

IN THE MATTER

of the Resource Management Act 1991

AND

IN THE MATTER

an application by **MAJAC TRUST** to vary parts of the Buller River Water Conservation Order relating to the Gowan River.

EVIDENCE OF CLIFTON GRAEME BARROW

BACKGROUND

- 1.0 My name is Clifton Graeme Barrow and I am a qualified electrical engineer residing in Nelson. I obtained a Bachelor of Engineering Degree in Electrical Engineering from the Canterbury University in 1975.
- 1.1 I have worked in the Electrical Industry in a professional capacity for 30 years and was formerly the Chief Engineer for Tasman Energy, Nelson. I held this position from 1988 until 1998. During this time I was responsible for all engineering activities carried out by the Company.
- 1.2 My duties included the responsibility for the advancement of Tasman Energy's generation investigations. I was involved in the original Buller Conservation Order hearings while representing the interests of Tasman Energy. While so employed I undertook the collection of the video evidence over a period of years relating the usage of the Gowan River in support of Tasman Energy's endeavor to have provision made for hydro generation included in the Order. During this time I gained experience with operating video surveillance equipment in such situations.
- 1.3 I currently work as a Consultant in the Electrical Supply Industry. I have been retained by Majac Trust as Project Manager and as part of these duties have been responsible for the determination of river usage. My evidence will be in two parts addressing:
 - (i) A record of Gowan River Usage.
 - (ii) Energy and Transmission Issues for the Tasman/Nelson areas.

PART ONE

2.0 RECORD OF GOWAN RIVER USAGE

- 2.1 A video recording suite was installed observing the river near the outlet of the lake on property owned by Majac Farms.

The equipment is located on the true right bank of the river at location NZMS 1 S.33 992672 (S 41^o 47.652', E 172^o 35.542') and faces across the river in a westerly direction.

This site was chosen mainly as it would record the rafting traffic launched from the lake or the adjacent lake bridge. These points are the only practical launching points until one reached the vicinity of the camping ground.

- 2.2 The equipment used is a Panasonic video camera. This feeds into a Honeywell HRHD4 4 channel digital video recorder. The information is stored on an internal hard disc drive and can subsequently be downloaded to compact disc in an encrypted format. Downloading was done at regular intervals and the recordings can be made available to the Tribunal. This information can be viewed directly on a personal computer as the necessary programme and encryption is recorded on the compact disk at the time of burning of the disk. The original information is retained on the hard drive in the recording machine.
- 2.3 The video recorder records continuously from 7.00 am until 6.00 pm each day. Movement across a pre-programmed section of the target area triggers the recording process. Triggering sensitivity can be manually programmed. In the case of this recording location it was found that the least sensitive setting was required to minimize "false" triggering. False triggering can be caused by ripples on the water surface or individual grass stalks waving in the breeze if the sensitivity is set too fine.
- 2.4 The triggering level chosen was such that the recorder will recognise a fast flying duck momentarily passing through the preset programmed area. The recorder then stores the previous 6 seconds prior to triggering and continues to record whilst movement is present. It is programmed to store at 1 frame per second. The result is a series of recorded sequences of varying length with a time and date stamp for the period in question.
- 2.5 The equipment is located in a paddock close to the river and there is the occasional false positive operation due to the occasional sheep moving into frame. Generally the animal does not cover the full field of view and it would be an extremely unlikely event for a single unit of river traffic to pass unnoticed. Multiple units of river traffic would be clearly identified.
- 2.6 The equipment was sighted to record all river usage and also picked up usage of the wharf situated across the river on the true left hand bank. Access on the true right hand bank of the river is limited and any foot traffic tended to move across the field of view of the camera.
- 2.7 The equipment was installed on the 7th January 2005 and has been recording river traffic from this date with the exception of 4 days that was lost due to a battery malfunction.
- 2.8 The material recorded has been analyzed and is presented in summary form. This describes the type of traffic, plus the date and time of the event. In the period recorded so far (7th Jan 2005 to 1st September 2005) a total of 97 events were recorded. The most prevalent usage was from fishermen who were recorded on 33 separate occasions over the nine months recorded. Nineteen people were observed out walking on the true right bank. (Due to the nature of the vegetation on the bank on the other side no walking can take place over this section. There were 13 visitors to the wharf and 13 persons also utilized the wharf for swimming. The 13 visitors were people "having a look" at the water and carrying out such activities as feeding

the ducks. There were 12 other people who were either accompanying the fishermen or the swimmers. During this period 7 canoeists were observed passing down the river from the lake outlet. No rafting activity was recorded for the period.

3.0 **SUMMARY OF USAGE**

3.1 During the recorded period one person visited the river approximately every third day. On average there was one walker every 19th. day, and one visitor to the wharf in 20 days. Approximately one swimmer in 28 days used the river and one canoeist in 39 days. 33 fishermen were recorded over the period.

3.2 There was no rafting activity.

PART TWO

Justification of Hydro in the Nelson Region.

BACKGROUND

4.0 Brief History of Supply to the Nelson Region

4.1 From the early days of the electrical industry in this country there was a Government policy of making access to the benefits of electricity available to all New Zealanders wherever possible.

New Zealand was in the forefront of development of electrical supply around the world and was far more advanced in its implementation than such countries as America, traditionally seen as the home of innovation and technology. Whereas New Zealand had a substantial percentage of its rural population with access to electricity there were still substantial areas of America where the population had limited access to reticulated supply until well into the 1950's and even the 1960's.

4.2 In New Zealand up into the 1960's there was a guarantee system in various forms operating in New Zealand whereby customers in rural areas, called consumers in those days, paid for their infrastructure in what was virtually "take or pay" arrangements. Effectively they paid for their lines and poles over a period of ten years.

4.3 During the late 1950's there was a proposal to develop hydro-generation of 80 megawatts based on Lakes Rotoiti and Rotoroa. This would have been adequate, along with the current generation in the area to meet virtually all the demand in the region to the present day. This was known as the Braeburn scheme. However the scheme did not proceed as the decision was made to develop a backbone infrastructure of transmission lines where all power companies could have access to this infrastructure under the same financial conditions regardless of location. This arrangement served the industry well for many years.

4.4 By the mid 1980's the basic transmission infrastructure was in place to serve our region. Generation took place in the south based on the Southern lakes. Energy was transmitted to Islington, near Christchurch, and from here lines went to Kikawa where they diverged, with lines going to Nelson, Marlborough and back down to the West Coast and Buller.

- 4.5 In the mid to late 1970's however reform started to take place. All major works had virtually been developed and the majority of people in cities, towns and rural areas had access to reticulated electricity. In fact there was a subtle change taking place in the industry as the emphasis switched from the frantic expansion of the infrastructure to a regime of maintaining the existing assets.
- 4.6 It was deemed appropriate at this time to restructure the industry to better reflect the changed nature of the operation. The restructuring emphasised a more "user pays" philosophy which had the effect of shifting the focus from long term goals to focus on the short term. The subsequent result was emphasis on short term profit at the expense of investment in the assets that supported long term stability.
- 4.7 The Power Boards were transformed into companies and the traditional elected members were replaced by more entrepreneurial people operating under more "commercial principles". The law was modified to encourage this change of emphasis and the "bottom line" became a mantra and the focus shifted to a short term gain.
- 4.8 This has had unfortunate consequences because the industry requires a long term focus as the development and building of additional infrastructure takes years to bring into service. This has resulted in a lack of adequate capacity to meet any extremes in demand in the short term.
- 5.0 Energy Issues
- 5.1 There has been much written about just how much "surplus" energy there is available at any one time. It must be appreciated that this is never a fixed, or even a precisely quantifiable quantity. There are a large number of variables that effect just how much apparent "surplus" capacity is available at any given time. The inflow to the lakes, the need to take equipment or infrastructure out for maintenance, the demand at the time, the anticipated load profile, the weather and under today's environment even the price affect the difference between what energy or power is required and what is available.
- 5.2 For the last few years the Nelson region had been favoured by relatively mild winters. This has kept the winter demand within limits and power seemed to be available as normal. There were severe warnings a few times on the need to conserve electricity and on a number of occasions over the last few years appeals went out to the public to switch off any appliance that was not essential. There was a modest response and a few platitudes from the powers that be and the public appeared to forget about it and got on with their normal routine. This is as it should be; it is good that something as essential as a reliable energy source should be able to be taken for granted. The need for electricity pervades every moment of our lives; we have grown to look on it as essential but this was not always so.
- 5.3 For example for years the Nelson region relied on a coal fired generator situated on the foreshore in Nelson Harbour. The commissioning of the Cobb Dam with its 32 Megawatts was a major event in the district and went a long way to alleviating the severe restrictions that were in force in the region.

- 5.4 However these times are again looming. The fact that the general public did not suffer blackouts over recent years is due to quirks of fate, the mild weather, and to a certain extent, the change in the way energy is purchased from the generation companies.
- 5.5 Major industries and the Energy Companies now have the ability to purchase energy on what is known as the spot market. When the dams in the South of the island are spilling water then the price that they pay for energy is extremely low. Water that does not pass through the generators has no value so any of this surplus water that is passed through the generators is sold sometimes at virtually the cost of transmission. On the other hand if the cost of energy becomes too great then industry has the choice of shutting down. This has in fact been happening recently in our region.
- 5.6 The industry has moved into an era of allowing market forces to dictate investment. The theory is that prices will rise to ensure economic investment in the network. In a theoretically competitive environment this is true; however the New Zealand Electricity market is too restricted and dominated by dominant players to be regarded as such. The pricing strategy adopted is said to be "sending a signal". That is if there is a lack of capacity then the price will increase and there is a choice either to accept the higher price or refrain from using the supply.
- 5.7 This appears to have some merit superficially. If the cost is too high industry can switch off and send its workforce home. Remembering that each company is in a position to avail itself of electricity at little cost at times of surplus it probably profits by the arrangement in the longer term. However the workers that are sent home suffer financial hardship. In the case of domestic customers the higher prices hit those that can least afford them. Those on a fixed income such as the elderly resort to turning off heating in winter to minimise their energy bills.
- 5.8 It has become evident that the price signals have not had the desired impact in the other direction. The price signals were supposed to encourage investment in the network and new generation. Instead it has encouraged a culture of profit taking. The bulk of the generation in New Zealand is in the hands of a few major players. There is little true competition and therefore little incentive to invest in generation or infrastructure. All the major attractive hydro sites in New Zealand were developed before the generators were broken up into what was supposed to be competitive generating companies.
- 5.9 Most of all the financially and physically significant sites have been developed and this acts as a significant barrier to any company wishing to break into the market in New Zealand.
- 6.0 Transmission
- 6.1 A supply crisis can be brought about by lack of water in the southern lakes, high peak demand on the transmission infrastructure, or transmission difficulties, generator failure or even gamesmanship on the part of the generators as has happened overseas.

- 6.2 Since 1988 there has been little major development of the national grid that brings energy to our region. There has been significant increase in load in the intervening period that has not been matched by reinforcement to the grid. The lines from the generators at the Southern Lakes to the major distribution point at Islington near Christchurch are reaching capacity for the transportation of energy. Substantial investment on new lines is proposed.
- 6.3 The lines from Islington to Nelson are experiencing stability problems and over the past few winters have had difficulty in maintaining voltage to the region. Luckily the region was not hit by any severe weather pattern. The appeals from the Government to conserve power were headed by enough responsible people in the region, the line companies cut as much water heating and other controllable load as possible for as long as they could get away with it, transmission lines from Islington did not drop out, Cobb dam kept generating as did Argyle and the Branch scheme in Marlborough, and the rising price of power on the spot market plus a little persuasion in the right quarters saw some industry shutting down, and all was well.
- 6.4 Contingency plans were imposed on Lines Companies who were forced to agree to shed load on demand or risk being disconnected completely. In some ways it is unfortunate that this did not happen as this certainly would have graphically demonstrated the precarious state and vulnerability of the national grid.
- 6.5 Since this crisis some work has been carried out to alleviate the Islington /Nelson voltage stability problems in part by installing capacitors at the Transpower Stoke substation. This is the only significant work that has been carried out on the region's supply in the last 20 years in spite of the ever increasing power prices.
- 6.6 The reforms in the power industry were supposed to bring a structure whereby pricing signals would encourage investment in both generation and infrastructure. To date this has not happened and we have experienced profit taking at the expense of asset investment. The result of this behaviour has been that any cushion against adverse conditions has been eroded to such an extent that any series of minor events could trigger major power disruptions to our region.
- 7.0 Demand
- 7.1 Demand in the Nelson region has grown by 14.9% between 1999 and 2003. If this growth continues then in another 4 years the advantage of the latest grid improvements at Stoke will disappear. The present supply to Nelson still depends on all system components remaining in service at critical times for continued stability. For instance the loss of the Cobb generation or the loss of one of the transmission lines from Islington at a time of high demand could trigger a major blackout of considerable duration brought about by voltage instability. There have been instances of snow build-up causing the loss of the transmission lines from Islington and the loss of transmission towers. These type of outages will be unexpected i.e not planned, and therefore a lot more costly to the community and industry users than planned or voluntary cutbacks.
- 7.2 There are in addition severe restraints on the transmission infrastructure south of Islington. Extensive reinforcement is required to supply the combined demand of the top of the South Island. This will involve the eventual construction of additional transmission lines. As can be seen from the difficulty in obtaining planning

permission, and in particular easements to cross private land, with regard to the construction of a similar line to service the Auckland region this has the potential of being a long drawn out process in the Environment Court in order to obtain Planning permission. The possibility of some years delay in beginning construction is most likely. A time frame of 10 years to commissioning would seem to be probable.

- 7.3 In the meantime Transpower have revisited the design of the line and have made the decision to retension the line and run at a higher conductor temperature. To run at a higher temperature without retensioning would allow the lines to sag and drop to less than acceptable ground clearance and present a hazard. Presuming that the original design was correct and as such had adequate safety factors built in the decision to run outside these design parameters indicates an acceptance of a lowering of security standard brought on by current state of the network.
- 7.4 The running of the lines at higher temperatures has an additional adverse effect. The production of losses associated with transmission follows a square law relationship. That is if the lines are operated with an increased current of 20% then the overall effect will be that losses will increase by around an additional 8.5%. This additional cost will be recovered from users.
- 7.5 The region is dependent on its energy supply over a transmission system that is having the last ounce of performance wrung out of it and which in spite of these measures is still at risk if any one of its component parts fails. If any vital component fails and adverse conditions such as a severe winter hits the whole structure has the potential to collapse.
- 8.0 Benefits of the Proposed Hydro Generation.
- 8.1 The hydro generation scheme on the Gowan for which a modification to the Order is sought will not in itself correct all the difficulties associated with the region. However the addition of local generation in the area will have a substantive beneficial effect to the region. The additional units generated will be a useful addition, especially as there will be minimal transmission loss. At present approximately 20% of the energy that leaves the generating plants is lost by the time it gets to the Nelson region. The peak output of the station will be of much value to the region in adding to the peak demand capability and in addition be available for voltage support to assist in establishing voltage stability in critical periods.
- 8.2 As stated there is a 20% loss in transmitting energy across the system known as the top of the South network. This is the part of the South Island network to the North of the hydro lakes. The reason for this seemingly unbalanced view of the network is related to the significant load associated with the aluminium plant at Tiwai Point which is amongst the 20 largest aluminium plants in the world.
- 8.3 The 20% loss associated with the top of the south network is dissipated in an uneven geographic distribution across the network. The bulk of the losses are concentrated in the towns and cities from Christchurch south. The construction of the proposed Gowan hydro will enable the transmission losses between Christchurch and Nelson region to be reduced by approximately 25% while the Gowan hydro is in operation.

- 8.4 However with the bulk of the losses concentrated in Christchurch area and further south the overall impact overall will be in the order of a few percent. This may not seem to be much but in monetary terms is a substantial amount.
- 8.5 The benefits to accrue by the construction of the Gowan will effectively make generation, equivalent to the losses avoided, available for use elsewhere. This is a benefit to the country as a whole as it is effectively "new" generation.
- 8.6 There is direct benefit for users in the Nelson region. Every consumer in the Nelson region pays for the transmission losses associated with transport over the top of the south grid. These costs will be reduced by the construction of local generation. In addition Transpower charges for its infrastructure assets at each grid exit point. This is a complicated relationship that looks at the proportion of the financial value of the asset between that exit point and the generators at the southern lakes. As supply splits at each grid point so are the allocated costs.
- 8.7 The costs are set to recover a return on investment, maintenance and operating costs plus a component to finance future investment in the network. By constructing generation in the region the bulk of these costs can be avoided. The greater amount of generation that can be developed the greater the benefit to the people of the region.
- 8.8 It will be recalled that recently there were line charge increases that were passed on by the local line company. This reflects the cost of the recent urgent investment in the transmission system servicing the area. Substantial investment in the form of additional transmission lines serving Islington are planned for construction with urgency. The capital cost of investment along with the operating expenses will be recovered from those who benefit. The Nelson region line charges will increase accordingly. Local generation can avoid this cost. In addition such investment in local, low impact hydro generation can defer or even remove the need for such construction in the future.
- 8.9 There is an urgent need for additional capacity in the Auckland region. There is a proposal to commission a coal fired station in the region. Apart from the environmental effects of releasing thousands of tonnes of green house gasses into the atmosphere New Zealand was recently a signatory to the Kyoto Agreement. This imposes severe penalties on a producer which have to be paid for. Hydro avoids both the production of harmful greenhouse gasses and the associated financial cost.
- 8.10 The Nelson Region does not have significant alternative generation options. Network Tasman investigated a number of alternative generation proposals including wind farming. The study indicated that under current construction costs wind farming would not be an attractive option in the near future. The most attractive energy option for the Nelson is the construction small scale minimal impact hydro generation.
- 8.11 The Gowan proposal is an outstanding project in this regard which has substantial benefit to the region.

SCHEDULE A

Notes

Start	Time	fisher man	walk er	wharf	swim mer	cano eist	rafter	other
7-Jan	10.38 am	Mike A on wharf						
7-Jan	12.00 midday	Mike A weed eating bank						
7-Jan	1.39 pm	two people on wharf fishing	1	1				
9-Jan	1.39 pm	man on wharf feeding ducks		1				
10-Jan	11.34 - 11.36 am,	Man back with dog and fishing	1					
10-Jan	4.56 pm,	man on wharf looking at river		1				
12-Jan	11.03 am,	man and child on wharf		2				
13-Jan	10.02 - 11.00am,	man fishing right hand bank	1					
14-Jan	2.06-3.26 pm	man and woman fishing right hand bank	1					1
20-Jan	2.41pm	man walking	1					
20-Jan	2.41-2.42 pm	man on right hand bank inspecting river						1
22-Jan	9.07am	person on wharf		1				
24-Jan	12.33pm	person on wharf		1				
24-Jan	3.24pm	Fisherman and girl	1					1
24-Jan	3.24-4.31	Man and woman, man fishing	1					1
28-Jan	5.16pm	Fisherman	1					
28-Jan	5.16pm	fisherman inspecting river	1					
29-Jan	10.50am	Person and dog on wharf		1				
29-Jan	3.26pm	two fishermen	2					
29-Jan	10.51am	man and dog on wharf		1				
29-Jan	3.27-3.30 pm	two fishermen fishing	2					
30-Jan	4.10pm	swimmer at wharf			1			
30-Jan	4.10 pm	man swimming from wharf			1			
31-Jan	4.15pm	swimmer at wharf with woman			1			1
31-Jan	10.02am	fisherman	1					
31-Jan	4.15-5.44 pm	man swimming			1			
3-Feb	1.10pm	swimmer at wharf			1			

