

4.1 Introduction

This section describes the various alternatives that have been considered; including doing nothing, developing a community based water enhancement scheme, the different water resources considered, alternative intake sites, alternative storages and alternative distribution systems. A detailed description of these alternatives is contained in the feasibility study¹.

The Resource Management Act no longer requires the “best practicable option” to be adopted, nor does it require the consent authority under section 104 to have regard to the consideration of alternatives. The Fourth Schedule of the RMA, Clause 1 identifies the aspects that should be included in an assessment of environmental effects (AEE). Clause 1(b) states that;

“Where it is likely that an activity will result in any significant adverse effect on the environment, a description of any possible alternative locations or methods for undertaking the activity”

4.2 No further irrigation

The option of no further irrigation on the Central Plains runs contrary to the purpose of the Resource Management Act 1991 and cannot be considered as sustainable management, in that it will not provide for the use and development of the natural and physical resources of the region in a way that enables people and communities to provide for their social, economic and cultural wellbeing, nor for their health and safety. Given this, the “do nothing” alternative has been discounted.

4.3 Multiple small schemes

As presented in Section 2, the failure to provide a centralised community-owned, comprehensive irrigation and water enhancement scheme for the Central Plains will result in the ad hoc development of small individual schemes that will not provide for the efficient and wise use of water from what is becoming a scarce resource. The Central Plains scheme has the size and scale to be able to provide water storage and to adopt water harvesting principles to fill the storage. This raises the reliability of the water supply in the rivers from the low 70 percents to the high 90 percents. Thus the use of the river resources is enhanced through the provision of storage. The small schemes taking water from both the Rakaia and Waimakariri Rivers that are being considered at present do not include storage and therefore should not be considered as a viable alternative to that proposed here.

¹ Central Plains Water Enhancement Feasibility Study, URS January 2002, prepared for the Central Plains Water Enhancement Committee and the Selwyn District Council and Christchurch City Council.

4.4 Major community owned scheme

As presented in Section 2, this option is for a major community owned scheme. The Central Plains Water Trust will hold the consents, and as its overriding objective is the continued public ownership of the resource consents, this will ensure long-term community protection of the Region's scarce water resources. The Trust has not been established purely to pursue commercial objectives, it being the intention that such commercial objectives will instead be pursued through Central Plains Water Ltd.

Central Plains Water Limited has been formed by the Central Plains Water Trust to investigate, construct and operate a water enhancement scheme, providing surface water for community irrigation to farmers who farm within the Central Plains area. The company has been charged with obtaining the necessary resource consents for and on behalf of the Trust. This is an important feature, in that the resource consents will be held by the Trust, while the scheme will be operated by the company.

The Company has entered into a Memorandum of Agreement (as appended) with the Trust that sets out the respective roles of the Company and the Trust and, in particular, specifies the basis on which the Company will apply for the resource consents on behalf of the Trust. The Trust will subsequently making the resource consents available to the Company for the purposes of constructing and operating the Scheme, on agreed terms and conditions to ensure that the needs of irrigators and the wider objectives of the Trust as set out in the Memorandum of Agreement are realised in an enduring and practical way.

From these initiatives and scheme has been developed that will provide a reliable source of water for all those parts of the Central Plains that do not have access to groundwater due to resource or financial constraints.

It is clearly the position of the applicants, that a community based approach to the use of the water resources of the Central Plains is the best alternative.

4.5 Alternatives within proposed scheme

4.5.1 Alternative water sources

The main water sources within the Central Plains area are the Rakaia and Waimakariri Rivers. These are the only rivers that have flow regimes suitable for meeting spring and early summer water demands from run-of-river abstractions because of their response to north west weather in the main divide area. This also means reduced size for the water storage needed to meet scheme demand. Other water sources such as the Selwyn River and its various tributaries and the Kowai River are all far too small and unreliable to consider as a suitable source of water for irrigation and enhancement opportunities. The focus of these studies (and the many previous studies) has been on these two main rivers, fed from catchments in the Southern Alps.

There are two potentially viable sources of water for irrigation in the Central Plains area: surface water from the Rakaia and Waimakariri Rivers, and groundwater. Where the depth to the water table is shallow,

and groundwater is plentiful, the economically viable source of water is this groundwater. Where the water table is at greater depth, surface water resources become more economically viable. Thus, the general boundary of the scheme area was determined by reference to the availability of groundwater as an economic alternative to a surface supplied source of water. Where the lower plains (generally southeast of SH 1) have easier access to groundwater, it is in the upper plains area that is more suited to irrigation from surface water from the two rivers.

The major consideration with this proposal has therefore been how much water to take from the Rakaiia and Waimakariri Rivers. A wide perspective was adopted, taking into consideration the potential water demands from Ashburton District as well as Selwyn District. From this a co-operative sharing agreement has been reached with the Ashburton Community Water Trust for the remaining water in the Rakaiia River. Of the ~ 40 cumecs of available water in the Rakaiia, the agreement provides for equal sharing of 20 cumecs each, with the ability of either party to take the full entitlement should the other party not use their share. The definition of available water in the Rakaiia River is that portion of the 70 cumecs allocated in the National Water Conservation Order for abstractive uses, and provides for the proposed Barthill-Chertsey abstraction even though that take has not yet been exercised. The Central Plains/Ashburton Community Water Trust takes therefore do not affect the priority of any of the existing resource consent holders.

The take from the Waimakariri River is in accordance with the sharing regimes within the Waimakariri River Regional Plan, where Central Plains would utilise the remaining ~2 cumecs of "A Class" water, and up to an additional 38 cumecs of the more unreliable "B Class" water. "A Class" water would be shared on an equal priority as the other A Class water users within that allocation band. As part of this application, Central Plains Water would also seek to use the unallocated winter water not currently part of the Waimakariri Irrigation Ltd's resource consent – given that they do not have water storage and therefore do not take irrigation water during the winter.

Therefore the consideration of the available sources of water has been comprehensive and these applications are for the best and only source of water to meet the community needs.

4.5.2 Alternative intakes

Intakes from the two rivers need to be above RL 235 m (plus head losses) to enable water to flow into the headrace. This dictated the two intake sites being that on the Rakaiia River and at the Gorge Bridge on the Waimakariri River. As the scheme concept developed, an intake above the confluence with the Kowai River was seen as a practical alternative to provide water to the Waitaniwaniwa reservoir without the need for pumping. Therefore the upper Waimakariri intake site became desirable.

Intakes above the two main gorges are physically not practical due to the steep rocky terrain, and are also not provided for by way of the NWCO for the Rakaiia River or the Plan for the Waimakariri River. Nevertheless an intake located at Lake Coleridge was considered with a canal sidling down the higher terraces to the Rakaiia River through the gorge to the Windwhistle area. A Lake Coleridge intake was favoured early in the feasibility study as it could provide a reliable flow of ~ 8 cumecs of clean water to a storage reservoir in the Wairiri Valley under gravity flow.

The Coleridge intake was discounted for a number of reasons, including:

- The water in Lake Coleridge has been fully allocated to TrustPower for electricity generation;
- The NWCO prohibits the reduction in flow of water through the Rakaiia Gorge, anticipating the discharge of all Lake Coleridge water (harvested from the Harper and Wilberforce Rivers) through the power station and then through the gorge;
- The cost of the canal from Lake Coleridge to the plains; and
- The ultimate rejection of the Wairiri Valley as the preferred storage site.

It is therefore contended that the intake sites on the Rakaiia and Waimakariri Rivers are the only three alternative sites that are practicable.

The intake structures proposed are all considered to be current best practice and therefore alternatives such as sonic fish screens, not using settling basins, using infiltration galleries etc have not been considered in any detail and are not discussed further.

4.5.3 Alternative water storages

Wairiri Valley

The initial phases of the project focused on the Wairiri Valley for water storage. This valley had the advantage of being able to be fed by gravity from Lake Coleridge. This concept provided for a uniform flow of 8 cumecs all year round from the Lake into the reservoir. Having the ability to call on a fully reliable source of water to fill the reservoir resulted in a smaller storage volume being required. This is in essence because some of the required storage would be provided within Lake Coleridge.

There were a number of disadvantages with the Wairiri Valley that ultimately lead to it being discounted. These included:

- The use of Lake Coleridge water to fill the reservoir and the potential conflicts with the NWCO and TrustPower's rights to that water;
- The need to rely on pumping to fill the lake from other sources.
- The limited storage volume provided by the valley;
- Unfavourable foundations conditions for the dam site;
- The need for extensive ridge and saddle dams to provide the required storage; and
- No future ability to increase storage should the need arise.

Lake Coleridge

Lake Coleridge itself could have provided the necessary storage. As above there are major impediments with the use of water from the lake, and utilising the lake for the full storage requirements for the scheme exacerbated these difficulties. These included:

- The need for a very large race from the lake to supply the peak demand;
- The large variation in lake level that would result from this (in the order of 6m), which would have unacceptable effects on the margins of a very sensitive environment; and
- Conflict with the NWCO and TrustPowers' sole rights to the use of that water.

Other storage locations

The prefeasibility study considered other sites in the foothills, including sites at Flagpole Hill on the High Peak Station in the upper Selwyn River and Whitecliffs. These were discounted on the grounds of cost, environmental effects and social impacts. Storage above the Waimakariri gorge in the Broken, Esk or Poulter Rivers was also considered, but discounted primarily as these are prohibited activities under the Waimakariri River Regional Plan.

Waianiwaniwa Valley

The Waianiwaniwa Valley is the best practicable option for storage, as it can be filled either by a gravity canal from the Waimakariri River as proposed, or by pumping from the main headrace canal utilising water from both the Rakaiia and Waimakariri Rivers. There is a suitable dam site at the mouth of the valley that does not require extensive excavation and foundation work. An alternative dam site was considered in the valley approximately 500m to the north of the proposed site, however this site had unsuitable foundation conditions that would have required extensive remedial works.

The Waianiwaniwa Valley has the potential to store 450 million cubic metres of water and therefore, should there be a future need for stored water, the capacity exists within the valley.

4.5.4 Alternative Distribution Systems

All of the distribution systems considered involve the level headrace canal. Having the ability to transfer Rakaiia River water as far north as the Waimakariri River and vice versa enhances the combined reliability of water from the two rivers. It also enables water from either river to be used to fill the reservoir if a pumped option is finally selected.

Gravity water races

This proposal includes an extensive network of gravity canals across the plains, as described in Section 3. Races are efficient carriers of water when economic factors are taken into account. While distribution through races will result in leakage to groundwater, this has the potential to enhance groundwater levels

through recharge and therefore if a broad perspective of water use efficiency is adopted, then the leakage itself does not constitute an inefficient use of the resource. The leakage is small compared with the total take.

Gravity piped distribution

A gravity piped distribution system was considered as part of the feasibility study. Reticulation via the piped gravity system would utilise gradient of the Canterbury plains (approximately 1 in 170) to provide water to the farm boundary at a minimum head of 50 m. This requires that the irrigation area is located approximately 11 km down-gradient of the headrace. For land closer than 11 km to the headrace, additional pumping would be required.

The key features of a piped system compared to a gravity canal system are:

Advantages

- Water is delivered at pressure at the farm gate – no pumping costs;
- Water losses are minimised through distribution – reduced leakage and bywash; and
- No visual impacts or loss of land as pipes are all buried.

Disadvantages

- Much more expensive even when additional pumping costs are taken into account;
- Only the properties on the lower extremities of the command areas get water at sufficient pressure to avoid pumping;
- Design considerations for transient pressure surges (water hammer) become critical to the project; and
- Lose some of the environmental habitat advantages of races.

Preliminary assessment of the piped alternative shows that in comparison to the open channels, there would be increased costs across the whole distribution network, and operational issues for those areas not commanded by sufficient gravity head. Further consideration will be given at the final design and financial packaging stages. In general, the environmental footprint of a piped system will be clearly less than the open channel option described here, and it is the wish of the applicant that this alternative be considered under the present resource consent applications. If a piped distribution system were to be constructed, it would follow the alignment of the races described in Section 3.

Material for this section has been provided by Converge Ltd, and Byfield Budd.

In 2000 a joint committee was established by Selwyn District and Christchurch City Councils to investigate the opportunity to use water for the benefit of the wider community. As part of an initial feasibility study, the committee undertook extensive consultation with a wide range of stakeholder groups.

One of the first initiatives by the Central Plains Water Steering Committee was to establish a potential water users group, following six woolshed meetings within the proposed scheme area. Consultation revealed strong interest within the area for the proposed scheme and this group later became the Ritso Society, which has continued to be instrumental in furthering the scheme.

Following consultation with other interested stakeholders a consultative working party was established in mid-2000. This included representatives of groups that included potential water users, conservationists, outdoor enthusiasts, township committees, host communities, existing irrigators, Tangata Whenua and people living to the east of the proposed scheme where aquifer recharge from the scheme could be an issue.

There were two strands to the consultation – one focused on the interest within the farming community for a community based water enhancement scheme and the principles on which such a scheme should be based. The other sought to identify potential issues and how those issues might be addressed in a sustainable way.

The consultative working party identified key issues from an environmental, social, economic and cultural perspective. These issues were fed back to the scheme's technical experts and the Steering Committee to assist in decisions on the development of the scheme.

In 2003 Central Plains Water Ltd sought to raise funds to enable the scheme to apply for the resource consents needed to proceed. This required further consultation with the farming community and involved numerous meetings and focus groups to clarify scheme details, funding options and other preferences.

Central Plains Water Limited was established in mid-2003 as a commercial entity to raise sufficient share capital to obtain the resource consents. In 2003, during the fund raising phase, members of the Central Plains Water Trust met with farmers in the Wainiwanui Valley to discuss the scheme and the potential impact it would have on their farms.

Moving into the resource consent process in 2005, Central Plains Water Limited has continued to consult with a variety of interest groups.

The ongoing technical investigations are addressing valid issues previously identified by key stakeholders. Central Plains Water technical representatives are attempting to mitigate concerns that have arisen as a result of consultation.

The objective of the consultation is to find a balance between enabling sustainable use of water supplied by the Scheme, while, where possible, avoiding or mitigating any adverse effects. Many of the scheme's principles have been influenced by the consultation process, for example:

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- The bottom of the storage dam will not be allowed to dry out to offset potential dust issues;
 - The principle of a Farm Management Accord that addresses potential water contamination issues;
 - The scheme proposals will work within the scope of the Rakaiia National Water Conservation Order and the Waimakariri River Regional Plan; and
 - The use of gravity to move water wherever possible.
- Other opportunities to mitigate the effects of the scheme include:
- Enhancement work at Te Waihora (Lake Ellesmere);
 - Introducing wetland areas;
 - Establishing high environmental standards that require efficient use of water eg. spray irrigation rather than flood irrigation; and
 - Creating opportunities for water based recreation on the reservoir and on other structures associated with the scheme.

Consultation will continue throughout the consent process and there will be ongoing opportunities for Central Plains Water to meet with stakeholders to address issues and concerns prior to the hearing.

The tables below document the consultation that has been carried out in relation to the proposed central Plains Water Enhancement Scheme in two stages: the feasibility assessment phase (Table 5-1), and the more recent phase associated with the development of the proposal to the present resource consent application stage (Table 5-2).

Table 5-1: Consultation during the Scheme Feasibility Assessment Phase

GROUP	DATE	KEY ISSUES	COMMENTS
Woolshed Meetings	Aug 2000 to Oct 2000	<ul style="list-style-type: none">• Concern that the water remained in community ownership• Community wanted control of water and management of scheme• Reliability of water / scheme reliability	Attendees were asked to seek to identify interested parties within their community who would be interested in the supply of the water.
Issues and outcomes meetings	Sept 2000 to Oct 2000	<ul style="list-style-type: none">• Effects of the takes on the rivers• Land use intensification	Opinions expressed drove initiatives such as the Farm Management Accord and certain aspects of the scheme design.
Over 15 meetings with			Information fed back to the Steering

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GROUP	DATE	KEY ISSUES	COMMENTS
stakeholder groups – commercial and environmental interest groups and the rural community.		effects	Committee.
Consultative Working Party	Sept 2000 to Dec 2001	<ul style="list-style-type: none"> Working party agreed that the following are the most important issues arising out of the feasibility study Abstraction and diversion -The effects of abstraction from the Rakaia and Wainakariri Rivers Logistics - Water transport and storage Host communities - The impact of a scheme on the host community. Secondary impact - The regional effects of the intensification of land use, including on the quality and quantity of groundwater and surface water, specifically on rivers, lowland streams and Te Waihora. Economics - The cost of the water from the scheme to those who wish to use it. 	Included representatives from Dam Action Group, Salmon Anglers Group, Forest and Bird, DOC, Fish and Game, Ngai Tahu, Ritso Society, irrigation users, community members. Information fed back to the Steering Committee and technical team for consideration in the overall design and development of the proposed scheme.
Least Impact Option Group	Nov 2000 to Dec 2000	<ul style="list-style-type: none"> Effects of the takes on the two rivers Effects of land use intensification on the environment 	Discussed principals and concepts and how major environmental impacts of the scheme could be addressed. Information fed back to the Steering Committee and technical team for consideration in the overall design and development of the proposed scheme.
Combining groups who expressed a view that land use intensification should be minimised –	Three meetings		

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GROUP	DATE	KEY ISSUES	COMMENTS
Dam Action Group, Forest and Bird, DOC, Fish and Game, Ngai Tahu, Salmon Anglers			
Rural	Mar 2001	<ul style="list-style-type: none"> Concern over water quality 	Information was given regarding the state of the allocations from the Waimakariri and Rakaia Rivers and that there was enough water to satisfy the requirements of the study area. The downstream effects of the scheme were discussed as forming an important part of the next phase of the process.
Township Meetings –		<ul style="list-style-type: none"> Groundwater contamination a major concern Dam safety issues Effects of the community on scheme infrastructure 	The meetings were informed that much of the detail that was being sought was not yet available. It was acknowledged that while this was frustrating for some, it was important to determine what the scheme was before the in depth study began.
Glentunneil Hall Whitecliffs-old School Hall Darfield			Ongoing consultation and information with these groups.

Water storage options meetings	Apr 2001	<ul style="list-style-type: none"> Environmental concerns, the effects of the storage and transport of water specific to their area. Effects on ongoing farming operations 	Ongoing consultation with community groups. Initiatives to come from these meetings included farm levies, environmental trusts – ideas currently being reviewed and considered.
views of the Whitecliffs/Glentunneil/Wairiri/Russell's Flat/Windwhistle to Coalgate / Highpeak Station communities on the storage options for Central Plains Water.			
Consultation with Tangata Whenua	Apr 2001 to Sept 2001	<ul style="list-style-type: none"> Water abstractions Mixing of waters The Waiariwaniwa 	Cultural Impact Assessment study commissioned by CPW. Protocols can be put in place.

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GROUP	DATE	KEY ISSUES	COMMENTS
Hui with five Rununga with a stake in the study area.	Aug 2005 – hui – site visit Nov 2005 – hui	<ul style="list-style-type: none"> • storage reservoir • The construction and use of canals • The use of water on the Central Plains • Effects of engineering works to affect cultural heritage sites of significance to Ngai Tahu and development of protocols to address discovering any cultural remains. 	<p>Considerable uncertainty with a scheme of this nature causing considerable concern</p> <p>Ongoing consultation throughout the entire scheme and will continue into 2006.</p>
Affected land owners Waianiwaniwa farmers	Aug 2001 Sept 2003 Oct 2005 Nov 2005	<ul style="list-style-type: none"> • Uncertainty associated with the scheme proposal to farm management. • Loss of farmland and requiring authority status • Land acquisition process 	<p>Ongoing communications and consultation with these communities is important.</p>
Affected land owners Canal Meetings to inform property owners that water scheme canals could potentially affect their properties.	1-6 Nov 2000 Four meetings were held, three on 1 Nov and one following on 6 Nov.	<ul style="list-style-type: none"> • Those that see benefits are comfortable with the concept. They are prepared to make sacrifices to see this scheme go ahead. Comments include: "This must happen, should have happened years ago." • Those that don't see any benefit are very concerned about the effects of any scheme on them. 	<p>Ongoing communications and consultation with these communities is important.</p>
Lake Ellesmere River Rate and Drainage Committees – four separate meetings at: A Campbell's	Aug 2001	<ul style="list-style-type: none"> • The effect on water tables, nitrate loading in ground water. • The opportunity to use bonds to gain certainty from consent holders. • Needs effective monitoring, benchmark 	<p>Ongoing consultation with this group.</p>

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<i>GROUP</i>	<i>DATE</i>	<i>KEY ISSUES</i>	<i>COMMENTS</i>
(north side of the Hororata River) T Thwaitis (south side of the river) Whitecliffs Hall G & D Innes (Longspur, Windwhistle		<ul style="list-style-type: none"> now and then monitor changes. • Efficiency of use is a serious issue. • The effect on the spring zone, this is the distance spring sources can move from wet to dry years. 	
Joint committees and Councils Christchurch City Council and Community Boards/ Selwyn District Council / Selwyn and Malvern Community Boards	Ongoing meetings since commencement of feasibility study	<ul style="list-style-type: none"> • Information flow and funding 	Council are kept informed.

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Table 5-2: Consultation during the Resource Consenting Phase

GROUP	DATE	KEY ISSUES	COMMENTS
Department of Conservation	May 2005 to July 2005	<ul style="list-style-type: none"> DoC's four areas of interest are –native birds, invertebrates, fish, and vegetation Conservation of natural remnants 	Ongoing consultation has occurred, keeping DOC up to date on the scheme's progress. DOC staff and CPW's technical team met in November 2005 to discuss issues and mitigation. Ongoing consultation will continue to occur.
Fish and Game (Salmon Anglers part of some of this consultation)	May 2005 July 2005 Sept 2005 Oct 2005	<ul style="list-style-type: none"> Statutory responsibility for the sports fisheries Effects of takes on trout and salmon habitat Salmon passage Fishing days Fish screens Land use intensification and the effect on groundwater quality, surface water quality and potable water supplies Effects on lowland streams 	Ongoing consultation has occurred, keeping F&G up to date on the scheme's progress. A technical meeting between the Nth Canterbury F&G Council and CPW technical staff occurred in October 2005. F&G will send specific questions to the technical team for consideration. CPW will respond to the questions and continue to meet to ensure F&G's concerns are addressed. Briefing paper sent to head of F&G nationally.
Coalgate Residents Association – Bob Mugford	Sept 2005 Nov 2005	<ul style="list-style-type: none"> Dam Safety 	Results of a residents survey reviewed. General meetings to update the Association have taken place. Questions from association expected soon and further meeting to be arranged to answer these questions.
Glentunnel residents	Nov 2005	<ul style="list-style-type: none"> Scheme infrastructure Imposition and benefits accruing elsewhere 	Range of resident views regarding the scheme. General meetings to update the Association have taken place. Feedback from consultation has seen the scheme place water in the bottom of the dam continually to avoid potential dust storms. Will continue to update this group and work to address valid concerns.

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GROUP	DATE	KEY ISSUES	COMMENTS
Malvern Hills Protection Society Inc (formerly known as the Dam Action Group)		<ul style="list-style-type: none"> Scheme infrastructure Imposition and benefits accruing elsewhere Dam Safety 	A community that sees costs on their local social and environmental well being. Have shown this group that the Dam is safe – will continue to update this group and work to address valid concerns.
Water Rights Trust	May 2005 July 2005	<ul style="list-style-type: none"> Increased irrigation promotes intensive farming methods – more dairy conversions – increased environmental burden on streams, aquifers and downstream properties. 	Several meetings held to discuss the scheme and WRT's opinions. Information fed back to technical team.
Forest and Bird	Oct 2005	<ul style="list-style-type: none"> Impact on native birds 	Information on the technical experts retained and the reports that will be produced have been sent to F&B for their comment.
Consultation with Tangata Whenua – hui with five Rununga with a stake in the study area.	Aug 2005 – hui – site visit Nov 2005 – hui	<ul style="list-style-type: none"> Water abstractions Mixing of waters The Waiainiwaniwa storage reservoir The construction and use of canals The use of water on the Central Plains 	Cultural Impact Assessment study commissioned by CPW, Report received and CPW technical experts working with Ngai Tahu on issues raised. A written report will go back to Ngai Tahu, followed by a hui to further discuss issues. Ongoing consultation throughout November and into 2006.