecessors of Contact) had undertaken some landscaping, and even commissioned a landscape plan[114]. Perhaps as a consequence of the privatisation of the Electricity Corporation and/or the sale of its assets, the recommendations in that report were never carried out.

[95] In his closing submissions Mr Todd argued that an outstanding natural landscape[115] is at risk from Contact's operations. That submission does not recognise, as Mr Boffa earlier observed[116], that Lake Hawea achieved its status in the district plan of the QLDC while the lake was raised and lowered – causing erosion – in order to store and release water for Contact's hydro-electric generation further down the catchment.

[96] We conclude that:

(1) A landscape management plan is required for the southern shore of Lake Hawea with particular emphasis on management of three areas:

(a) the entrance to Lake Hawea township from the western side, that is between the camping ground and across the outlet;
(b) the land in front (north) of Lake Hawea township;
(c) the land in front of John's Creek hamlet;

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113 E W Carr, evidence-in-chief para 7.13.9.
114 The "Lake Hawea Southern Foreshore Landscape Management Plan" by R B Knox (1984)
115 Under section 6(b) of the RMA.
116 F Boffa, evidence-in-chief para 2.24.

(2) Remedial work along the lake margin below Meads Road (at the Neck) should be carried out to remove the skeletons of trees and scrub left after the raising of the lake;

- because all are affected either by fluctuating lake levels, or by erosion or the threat of it, caused by Contact's manipulation of the lake levels exacerbating natural forces.

[97] We are not sure of the precise ownership of the land referred to in the previous paragraph – it may be partly Contact's, partly the Crown's. Contact should promptly prepare a management plan, after consultation, and have it approved by the Otago Regional Council. Any work contemplated by the management plan should then be completed at Contact's expense whether the land is the Crown's or Contact's. We acknowledge that the road into Lake Hawea township is vested in the Queenstown Lakes District Council and find that some of the unsightliness of the entrance to Lake Hawea township is caused by the QLDC's primitive maintenance. We would expect it to co-operate with Contact by ensuring that improvements within the road reserve complemented those below it.

*Effects on boating and fishing*

[98] Mr Carr suggested that lower lake levels reduced the recreational values[117] "... particularly for all forms of fishing and boating activities". However the researches of Mr R J Greenaway, an expert on outdoor recreation who was called by Contact, led him to the view that lower levels may help such recreations as trout fishing. He wrote[118]:

> There is some conflicting writing in guidebooks in reference to the benefits of the fluctuating level of Lake Hawea. Tony Busch writes in *Trout Fishing A Guide to New Zealand's South Island*, 'There have been several occasions during the last 20 years when the lake has been extremely low, causing the fish to change their feeding habits and move into deeper water'. He describes the poor access at low lake levels, 'that fortunately only occur during the winter months' and which create, 'a quagmire for months'. He states that fishing is 'exceptional' when lake levels rise in spring and fish have access to 'prolific insects'. Brian Turner in the Otago Fish & Game Council's *Guide to Trout Fishing in Otago* states, 'Lake Hawea tends to fish best when it is low'.

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117 E W Carr, evidence-in-chief para 7.1.5.
118 R J Greenaway, evidence-in-chief para 46.

[99] To mitigate the perceived adverse effect of fluctuating lake levels on boating activities Mr Carr proposed that conditions be imposed (or financial contributions required) for Contact to provide (or pay for) boat launching ramps, toilets, jetties, a swimming pontoon and lake edge enhancements such as barbeques. Mr Greenaway observed that[119]:

> As Lake Hawea presents a more natural setting than Lake Dunstan, the same level of development might not be considered appropriate.

We agree. In the absence of any policy in the RPS, Regional Plan: Water or the District Plans we consider it would be inappropriate to impose an obligation on Contact to provide those facilities.

*Lake levels*

[100] There were two aspects of the Commissioners' decision relating to Lake Hawea's level that were challenged:

- The proposed normal operating range of 338 m – 346 m; and
- The ability to draw the lake down to the 338 m – 336 m in times of power shortage.

The ORC accepted the proposed normal operating range but opposed the lake being taken down below 338 m. QLDC, HCA and Dr Douglas sought various more limited ranges. We conclude that the Commissioners' ranges are appropriate when combined with other conditions relating to monitoring, reporting and review.

## *[E] Lake Dunstan*

*Sedimentation of the Kawarau Arm*

[101] Before any dams were built the Clutha River used to transport large quantities of sediment – fine silt, sand, gravel, stones and boulders – down river to the sea. After the Roxburgh dam was built it trapped the sediment at an average rate of 1.45million $m^3$ per year[120]. When the Clyde dam was built it in turn stopped the sediment reaching Lake Roxburgh, by trapping the sediment in Lake Dunstan.

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119 R J Greenaway, evidence-in-chief para 49.

120 P J Foster, evidence-in-chief para 7.2.

[102] The process of sediment trapping and its consequences was described by Mr P J Foster, a civil engineer specialising in dam engineering who was called by Contact[121]:

> The velocity of the water entering the top end of the lake reduces compared to the velocity in the river upstream of the lake. This causes the sand and gravel materials that roll and bounce along the riverbed to settle out and form a delta. The finer suspended sediment also begins to fall from suspension and forms an apron type deposit on the reservoir bed.
>
> ...
>
> With time the delta front or tipping face advances down the reservoir. As the delta advances, the "topset" reach, upstream of the tipping face, must aggrade and shallow so that there is sufficient gradient and flow velocity to move bed material to the tipping face. As this occurs the upstream section of the lake transitions to a morphology more like that of an alluvial river, with "point bars" growing off the inside of bends and possible "medial" bars or islands growing in mid-stream if the channel is wide enough. This can create a meandering or semi-braided channel pattern.

Of course the depth of the lake – or river – upstream of the tipping face becomes much shallower too.

[103] The tipping face in the Kawarau arm is advancing fast because huge volumes of sediment are brought down the Kawarau River from its tributary, the Shotover River which has an unusually high erosion rate. Mr Foster estimated[122] that on average the sediment accumulation in the Kawarau arm (and Cromwell gorge) is 1.2 million $m^3$/year, compared with Upper Clutha sediment deposition into the Clutha arm of 0.17 million $m^3$/year. Because the Clutha arm does not receive such a large sediment load its tipping face is moving down the lake much more slowly.

[104] Sandbars are visible in the Kawarau arm of Lake Dunstan already. They are a consequence of the fact that the tipping face of the Kawarau arm has reached the Bannockburn bridge now (2005). The face is predicted to reach the junction with the Clutha arm (stretching down from Bendigo) within five years. After 2010 the tipping face from the Kawarau arm will turn[123] the corner into the Cromwell gorge and move down the main lake; so that in a further 25 years – by

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121 P J Foster, evidence-in-chief paras 7.9 and 7.10.
122 P J Foster, evidence-in-chief para 7.16.
123 P J Foster, evidence-in-chief Figure 7.8.

2035 – it will be about nine kilometres down the gorge, which is halfway to the Clyde dam. By 2105 it is likely to be at the Clyde dam. That is a significant date for the town of Alexandra as we discuss more fully later, because it means that the probability of floods will dramatically increase.

[105] Since Lake Dunstan is not a storage dam, the sediment filling the dam will cause no particular problems for generating electricity. However, the character of parts of the lake will change quite radically. The Kawarau arm will over the next few years look like a large powerful braided river with sandbars which trees, shrubs and weeds will colonise over time.

[106] Grape growers and other irrigators along Felton Road and at Bannockburn had been concerned that they would be unable to draw water from the Kawarau arm of the lake, or that their pumps would be clogged with sediment. However, as we have described, those issues were resolved by agreement and the relevant appeals were withdrawn before the hearing started.

[107] Other consequences of the change in character of the Kawarau arm are:

- the outlook of rural and urban (Cromwell) residents will change – within five years the latter will be looking down onto a semi-braided river rather than a lake;
- recreational opportunities will be changed – in particular the launching ramp and jetty at Cromwell will become more difficult to use.

As to the latter, Contact has volunteered a condition directing dredging of a channel from the jetty to the river if the jetty becomes silted up. That should be inserted into the resource consent.

[108] Dealing with the outlook issues is more difficult. Cross-examination of Mr Boffa by Mr Todd[124] showed that Mr Boffa was not of the opinion that siltation of the Kawarau arm would cause the natural character or visual amenity of the Kawarau arm to be worse, merely to change. It is not obvious to us that substituting a fast-moving braided river with medial bars and islands for a slow-moving one (which is what the Kawarau arm of the "lake" was) is necessarily a detraction in amenities. Any larger sandbars will be colonised with plants – probably willows – quite quickly. The experts compared this area with the Kawarau River much further upstream – in the Rastus Burn area immediately below the Shotover confluence, and the willows there are not unattractive.

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124 Transcript pp. 56-58.

*The weed Lagarosiphon*

[109] The Regional Council and the CODC were concerned with the amount of the exotic weed *Lagarosiphon major* growing in Lake Dunstan. The Regional Council wanted the conditions imposed by the Commissioners' decision retained. The CODC sought either a condition[125] that Contact control the *Lagarosiphon* or a financial contribution to be paid to the ORC so that it could carry out any necessary work. Mr Whitney, the planner who gave evidence for the CODC, wrote that *Lagarosiphon* is a nuisance to anglers, boaters and other persons recreating on the lake; it also causes unsightly and smelly mounds along the lake edge. On the ecology of the Clutha catchment, Contact called Dr G I Ryder, a water quality scientist and aquatic ecologist. Dr Ryder described the development of the problem in Lake Dunstan and efforts to control it as follows[126]:

> After lake filling, *Lagarosiphon* rapidly colonised sheltered, stable, shallow areas with fine substrates. This was not surprising as it was known to be well established in the Clutha River/Mata-au above and below the location for Lake Dunstan ..... The speed of colonisation is attributable mainly to the downstream drift of plant fragments but also boating activity, and the relatively small fluctuations in lake levels. Higher fluctuations, such as occur at Lake Hawea, appear to preclude colonisation. In Lake Dunstan, *Lagarosiphon* forms an essentially [a]monoculture at 1-4 m depth, particularly in areas such as immersed valley heads and ridges, and in sheltered embayments. The weed is a nuisance species in terms of amenity and recreational values of the lake, and presents a risk as a source of material for colonisation of other water bodies via boats. The presence of *Lagarosiphon* in the lake is thought to limit the extent of native macrophyte species.
>
> LINZ (Land Information New Zealand – the Crown agency responsible for ownership of the lake bed), report that *Lagarosiphon* in Lake Dunstan is controlled by aerial application of a herbicide with diquat as the active ingredient. LINZ report that control levels achieved with this method have been very good (LINZ 2004a, 2004b). The spraying programme has the full support of the Lake Dunstan Management Committee. The programme demonstrates that it is possible to control the spread of *Lagarosiphon* and its effects on lake amenity values. Similar management programmes are being undertaken [elsewhere] in the Clutha River/Mata-au Catchment (e.g., Lake Wanaka Lagarosiphon Management Team).

[110] The Regional Policy Statement states a policy[127]:

> To reduce and where practicable eliminate the adverse effects of plant and animal pests on Otago's communities and natural and physical resources through:

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125 Condition 15 of Clyde Water Permit to Dam 2001.385.
126 Dr G I Ryder, evidence-in-chief paras 9.11 and 9.12.
127 *Policy 10.5.3 RPS* p142.

(a) Developing strategies to effectively manage Otago's plant and animal pests; and

(b) Educating about the responsibilities of all parties in the management of Otago's plant and animal pests; and

(c) Adopting the most practicable method of pest control while safeguarding the environment.

We also note that rules in sections 12.7 and 13.7 of the Regional Plan facilitate, as permitted activities, the control of *Lagarosiphon*. Further, *Lagarosiphon* is also a designated pest plant in the Regional Pest Management Strategy For Otago.

[111] We accept that LINZ is making some efforts to control the growth and spread of *Lagarosiphon* because the Crown accepts that as its responsibility. How well the Crown is achieving that is another matter. There are two issues of concern: the first is that the Crown is not bound to comply with the Regional Pest Management Strategy, and the second is that apparently LINZ does not always have sufficient funds to carry out the work[128].

[112] Those difficulties may at first sight suggest that Contact should be responsible for controlling *Lagarosiphon* as a backup. However Mr Donnelly, the economist, gave interesting answers about that in his cross-examination by Mr Todd[129]. Mr Donnelly said that the creation (or continuation) of the lake was a positive externality for the public. The lake was created primarily to generate electricity, but provides partly incidental benefits to third parties, the public, which they can enjoy for swimming, boating, fishing, birdwatching and sundry other recreational activities. The presence of *Lagarosiphon* detracts from some of these activities[130]. Thus the positive externality, the lake, is reduced by the negative externality, but does that mean that therefore the *Lagarosiphon* should be controlled by Contact. Mr Donnelly considered not, because there is still a "net benefit by providing the lake"[131].

[113] We hold that, as Contact seeks, the *Lagarosiphon* condition should be deleted.

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128 N J Gillespie Evidence-in-chief para 76.

129 Transcript pp 979 et ff.

130 But not all – it may increase the number of Great Crested Grebe *(Podiceps cristatus)* in the lake, which is a subject for rejoicing amongst birdwatchers and ecologists.

131 Transcript p. 980.

### *[F] Lake Roxburgh*

*Introduction*

[114] The most important issue in relation to Lake Roxburgh is flooding of Alexandra. That attractive town sits on rock and river terraces where the Manuherikia River, which rises in the Hawkdun mountains 50 kilometres to the north, joins the Clutha River (Lake Roxburgh) and that lake turns south into a steep dry gorge which is nearly 30 kilometres long. Historically, most of Alexandra had been above the largest floods, but that has changed since 1956 when the Roxburgh dam was completed.

[115] Under the RMA 'effect' includes[132] any potential effect of low probability which has a high potential impact, and so we should[133] have regard to floods which are of low probability but have the potential to cause damage to property in Alexandra. The product of the probability of a harmful event and its consequences is called the risk. Generally speaking, if the cost of reducing the probability, or avoiding the consequences (or both) is less than the risk then it is worth taking those avoiding, remedial or mitigating steps. We analyse these issues in this way:

(1) we describe the evidence about large floods at Alexandra;

(2) we assess the probability of future flooding at Alexandra, by reference to the history of floods as already described;

(3) we analyse the consequences of flooding - briefly because there was little evidence about that;

(4) we examine what steps can be taken to reduce the probability of large floods, or to remedy or mitigate the consequences.

*The history of large floods at Alexandra*

[116] The engineering experts (Mr Foster, Mr Hamilton and Mr Johnson) agreed[134] that the largest flood ever to flow past Alexandra was the 1878 flood. We were told that the 1878 peak water level at Alexandra Bridge was 140.52 masl (Dunedin), although we were given no evidence of how that figure can be given with confidence. The experts disagreed for a long time as to what was the peak flow of the 1878 flood since of course it was not measured at the time. There was a

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132 Section 3(f).

133 Under section 104(1)(i) of the pre-2003 RMA.

134 See Report on "Sedimentation/Flooding Issues: Meeting of Experts Tuesday 15 February 2005" – Evidence of P F Foster Exhibit 15 1.

large volume of evidence from the three experts on that issue which we have not found it easy to understand. One of the complications was that the witnesses, especially Mr Foster, tended to describe peak flows in a technical way. He gave the flows at three-hourly averaged peaks, not as instantaneous flows which are intuitively easy to understand – do they go over the top of one's gumboots or not? The three-hourly figures are used to calculate electricity generation potential, but have little to do with flooding which needs to use figures which will show when a stop-bank will be topped.

[117] The estimates of the three experts as to the instantaneous flow of the 1878 flood at its peak were:

| | 3 hourly peak flow | instantaneous peak flow | margins of error |
|---|---|---|---|
| • N P Johnstone[135] | | 4,650 $m^3$/sec | (4,190 to 5,110)[136] |
| • D J Hamilton[137] | | 4,650 $m^3$/sec | 4,500 to 4,900 |
| • P F Foster[138] | 4,150 $m^3$/sec | 4,360 $m^3$/sec | plus or minus 100 $m^3$/sec |

We do not intend to make any findings as to which of the witnesses is "correct" about the 1878 peak flow. We find that the peak instantaneous flow was, so far as it can now be assessed, somewhere between 4,200 cumecs and 5,000 cumecs. The relevance of those figures is to establish two matters. First, since 127 years have passed since that flood the one in 125 year flood event (and as we shall see later that figure has a spurious accuracy) is around 4,600 cumecs plus or minus 400 cumecs. Secondly, the experts have more or less agreed that Mr Johnstone's figure of 4,650 $m^3$/sec is not so inaccurate it cannot be used when plotting flood flows at Alexandra against water levels.

[118] We have described how in the 1990s three successively larger floods affected Alexandra. Their flows have been assessed to within 3%. The 1999 flood peaked at 142.29 masl and an

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135 N P Johnstone, evidence-in-chief para 1.6.6.

136 Although Mr Johnstone gave no confidence limits in his evidence, his earlier reported work (Scarf, I M and Johnstone, N P *Clutha River Flood Levels at Alexandra Bridge* (ORC 1986) gave the assessed likely flow range as being between 4190-5110$m^2$ – see D J Hamilton's evidence-in-chief Table 4.5 (p.23)).

137 D J Hamilton, evidence-in-chief para [4 1 5] actually [4.1.7].

138 P F Foster, evidence-in-chief para 5.29.

instantaneous flow at Alexandra Bridge of 3,800 cumecs[139]. In fact the 1999 and 1995 floods were the second largest and third largest floods ever to hit Alexandra (after the 1878 flood). Shortly after the 1999 flood the CODC sought and obtained resource consents to build a flood bank around the vulnerable parts of Alexandra. The stopbank was built to a height of 142.75 masl with a freeboard of 0.5 metres, giving a stopbank crest level of 143.25 masl.

[119] Lake Roxburgh flood levels in January 1994 "were elevated by approximately 5 metres compared with pre-[Roxburgh Dam] levels"[140]. Subsequent movement of sediment by floods resulted in the November 1999 flood peak being 3.2 metres above pre-dam levels[141]. Mr Johnstone's conclusion[142], which we accept, is that if the floodbanks at Alexandra are overtopped in the near future then Alexandra would be flooded to a level 2.7 metres higher than pre-dam levels.

[120] As we have just shown, the current trend is not for a steady increase in the height of floods at Alexandra for any given flow. That is because, as a result of the building of the Clyde Dam the sediment (especially gravel and larger particles) moving into Lake Roxburgh has been substantially reduced. That has resulted in two substantial relative benefits for Alexandra. First, the reduction in sediment being moved into Lake Roxburgh has not by itself lowered flood levels at Alexandra, although it has stopped them rising. In addition the floods through Lake Roxburgh have redistributed the existing sediment on the lake bed. Since 1992 this redistribution has lead to the fall in the flood levels at Alexandra by about 2.3 metres. Most significantly for the flood levels at Alexandra the floods have transported sediment from the Narrows downstream to the wider reach above the dam. However as we have stated they are still 2.7 metres higher than they would have been for the same flow in 1956. The experts all agree that the 1990s floods have achieved the bulk of sediment redistribution from the Narrows that can be expected. They also agree that some further distribution can be expected, but disagree about the quantity of sediment that can be expected to be moved from the Narrows.

[121] To put that issue in perspective, Mr Johnstone pointed out the fine line between maximising movement of sediment, and flooding of Alexandra. A flood of 4,100 $m^3$/sec (that is

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139 Experts' Report – Exhibit 15.1 para 3.5.
140 N P Johnstone, evidence-in-chief para 1.6.1.
141 N P Johnstone, evidence-in-chief para 1.6.2.
142 N P Johnstone, evidence-in-chief para 1.14.6

greater than the 1999 flood of 3,800 $m^3$/sec) would be ideal (if there has to be a flood) because it would not overtop the floodbanks, but would move sediment down the lake from the Narrows. That sediment redistribution would lower flood profiles at Alexandra by up to 0.3 metres[143]. The difficulty is that a flood only a little larger than the ideal scenario, say 4,150 $m^3$/sec, would see the start of overtopping of the banks and flooding to 143.5 masl. Mr Johnstone may have, here as elsewhere, overstated the point a little but it has some validity: the very flood forces that Contact is relying on to move sediment may, with Nature's usual lack of regard for human convenience, not restrict themselves to a flow just below the top of the floodbank at 143.25 masl.

*Predicting future flood levels for given flows*

[122] For the three floods in the 1990s the accurate discharges were determined by the rating curves[144] which were dominated by the rating curve from Clyde Dam. Mr Foster, for Contact, presented us with the maximum flood level for each flood determined by a survey of the upper limit of the debris. He described the manner in which the flood levels depend on the time variation of the flow, the measured geometry of each bed cross-section and variation between each bed cross-section and the roughness between each section. This roughness is characterised by Manning's "n" and depends on the bed composition (sand, gravel, boulder and vegetation) and when the sediment of the bed surface is moving it depends on formation of the bed (ripples, dunes etc). He then described the method that was used to calculate the debris levels. He showed that to reproduce the debris levels it was necessary to use within the Narrow's section (17 to 28 km above the dam) a value of the roughness Manning's "n" that varied with the discharge. His model agrees with the facts in that it shows that for the 1999 flood the debris level upstream of Roxburgh Dam compares very favourably with the predicted levels using the variable 'n'. Similar favourable comparisons were presented for the 1994 and 1995 floods. Mr Foster suggested that this variable 'n' necessary for these predictions was probably caused by bed formations (dunes) in this narrow region. The other experts agreed that it is necessary in these proceedings to use this variation.

[123] Mr Hamilton, the engineer called for the CODC, produced a graph of "Flood Levels at Alexandra Bridge for Different Manning's n and Flows". By joining the ratings for a number of increasing but constant Manning's n he was able to obtain a composite rating curve for increasing

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143 N P Johnstone, evidence-in-chief para 1.14.8.

144 "A rating curve is a plot with water level on one axis and flow on the other". [P F Foster evidence-in-chief footnote 6].

Manning's n to accurately 'predict' the 1999 flood. The experts agreed this is as good a working document as it is possible to produce at present. A further version[145] of the graph is reproduced on the next page as Figure 1. The graph shows first:

- that the capacity of the flood banks at Alexandra is 4,100 $m^3$/sec (instantaneous), allowing 0.5 metres freeboard because of wave action and other problems requiring tolerances;
- the stopbank would, at present, definitely be overtopped at 4,300 $m^3$/sec (instantaneous peak flow).

*What is the probability of overtopping the Alexandra stopbanks?*

[124] Mr Hamilton produced a table, reproduced as Figure 3 immediately after Figure 2. The experts now agree that Figure 3 shows, according to current knowledge of past flood events in the last 127 years:

(1) A table of instantaneous flows at Alexandra;
(2) The related three-hourly flows:
(3) The related water level at Alexandra Bridge for the flows referred to in columns (1) and (2);
(4) Then – because the experts agree that the relationship (at present) between instantaneous flows and levels at Alexandra Bridge and annual exceedance probabilities[146] is:

| | |
|---|---|
| 3,850 $m^3$/sec, 142 masl | 1 in 100 AEP |
| 4,300 $m^3$/sec, 143.35 masl | 1 in 200 AEP |
| 4,900 $m^3$/sec, 144.9 masl | 1 in 500 AEP |

– the fourth and subsequent columns give the agreed probability of any such flood during certain periods.

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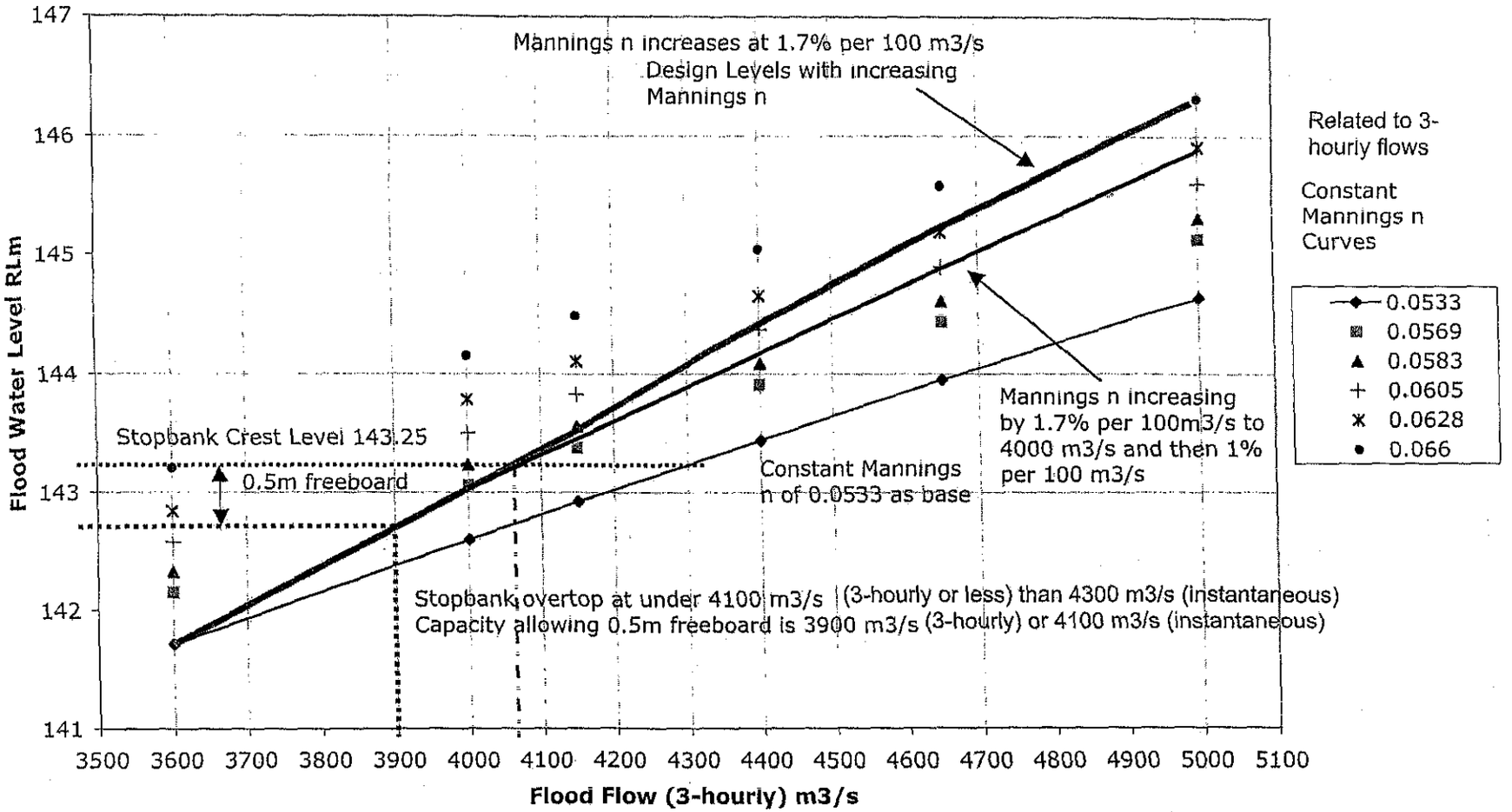
145 Dated 14 April 2005: it is a version of Mr Hamilton's graph of 7 April 2005 (Ex 26.4) amended to show instantaneous peak flows rather than three-hourly average flows.

146 For convenience we call an annual exceedance probability an "AEP".

## Flood Levels at Alexandra Bridge for Different Mannings n and Flows

December 1999 Cross Sections




| 3800 | 4000 | 4200 | 4400 | 4620 | 4830 | 5040 | 5250 |
|---|---|---|---|---|---|---|---|

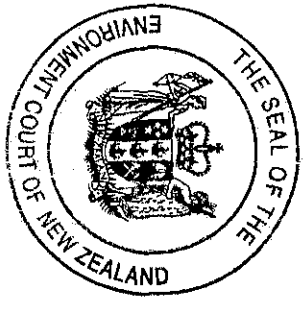
**Flood Flow (Instantaneous) m3/s [Approximate to ~1%]**

Note: The flood water levels for these flows are satisfactory as the calibration was done for the 3-hourly flows, but the Mannings n on this graph relates to the 3-hourly flows and not the instantaneous flows. A hydraulic model run using the same cross-sections and n-5% should result in similar levels for these instantaneous flows.

Figure 2

| Combined Table Alexandra | | | Probability of Events during next 10 years, 35, 100 and 500 years | | | | | Ref. Hamilton 6.2 |
|---|---|---|---|---|---|---|---|---|
| D Hamilton | D Hamilton | | Where R is return period, p is period of exposure | | | | | |
| Instantaneous | 3-hourly | From Graph 7/4/05 | | P = 100 (1-(1-1/R)^p) | | | | Optimx Estimate |
| Flood Peak | Flood Peak | Alexandra Bridge | Years | 10 | 35 | 100 | 500 | No. of Properties |
| $m^3/s$ | $m^3/s$ | Water Level RLm | R | p=10 | p=35 | p=100 | p=500 | Affected |
| | | | 5 | 89.30% | 100.00% | 100.00% | 100.00% | |
| | | | 10 | 65.10% | 97.50% | 100.00% | 100.00% | |
| | | | 20 | 40.10% | 83.40% | 99.40% | 100.00% | |
| 3400 | 3240 | | 50 | 18.30% | 50.70% | 86.70% | 100.00% | |
| 3850 | 3660 | 142 | 100 | 9.60% | 29.70% | 63.40% | 99.30% | |
| 4300 | 4100 | 143.35 | 200 | 4.90% | 16.10% | 39.40% | 91.80% | 190 |
| 4900 | 4650 | 144.9 | 500 | 2.00% | 6.80% | 18.10% | 63.20% | 580 |
| Note: 1:500 AEP natural event of 5150 $m^3/s$ less allowance of 250 $m^3/s$ for Hawea | Note: Approx. 5% less than Instantaneous | | | | | | | Note: Graph less 20 for properties lost to Stopbank |

Table 8.3 from D Hamilton's Evidence-in-chief amended for the Court to include design flows and water levels. Flows are shown both as instantaneous and 3-hourly associated with the levels for the associated flood frequency event.



[125] We note that annual exceedance probabilities are not fixed. The AEPs have changed at Alexandra since 1957 as a consequence of the Lake Hawea dam; of the floods that have occurred since; and of changes in management. Further very large floods will also immediately change the AEPs.

[126] The significant figures in Figure 2 are that a 1 in 100 AEP (as assessed under the 1999 rating curve) flood will not overtop the floodbanks, but a 1 in 200 AEP will – by 10 cms at the Alexandra Bridge, and by 30-40 cms 300 or 400 metres upstream according to Mr Johnstone. However, there is a large qualification to those conclusions. These figures depend on frequency analysis of the floods and fitting the data to a distribution and extrapolating large AEPs. Once the distribution has been decided and presuming that the catchment has not changed greatly in the historical period (the catchment was changed a little with building of the Hawea dam and the change in land use) confidence limits could be computed. Confidence limits are control curves on either side of the frequency curve which contain a predicted known percentage of the data points. Such confidence limits always show that the determination of AEP from frequency analysis has very large uncertainties. In spite of its reliance on the future repeating the past and the defects of frequency analysis, it is the only tool available for prediction.

*What are the consequences and costs of a flood at Alexandra?*

[127] Floods do not come to Alexandra unannounced. There are various warning signs so that Contact, the ORC, Civil Defence authorities, and eventually the community can become alert, watch, take mitigating action (reduce Hawea outflows, increase Roxburgh outflows[147], pile up the sandbags on the stopbanks) and if necessary in exceptional cases evacuate the low-lying parts of the town.

[128] First, meteorological services provide up to 48 hours [148] notice of weather patterns that are likely to cause heavy rain in the headwaters of the Clutha catchment. Secondly, when heavy rain does occur, and the level of the upper lakes (Hawea, Wanaka and Wakatipu) begins to rise that

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147 Although, for reasons we explore later, this action has little short-term effect on water levels at Alexandra, since the latter are determined more by water backing up in the Narrows.

148 Transcript p. 763 (Hamilton)

gives Contact and the ORC about 18 hours notice[149] of what is likely to occur in Alexandra. Thirdly, the flow at the lake outlets gives 12 hours (or a little less) precise warning of the size of a flood[150]. The length of warning that a flood will occur at Alexandra means that loss of life is very unlikely. There is sufficient time for Civil Defence authorities to visit every house and business at risk (up to 580 properties in a 1 in 500 AEP event) before the flood overtops the floodbanks. So the risk of flooding in Alexandra is a risk of damage to property plus great inconvenience, loss of productivity and loss of profits, rather than a significant risk to life.

[129] The floods in 1994, 1995 and 1999 caused considerable damage in and around Alexandra. Regrettably, as His Worship the Mayor of Alexandra, Dr Macpherson confirmed[151], the overall costs of that damage have never been calculated. The most we know is that in the 1999 flood 40 businesses and 20 houses were directly affected through flooding[152]:

> A substantial portion of the ... [Alexandra Business District] was affected with some 40 businesses directly affected through flooding. Nearby businesses were also directly affected by the flooding because there was a significant reduction in economic activity in the wider business community during the flooding and its aftermath. People were evacuated from homes and houses were seriously flooded, several for the third time in five years ...
>
> Businesses and residents are faced with problems obtaining insurance under reasonable conditions. Some tenants have moved and property owners are faced with substantial earnings and equity losses.

Most of the houses and businesses damaged in the 1999 flood have either been removed – after purchase by Contact – or are now behind the new floodbanks.

*Avoiding, remedying or mitigating the risks*

[130] Various methods or a combination of them were suggested in the evidence expressly to reduce the risk of flooding at Alexandra. Mr Hamilton identified[153] these methods:

(1) raising the stopbanks further;

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149 Transcript p. 763 (Hamilton).

150 N P Johnstone, oral evidence-in-chief [Transcript p. 791].

151 Dr M Macpherson, evidence-in-chief p. 4.

152 Report of the "Clutha Solutions Co-ordinator" – Mr A Adams (as quoted by Mr Whitney in his evidence-in-chief paras 100-101).

153 D J Hamilton, evidence-in-chief para 10.1.

(2) assisting floods to move sediment from the Narrows by drawing down the lake at the Roxburgh Dam;

(3) dredging sediment from the Narrows and either deposit the spoil on land or back into the lake closer to the Roxburgh dam;

(4) for Contact to purchase the properties which may be flooded.

There are other possibilities too which were not discussed in the evidence. They are to take none of the above steps, but:

(5) to continue imposing the risk on the Alexandra owners and to adopt a monitoring and communication process which enables future calculations of the risk to be more precise, and enables them to be fed into the regional and district plans (e.g. as flooding hazard maps) and advised to affected landowners; and/or

(6) to remedy any adverse effects by transferring the risk from the landowners and occupiers to Contact.

(1) Raising stopbanks

[131] One method of avoiding adverse effects is to raise the stopbanks further. For the CODC Mr Hamilton wrote[154]:

> The recently completed stopbanks were a compromise between standard of protection, acceptable height for landscaping and appearance, and costs. They could be raised to provide a higher standard of protection. This would require extension up the Clutha River and at Walton and Thompson St from the Manuherikia River. A number of properties not behind flood banks would be still exposed to these floods.

We heard no evidence about the costs of this method.

(2) Drawdown of Lake Roxburgh

[132] Contact had a suggestion for assisting natural processes – large floods – to remove sediment from the Narrows on which we read considerable evidence and heard quite lengthy cross-examination. Contact proposes to increase exit flows at the Roxburgh Dam by drawing the dam down when there are minor or midrange floods to increase the forces working on the

154 D J Hamilton, evidence-in-chief, para 10.2.

sediment. The concept worries ADFAS because its case is that nature does all the work – that is, any redistribution of sediment will occur if there is a sufficiently large flood, but not otherwise. At the hearing CODC and ADFAS both complained that most sediment redistribution gains have already been gained by the big 1990's floods (in 1994, 1995 and 1999); and that armouring of the river is likely (armouring is the presence of a layer of larger stones on the bed of a river which prevents the bulk of the sediment below from moving). Contact accepts that, but contends there are still significant gains to be made if nature is helped.

[133] Dr Hicks produced some interesting work on the profile of sediment on the lake floor and on its composition. The profile is known from measurements of the depth of the lake at the measuring stations along the length of the lake. Some work has also been done to analyse the composition of the sediment, although Mr Johnstone was critical of the number of sampling points, saying it was too small. Dr Hicks analysed the samples and produced values for mean sediment diameters known as D50 and D84. The D50 is the mean size and the D84 is commonly regarded as the representative grain size of an armoured layer.

[134] Dr Hicks then calculated the shear stresses[155]:

(a) that act on the sediment at various flows[156] and in particular the minimum shear stresses needed to move sediment at various stations along the lake; and

(b) that can be increased artificially by drawing down the lake (that is discharging more water over the spillway at Lake Roxburgh).

Because the backwater curves are well verified for the 1990s floods at discharges from the Roxburgh dam of between 2400 and 3620 cumecs **and** because shear stress only depends on the backwater depth and the slope of a backwater curve, we have confidence in Dr Hicks' calculations of the shear stresses along the lake beds both without and with additional drawdown. We also record that Dr Hicks calculated the critical shear stress for both sediment diameters D50 and D84.

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155 At the risk of oversimplifying: "shear stress" is the force per unit area caused by the flow of the river. For uniform flow it is calculated as a product of specific weight, depth and slope. For floods the depth changes very slowly with distance and (reasonably) uniform flow is assumed.

156 850, 1500 and 3400 cumecs.

[135] Dr Hicks produced two figures which clearly demonstrate the effectiveness of augmenting floods with drawdown to move sediment. We produce his figures 3b and 3c as appendices to this decision. He described them as follows[157]:

> On Figure 3b, for a discharge of 1500 cumecs and through the key reach between Alexandra and the Narrows, the model-determined shear stresses for both drawdown and no-drawdown cases are well above the entrainment threshold stress, whilst the stress for the drawdown case is substantially larger. Again, since sediment transport capacity scales with shear stress elevated to the power of approximately 1.5, this indicates that drawdown should have a significant influence on the sediment transport capacity through this reach.
>
> On Figure 3c, for a discharge of 3400 cumecs, a similar pattern is revealed except that the difference in extra shear stress created by drawdown through the Narrows to Alexandra reach (17-28 km upstream) is less substantial. Also, there is actually greater shear stress through the lower lake without the drawdown, but this has no impact on the key Narrows to Alexandra reach. As would be expected, compared with the 1500 cumec case, the shear stress values are much higher and more sediment entrainment should occur.
>
> Thus I conclude two key points. First, the drawdown process, when operated during natural high flow and flood events, should significantly enhance the capacity of the natural high flows to transfer bed sediment through the Alexandra to Narrows reach. Second, at least as the situation existed between December 1999 and September 2000 (when the bed was last sampled), the bed shear stress through the Narrows to Alexandra reach during drawdown-assisted discharges above 850 cumecs is substantially greater than the stress required to entrain the bed surface sediment, even if it were to develop a coarsened surface layer. Therefore I do not agree with Mr Johnstone's contention that future lake drawdown operations would be relatively ineffective at redistributing sediment.

Mr Johnstone's reason for criticising Dr Hicks' calculations was that they were a desktop study, and that there is no experience of drawdown to show that it works. We have confidence in Dr Hicks' calculations, in particular because the difference between the shear stress and the critical shear stress for the movement of the sediment is large. For example, even in the case of a relatively small flood of 1,500 cumecs the ratio of shear stress to the critical stress for the grain size representative of an armoured layer in the Narrows is of the order of 5 to 10. In any event the effectiveness of drawdown can be tested over the term of any water permit granted.

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157 D M Hicks, rebuttal evidence-in-chief paras 4.8 to 4.10.

[136] As for Mr Johnstone's suggestion that sediment will not move because it is or will be protected by armouring, that is a layer of smooth stones on the riverbed protecting the bulk of the sediment underneath, Dr Hicks also wrote[158]:

> Further to this point, it is worth noting that a stable armour layer will only form on a river bed, and thus protect the finer bed material beneath it, if the grading of the available bed material is sufficiently wide – in other words, if there are enough large cobbles mixed in with the finer sediment on the bed to concentrate down to a stable lag surface. The bed sediment being 'worked over' along the Alexandra to Narrows reach was deposited before 1992 on a 'delta front' or 'tipping face'. In a reservoir, the flow velocity wanes down the tipping face and this causes hydraulic sorting wherein finer grains are transported further into the reservoir than coarser grains. The net effect is that the deposits of a given status are well sorted (that is, uniform in size) and so do not constitute a good mixture for potential armour development ...

He was cross-examined on this point by Mr Randle but he was unshaken.

[137] Further Dr Hicks was careful to consider the actual state of the lake on this issue[159]:

> I note that under the drawdown regime, as represented by the September 2000 grainsize profile, the tipping face and the locus of downstream fining has translated to the reach downstream of the Narrows (that is, downstream of the 17 km mark). The September 2000 grainsize profile is flat through the key Alexandra to Narrows reach, indicating more riverine conditions there. The coarsening that occurred along this reach since 1994 will have occurred primarily through a vertical sorting process as the bed has been scoured down, concentrating the less entrainable sediment fractions into a well graded but coarser layer. While this is essentially the mechanism that can lead to an immobile armour forming, an immobile armour is not expected along this reach for several reasons that I have noted elsewhere. First, the sediment being scoured was originally deposited on a tipping face and is well sorted and fines with depth. Second, the reach is not supplied with very coarse material from the Manuherikia and Fraser Rivers in quantities sufficient to concentrate into a stable armour layer. Third, the bed shear stresses developed during drawdown-assisted floods are large enough to entrain the bed material present.

That passage was put to Mr Johnstone by Mr Robinson, and Mr Johnstone accepted it as true[160].

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158 D M Hicks, rebuttal evidence-in-chief para 4.11.
159 D M Hicks, rebuttal evidence-in-chief para 4.16.
160 Transcript p. 841.

(3) Dredging

[138] Another measure to avoid some flooding (or to mitigate the potential effect of some larger floods) is to dredge sediment from the Narrows. To show this was feasible the CODC and ADFAS pointed to the dredging which Contact has carried out between Alexandra and Clyde in order to ensure that when the Clyde Dam is turned off overnight the bed of the Clutha River/Lake Roxburgh is not dewatered between those two towns. Mr Hamilton's proposal was that since Contact was able to dredge there, it could also dredge 2 million $m^3$ of sediment out of the Narrows and either dump it further down the lake or find a land disposal site. That proposal runs into a number of difficulties: first it is likely that more than 2 million $m^3$ would need to be moved, as Mr Johnstone conceded under cross-examination by Mr Robinson[161]; secondly Mr Whitney conceded a land use consent might be required to dump sediment on land[162]. Thirdly Contact called the evidence of Ms S D Hartwell, an engineer who specialises in this kind of work. She wrote that putting slurry onto barges and trucks would be inefficient[163] and pumping it kilometres would be unprecedented also. Fourthly dredging would have to continue 24 hours a day all the time[164]. Finally the cost of dredging would be an expensive ongoing cost as against the unknown costs of low probability floods. Our conclusion about dredging to this point is that because we do not know the quantitative cost of the risks of flooding, we are not initially disposed to order the drastically expensive ongoing operation such as dredging – especially since that might cause externalities such as noise, disposal of slurry, diminished water quality downstream which would require much greater analysis.

(4) Purchase of properties

[139] Mr Hamilton wrote[165] that 'the large number of properties and the great disruption to the community suggest that .... this is not likely to be the sole solution'. We agree.

[140] Before we discuss methods (5) and (6) identified above we assess the standard of flood protection which Alexandra may be entitled to. We should first identify the general principles in Part II of the Act which should inform our conclusions.

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161 Transcript p 830.
162 Transcript p. 615.
163 Evidence of *S D Hartwell* para *197*.
164 Transcript p. 768.
165 D J Hamilton, evidence-in-chief para 10.13.

### *[G] Part II of the RMA*

[141] It is usual to consider Part II of the RMA at the end of a decision, after mitigating conditions have been discussed. However in this case we will discuss Part II now for the reason that granting most of the water permits is inevitable, although the operating conditions are definitely not. The reason for the inevitability is that because the dam structures are already in the rivers[166] they will have a damming effect regardless of how they are operated. Given those circumstances, Part II of the Act is very important for the setting of the conditions to avoid, remedy or mitigate the adverse effects of the dams and we expand on its controlling relevance now.

*Sustainable management*

[142] The relevant sections of Part II of the Act for this decision are sections 5 to 7. Section 5 states:

> **5 Purpose**
>
> (1) The purpose of this Act is to promote the sustainable management of natural and physical resources.
>
> (2) In this Act, **sustainable management** means managing the use, development, and protection of natural and physical resources in a way, or at a rate, which enables people and communities to provide for their social, economic, and cultural wellbeing and for their health and safety while –
>
> (a) Sustaining the potential of natural and physical resources (excluding minerals) to meet the reasonably foreseeable needs of future generations; and
>
> (b) Safeguarding the life-supporting capacity of air, water, soil, and ecosystems; and
>
> (c) Avoiding, remedying, or mitigating any adverse effects of activities on the environment.

There are several aspects of section 5(2) as it applies to these proceedings which we should mention here: first, hydro-electric energy generation is a sustainable process, and thus at first sight promotes the purpose of the Act; secondly, the primary thrust of this case is about avoiding, remedying, or mitigating the adverse effects of the dams; thirdly, this is an unusual case in that the reasonably foreseeable needs of remoter future generations – in this case the protection of residents of Alexandra in 100 years or more from flooding – need to be considered as to how they

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166 And, as we have said, Contact holds certificates of compliance for them.

may best be managed and developed; and fourthly there is a question as to whether allowing erosion around Lake Hawea is sustainable management?

[143] First, hydro-electric generation is often stated to be an exemplary use of a renewable resource (water) to generate energy without adverse effects. These proceedings show that reality is, as usual, not as simple as that. Sustainable management of the Clutha hydro scheme requires the use of all the natural and physical resources of the scheme in a way which enables both local people and communities and indeed the whole of New Zealand to rely on the social, economic and cultural benefits of a (so far) consistent and artificially[167] cheap electricity supply. But we must record and give due weight to the contribution of the Clutha River's hydro-electric plants to New Zealand's power supply. As we stated earlier, the Roxburgh dam generates 320 megawatts, and that at Clyde 432 megawatts[168]. Mr G J Quinn, the Generation Manager for Contact, described how together the dams generate 40% of the energy supplied by Contact, and Contact produced nearly 26% of the electricity wholesale market in 2003/4[169].

[144] Lake Hawea is the only storage lake in the Clutha catchment whereas Lakes Dunstan and Roxburgh are too narrow and have a limited operating range. The storage capacity of Lake Hawea has two significant advantages. First Lake Hawea has the potential to store water equivalent to 300 gigawatt hours when full[170]. One gigawatt hour is the energy which would be produced by a 1,000 megawatt generator running for one hour. Theoretically water can be released from Lake Hawea (if it is full to start with) to keep the turbines running at the Clyde and Roxburgh dams for about 15 days, without relying on any other water refilling any of the lakes at all. Secondly, Lake Hawea can be managed so that during heavy rainfall in its catchment its control gates may be shut thus reducing peak flood flows downstream (particularly at Alexandra) by 250 $m^3$/sec.

[145] Secondly, section 5(2)(c) of the Act includes as a component of "sustainable management" the "avoiding, remedying or mitigating of adverse effects on the environment". The verb "remedy" is defined in The New Zealand Oxford Dictionary[171] as meaning (relevantly):

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167 P J Donnelly, evidence-in-chief para 3.11.
168 G J Quinn, evidence-in-chief Table 1.
169 G J Quinn, evidence-in-chief para 3.4.
170 G J Quinn, evidence-in-chief para 10.4.
171 OUP 2005.

Rectify, make good.

So to put the phrase "avoid, remedy or mitigate adverse effects" in context:

(1) to avoid potential adverse effects is to ensure they do not occur;
(2) to mitigate them is to allow them to occur but to lessen their impact;
(3) to remedy adverse effects is again to allow the probability of potential adverse effects to arise and if the effect does occur, then to rectify or make good those adverse effects.

[146] Applying that concept of "to remedy" means that where a good is readily substitutable then to remedy its loss merely involves a consent holder in paying for the price of a new one, thus making it good. We note that one of the potential adverse effects of a dam is an effect of low probability but high potential impact : flooding beyond the usual high water mark if a flood pours into the reservoir. The RMA contemplates that those potential effects are to be avoided, remedied, or mitigated. No doubt avoidance is an ideal solution in many cases, but there comes a point especially with low probability effects where further avoidance is extravagant. In this case avoiding the risk of flooding of Alexandra would require either higher stopbanks, or dredging of the river, both of which appear to be expensive options to avoid unlikely (but inevitable) events. Another way of avoiding the risks to third parties is to transfer the risks to the consent holder. That is, Contact could buy the properties subject to flood risk. To mitigate the risk Contact could dredge the Narrows. We will consider these and other options later.

[147] Thirdly, in relation to effects on future generations, we find it is highly likely that in 100 years from now (2105) the tipping face of the sediment in Lake Dunstan will meet[172] the Clyde dam. If the dam is to continue to generate electricity, all the sediment arriving in the dam from the Shotover River via the Kawarau River and arm will need to go over the spillways, or through the turbines and sluices of the Clyde dam. So in about 100 years from now, if sediment management practices in Lake Roxburgh do not change in the meantime, sediment will start to build up in Lake Roxburgh again. The consequences of that for Alexandra are relatively easy to predict because it will be in the same situation as before the Clyde dam was built. If nothing is done, then the evidence predicts that in about 120 or 130 years from 2005 Alexandra is going to

172 See Figure 7.8 of Mr P F Foster's evidence-in-chief.

have a serious flooding problem. Most floods will be metres above their levels now, and a one in 100 AEP flood is likely to be two to three metres higher. And after further floods the flood level may increase further. So the needs of future generations are of real significance in these proceedings.

[148] Next the HCA, QLDC and Dr Douglas questioned whether it is sustainable management to allow, even encourage, erosion of the shores of Lake Hawea. The answer would usually be "No". But there are exceptions and this case is one. When the Hawea dam was built in 1959 some rapid (on geological time scales) erosion was inevitable if the lake was to be kept close to its new capacity and used to store and release water. Of course erosion does occur naturally. We have already noted the huge volumes of material coming out of the Shotover River, which is also in the Clutha catchment. In the circumstances we hold that allowing the lake to nibble at some of its margins is currently sustainable management provided that the rates of erosion are measured more carefully and regularly than in the past, and that no landowner other than Contact is having its land eroded. However, a careful eye needs to be kept on the rates and places of erosion, for example to ensure that the foreshore of Lake Hawea township is not eroded.

*Matters of national importance*

[149] Section 6 states (relevantly) in the pre-2003 RMA:

> In achieving the purpose of this Act, all persons exercising functions and powers under it, in relation to managing the use, development, and protection of natural and physical resources, shall recognise and provide for the following matters of national importance:
>
> (a) The preservation of the natural character of the coastal environment (including the coastal marine area), wetlands, and lakes and rivers and their margins, and the protection of them from inappropriate subdivision, use, and development:
>
> (b) The protection of outstanding natural features and landscapes from inappropriate subdivision, use, and development:
>
> (c) The protection of areas of significant indigenous vegetation and significant habitats of indigenous fauna:
>
> (d) The maintenance and enhancement of public access to and along the coastal marine area, lakes, and rivers:
>
> (e) The relationship of Maori and their culture and traditions with their ancestral lands, water, sites, waahi tapu, and other taonga.

To the extent that the applications raised issues about section 6(a), (b), (c) and (e) those issues have been resolved between the parties (and others) by consent. Section 6(d) makes the provision and enhancement of public access to and along lakes a matter of national importance. We will discuss that later.

*Matters to have particular regard to*

[150] Section 7 also requires the Court to have particular regard to (relevantly):

> ...
>
> (b) the efficient use and development of natural and physical resources:
>
> (c) maintenance and enhancement of amenity values:
>
> ...
>
> (e) recognition and protection of the heritage values of sites, buildings, places or areas[173]:
>
> ...
>
> (h) The protection of the habitat of trout and salmon:

We have considered efficiency when discussing whether pre-emptive measures to avoid damage, versus remedial work afterwards is the best way to manage flood risks. We have regard to amenity and heritage issues, and the habitat of salmonids when setting conditions.

[151] There is one exception – we have not discussed the effects of the Roxburgh dam on the visual amenities at Alexandra. We have already discussed how the dam has the effect of causing the river to drop more sediment at the Narrows, and thus to flood Alexandra to higher levels than formerly. That has meant there is an area of wasteland[174] particularly along the west bank of the Manuherikia River, immediately below a residential area of Alexandra.

[152] Mr Boffa also wrote[175]:

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173 This is in the pre-2003 Amendment RMA. In the amendment heritage protection was made a matter of national importance under section 6.

174 F Boffa, evidence-in-chief para 6.8.

175 F Boffa, evidence-in-chief para 6.6.

> While I am not familiar with the details of land ownership within the area, I would expect the Management Plan would incorporate all public land within the area identified so as to enable the preparation of a more comprehensive and integrated management plan. It appears to me that land administration issues in this, and possibly other areas associated with the Clutha River hydro scheme, has tended to create what appear to be areas of wasteland with low visual and recreational values. These areas also appear to be "left over areas" that no agency or organisation appear to identify with or actively manage. In some instances these areas are quite visible and accessible and could clearly be used for public recreation and amenity purpose.

Generally, how Contact and other landowners manage their land is their business until a plan under the RMA[176] says otherwise. However we consider there is an exception where a wasteland is adjacent to towns, and the uncared for land has an effect on the amenities of those towns. Contact accepts[177] a condition to prepare a management plan about landscape and we will discuss that under "Conditions" in Part [I] of this decision.

*Climate change*

[153] Section 7(i) of the RMA as amended[178] in 2004 requires decision-makers under the Act to have particular regard to the effects of climate change. Obviously that provision does not apply to these proceedings which, as we stated earlier, are to be decided on the Act as it stood before 1 August 2003. However, in our view we can consider the possible effects of climate change under section 104(1)(i) of the RMA.

[154] When being cross-examined by Mr Randle for ADFAS, Mr Martin produced[179] a copy of a report by the Ministry for the Environment ("MFE") dated July 2004 and titled *Preparing for Climate Change*. The report contains a table which shows projected changes in seasonal and annual precipitation by region. The relevant section for Queenstown (being the only rainfall station in the MFE table which is in the Clutha catchment) shows the following projected percentage changes (on 2004 figures[180]) in:

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176 or other legislation.
177 F Boffa, evidence-in-chief para 6.9
178 Section 5 of the Resource Management (Energy and Climate Change) Amendment Act 2004 (2004/2)
179 Exhibit 31.10.
180 The MFE booklet is not clear on what the baseline year is

| | Summer | Autumn | Winter | Spring | Annual |
|---|---|---|---|---|---|
| 2030-40 | -14 to +11 | -3 to +18 | -12 to +59 | -11 to +23 | -4 to +22 |
| 2080-90 | +3 to +46 | -5 to +21 | -22 to +129 | -15 to +45 | +2 to +57 |

*It will be seen that except for summer in the 2030's when the rainfall may be about the same as* now, all other projected rainfall figures, and especially those in spring, suggest there may be more rain in the future than there is now. In fact Mr Martin agreed[181] that the predicted change for Queenstown is the highest in New Zealand.

[155] The MFE Report warns[182] that:

> A change in extremes of particular importance for local government planning is an increase in the risk of heavy rainfall events. Such an increase is likely to be greatest where mean rainfall increases, ...

Mr Martin rather explained this away[183] by referring to his doubts whether "storminess" is increasing or whether the 1990's, in his example, were "one of nature's 25 to 30 year cycles". In our view both factors – that is, increased storminess and continuing cycles – are likely to be true of the weather patterns. We should be cautious and assume that more rain, and more significantly, more extreme flood events are more likely in the future in the upper Clutha catchment.

*Ownership of lake and river beds and margins*

[156] A persistent theme in the proceedings is what Mr Todd described in his closing submissions as:

> ... the complicated, uncertain and what I might respectfully suggest, totally unsatisfactory relationship that *exists between Contact and the Crown in terms of Contact's rights to occupy* Crown land and the resultant apparent unwillingness of either party to accept and confirm responsibility for remedial or mitigation measures which otherwise would have gone a long way towards satisfying concerns of the parties and their respective communities for whom I appear.

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181 Transcript p. 935.
182 *Preparing for Climate Change* MFE (2004) at p. 9.
183 Transcript p. 963.

We can really say little about that because questions of ownership are outside the jurisdiction of the Court. We approach the issue in this general way: if there is likely to be an adverse effect caused by any one of the resource consents which Contact seeks and it should be remedied or mitigated in order to achieve sustainable management then we will (if all relevant tests are met) impose a condition to deal with it in such a way that the condition only relates to land which is, or should be, within Contact's control. If the condition happens to relate to land not within Contact's control it will have to take steps to obtain such control.

[157] We believe there is no real issue: in his closing submissions Mr Logan gave a close analysis of Contact's Operating Easements from the Crown (which is not a party to these proceedings) which suggests that Contact has the rights to manage all the land over which reasonable conditions have been sought to be imposed by the appellants.

### *[H] What standard of flood protection is Alexandra entitled to?*

[158] What standard of flood protection are the residents of Alexandra entitled to? The obvious place to look is in the Regional Plan but as we have seen, it is open-ended. Nor does the Act give any direct guidance. More specific guidance may be found in other sources: from the common law; from the statutes under which the Roxburgh dam was first built and operated; from historical evidence from those who operated under those statutes; from economic evidence; or from risk analysis. All are relevant under section 104(1)(i) of the Act and we consider each in turn.

*The common law*

[159] When considering the common law on flooding there are two salient facts about flooding of Alexandra to bear in mind: first, it was common ground that the construction and filling of the Roxburgh Dam by itself caused flood levels at Alexandra to rise by one metre. Any increases in flood level thereafter were the result of a backwater effect from sediment accumulating between Alexandra and the Narrows.

[160] In *Kerr v Earl of Orkney*[184] Lord Justice-clerk Hope of the Scottish Court of Session stated:

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184 (1859) 20D 298, 302.

> Although we did not require any answer from the respondent upon the general point of Lord Orkney's liability for the consequences of his dam bursting from a violent fall of rain, yet I think it right to state the general principle on which the view of the Court is founded. That principle is – that if a person chooses upon a stream to make a great operation for collecting and damming up the water for whatever purpose, he is bound, as the necessary condition of such an operation, to accomplish his object in such a way as to protect all persons lower down the stream from all danger : He must secure them against danger. It is not sufficient that he took all the pains which were thought at the time necessary and sufficient. They were exposed to no danger before the operation. He creates the danger, and he must secure them against danger, so as to make them as safe notwithstanding his dam as they were before. It is no defence in such a case to allege the dam would have stood against all ordinary rains – it gave way in an extraordinary and unprecedented fall of rain, which could not be expected. The dam must be made perfect against all extraordinary falls of rain – else the protection is not afforded against the operation which the party must accomplish. An extraordinary fall of rain is a matter which, in our climate, cannot be called a *damnum fatale*[185] – supposing the doctrine so denoted by that term to be applicable, generally speaking, to a dam for collecting water.

Bearing in mind that the test is whether the event is "... so extraordinary as to be beyond human foresight" per Latham CJ in *Commissioner of Railways (WA) v Stewart*[186] it is amusing, but significant, to see a Scottish Judge recognising that extraordinary rainfall cannot, in Scotland, be seen as an extreme occurrence. We take the same judicial notice of the possibilities of VERY heavy rainfall in the mountains at the head of the Clutha catchment.

[161] The House of Lords of Scotland approved that decision in *Tennent v Earl of Glasgow*[187] where Lord Westbury said:

> My Lords, this case differs very much from those which have been cited and relied upon at the Bar. If anything be done by an individual which interferes with natural occurrences, such as, for example, in *Lord Orkney's Case* (1), throwing a dam across the course of a stream, it is undoubtedly the duty of that individual so to construct the work as to provide in an efficient manner, not only against usual occurrences and ordinary state of things, but also to provide against things which are unusual and extraordinary. And, therefore, the decision of the Court in the *Earl of Orkney's Case* (1), where a dam gave way, was properly referable to that circumstance.

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185 This is Scots Legal Latin for "extreme occurrence" or an event the possibility of which cannot be foreseen. We know of no authority as to what AEP becomes such an extreme occurrence.

186 [1936] 56 CLR 520 at 529.

187 2M (HL) 22, 26.

Lord Westbury recognised an exception to that for extreme events when he stated[188]:

> Under these circumstances, my Lords, what has occurred is one of those things which do not involve any legal liability – what are denominated in the law of Scotland *damnum fatale* occurrences – circumstances which no human foresight can provide against, and of which human prudence is not bound to recognise the possibility, and which when they do occur, therefore, are calamities which do not involve the obligation of paying for the consequences that may result from them.

[162] Next was *Greenock Corporation v Caledonian Railway and another*[189] (the House of Lords of Scotland). In the House of Lords Lord Finlay[190] first approved the principle in *Kerr v Earl of Orkney*, then, when the Corporation argued the storm was so extreme (a *damnum fatale*) it should not be liable, he stated[191]:

> In my opinion the appellants have entirely failed to establish any defence on this ground. It is true that the flood was of extra-ordinary violence, but floods of extraordinary violence must be anticipated as likely to take place from time to time. It is the duty of any one who interferes with the course of a stream to see that the works which he substitutes for the channel provided by nature are adequate to carry off the water brought down even by extraordinary rainfall, and if damage results from the deficiency of the substitute which he has provided for the natural channel he will be liable. Such damage is not in the nature of damnum fatale, but is the direct result of the obstruction of a natural watercourse by the defenders' works followed by heavy rain.

[163] The cases referred to so far all concern downstream damage but the principle has been more widely stated than that by Lord Maugham, giving the advice of the Privy Council in *R v Southern Canada Power Company Limited*[192]. He stated:

> ... the judgments of LORD FINDLAY and LORD DUNEDIN in the case of *Greenock Corpn. v. Caledonian Ry. Co., Greenock Corpn. v. Glasgow & South Western Ry Co.* (2), and the authorities therein cited, are conclusive to show that, at common law, apart from statute, the duty of one who obstructs the natural flow of a river is to prevent damage, and, if damage results to any persons, he will be liable to them, irrespective of whether or not they are riparian owners.

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188 2M (HL) 22, 26.
189 [1917] AC 556.
190 The Lord Chancellor of Great Britain.
191 [1917] AC 556 at 572.
192 [1937] 3 All ER 923 at 928.

There is also an earlier case which shows that a lower dam and mill owner cannot back up water so as to flood the mill of a higher riparian owner on a river: *Milner v Gilmour*[193].

[164] However, against that, we recall that there is another principle stated in *Halsbury's Laws of England*[194]: the owner of the bed of a natural watercourse or an artificial channel is not liable at common law for damage done by water which has overflowed from the watercourse or channel because of the natural and gradual silting up of the bed and the growth of weeds.

[165] We conclude[195] that at common law:

(1) a person who dams a river is liable for up or downstream damage by flooding even when a flood is extraordinarily large;
(2) only floods which are really extreme – beyond the possibility of being foreseen – remove the liability of the dam-owner;
(3) a dam-owner is not responsible for flood damage caused by natural sedimentation (but probably is if the sedimentation is substantially caused by a dam in the river).

[166] We also note that, significantly, all the successful cases we could find are about granting damages after a flood. Pre-emptive (injunctive) actions have not been attempted. We infer that the common law understands that where remote risks of damage to property are possible it is usually more efficient to wait for the risk to be realised and then award damages rather than to protect against such a remote contingency in advance.

*The Public Works Act 1928 and the Electricity Act 1968*

[167] We now turn briefly to the statutory authorities for the building and operation of the Roxburgh Dam, and to statements made for the Crown by persons acting under these powers. The Roxburgh Dam was built under the authority of a Gazette Notice issued under section 311 of the Public Works Act 1928 ("PWA 1928"), now repealed, which conferred upon the Government the power to authorise the relevant Minister to:

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193 (1859) 12 Moo PCC 131, 156.
194 Volume 49(2): Water [4th Edition (2004 Reissue)] para 256.
195 These are not statements of the law: the Environment Court has no power to declare what the common law is.

(c) Raise or lower the level of any lake, river or stream, and impound or divert the waters thereof.

– as well as to generate electricity and sell it.

[168] Then section 313 of the Public Works Act 1928 provided:

> **313. Compensation for damage or user of land** – Where any property of any person is at any time damaged by or through the exercise of any power conferred by paragraph (c) of section three hundred and eleven hereof, or is used for any purpose mentioned in paragraph (d) of the same section, he shall be entitled to compensation, to be ascertained in the manner prescribed by this Act.

Part III of the Public Works Act 1928 set out the procedures for seeking compensation. Section 42 grandly stated:

> **42. All persons suffering damage entitled to compensation –**
>
> (1) Every person having any estate or interest in any lands taken under this Act for any public works, or injuriously affected thereby, or suffering any damage from the exercise of any of the powers hereby given, shall be entitled to full compensation for the same from the Minister or local authority, as the case may be, by whose authority such works may be executed or power exercised.

– but section 45 then qualified that by limiting the time within which a claim for damage done by the execution of the work to 12 months after the "completion of the construction of any portion of a work". That period was later extended, if leave of the (then) Supreme Court was obtained, to five years.

[169] Our impression, although it is beyond our powers to determine, is that the Public Works Act 1928 was concerned with the taking of land, or damage done by work in, for example, the construction of a dam, but not with the consequences of the filling of the valley so dammed. Thus the PWA did not impact on common law rights in relation to flooding.

[170] Historical statements made by persons who appear to have been speaking for the Crown during the design and life of the Roxburgh dam up to 1992 appear to indicate that the Crown did not contemplate simply imposing the greater risk of flooding on the residents of Alexandra. To

the contrary, the uncontradicted evidence we read was that the Crown was concerned to protect Alexandra up to a 1 in 500 AEP flood standard. First, when the Roxburgh dam was built[196] the supervising engineer Mr W M Fisher recommended trying to limit future flood peaks at Alexandra to 100,000 cusecs (2,830 $m^3$/sec)[197] and flood levels to the then understood 1878 flood level of 140.28 metres (actually the current consensus is that it was 140.52 masl as stated above). Mr Fisher then also wrote[198]:

> No worse flood conditions will be experienced at Alexandra than have occurred in the past under natural conditions of river flow.

We note that statement is not necessarily consistent with the design standards stated by Mr Fisher. His optimism may have been caused by the proposal that flood peaks should be controlled by building structures at the outlets of both Lakes Wanaka and Hawea:

> The flood range in Lakes Wanaka and Hawea has been designed to control the flow of the Clutha at Alexandra to 100,000 cusecs for a 1 in 500 year flood[199].

In fact only Lake Hawea subsequently had a control structure erected so that outflows could be managed.

[171] We were shown the estimated "backwater curves" for Lake Roxburgh in the 1948 design[200]. These show that at a flow at the Alexandra Bridge of 100,000 cusecs (2,830 $m^3$/sec) the water level was predicted as being underneath 458 feet above sea level (140.46 masl).

[172] Over thirty years later, a memorandum[201] from the Treasury to the Minister of Finance dated 31 March 1981 states:

> MWD advise us that it is normal policy to purchase land which is likely to be affected by the one in five hundred year flood. Calculations done by MWD in 1960 established the level for the Manuherikia Valley at

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196 N P Johnstone, evidence-in-chief para 9.13.
197 One cumec = 35.3 cusecs (cubic feet per second).
198 W M Fisher "Preliminary Investigations of the Roxburgh Power Development, Otago Central, New Zealand" (1948) p. 89.
199 *Fisher (1948) p. 142.*
200 P F Foster's Figure B.2.
201 Quoted in D J Hamilton evidence-in-chief para 2.15.

> 139.6 metres. The land that had already been purchased, then, i.e. up to the 140.3 metre contour level, fell well within this level. However, as a result of complaints from residents in the area the contour level has been re-estimated. Greater levels of siltation than was expected have increased the contour level for the 1 in 500 year flood to around 141 3 metres. This has resulted in a proposal to purchase additional land, which has been subject to frequent flooding in recent times, up to the 141.5 metre contour level for an area that extends 3.5 km up to the Manuherikia Valley and continues for a further 1.5 km to the Galloway bridge at a contour level of 143 3 metres. The greater contour level for the last 1.5 km is due to backwater effects which were not originally allowed for.

The important point to be taken from this is that there appears to have been a consistent Crown policy to protect (by purchase) land which would be flooded by 1 in 500 AEP return events.

*Economic analysis*

[173] The common law and economics coincide in the law of negligence. We draw on the negligence formula[202] of Judge Learned Hand in *United States v Carroll Towing Company*[203]. If the probability of a flood is called "P" and the magnitude ($X) is "L" (for loss) then the present (discounted) loss is as a first approximation P x L. The loss is discounted because it has not happened yet and may not occur for generations. Then if we call the cost of prevention "B" (the cost of a new floodbank say, or the cost of dredging), the standard of flood protection would be efficient only if B is less than P x L. If the cost of flood protection exceeds the present loss, what is the point of carrying out the work? It would be a waste of money, and thus inefficient.

[174] While the Court heard interesting and useful evidence from Mr Donnelly, the economist called for Contact – and the only economist called in the case – he rather stopped on this issue just at the point we needed him to continue. He wrote[204]:

> ... my understanding is that Contact can manage sedimentation in Lake Roxburgh such that there will be a reduction in the current flood risk to the Alexandra town over the next few years. The cost of managing sediment is or should be incorporated into Contact's Clutha operating cost which is or would be efficient The real point of issue is whether the measures proposed to manage sediment are adequate to avoid welfare reducing losses to third parties. This is a technical issue beyond my area of expertise to comment on. However, I understand (from Mr Foster's evidence) that at present the flood risk to the town is greater than one in one hundred years and that the risk is predicted to drop further over time. I do not therefore accept the

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202 See R A Posner *Economic Analysis of Law* (4th Edition 1992) pp. 163-165.

203 159 2d 169, 173 (2nd Cir 1947).

204 P J Donnelly, evidence-in-chief, para 5.71.

> Society's claim that future flood risk continues to create a detrimental socio-economic impact on Alexandra District's community. There is no economic basis for the claim.

When the Court asked him about this general issue he stated[205]:

> ... You know, the problem is we always discount, so what you'd be looking at is: is it better to leave it until such future times and dealing with it way into the future, as to dealing with it now? Economics would generally favour dealing with it in the future. Now, there could be equity issues involved with that but, from an efficiency point of view, you just wouldn't deal with it then because it would be more efficient to deal with something much – even though the costs might seem quite large, in discounted terms you would favour that. As I said, it has that sort of inter-generational problem in that maybe you are actually inflicting costs on future generations and discounting doesn't take account of that.

*Risk analysis*

[175] As we have said, risk is the product of likelihood and consequences or effects. In this case we read and heard little about the quantification of the likelihood of floods and even less about the measurement of the consequences of a flood in Alexandra.

[176] For the CODC Mr Hamilton had undertaken a review of the design standards – in terms of probabilities – for urban flood protection in New Zealand[206]. He wrote[207]:

> The most common urban standard is 100 years. These design floods were often called the nominal 100 year flood as there was insufficient data to calculate meaningful return periods. If the analysis is done today then the standard is likely to be different (higher or lower) than the nominal standard. The most recent schemes have been opting for higher standards, e.g. Southland (1:200 AEP), Hutt (1:400 AEP as a minimum, highest standard much greater), Palmerston North (1:500 AEP or greater). Variable standards related to the consequences of failure at a site may be selected.
>
> A number of respondents commented that the schemes were often designed based on the largest known flood (NZ European history) at the time. This accords with my own understanding of many schemes. One reason for doing this was that the information on the extent of flooding and flooding damage relating to a particular event made the assessment of the improvements that would be provided by the new works easier for the community to understand and decide whether they wanted a higher or lower standard. People were normally comfortable with a design to cater for the largest recorded flood.

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205 Transcript p. 1017.
206 D J Hamilton, evidence-in-chief para 12.1
207 D H Hamilton, evidence-in-chief, paras 12.2 to 12.4.

> A number of respondents also commented along the lines:
> "Our general view is that we will design to protect areas against a known size flood or a design flow. We try to steer away from return periods and confidence limits if possible". The concerns have been the moving target as our understanding of hydrology has improved with longer records, and the misunderstandings associated with the terminology of 'return period'. For determining scheme economics or relativities for different options then obviously probabilities are used.

[177] Mr Hamilton pointed out[208] that based on national practice the 1878 flood flow would be the minimum standard the town should be provided with. Indeed he said that the stopbanks for Balclutha – downstream of the Roxburgh dam – were designed to protect it from the 1878 flow. Later Mr Martin confirmed that Balclutha was in his opinion protected to a 1:100 AEP standard, but that some engineers considered it was protected only to a less frequent AEP[209].

[178] There is also the question of whether there should be a different standard for imposed risk. Most New Zealand towns which need stopbanks are on floodplains. Lower Hutt is the most obvious example on a large scale. Balclutha is another, within the Otago Region – so the risks are taken on by the people who live there. By contrast, Alexandra is mostly above the flood plain although much of it is on old riverine terraces. The greater risks it now faces are imposed by the operation of the Roxburgh dam. Mr Robinson cross-examined Mr Hamilton on this[210] and obtained the concession that in the largest historical flood in 1878 buildings were swept away in Alexandra. However our understanding is that the buildings swept away were on a road by the river that no longer exists, and at a level below the current stopbanks. We consider Mr Hamilton's conclusion that a greater risk is imposed on present-day Alexandra as a result of the dam is inescapable.

[179] We were referred to a United Kingdom report[211] by the Health and Safety Executive ("HSE") on the tolerability of risk (from nuclear power stations). It found that:

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208 D J Hamilton, evidence-in-chief, para 12.6.
209 Transcript p. 900.
210 Transcript p. 769.
211 HSE (1992) quoted in D J Hamilton evidence-in-chief paras 6.4 to 6.6.

> The distinction between voluntary and involuntary risks is important, especially in the current context. In general, people are willing to take on a significantly higher level of risk if the risk is voluntary. For example, a person may quite happily accept the risks associated with parachuting if they actively jump out of a plane. However, that same person is unlikely to accept the same level of risk if they are thrown out of the same plane wearing the same parachute from the same height. The actual level of risk, if one could be assessed, has probably not changed, but the level of risk acceptability is likely to be significantly lower in the latter situation.

That is important for two reasons. First in the Alexandra case the actual level of risk (or at least its probability component) **has** changed for the worse. Secondly Alexandra residents are currently being forced to accept that higher risk by the operation of the Roxburgh dam.

*Conclusions on flood risks*

[180] The most important factual conclusion about flooding at Alexandra is that the level at which the stopbanks are overtopped (142.75 masl or, if the freeboard is included, 143.25 masl) will be reached more often now that the Roxburgh dam exists. Consequently landowners and occupiers will suffer damage more frequently than if the dam did not exist. We conclude that, at the extremes, there are two competing methods for dealing with the problem. Economists and common lawyers argue: 'because potential flood damage is so remote and uncertain, wait for it to occur and then make the flooder pay the victims'. By contrast, the paternal statutory policy was to purchase all land under a 1 in 500 year flood contour – and appeared to allow for changes in that standard as there were more floods and consequent better knowledge of return periods. Part of the motivation for the cases of ADFAS and the CODC is that Alexandra has lost the protection it used to enjoy from the Crown and the residents are now uncertain about the future.

[181] The expert witnesses all agree that using current (1999) rating curves for Clutha River:

(1) in the current situation the floodbanks would be overtopped at 143.25 masl at an instantaneous flow at Alexandra of 4,300 cumecs (assuming 300 cumecs is not released from Lake Hawea[212]);

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212 The experts oscillated between 250 cumecs and 300 cumecs as the capacity of Lake Hawea to store water rather than release it.

(2) if the Roxburgh dam did not exist then the flow necessary to reach 143.25 masl would be over 5,000 cumecs.

[182] According to the experts under current conditions and knowledge the AEP of a flow of 4,300 cumecs at Alexandra is 1:200; and that of a flow of 5,000 cumecs is estimated to be 1:500 or more[213]. It is useful to determine the levels that would have been reached during floods if Roxburgh dam had not been built. Before construction of the Roxburgh and Hawea dams the value of the 1:200 AEP would have been about 4,600 cumecs. There is considerable dispute about the pre-Roxburgh-dam rating curve for the higher flow (particularly for the 1878 flood) but Mr Foster presented two rating curves[214]. The upper curve is Mr Foster's estimate and the lower is that used by the Regional Council (1960). If we accept these as the two limits of estimates then at 4,600 cumecs the rough level estimates are between 140.4 and 142.0. These are 2.85 and 1.25 metres below the crest of the stopbank.

[183] If we then accept the reduction of flood discharge because of the storage at Hawea the 1:200 AEP would be 4,300 cumecs. For this case of no Roxburgh dam but with the storage at Hawea the rough level estimates limits are between 140.2 and 141.4. These are 3.05 and 1.85 metres below the crest of the stopbank. Then there is no doubt that even with stopbanks Roxburgh dam considerably increases the frequency of flooding at Alexandra.

[184] A crude way of trying to approximate the different probabilities of floods at Alexandra is to compare the AEP – 1:200 – of a flood of 4,300 cumecs which would now clearly overtop the floodbanks, with the AEP of 1:500 or more of a flood of 5,000 cumecs which would have reached the same level before the Roxburgh dam was built. Comparing 1:200 with 1:500 it appears that the probability of a flood at Alexandra has increased by at least 250% as a consequence of the construction of the Roxburgh dam. The figure is not accurate because it includes the 1:500 AEP events in the 1:200 AEPs. On the other hand we have used a very generous overtopping figure of 4,300 cumecs, whereas in practice[215] the stopbanks (less 50 cm freeboard) would be overtopped at 142.75 masl at an instantaneous flow of 4,100 cumecs (with an AEP of between 1:100 and 1:200). In our view increasing the frequency of flooding by 2.5 times is a strong reason for asking the

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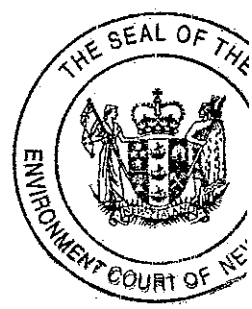
213 See Figures 2 and 3 to the decision (after para [124]).
214 P F Foster, Figure B14.
215 See Figure 1 to this decision.



consent holder to remedy any damage caused by more frequent floods by paying for replacement and other reasonable costs.

[185] In the result we conclude sustainable management under section 5 of the Act entails that the citizens of Alexandra including residents outside the flood banks or on the right bank of the Clutha River, are entitled to either some compensation (mitigation or remedying), or further flood avoidance measures. Given our finding that the most common type of loss which will be suffered by residents and businesses in Alexandra is damage to property, we find that the ideal recipe for dealing with the heightened risk to residents and businesses in Alexandra is to move the loss from them to the consent holder. We will draft a condition – see the next Part [I] of this decision – attempting to achieve that. We will also try to create an incentive – a greater term for the resource consent – for the consent holder to adopt that solution. The advantages of this two-pronged approach are that it:

(1) recognises the small risk of large floods;
(2) gives certainty to residents that if a flood occurs they will be compensated;
(3) provides the consent-holder with an incentive to calculate whether mitigating work (such as dredging and draw-down during floods) will cost less than paying-out in the unlikely event of a flood overtopping banks.

[186] As a second-best position in case that approach cannot be made to work, we find the Roxburgh dam consent should include a condition imposing an obligation on the consent holder to reduce flood levels at Alexandra by whatever means within ten years from now and a total term of 20 years.

### *[I] Conditions*

[187] If a resource consent is to be granted, it may be upon any conditions that a consent authority considers appropriate[216]. Any condition must also comply with the requirements that it:

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216 Section 108(1) of the RMA – subject to exceptions set out in subsection (2).

(1) relates to the activity for which consent is sought, and

(2) serves a resource management purpose, and

(3) not be so unreasonable that no reasonable consent authority or Environment Court would impose it.

Those principles are derived from an English planning case – *Newbury District Council v Secretary of State for the Environment*[217] – and were reaffirmed as applying to the RMA by the Court of Appeal in *Housing New Zealand v Waitakere City Council*[218].

[188] When reading the conditions for each resource consent it is important to recognise that the conditions imposed by the Commissioners' report envisage the Clutha hydro-electric scheme as a whole, with all the resource consents being expressed to be interrelated. Condition 2 to each consent enumerates the other consents which are to be exercised with that consent. We now turn to discuss conditions which are contentious. We refer to the conditions as set in the Commissioners' decision but with the changes agreed by the parties and other appellants.

### *1. Conditions (generally)*

[189] Many of the challenged conditions in the various resource consents have been the subject of determination in earlier parts of this decision so we do not need to consider them further. There are other conditions which we should consider separately and we deal with those now.

*Management plans*

[190] Generally how Contact manages its land in rural areas is its business. However, there are three areas adjacent to towns where we have found that some landscape improvement is desirable as a consequence of the damming of Lakes Hawea and Roxburgh: first, the lakefront at the southern end of Lake Hawea; secondly, the removal of dead vegetation east of the Neck between Lakes Hawea and Wanaka; and thirdly, at Alexandra, the area from the Little Valley Bridge down the Manuherikia River, past the "Linger and Die" area to the Manuherikia's confluence with the Clutha River.

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217 [1981] AC 578.

218 [2001] NZRMA 203.

[191] The relevant conditions for the dam consents[219] (2001.383 (Hawea); 2001.385 (Clyde) and 2001.386 (Roxburgh) and Land Use consent to alter Lake Roxburgh lakebed etc – 2001.398) provide in each case that the consent holder is to prepare a "Landscape Management Plan", "Landscape and Visual Amenity Plan" or a "Foreshore Management Plan" within two years that describes how it will manage the effects of its activities. The relevant appellants were concerned in each case that the proposed management plan would be carried out. We consider the rules guiding all management plans should be more precise.

[192] For example, in addition to the specific matters discussed earlier in part [D] of this decision we consider the conditions for the Lake Hawea Foreshore Management Plan should address these matters:

(1) The measures to avoid, remedy or mitigate erosion need not apply to land which is owned by Contact for two reasons. First if Contact owns land around the lake margin it is because it is eroding and some erosion is inevitable for the lengthy (human) period which the lake will need to find its new levels; and secondly, as we have described, some erosion is probably needed to supply gravel for the onshore drift from the eastern end of the lake to the western end. However, it may be appropriate to include "public land and reserves" in the list of priority areas.

(2) We consider that action should be undertaken (without delay) especially along the lake margins and adjacent land in front (north) of Lake Hawea township. The condition should require a "programme" of changes and timelines, not merely an "outline" of them. The condition is to state that the programme in the FMP is to be implemented.

(3) The Gladstone Gap stopbank is to be included in the FMP. In addition we consider that the extent of the likely overland flow path from the stopbank to the Hawea River should be identified on a hazard map. (This matter may need to be duplicated in Consent 2001.384 Gladstone Gap Stop Bank Water Permit to Dam.)

(4) The term "review" of the FMP be replaced with "revision" or "reassessment" to avoid confusion with a statutory review under section 128 et ff of the RMA.

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219 Hawea permit to dam 2001.383 condition 11; Clyde permit to dam 2001.385 condition 19; Roxburgh permit to dam 2001.386 condition 18; Roxburgh land use consent 2001 398 condition 9.

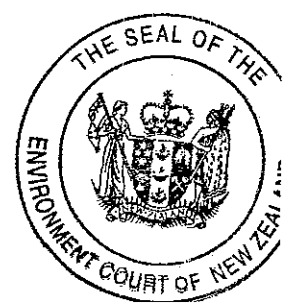
(5) Any revision or reassessment shall include consultation with the same parties as were involved in the development of the initial plan.

[193] Similar changes to those listed in subparagraphs (2), (4) and (5) in the preceding paragraph should be made to the conditions relating to the Clyde Landscape Management Plan (Condition 17, Consent 2001.385) and the Roxburgh Landscape and Visual Management Plan (Condition 9, Consent 2001.398). Some further standardisation of wording in all of the management plan conditions may be appropriate.

*Annual Reporting*

[194] As a result of an annual reporting condition being included in several of the consents, the consent holder will likely prepare one combined annual report. Given the interrelated nature of the consents, we require that copies of any annual reports be supplied not only to the Otago Regional Council but also to all of the relevant local authorities: Queenstown Lakes District Council, Central Otago District Council, and Clutha District Council.

[195] As these reports will be available to the public, it is open to any other parties or individuals to have access to them, and arrangements could be made accordingly. We consider that wider distribution of these reports will go some way to improving communication between the interested parties, including the various local communities. In this regard we have also considered whether there would be merit in establishing a forum of stakeholders (sometimes called a "Community Committee" or "Liaison Group") to further facilitate communication between all parties and possibly provide a mechanism, other than litigation, to resolve concerns. We conclude that, at this stage, it is not necessary for such a forum to be formalised through these consents. Of course that does not preclude the key stakeholders, such as the local authorities and the consent holder, from voluntarily setting up such a forum. We consider that it could serve a useful and positive purpose even if it were to meet only once a year to discuss the contents of the annual report. In considering this matter we recognise that not all parts of the system and these consents may be of equal interest to all parties. It may be that subgroups with a common interest in a geographical area or issue would better serve this purpose, and we note that other consent conditions require consultation between affected parties.



*Flood Management Procedures*

[196] We have some concerns with the repeated conditions about the flood management procedures. First there is the chicken-and-egg aspect of this condition: which comes first, the conditions of consent or the Flood Rules? It seems to us that the Flood Rules should have priority since they are for potential emergencies and to protect lives and then property.

[197] Secondly we note that there are various versions of the condition included in the different consents. For example these differ in the listing of the local authorities to be consulted, and then in specifying how the ORC is to be notified. In line with our earlier comments on the Annual Reporting condition, one standardised condition should be used in each of the relevant consents. All of the Clutha River local authorities should be involved.

[198] Thirdly, many of the proposed conditions include the "Clutha Flood Rules Version 1" as a part of the consent. Then the condition provides for them to be changed, and indeed requires them to be updated within six months, and approved by the ORC, without following the procedures in the Act and without other interested parties having any rights of involvement. In our view the Flood Rules should not be in any conditions. The Flood Rules, like other management plans, should be required by a condition. However, the details are maintained outside of the consent. In the latter case the conditions of consent will need to be specific as to the matters to be complied with and achieved by the Flood Rules.

*Maintenance of lake shore structures*

[199] The three dam consents came with conditions[220] imposed by the Commissioners for "Maintenance of Lakeshore Structures (and Facilities)". The number of facilities varied for each lake. They were:

- Lake Hawea – a "boat ramp" at the Neck[221]; and two at the Hawea Motor Camp;
- Lake Roxburgh – three boat ramps;

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220 Hawea permit to dam 2001.383 condition 11; Clyde permit to dam 2001.385 condition 14; Roxburgh Arm to dam 2001.386 condition 12.

221 We have put scare quotes around the "boat ramp" at the Neck, because it was the unopposed evidence of Mr N J Gillespie for Contact that there is no such boat ramp, and our site inspection confirmed its absence.

- Lake Dunstan – six boat ramps, 15 picnic grounds with tables, barbeques in some cases, toilets and rubbish bins; four floating jetties.

Contact appealed those conditions, but they were opposed by all other remaining (except the ORC) parties in their respective territories.

[200] As for Lake Hawea: first, there is a simple reason not to require maintenance of a boat ramp at the Neck: as we have said – there is no ramp there. Secondly, the boat ramps at the Lake Hawea Motor Camp are privately owned so we do not consider there is any ground for Contact to have to maintain them. Not only does it not have legal power to do so, but there is no reasonable connection between what is requested and the fact that the lake has been raised.

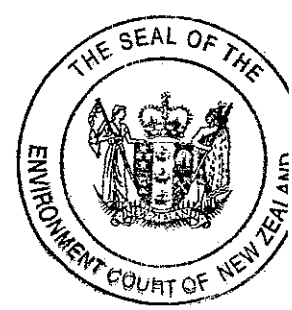
[201] All the picnic grounds and boat ramps were installed by one of Contact's predecessors when the Clyde dam was built. However it is difficult to see how the operation of the dam has caused any damage to those facilities. In economic jargon those facilities are positive externalities enjoyed by the public. Just because Contact no longer chooses to maintain them does not entail that the Court should force it to. Since the operation of the dams is causing no adverse effects on the facilities, there should be no condition imposed for their maintenance. Accordingly the conditions should be deleted.

*Safety Signage*

[202] Various parties asked for more signs to be erected at various places. We consider the conditions in the Commissioners' Decision are adequate.

*Closing down the scheme at the end of the term*

[203] This case highlighted potential difficulties if a consent-holder simply wanted to walk away from the dams once the water permits expired. A condition should manage this. A draft condition for the parties to consider might read along these lines:



***15. Closing Down***

*If at the expiry of the term of this consent the consent holder:*

*a) does not apply for a similar new consent; or*

*b) applies for a new (replacement) resource consent and the application is refused*

*– then the consent holder shall cease operating the resource consent on the following conditions:*

*(1) it shall (temporarily) continue to act as if the resource consent was in existence;*

*(2) it shall forthwith after the resource consent expires or a renewal is refused (as the case may be) prepare a management plan for the closing down of the scheme of which the resource consent is part, and submit that management plan to the Otago Regional Council;*

*(3) after the management plan is approved by the Otago Regional Council, the consent-holder shall follow the management plan with any changes made by the Otago Regional Council for the closing down of the scheme for as long as is required by that management plan.*

***2. Roxburgh Water Permit to Dam 2001.386***

[204] We turn to conditions relating to flooding of Alexandra in respect of Roxburgh water permit to dam 2001.386. There are a few direct measures that we have power to order be taken to avoid, remedy or mitigate floods at Alexandra from the operation of water permit to dam. We consider each in turn. As for totally avoiding flood damage whilst we accept that is a strong policy preference in the Regional Plan[222], there are two ways that could be achieved: on land or in the lake. As to the first, no party seriously suggested that the present stopbanks should be raised. Certainly we read no evidence either of the costs of buying the necessary land, removing houses, building higher banks, and landscaping, or of the benefits that could be achieved. We have already discussed the second type of method of flood avoidance in part [F] of this decision.

[205] As for mitigating flood damage, the starting point is that if the Lake Roxburgh levels were not operated so as to enable electricity to be generated the risk of floods at Alexandra would be less. That is impractical. However the disadvantage of mitigation conditions is that they leave

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[222] Policy 5.4.2(2) [Regional Plan pp 41-2].

Contact open to two kinds of proceedings: first for an enforcement order under section 314(1) of the RMA if it fails to achieve the condition. That may appear to be a desirable course. The failure would also expose the consent holder to a prosecution under section 338 of the Act. That appears to be most undesirable for events as unlikely as the extremely large floods we are most concerned about.

[206] We turn to the idea that the adverse effects of floods should be remedied. The starting point for this scenario is that Alexandra should wait until a flood occurs and then Contact should reimburse the affected residents for[223] all actual and reasonable costs which they have incurred in remedying the adverse effects of flooding on them. The traditional way of achieving that would be to let the residents of Alexandra request the help of the common law when a large flood eventually exceeds the flood banks and causes damage. The disadvantages of that remedy are first that it is uncertain since the common law does not appear to be completely settled in the murky waters of liability for flood damages; secondly there may be complications under the statutes under which Lake Roxburgh was built and operated; thirdly the existence of the water permit itself causes problems for any claimant alleging nuisance or negligence since the consent holder can plead a defence of acting under lawful authority; and fourthly the costs of High Court litigation can be truly formidable even for a whole community.

*A remedial condition?*

[207] In view of the uncertainties of the common law remedy, and even its availability, we consider that a remedy under the Act is preferable. There is a possible management choice which involves remedying the adverse effects of floods after they occur. It is to impose a condition on the water permit to dam which requires Contact to remedy flood damage under a voluntary compensation regime. There is some doubt whether we have the power to impose a compensation provision on Contact although our analysis of the meaning of "remedying" in section 5(2) of the Act suggests those doubts are misplaced. In any event we can create an incentive for Contact to volunteer one by providing for differential terms (35 or 15 years) depending on whether it is volunteered or not. Alternatively, if Contact oppose the condition and any of the other parties considers we have power to impose such a condition on Contact they should seek leave to give submissions on the issue. We should add that we regard this type of condition as appropriate for

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223 The wording here is taken from section 314(1)(d) of the RMA.

the circumstances of Alexandra because human life is not at great risk and nor are any important ecological values. Both those sets of values (especially the latter) are difficult to quantify.

[208] We envisage a compensation (remedial) provision under which Contact will commit now to compensating people who suffer from flood damage at Alexandra as follows:

1. Residents

Contact will offer to pay to each occupier or owner:

(a) the actual and reasonable costs of the cleanup and of repairing or replacing (if a valuer certifies that is necessary) all fixtures, fittings and chattels damaged by a flood (up to a certain limit per item, unless a proper pre-dated valuation is supplied); and

(b) either the actual and reasonable costs of alternative accommodation while the floods recede, repairs are carried out and the house is made habitable;

(c) an allowance of $50 per person displaced per day as extra living costs if they staying with family, friends, or willing strangers;

(d) $4,000 per house (at 2005 values but adjusted by the CPI increase thereafter) for cleanup costs, damage and inconvenience

- if the house is flooded; or

(e) the actual and reasonable costs of accommodation if ordered out by the Civil Defence but in fact the house is not flooded; and

(f) $500 (CPI adjusted) for distress and inconvenience; and

(g) full replacement costs if the house is destroyed.

2. Businesses

Contact will offer to pay each business flooded:

(a) all rentals (or an equivalent at 8% of capital value if the business owns its premises) while the business is under water, being repaired, and made fully operable;

(b) the cost of replacement of all damaged or destroyed stock (provided Contact has the right to the stock so replaced);

(c) the actual and reasonable costs of repair;

(d) full replacement costs if any building is destroyed.

(e) all standard wages while the business is not operating;

(f) $1,000 (CPI adjusted) for distress and inconvenience;

3. If there is any dispute over any figure it shall be settled by a chartered accountant and a valuer in a brief "look-sniff" arbitration without lawyers on the following terms:

(a) one accountant and one valuer ("the panel") to settle all disputes raised between any residents or business and the consent holder shall be appointed either:

(i) by the Mayor of the Central Otago District Council and Contact by agreement; or

(ii) failing such agreement by the Chief Executive of the ORC, from a choice of six chartered accountants and six valuers – three nominated by the Mayor of the Central Otago District Council as representative of the community, and three by the consent holder;

(b) all the chartered accountants' costs and valuers' costs shall be paid by the consent holder;

(c) all disputes shall be settled on such invoices and brief evidence as the panel calls for and are provided to them in writing within ten days of their request;

(d) there shall be no reduction for alleged settlement in respect of replacement chattels;

(e) no hearing will be required but access to private property will be given if the panel wishes to inspect any house, building or its contents (provided prior telephone or written notice is given);

(f) all other procedures are to be agreed by the parties or (failing that) fixed by the panel.

4. Contact would not be liable for any damage caused by a flood so large it is within 5% of the possible maximum flood.

5. Any person who accepts Contact's offer of compensation (as fixed by agreement) must agree to give up all other remedies.

6. Any person who submits a dispute to the panel must agree to give up all other remedies before the panel starts its inquiry.

There are various other consequences of such a regime which will need to be worked through. For example, are the compensation figures reasonable? Will occupiers be able to dispense with insurance for flood damage in reliance on the consent holder? Should roads and other services be repaired at the consent holder's cost? We will seek submissions from the parties as to:

- those issues and any other issues raised by any party;
- whether such a condition is within our powers and, if so, appropriate;
- whether evidence on compensation figures is necessary; and
- any improvements in the wording of the condition.

*Flood Hazard Maps*

[209] As we have stated the only flood hazard maps for Alexandra we were given were:

- An otherwise blank (no names) cadastral map of Alexandra with a blue line showing the approximate limits of the 1999 flooding;
- A nearly indecipherable copy of a map in the CODC's district plan.

Mr Hamilton, the engineer called by the CODC, recommended[224] that inundation maps were prepared by Contact on the grounds that it causes the greatly increased flood risks. We agree, although implementing that is not completely straight forward since as Mr Hamilton conceded in cross-examination[225] there are any number of estimates about what constitutes a 1% AEP flood (or a 2% or 0.2% AEP) let alone a probable maximum flood ("PMF"). Despite that we consider flood hazard maps should be prepared.

[210] We consider that the preparation of flood hazard maps should be a condition of the Roxburgh Permit to dam[226] along the following lines:

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224 D J Hamilton, evidence-in-chief para 11.4.
225 Transcript p. 768.
226 ORC No. 2001 386.

Flood Hazard Maps for Alexandra

X(a) Within 9 months of commencement of this water permit the consent holder shall lodge with the Manager for approval flood hazard maps for the following real and hypothetical flood events:

- the 1999 flood;
- 
- 1% AEP;
- 
- the probable maximum flood

(b) The hypothetical flows shall be settled by any three of four experts conferring (one for each of Contact, the ORC, the CODC and ADFAS) with Contact contributing expenses for three days of preparation and half-day of meeting for the experts.

(c) The maps shall contain a prominent note that changes in the AEP will occur.

(d) Copies of the flood hazard maps shall, forthwith after approval, be served on the CODC and ADFAS.

*Sediment transport in Lake Roxburgh*

[211] We have already discussed in part [F] of this decision how Contact is hopeful that it can reduce flood levels at Alexandra by a further 1.1 metres from post 1999 flood levels by a programme of enhancing natural floods with drawdown. The Commissioners' report was slightly sceptical about the possibility of success of that (as are we) but added a condition anyway. Condition 11 to the Roxburgh Dam Permit (2001.386) as proposed by the Commissioners states (relevantly):

11. Flooding

(a) The consent holder shall within ten years of the commencement of this consent ensure that for a flood discharge of 3600 cumecs at Roxburgh Dam and a lake water level at the Roxburgh Dam of RL 129.8 above datum the predicted flood water level at Alexandra Bridge [as determined by an independent panel, the membership of which is defined in (d) below], shall not exceed RL 141.27 m above datum

[brackets added)

[212] Condition 11(b) provides that the consent holder must calculate the predicted water level at each cross section of the dam for a flood of 3,600 $m^3$/sec and a lake level at the Roxburgh dam of 129 masl and forward the information to the Regional Council.

[213] Then, in order to ascertain whether the target of achieving a 1.1 metre reduction in flood level at Alexandra within ten years, condition 11(c) provided:

> (c) At five yearly intervals from commencement of consent the consent holder must appoint a panel of independent technical experts to:
>
> - Examine the data obtained from the biennial surveys of cross sections within Lake Roxburgh.
> - Independently calculate the predicted water levels at Alexandra for a flood of 3600 cumecs measured at Roxburgh Dam and a lake water level at the Roxburgh Dam of RL 129.8 m above datum.
> - Examine, for the period from the commencement of this consent the extent that predicted flood levels have been lowered, by actions of the consent holder in redistributing sediment and removing sediment from within Lake Roxburgh. Then based on that examination predict the probability of the consent holder achieving the target of lowering the flood level by 1.1 metres in ten years to 141.27 m above datum at Alexandra as in sub paragraph (a) above.
> - Report their findings and comment on any discrepancy between their findings and those of the consent holder.

[214] Then condition 11(f) and (g) provide:

> (f) If the consent holder, using the information obtained from the bed survey of Lake Roxburgh conducted in the eighth year from the commencement of this consent, predicts flood water level at Alexandra greater than RL 141.82 m above datum for a flood of 3600 cumecs measured at Roxburgh Dam and a lake water level at the Roxburgh Dam of RL 129.8 m above datum the consent holder shall immediately investigate and report on alternative methods of reducing the flood level at Alexandra. The report is to be peer reviewed by the independent panel appointed under sub paragraph (c) above, and forwarded to the Otago Regional Council no later than ten years from the commencement of this consent.
>
> (g) If the panel's predicted flood level at Alexandra for a 3600 cumecs flood ten years from the commencement of this consent is not below RL141.4 m above datum (being the target level of RL 141.27 m above datum plus a margin of 10% of the required flood level reduction of 1.1 metres) the conditions of the consent shall be reviewed.

[215] In other words the Commissioners asked Contact to attempt to reduce the flood level at Alexandra within ten years by 1.1 metres from 142.37 masl to 141.27 masl (when 3,600 $m^3/sec$

was being discharged from the dam and the lake level at the dam was 129.8 masl). If the condition was not met in the opinion of an expert panel, then after a further report for the consent holder on alternative methods, the condition is to be reviewed.

[216] In our view this condition would not be necessary if our proposed remedial condition can be made to work. However, in case it cannot, we now consider whether the Commissioners' decision can be made to work or whether it should be deleted as Contact requested, or tightened up as ADFAS and the CODC sought.

[217] ADFAS appealed condition 2001.386 complaining that it should have imposed a 1.1 metre reduction from 2003 when the Commissioners' decision was issued. Further ADFAS wanted the condition to be tightened so that Contact must achieve the condition regardless of the effectiveness of floods and drawdown. If it had to do so to achieve the reduction, Contact should be obliged to dredge sediment from the Narrows. Finally ADFAS suggested, through Mr Randle's final submissions, that a test relying on backwater curves be imposed to ascertain whether the condition is met, and that such a course would be preferable to having a review panel.

[218] There are a number of difficulties with the Commissioners' condition. First, there is a question as to how much any draw-down would contribute to reduce future flood levels. Secondly, all the engineering experts agreed that there are likely to be diminishing returns from future floods, and that most of what is likely to be achieved has already occurred. Thirdly, the scale of flood necessary to remove sediment from the Narrows and redeposit it closer to the Roxburgh dam might be so large that a relatively small increment in size (200-500 cumecs) could push it over the stopbanks at Alexandra. Fourthly, the condition imposes a relatively cumbersome process for checking by a panel, when matters could be simpler. Fifthly, if the consent holder fails to meet the condition, that merely triggers a review.

[219] We consider a rating curve should be prepared for the 1.1 metre reduction scenario which shows levels at Alexandra for flows of less than 2,250 cumecs. That rating curve should be an extension of Mr Foster's line showing the "Flood Projection 2010" in his Figure 4.16[227]. The idea is that the curve would allow testing of whether the consent target shown in that figure is reached because it would show levels at Alexandra for more frequent flood flows. Then it would be a

[227] A copy of Figure 4.16 is annexed in the Appendices to this decision.

simple matter of observation to see if the water levels were in reality trending to the levels shown on the rating curve within the limits of stream gauging accuracy.

[220] In case it assists the parties we have attempted to modify paragraph 11 to reflect that intention.

[221] We suggest that condition 11 should be amended in the following ways:

(1) Condition 11(a) shall be amended by deletion of the words in square brackets.

(2) Conditions (c) – (g) should be deleted and the following substituted:

(c) By 10 November 2013 the flood level at Alexandra at an instantaneous flow at Alexandra Bridge of 1,500 cumecs and at maximum drawn down lake level at the Roxburgh Dam must not exceed a height to be fixed under (d) below.

(d) The consent holder is to prepare and serve on the Regional Council, the CODC and ADFAS:

(i) a copy of Mr Foster's backwater curve Figure 4-16 called "Flood Projection 2010" calculated back to a flow of 1,400 cumecs; and

(ii) any supporting data or information, and the model or calculations used

– by 30 June 2006.

(e) The other parties are to lodge and serve memoranda as to whether they agree with Mr Foster's amended "Flood Projection 2010" or not, by 31 August 2006.

(f) If the experts cannot reach agreement then the backwater curve is to be fixed by independent and appropriately qualified expert(s) approved by the Regional Council. All costs and expenses associated with the engagement and work of the expert(s) under this subpara (f) are to be met by the consent holder.

(g) By 15 December 2013 the consent holder must lodge a full written report with the Regional Council (copied to the CODC and ADFAS) as to whether condition 11(c) is being met; and if so, what is proposed to be done to meet the standard.

(h) If the Regional Council advises by 31 March 2014 that the condition is not being met to its satisfaction then:

(i) The consent holder must immediately start to reduce sediment in other ways (such as dredging or exaggerated drawdown using the sluices). Those techniques should be investigated further during the ten year period from the 2003 start, so that if the consent holder's report is negative then the consent holder is ready to act on an alternative method.

(j) The consent holder should have a further nine months after 31 March 2014 to lodge all necessary applications (if any) for further resource consents to implement any alternative method of removing sediment from the Narrows.

[222] In addition, since the consent process contemplated in the new paragraph 11 will inevitably take time and a few years should be given to see if the new method will work before new water permits are required, the term of this resource consent should be 15 years from 2003, if condition 11 is to be retained (in an amended form).

*Sediment Management Plan*

[223] In respect of condition 20 (Sediment Management Plan) the CODC also sought completion of sediment management plan within two years (not 4). Our view is that there is plenty of time and that it is better the work is carried out carefully rather than rushed. Thus we confirm the Commissioners' Decision on this issue.

### *3. Other specific conditions*

*Lake Hawea Information and Monitoring (Water Permit to Dam 2001.383)*

[224] It was clear from the evidence that the collection of data/information and monitoring at Lake Hawea needs to be more comprehensive and particularly include effects relating to erosion and dust issues. Some of the following matters may be appropriate to include in one or more of the conditions, such as Monitoring (Condition 3) and Foreshore Management Plan (Condition 10). The consent conditions should include further detail as to:

(1) A detailed survey, to a suitable scale, of the contours of the lake bed, the lake margins and the land behind the landward limit of the land owned by the Crown and/or the consent holder around the southern end of the lake;

(2) Monitoring (at six monthly intervals and after every major rainfall event (to be defined)) and recording of profile measurement points at all erosion prone points of the Lake Hawea foreshore;

(3) Wind speed and direction measurement and recording at a suitable place near the lakeshore at Lake Hawea township;

(4) Recording of concentrations of ambient dust in the air for five years at suitable places along the lake foreshore (and on the land to the south) of the Lake Hawea township;

(5) Whether there should be control sites (e.g. at Glenorchy or in Canterbury) in respect of ambient dust quantities;

(6) Further details of matters to be addressed in the monitoring programme and procedures, such as:

- Maintenance and calibration of monitoring equipment;
- Specify procedures for monitoring lake levels at the sites defined in the table in condition 8 of Consent 2001.383;
- Reporting frequency and format, which should include at least:
  - Summary graphs showing daily (or other appropriate units of time) readings of the measured data (accompanied by raw data, provided to the Regional Council in a format as agreed with the General Manager);
  - An interpretation of monitoring results;
- Identification of staff and or contractor responsibility.

*Hawea Water Permit to Dam 2001.383*

[225] In respect of Condition 7 (Dam Safety Requirement) the HCA and the QLDC are concerned about the safety of the dam. Mr Carr[228] raises the possibility of a flood coinciding with a slip in the Mt Maude landslide or an earthquake. The latter cannot be predicted but the evidence of Dr Hicks is that the Mt Maude landslide is being constantly monitored, and that shows that it is moving at 1 mm per year. The risk is too small to require any other action than that in the Commissioners' condition.

[226] In respect of condition 9 (Lake Levels) the opposing appellants (the HCA, QLDC and Dr Douglas) sought that the maximum lake level be lower and the minimum higher. We have not

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228 Evidence-in-chief para 7.9.1.

accepted the arguments and evidence about that – see Part [D] of the decision. So no change is required.

[227] The Regional Council was concerned that the Electricity Commission (being the New Zealand Electricity Industry's governing body at present) might use Lake Hawea as a convenient way of keeping retail prices low rather than as a last resort when there is the threat of brownouts or worse within four months. We have amended clause (b) in an effort to make clearer the circumstances when Lake Hawea can be lowered below the normal operating minimum of 338 metres to the absolute minimum of 336 metres above datum. We should record that while Lake Hawea has only been lowered below 338 metres two or three times in the last 20 or so years, regrettably that may occur more often in the next 10 or 15 years because there are uncertainties whether there is enough provision for infrastructure within New Zealand as a whole to supply the increasing demand for electricity over that period. Consequently there may be more shortages

[228] Out of caution we hold that condition 9(b) should be amended by adding after (ii):

> (iii) *that is determined solely by total normal capacity to generate – excluding specialised reserve generation such as the Whirinaki plant – electricity in New Zealand, and without regard to the price of generation.*

*Gladstone Gap Water Permit to Dam 2001.384*

[229] For the HCA Mr Carr requested[229] that the dam be removed but since the structure is a permitted activity we have no power to order that. However the HCA may be correct that a water permit is required for any discharge from the Gladstone Gap even if it only occurs very rarely. A permit is required because first there is a discharge[230]; and secondly there is no "emergency" defence[231] since the discharge may be reasonably foreseeable – it is designed for. However, Contact has, if it is lucky, a few hundred years to apply for the resource consent or persuade the Regional Council to undertake a plan change, or promote its own private plan change.

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229 E W Carr, para 7 4 1
230 Section 14 of the Act.
231 E W Carr, para 7 4 1.

[230] The HCA requested that the area between the coffer dam and the lake shore be set aside for recreation purposes. We have no power to direct that.

[231] Finally landscaping in this area will be managed under the Foreshore Management Plan for consent 2001.383.

*Hawea Discharge Permit to Discharge Water 2001.392*

[232] In respect of condition 13 (Riverbank and Berm Stability) the HCA sought[232] that "profile" measurement points be established at "erosion-prone" parts of the Hawea River banks. We prefer the evidence of Dr Hicks that this is unnecessary and expensive. In any event the condition provides that Contact is to pay 50% of a two-yearly investigation into this erosion. We consider that is sufficient.

[233] The CODC also seeks[233] that this condition should apply not only to the Hawea River but also to the upper Clutha River on the ground that riverbank instability through variable flows in the Hawea may also occur below its junction with the Clutha. However, the latter is much larger and is itself subject to some (if lesser) flow variation. We consider there may be difficulties in attributing causation to Hawea River flows and so we decline to extend the condition downstream.

*Clyde Water Permit to Dam 2001.385*

[234] Both Contact and the CODC challenged Condition 7 (Dam and Landslide Safety Requirement). Contact's expert evidence satisfied us this condition may be deleted.

*Roxburgh Water Permit to Dam 2001.386*

[235] The CODC sought a change to Condition 7 (Dam and Landslide Safety Requirement) but it called no expert to say that a further measuring station would be useful. We are satisfied by the evidence of Mr Macfarlane for Contact that a further station is not necessary.

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232 Mr Carr, evidence-in-chief para 7.11

233 Mr Whitney's evidence-in-chief para 187.

[236] Condition 15 (Land Purchase) relates to potential flooding issues on the right bank of the Clutha River (Lake Roxburgh) upstream from Alexandra. ADFAS challenged this condition as set by the Commissioners. Condition 15 directs the consent holder to investigate flooding further.

We consider this condition is adequate, because we heard insufficient evidence of the extent of potential flooding on the right bank of the Clutha River at Alexandra, and no evidence of potential losses so we are not in a position to impose any other condition.

*Roxburgh Land Use Consent to alter Lake Roxburgh Lakebed and Lower Manuherikia Riverbed No. 2001.398*

[237] CODC and ADFAS had concerns about condition 8 (Maintenance of the Manuherikia Riverbed). Condition 8(a) requires that:

> The mean bed level and thalweg level of the Manuherikia River between Lake Roxburgh and the Shakey Bridge shall be maintained at or below the levels shown below:

| Section | Location km u/s[234] from Lake Roxburgh | Mean bed level (RL metres) | Thalweg[235] level (RL metres) |
|---|---|---|---|
| M1 | 0 | 132.3 | 131.3 |
| M3 | 0.53 | 133.4 | 132.1 |
| M4 | 0.76 | 133.5 | 131.3 |

[238] In their commentary on this condition, the Commissioners wrote that[236]:

> The implication of this condition is that dredging will be needed in the lower Manuherikia River. There are two reasons for this . . The second reason is that the Manuherikia River introduces significant quantities of sediment, including stones and gravel, into Lake Roxburgh just below Alexandra. This will make it more difficult for the consent holder to lower the flood levels at Alexandra as required by Condition 5 of this consent.

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234 u/s = upstream.

235 The Thalweg level is the level of the lowest point in any right-angled cross-section of a river.

236 Commissioners' Decision paragraphs 141-142 [p. 350].

[239] However Mr Johnstone pointed out in his evidence that effectively the Commissioners' condition simply maintains the current bed level. To achieve the Commissioners' aim – and we agree that is desirable – he suggested[237] that the table in the condition be amended to read:

| Section | Location km u/s from Lake Roxburgh | Mean bed level (RL metres) | Thalweg level (RL metres) |
|---|---|---|---|
| M1 | 0 | 131.6 | 130.5 |
| M3 | 0.53 | 132.3 | 130.8 |
| M4 | 0.76 | 132.6 | 131.0 |

That would restore the riverbed levels to 1979 levels. It would have the additional advantages of reducing flooding on the true left bank of the Manuherikia River and erosion as boulders. Cross-examination did not shake Mr Johnstone on this point at all, and accordingly we agree that the condition should be changed as he suggested.

[240] Consequential changes to the Manuherikia conditions will need to be made as a consequence of our change to the Roxburgh Dam 2001.386 condition 11.

*Clyde Water Permit to Dam 2001.385*

[241] We have concerns about the vires of conditions 11(c) and 12(c) which seek to limit the powers of a consent authority when deciding future resource consent applications. All parties should review these (and similar conditions elsewhere in the suite of consents) before submitting final conditions to the Court.

### *[J] Financial contributions*

[242] Various appellants have sought financial contributions for:

(1) alternative legal access to or along the margins of the lakes and Clutha River;

(2) public open space or public facilities in an alternative location on the lake or river margins;

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237 N P Johnstone, evidence-in-chief para 7.13.

(3) planting, transplanting or maintenance of new or existing vegetation;

(4) landscaping or planting elsewhere than the site of the activity;

(5) works protecting the margin of the lakes and river;

(6) protecting areas of cultural heritage;

(7) protecting ecosystem values or habitats beyond the area immediately affected by the activity.

The contributions were sought under chapter 17 (Financial Contributions) of the Regional Plan and correspond, roughly, to headings 17.2.1 to 17.2.7 in that chapter[238].

[243] The Court's jurisdiction in respect of these matters was the subject of the Fourth Procedural Decision in these proceedings[239]. As that decision noted[240]:

> A puzzling aspect of the Regional Plan is that most, perhaps even all, of the circumstances where financial contributions may be imposed, are not taxing provisions for Council utilities or services (roads, reserves etc). Rather they are circumstances where direct reliance on section 5(2)(c) – the duty to remedy or mitigate adverse effects – would appear to lead to a similar result in an effort to achieve a net conservation benefit: *Baker Boys Limited v Christchurch City Council, Remarkables Park Limited v Queenstown Lakes District Council*. This factor may be relevant at the substantive hearing.

It may therefore be useful to set out now our understanding of the role of, and limits to, financial contributions.

*Financial contributions under the Act*

[244] Sustainable management under section 5 of the Act promotes using natural resources, such as water, and physical resources, such as dams and turbines, to enable social, economic and cultural wellbeing (for example those resources together generate electricity to light and warm homes or to run factories) whilst at the same time avoiding, remedying or mitigating adverse effects. Part 2 of the Act gives guidance as to when effects may need to be avoided rather than remedied or mitigated.

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238 Regional Plan pp. 247-250.

239 Decision C204/2004 dated 23 December 2004.

240 Decision C204/2004 at para 18.

[245] There may also be occasions when mitigation of adverse effects can take the form of environmental compensation to achieve a net conservation benefit: *Baker Boys Limited v Christchurch City Council*[241], *Rutherford Family Trust v Christchurch City Council*[242]. For example in *Memon v Christchurch City Council*[243] the Court allowed a rezoning of a low hilltop in an outstanding natural landscape from a Rural zone to a Living (Residential) zone in return for other important landscape features– a valley floor and adjacent hillsides – remaining useable passively (to look at, as before) and becoming actively useable, for recreation and for flood ponding. In that case, adding extra positive effects to the use and development and protection of different parts of the outstanding landscape meant the rezoning outweighed the negative effects of the hilltop developments. By analogy in these proceedings, damming of the Clutha might be permitted to continue, with the continued flooding of the Cromwell and Roxburgh gorges if some environmental compensation was forthcoming.

[246] It is necessary in each case to weigh positive mitigating effects on site against adverse effects. As the Environment Court wrote in *Remarkables Park Limited v Queenstown Lakes District Council*[244]:

> "Environmental compensation" – as discussed in *Rutherford Family Trust v Christchurch City Council* and *Memon v Christchurch City Council* might include provisions including vesting of land and/or easements and covenants in or in favour of a council. Such vesting, covenants or conditions can be for pedestrian or other essentially utilitarian reasons – vesting of rights of way roads etc or for ecological and/or landscape reasons. But essentially environmental compensation is almost always of land subject to the subdivision/development. In theory conditions could be volunteered for other land not subject to the applications if it is available to the subdivider/developer and of equivalent ecological/environmental value . . .

[247] A difficulty arises as to how remote adverse effects can be and still be regarded as adverse effects which will be caused by a proposed activity. Causation has always been a difficult concept philosophically; the difficulties are enhanced with the development of chaos theory, as represented by the conceit that the fluttering of a butterfly's wing might cause a cyclone in the Caribbean Sea.

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241 [1998] NZRMA 433 at para [61].
242 C26/2003 (21 March 2003).
243 C116/2003 (15 August 2003).
244 [2004] NZRMA 433 at para [36].

[248] Indirect, partial and remoter effects may be compensated for under the financial contributions provisions of section 108 of the RMA. That provides:

> **108. Conditions of resource consents –**
>
> (2) A resource consent may include any one or more of the following conditions:
>
> (a) Subject to subsection (10), a condition requiring that a financial contribution be made:
>
> (b) . . .

Section 108(10) states:

> (10) A consent authority must not include a condition in a resource consent requiring a financial contribution unless –
>
> (a) The condition is imposed *in accordance with the purposes specified* in the plan (including the purpose of ensuring positive effects on the environment to offset any adverse effect); and
>
> (b) *The level of contribution is determined in the manner described in the plan* (Emphasis added)

[249] The rationale for financial contributions as an attempt to remedy or mitigate adverse effects was stated in the *Remarkables Park* case as being[245]:

> . . . they are clearly not usually contemplated to be for services to be provided on the land being subdivided and/or developed (those are normally the landowner's/developer's responsibility) – but for services off-site, that is from the site's boundary and radiating outwards. The very name of these specialist (Pigovian-type) taxes suggests that only a contribution not the full cost of such services needs to be paid by the landowner/developer.

[250] In our view it is important to realise that the scheme of the Act is that financial contributions are to remedy a subset, although a large one, of remoter, indirect and partial effects under the Act. They are to partly mitigate or compensate for damage from the outer ripples or waves of effects that are caused by dropping a new activity into the pond which is the receiving environment.

[251] These proceedings are unusual in two respects. First the respondent, the ORC, is not keen to receive any financial contributions; and secondly, the contributions sought to be imposed are very large:

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245 [2004] NZRMA 433 at para 37.

- the CODC seeks $5,000,000;
- the QLDC and HCA seek $3,000,000;
- ADFAS seeks $1,000,000 per year (although it called no evidence on this and we do not consider it further).

*The provisions of the Regional Plan*

[252] The Regional Plan: Water has made considerable attempts to comply with the requirements of section 108 as they relate to financial contributions. Clause 17.3 of the Regional Plan provides financial contribution assessment criteria which are referred to in each of the "method" paragraphs of clauses 17.2.1-17.2.7. The financial contribution assessment criteria are as follows:

> **17.3 Financial contribution assessment criteria**
>
> **17.3.1 In deciding whether or not to impose financial contributions and the types of contributions, the Otago Regional Council will have particular regard to the following matters:**
>
> 1. The extent to which any unavoidable adverse effect resulting from the activity can and should be remedied or mitigated; and
> 2. The extent to which the applicant has made, or has undertaken to make, some form of compensation for such unavoidable adverse effect; and
> 3. The extent to which a financial contribution may offset any unavoidable adverse effect caused by or contributed to by the activity; and
> 4. The extent to which a contribution is required to achieve objectives and policies of this Plan; and
> 5. The extent to which a financial contribution can be applied as close as possible to the site where the adverse effects occur or, where this is not practicable, the extent to which those people or communities most directly affected can benefit from the positive environmental effects that result from the financial contribution; and
> 6. The reasonableness of the contribution and consistency with the purposes of the Resource Management Act; and
> 7. Any other financial contribution required by any other statutory authority with respect to that activity and the extent to which financial contributions have previously been made or facilities have been provided.

**17.3.2 In deciding the actual value of the financial contribution required, the Otago Regional Council will have particular regard to:**

1. the significance of the effects attributable to the activity;
2. Where such effects are contributed to by other activities, the extent to which those effects can be reasonably attributed to the activity for which consent is granted; and
3. The extent to which any positive effects of the activity offset any adverse effects; including facilities already provided

[253] The Regional Plan then sets out eight general purposes of financial contributions. Each of them follows the same pattern of setting out in order: the circumstances for requiring a financial contribution, its "precise purpose", and then a statement requiring the predicted cost of the work and/or services to be paid for, to be identified.

[254] The first type of financial contribution is[246]:

*Contributions to enable legal public access*

[255] The circumstances relevant to clause 17.2.1, are stated to be[247]:

> Where legal public access to or along the lake or river margins will be restricted by the activity for which a resource consent is granted, and the effects cannot be avoided.

[256] In the opinion of the resource manager, Mr Whitney, called for the CODC, legal public access to or along lake or river margins will be restricted by damming activities, and the effects cannot be avoided. He identified the restrictions as being:

- sedimentation at the margins of Lake Dunstan and Lake Roxburgh;
- *Lagarosiphon* infestation along the margins of Lake Dunstan;
- restrictions to access along the margins of Lake Roxburgh and the Clutha River associated with changing water levels, including the effects of flushing;
- restrictions to access associated with flood events.

246 Regional Plan p. 247.
247 Regional Plan p. 247.

We do not need to consider the last any further. It is not an issue under the RMA – there is a defence under section 34(2) of the Act if actions were taken to save or protect life or health, or to prevent serious damage to property.

[257] The purpose stated in the Regional Plan associated with clause 17.2.1 is:

> To offset such effects by providing money, land, or a combination of both for **alternative legal public access**.
> (our emphasis)

[258] Then the predicted cost has to be estimated. In this case the CODC seeks[248]:

- $ 25,000 to extend the Bannockburn Track from the old oxidation ponds to Old Cromwell (two kilometres);
- $ 165,000 to extend the Bannockburn walkway all the way to the Bannockburn bridge and on to Ripponvale (five kilometres);
- $ 195,000 to develop access to the lakeshore from Pearson Road and Bannockburn Road, including securing access where necessary;
- $ 600,000 to develop a walkway along the southern side of the Cromwell Gorge (now Lake Dunstan) from Cornish Point to Clyde (19 kilometres);
- $ 55,000 to develop a road to the Dicey Pump and a walking track to Goldfields Road;
- $ 55,000 to realign and upgrade lookout track and the lookout at Clyde (one kilometre);
- $ 20,000 to upgrade the road down to the start of the Clyde to Alexandra walkway;
- $ 25,000 to continue the walkway track around River Road to the Alexandra Bridge;

248 Annex 3 to Mr W D Whitney's evidence

- $ 890,000 to upgrade the Doctors Point walkway and extend to Roxburgh Village (29 kilometres);
- $ 30,000 to develop a walking track between Alexandra and the river upstream of the Alexandra bridge (on the northern side of the river);
- $ 35,000 to upgrade the existing track along the Bridge Hill side of the Clutha River heading down the Roxburgh Gorge (two kilometres).

Total: $2,095,000

[259] Similarly the QLDC and HCA seek that financial contributions are paid to the ORC to build 53.8 kilometres of pathways as follows[249]:

> A portion of the financial contribution would be used to fund the construction of pathways on Crown land/marginal strips to facilitate public access along the margins of Lake Hawea and the Hawea River. These pathways would be for walking, cycling, horse riding etc (all non-motorised). These pathways would be constructed on a progressive basis over the many years of the Contact Energy Ltd consent, and would involve the following stages (in order of priority):
>
> - An extension of the existing pathway adjacent to the lake shore from Capell Avenue in Lake Hawea (opposite the hotel) to the eastern end of the township – a distance of approx. 2.2 km.
> - A new pathway from the eastern end of the Lake Hawea township to the John's Creek reserve – a distance of approx. 2.5 km.
> - A new pathway from John's Creek reserve to Timaru River – a distance of approx. 6.0 km.
> - A new pathway down both sides of the Hawea River, from the Hawea dam to the Hawea River/Clutha River junction at Albert Town – a distance of approx. 12.2 km on each side.
> - A new pathway from the Lake Hawea Holiday Park to The Neck – a distance of approx. 18.7 km.

[260] The cost of footpaths would be $125,000 per km[250], so the total sought within the Queenstown-Lakes District is 53.8 x $125,000 = $6.725 million.

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249 Mr E W Carr, evidence-in-chief para 7.6.1.

250 Mr E W Carr, evidence-in-chief para 7.6.2; confirmed by Mr P K Wilson in his evidence-in-chief.

[261] We find that in most cases the appellants are seeking to provide new or improved **physical** access, not legal access[251]. That causes difficulty because the Regional Plan's purpose is not to provide physical access but to provide "legal public access". That phrase is defined in Chapter 21 [Glossary] to the Regional Plan as:

> *includes legal roads, marginal strips, esplanade reserves, esplanade strips, access strips and* Walkways

As Mr Robinson pointed out in his closing submissions the word *Walkway* appears with a capital letter because it is also the subject of a definition which states that it means "a formal Walkway created under the New Zealand Walkways Act 1975". The New Zealand Walkways Act 1975 has been repealed and replaced by the New Zealand Walkways Act 1990 but the purpose of the legislation has consistently been to provide means of legal access. Further, Policies 5.4.6 and 5.4.7 of the Regional Plan (quoted above) also suggest that it is primarily concerned with provision of legal access.

[262] We conclude that *legal public access* is defined in relation to the lawfulness of the access which can be obtained. That is, it refers to the creation of roads and the other lawful means of access referred to, rather than to construction of physical access. In our view that means that almost all the applications for financial contributions are misconceived, and cannot be sustained. The claim for a financial contribution for access to the Kawarau arm at least falls within the right category for a financial contribution. However Mr Whitney, the CODC's witness, gave no evidence that legal access had been lost when the dam was filled.

[263] If we are wrong about that and the Regional Plan can be read more widely, then we find that there is insufficient evidence that public access will be restricted significantly by the various water permits. In particular we have little or no evidence as to what physical access (if any) there was beside the Clutha River before the various dams were built.

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[251] The only expressed exception is in the Central Otago District where the CODC seeks legal access to the lakeshore from Pearson and Bannockburn Road to the Kawarau Arm.

[264] There is one limited evidential exception. Mr Carr[252] described the degradation of the margins as follows:

> The margins of Lake Hawea and the Hawea River (where the wave action of the water meets the land) fluctuates widely as the lake level is adjusted between 336 and 346 metres and the river flow is adjusted between 10 and 200 cumecs to meet the operational requirements of Contact Energy Ltd for power generation. The wave action at the margins as the water levels fluctuate results in the stripping of fine gravels and sand from the lake beaches and also from the margin of the Hawea River (especially at the high river flows when the river is running "bank to bank") This means that the margins of the lake and river are now, and will continue to be, composed largely of coarse gravels and boulders – which makes it very difficult for the public to have safe walking access for any distance along the margins of either waterway. Because of the degradation of the margins of both the lake and the river, public access along the margins of these waterways is significantly restricted.

[265] To "restrict" means relevantly to "confine, bound, limit"[253]. Can physical access be said to be restricted because the size of the rock underfoot has changed? Similarly, is physical access restricted because rolls or piles of *Lagarosiphon* accumulated along the lake edge?

[266] We note first that the margins of lakes and rivers are usually quite narrow. The term "margin" as used in the RMA refers to ecological or physical space related to the land/water interface. In *Upper Clutha Environmental Society Incorporated v Queenstown Lakes District Council*[254] the Court held that the margin of a lake is approximately the upper limit of wave action. We also need to bear in mind that the maintenance and enhancement of public access to and along the lakes, and the Hawea and Clutha rivers is a matter of national importance to be recognised and provided for[255].

*Contributions to enhance amenity values*

[267] As we have stated the Regional Plan then provides for financial contributions for[256]:

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252 Mr E W Carr, evidence-in-chief paragraph 7.6.
253 *The New Zealand Oxford Dictionary* (OUP, 2005)
254 Decision C12/1998.
255 Section 6(d) of the RMA (quoted earlier)
256 Regional Plan pp. 247 to 249

(2) public open space or public facilities in an alternative location on the lake or river margins;

(3) planting, transplanting or maintenance of new or existing vegetation;

(4) landscaping or planting elsewhere than the site of the activity;

(5) works protecting the margins of the lakes and river.

[268] The CODC sought a sum of nearly $1 million under these headings for planting of poplar and willow trees on stable silt bars along the Kawarau arm, developing picnic areas, upgrading boat ramps and landscaping along the Clutha River, at Lake Roxburgh and downstream of the Roxburgh Dam.

[269] The QLDC and HCA sought costs as follows in respect of Lake Hawea[257].

| | |
|---|---|
| Picnic facilities | $80,000 |
| Signs | 50,000 |
| Boat launching jetties etc | 80,000 |
| Toilet facilities | 240,000 |
| Swimming pontoon | 20,000 |
| Walkways | 300,000 |
| Pedestrian bridge | 300,000 |
| Revegetation | 200,000 |
| Total | $1,270,000 |

[270] The first thing to note is that in order to remedy or mitigate the adverse effects of the dams and their operating regimes on the residents of Lake Hawea township, Johns Creek hamlet and Alexandra the Court has already decided to impose conditions requiring the consent-holder to consult, prepare, obtain approval for and implement management plans for those areas. So it is unnecessary to direct that financial contributions be paid for landscaping.

257 Summarised from the evidence of Mr P K Wilson.

[271] Secondly, as for upgrading boat ramps, providing picnic areas and so on, those do not arise as replacements for any adverse effects of the dams so no financial contributions should be imposed.

*Contributions to protect or restore heritage values*

[272] The Regional Plan identifies the following circumstances in which a financial contribution can be imposed under rule 17.2.6:

> Where the activity for which consent is granted will adversely affect a historic site, building, place or area or one of cultural or spiritual significance to Kai Tahu, in the bed of a lake or river, and the effects cannot be avoided.

[273] What are the heritage values of the Clutha river? There appear to be six groups of such values:

(a) Maori sites – now inundated – in the Cromwell Gorge[258]; and others downstream of the Roxburgh dam which are not affected by the Clutha hydroelectric schemes[259];

(b) The rock shelters and caves used by Chinese miners[260] in the Cromwell Gorge in the 19th Century, also now under water;

(c) the old main street of Cromwell and the adjacent riverbank mining areas at Cornish Point[261];

(d) old stone buildings and tailings in the Lowburn area[262];

(e) mining sites and tailings on the Kawarau Arm close to where it debouches from the gorge[263];

(f) Shaky Bridge at Alexandra and the historic Alexandra Bridge piers[264].

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258 N J Gillespie, evidence-in-chief paras 198 and 205.
259 N J Gillespie, evidence-in-chief Attachment Z.
260 N J Gillespie, evidence-in-chief para 198(a).
261 N J Gillespie, evidence-in-chief para 198(b).
262 N J Gillespie, evidence-in-chief para 198(c).
263 N J Gillespie, evidence-in-chief para 198(d)
264 Commissioners' Report p. 184.

[274] Most of the heritage values in (a) to (d) are underwater as a consequence of the filling of the Roxburgh and Clyde Dams. Mr N J Gillespie, the environmental advisor for Contact, wrote that from 1975 to 1990 extensive work was carried out by archaeologists and others on those issues resulting in a number of reports[265] as well as the building of a project information centre and a new Cromwell Museum[266] which contains historical artefacts recovered from the area.

[275] We note that the Alexandra Bridge piers and the Shaky Bridge, which is a very attractive wooden swing bridge across the Manuherikia at Alexandra, are both listed as Registered Historic Places in Schedule 1C to the Regional Plan and are therefore items for particular consideration in the context of Policies 6.5.6 and 8.4.2 of the Regional Plan: Water.

[276] However it is unclear to us as to how the damming is going to affect the bridges or the tailings at the exit of the Kawarau Gorge. Perhaps for that reason the "Archaeological Sites" condition imposed by the Commissioners' Report[267] obliged the consent-holder to carry out a baseline survey of the sites "potentially affected" by the damming, and only then to prepare a management plan for any sites that may be affected, and finally to contribute to the costs of protection works "in proportion to the extent to which its activities affect at-risk sites. Those conditions were not appealed by the CODC (or ADFAS). Instead the CODC sought financial contributions.

[277] The Regional Plan identifies the following purposes for a contribution under rule 17.2.6:

> To offset such effects by providing money, land, or a combination of both for contributing to protection, maintenance or restoration of some alternative historic or cultural site elsewhere within the lake or river margins in the same general locality.

In this case, as we have just said, there is no evidence there will be any adverse effects on the heritage values (d) and (e) above.

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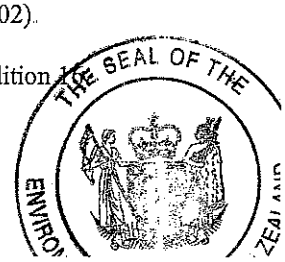
265 He identified them as Higham, Mason, Moore (1976); Mason (1977) and Peachey (2002).

266 N J Gillespie, evidence-in-chief paras 203 and 204.

267 Clyde Dam permit 2001.385 Condition 18; and Roxburgh Dam permit 2001 386 Condition 18.



[278] We were given[268] an estimate by a CODC officer of relevant costs. The total value of projects to protect, maintain or restore sites, buildings, places or areas of historic or cultural importance, including costs of heritage investigations, is $905,000 made up as follows:

| | $ |
|---|---|
| Lake Dunstan | |
| Heritage investigation of Kawarau Arm | 55,000 |
| Restoration costs ($25,000 pa for 15 years) | 375,000 |
| Securing historic tailings with fencing and interpretation signs | 45,000 |
| Lake Roxburgh | |
| Heritage investigation of Roxburgh Gorge | 55,000 |
| Restoration costs (contribution) $25,000 pa for 15 years) | 375,000 |
| Total | $905,000 |

[279] Considering the need for financial contributions for heritage values under the assessment criteria in the Regional Plan[269] we comment first that any heritage sites which are under water - since Mr Whitney's evidence may cover these – have been (in effect) the subject of previous contributions in the form of the reports and the Museum we have described. All those are sunk costs which should be let lie in these circumstances.

[280] Most of the other assessment criteria assume the damming will cause an "unavoidable adverse effect". As we have stated, we have no evidence that the damming of the water behind the Roxburgh and Clyde dams will affect the sites identified by Mr Whitney at all. We conclude there should be no financial contribution for heritage items and that the "Archaeological Sites" conditions in the two damming permits are satisfactory because if it is established flooding is or will cause damage then the consent-holder should contribute to the extent its operations exacerbate flooding.

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268 Annex 3 to the evidence-in-chief of Mr W D Whitney.

269 Regional Plan p 249 : quoted earlier in this part of the decision.

*To protect aquatic ecosystems or their habitat*

[281] The Regional Plan provides that[270]:

> Where the activity for which a resource consent is granted is likely to cause or contribute to adverse effects on any ecosystem values[271] . . and the effects cannot be avoided.

- then a financial contribution may be required.

[282] We accept that the operating regime will have effects. They were described succinctly by the Commissioners in a passage we gratefully adopt[272]:

> Artificially low flows and, particularly, daily flow fluctuations have three consequences. The first is the creation of a varial zone. This provides a poor habitat for most riverine flora and fauna, and can be thought of as a dead zone. Its extent depends on flow range, including minimum flow, on flow frequency and on the cross sectional profile of the river. The second consequence is that the changes in water level resulting from flow fluctuations impact on the spawning success of various fish species, both salmonids [trout and salmon] and some native fish. Thirdly, low flows affect some backwaters and inlets . .

We do not overlook that sections 6 and 7 of the Act make some of these matters of national importance and others matters which we must have particular regard to (e.g. protection of the habitat of trout and salmon[273]).

[283] Where this claim for financial contributions falls down is that the CODC does not itemise what contribution it seeks be paid to the ORC; nor does the HCA and the QLDC. Therefore we do not direct any financial contributions under this head either.

*Summary*

[284] All of the claims for financial contributions to be made to the ORC fail. That is not so surprising when one considers that the financial contribution provisions of the Regional Plan, as we have pointed out above, impose conditions that are more like mitigation or environmental compensation than quasi-taxes for more indirect effects. We have found that where there are

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270 Rule 17 2.7 (Regional Plan p 249).
271 Particularly those identified in Schedule 1A of the Plan.
272 Commissioners' Report, paragraph 182(vi) on page 215.
273 Section 7(h) of the Act.

adverse effects being caused by the activities for which resource consents are sought, then these adverse effects are in these circumstances better managed more directly.

[285] We should add that the HCA appeared to contemplate financial contributions as providing[274] moneys to the Regional Council which would set up a trust for the HCA. Mr Carr then wrote that:

> The capital and income from this financial contribution would be required to be used by the HCA ...

We do not have to decide the point here, but we doubt if that is a proper use of a financial contribution in the light of sections 110 and 111 of the Act which govern the use to which financial contributions may be put, and their refund if not used.

***[K] Term***

[286] The Commissioners granted a term of 35 years for all consents. That is the maximum term which can be granted under the Act for water permits[275]. The CODC, QLDC and HCA all appealed against the term of the consents and requested that the term be confined to 15 years, on the grounds[276] that would encourage Contact to:

(a) resolve its relationship issues with the Crown;

(b) encourage Contact to implement any landscape management plans.

We doubt if the first is a legitimate factor when considering the term of a resource consent; and the second reason is more an argument for making the landscape management plan conditions stricter, which we have attempted to do anyway. ADFAS argued that the flooding risks and the measures to avoid or mitigate them were so uncertain that Alexandra should not be faced with a 35 year term.

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274 E W Carr, evidence-in-chief para 7.13.14.
275 Section 123 – duration of consent.
276 As summarised by Mr Todd in his final submissions.

[287] The case for both Contact and ORC is that any uncertainties could be dealt with by two levels of review – re-assessment of management plans, and formal review of conditions under sections 128 to 132 of the Act by the ORC. Mr Logan submitted succinctly for ORC:

> The Regional Council is a public body. It is accountable – politically through the ballot box, legally through judicial review proceedings, and its conduct is subject to investigation by administrative watchdogs, such as the Ombudsman and Auditor-General. It is required to conduct its business in an open and transparent manner. The information it receives and the records of its decision-making are publicly available information (both under section 35 Resource Management Act and the Local Government Official Information and Meetings Act 1987).

We accept that submission. For Contact, Mr Robinson took it further. He submitted that the Court must assume that ORC will carry out all its responsibilities. We do so, but we are inclined to agree with the appellants that there is some doubt as to whether the ORC will carry out its duties fully. Our reasons for being dubious about the ORC carrying out its responsibilities fully – rather than to the minimum extent required by law – are that it appears that the ORC does not, at present, have staff or contractors available who are competent to check and report independently on the various technical aspects of the hydrology of the Clutha River. That by itself is not enough to make us shorten the terms of the consents, but we do need to record our concern about the lack of competent experts with ongoing contextual knowledge to give independent and objective guidance to the Regional Council about these issues.

[288] We consider that the resource consents for Lakes Hawea and Dunstan should all be for a term of 35 years and that the Regional Council's power to review will be adequate to deal with issues that arise during that time. However, we also consider that the Lake Roxburgh consents are too uncertain for us to be sure that as a whole they sustainably manage all the resources involved. In particular, as we stated earlier when considering conditions, we are concerned about the lack of definite mitigation or remedy for residents and businesses in Alexandra in relation to the risk of large floods (of small probability but high potential impact). In relation to these resource consents we consider that (except for the possibility of a compensation provision) a 15 year term from 10 September 2003, when the Commissioners issued their decision, is appropriate.

[289] It does not seem impracticable to us that the two upstream dams – Hawea and Clyde – should have 35 year terms, but that the Roxburgh site should have a 15 year term from 2003. So

we will amend the terms accordingly unless Contact volunteers the kind of condition we discussed in part [I] of this decision or the other parties persuade us it is appropriate (and within jurisdiction).

## *[L] Outcome*

[290] Under section 290(1) of the RMA we:

(1) confirm the decision of the Otago Regional Council to grant the resource consents identified in paragraph [2] of this decision and on conditions proposed in the Commissioners' decision except to the extent those conditions have been amended by the parties by agreement or by this decision;

(2) record for the avoidance of doubt, that this decision is final in respect of the confirmation of the grant of the resource consents (on amended conditions) and in relation to financial contributions; but

(3) record that the decision is interim in respect of the precise wording of the conditions;

(4) record that this decision is final in respect of the term of 35 years from the date of this decision for the Lake Hawea and Lake Dunstan consents, but interim on the term of 35 years for the Lake Roxburgh consents since the latter term may need to be reduced to 15 years from 10 September 2003 for the reasons discussed.

[291] We reserve leave to any party:

(1) to make further submissions on the wording of the proposed conditions in order:

(a) to deal with issues the Court has sought or reserved submissions on;

(b) to make any corrections;

(c) to make conditions consistent with each other;

(d) to make the condition better meet the spirit and intent of the decision; or

(e) to deal with any other issues that were raised during the proceedings but which remain unresolved or require clarification

– if the parties cannot agree on any such submissions or on amendments to the conditions;

(2) to any other party to reply within 30 working days.

(3) for any party to apply to the Court to reconvene to hear further submissions and/or evidence on the remedial/compensation provisions suggested in paragraph [208] and in particular (but without restricting the generality of this leave) on the question of figures for remedial costs, if the parties cannot agree on the precise wording.

[292] We set no time limit, at this stage, for the conditions to be resolved but direct:

(1) that the Regional Council lodge a report with the Court by 24 February 2006 as to progress, and advising what timetable is proposed by the parties for any submissions and/or reconvened hearing;
(2) that any party may apply upon notice at any stage for any other timetable to resolve matters.

[293] Costs are reserved, although given the novel aspects of these proceedings and that all parties have won some issues and lost others, we consider on a preliminary view that costs should lie where they fall (except perhaps on some procedural matters). In particular we would find it hard to be critical of the District Councils and the HCA for appealing the grant of the resource consents. First, many of the issues in the proceeding were novel, and secondly those notices of appeal have given us jurisdiction to make some necessary wide-ranging changes or additions to conditions which the Court may otherwise have lacked.

[294] We thank all witnesses for the thought and care which went into the preparation of their evidence. There was little or no routine evidence in this case; and some of it was very good indeed. We also thank all counsel for their careful and thorough written closing submissions. We have found them very helpful. We should particularly note that although we have been rather critical of the ORC that is no reflection on its counsel, Mr Logan, or on the evidence of its General Manager, Mr Martin. The former gave us excellent closing submissions which were very helpful.

The latter was a thoughtful witness when cross-examined, even if his evidence-in-chief did read as if he was a one-man band.

[295] The case for ADFAS was presented by W S Randle, a legal layperson. He presented the case in difficult personal circumstances (as the later transcript records). We should also record that throughout he was both courteous to witnesses and the Court, and alert to issues of relevance and proportion.

**DATED** at CHRISTCHURCH 20 July 2005

For the Court:

**J R Jackson**
**Environment Judge**

Issued[277]: 21 JUL 2005

Appendices:

| | | |
|---|---|---|
| | Mr P F Foster | Figure 4.16 |
| | Dr D M Hicks | Figure 3b |
| | Dr D M Hicks | Figure 3c |

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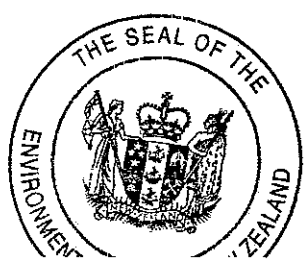
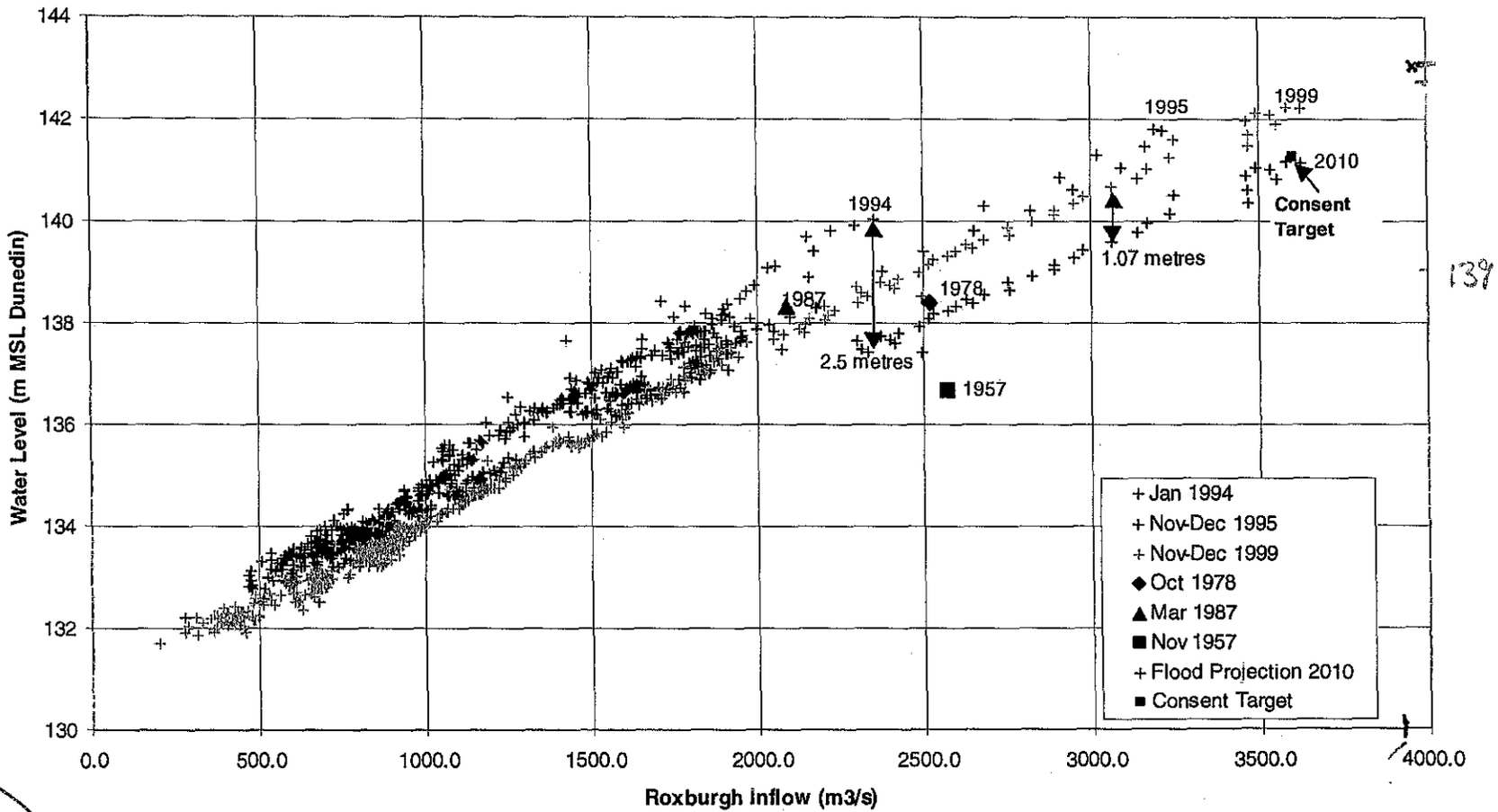
THE SEAL OF THE ENVIRONMENT COURT OF NEW ZEALAND

# APPENDICES



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**Alexandra Water Levels and Roxburgh Inflows: 1999 Flood**

**Figure 4.16**

ENVIRONMENT COURT OF NEW ZEALAND THE SEAL OF THE

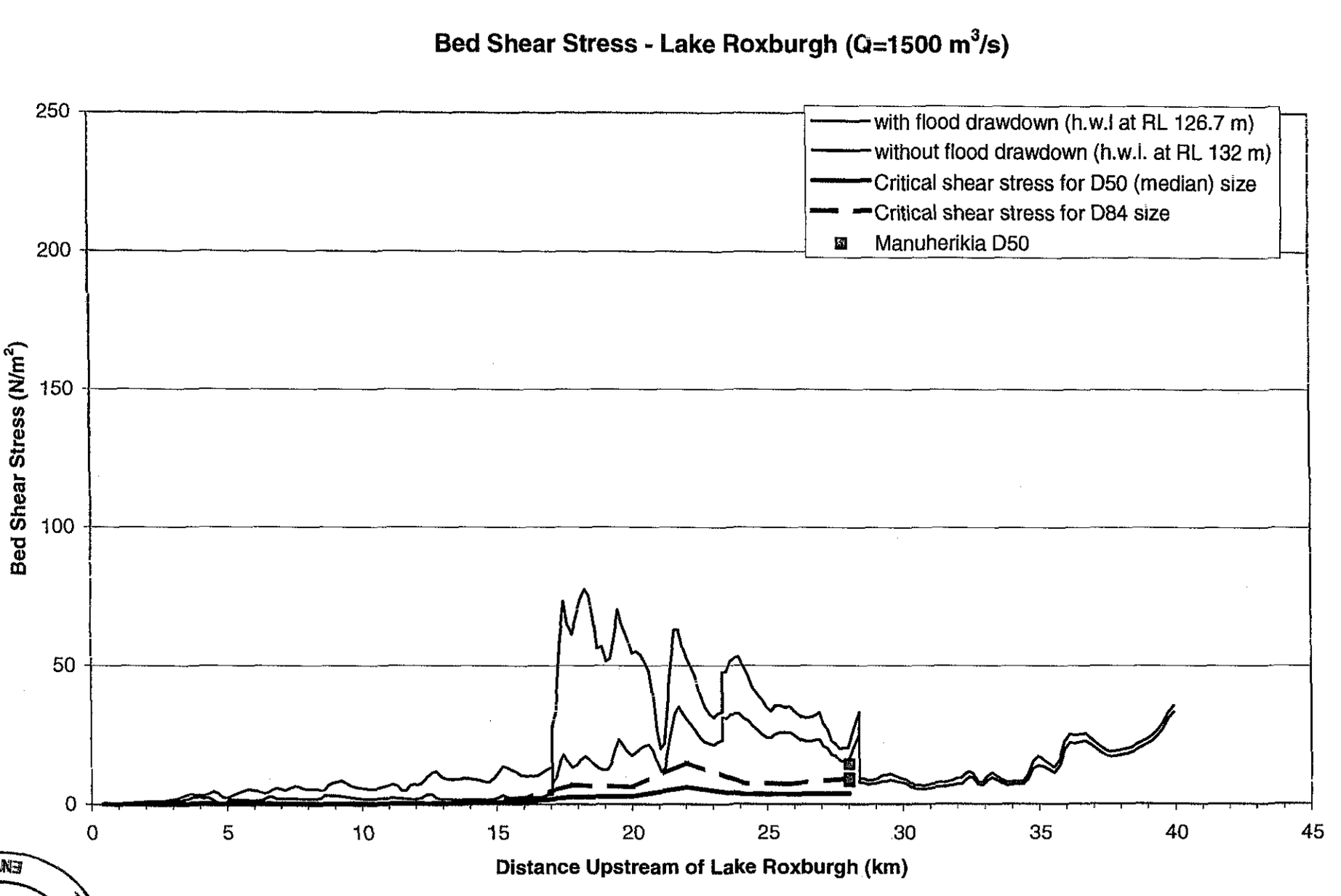


Figure 3b: Bed shear stress profiles along Lake Roxburgh at 1500 cumecs with and without drawdown.

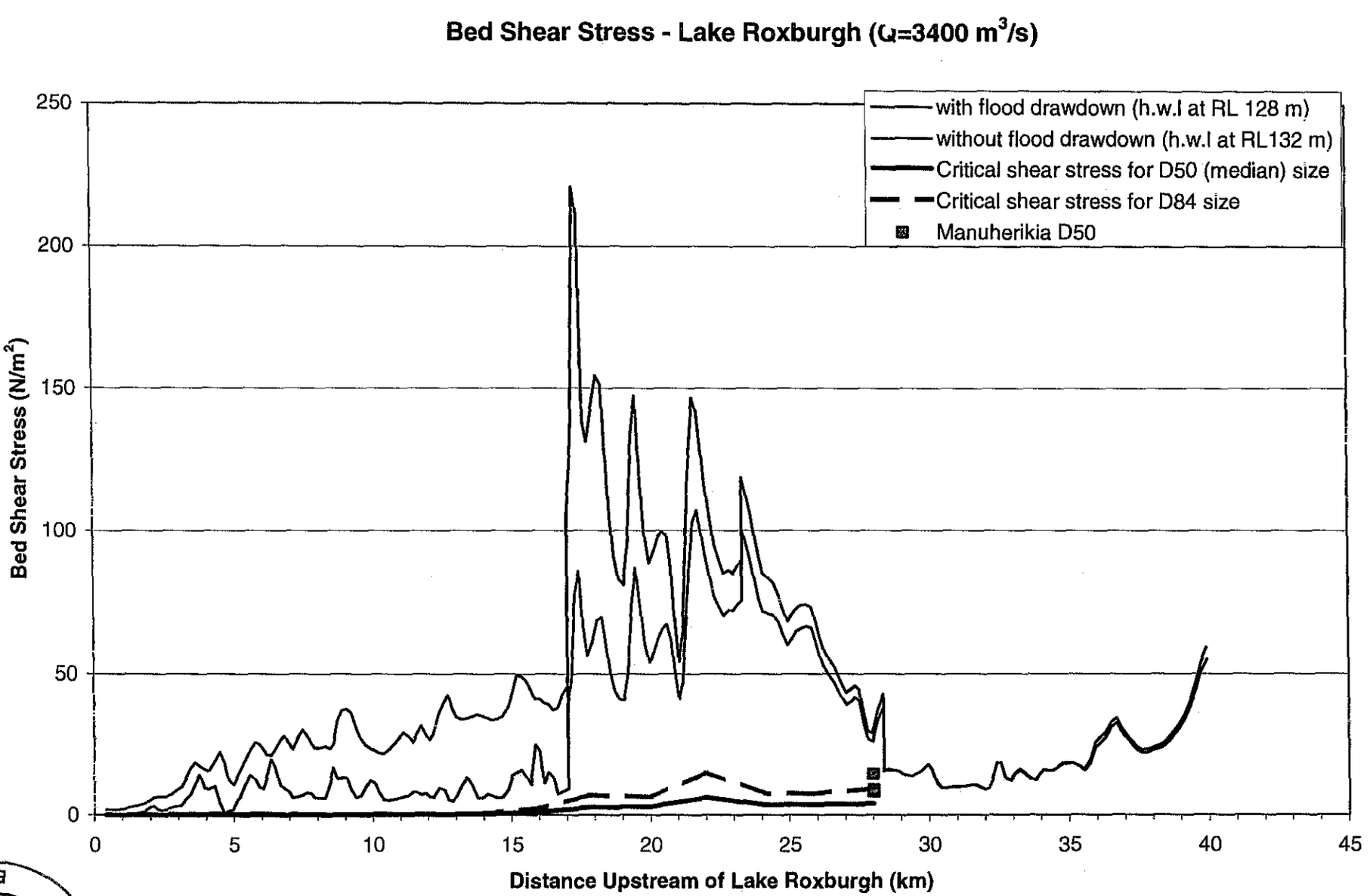


Figure 3c: Bed shear stress profiles along Lake Roxburgh at 3400 cumecs with and without drawdown.