Planning report on the review of the environmental minimum flow and water allocation for Knights Creek, the Halswell River, the LII River, the Kaituna River and Prices Stream.

Prepared by
R K Maw Planning Team Leader – Environmental Flows Review

Report No. U07/61

ISBN 978-1-86937-692-5

58 Kilmore Street
P O Box 345
Christchurch
Phone (03) 365 3828
Fax (03) 365 3194

Environment Canterbury
Your regional council

75 Church Street
P O Box 550
Timaru
Phone (03) 688 9069
Fax (03) 684 0505

Table of Contents

(This page is intentionally blank.)

Part 1: Context for this planning report

The Halswell River, Knights Creek, LII River, Kaituna River and Prices Stream are some of the many rivers in the region with existing minimum flows set on individual consents. The Proposed Natural Resources Regional Plan, Policy WQN5, states that within five years of NRRP becoming operative, rivers such as those in the Kaikoura area, will have had their existing minimum flows reviewed and incorporated into Schedule WQN1. Environment Canterbury commenced community consultation in 2002 to review the environmental minimum flow regimes. Five meetings were held with the community to discuss flow regime requirements, including the needs of both instream values and those of irrigators.

This Planning Report, U07/61 contains the information provided to the Regional Planning Committee as part of the Committee's consideration of the review of the environmental flow regimes for the above mentioned rivers.

The Staff Report to the 13 June 2007 Regional Planning Committee, prepared by Ray Maw, sets out a summary of technical and other information relevant to the decision making process, and includes recommendations for minimum environmental flow and allocation regimes.

The Community Advisory Group Report is included as it records the discussions and recommendations of the Group.

This report contributes to the Section 32 process.

(This page is intentionally blank.)

Part 2: Report to Regional Planning Committee

ITEM AGENDA NO: 6	**SUBJECT MATTER:** NRRP Variation – Lake Ellesmere/Te Waihora 1 Area Rivers Review of Environmental Flows
REPORT TO: Regional Planning Committee	**DATE OF MEETING:** 13 June 2007
FILE REFERENCE: PL5C/142	**PORTFOLIO:** Water **PROJECT:** Review of Environmental Flow Regime **OUTPUT:** Variation to NRRP
REPORT BY: Ray Maw, Planning Team Leader – Environmental Flows Review	**ENDORSED BY:** John Glennie, Natural Resources Planning Manager, and John Talbot, Director Policy and Planning.

PURPOSE:

In 2002, Environment Canterbury initiated investigations, and commenced a community consultation programme to review existing minimum flows in a number of the catchments that flow into Lake Ellesmere/Te Waihora. The consultation process has been completed for four of the catchments and this report recommends environmental flow regimes, including minimum flows and allocation limits, for these catchments to be formalised through a variation to Chapter 5 of the proposed Natural Resources Regional Plan (NRRP).

ATTACHMENTS:

Staff Moderation Report for Ellesmere 1

Community Advisory Report

BACKGROUND:

Environment Canterbury has initiated a rolling programme of reviews of the existing minimum flow regimes for over 150 rivers in Canterbury. The purpose of the review process is to assess the adequacy or otherwise of the existing flow regimes by testing them against the requirements of Objective WQN1 in Chapter 5 of the NRRP. In addition, a Community Advisory Group (CAG), that was open to anyone to participate in, was established. Subsequently the flow requirements for each value in Objective WQN1 were assessed by a technical panel comprising people with expertise in those values. The CAG provided local input, including the impact of any changes in flow regimes on existing users. Five CAG meetings were held, including discussions on drafts of the staff report and issues arising from them. Different options for flow reviews have been discussed as part of the process.

THE PROPOSAL:

This report recommends environmental flow regimes, essentially the setting of minimum flows, plus allocation regimes comprising A, and where appropriate, B blocks for four catchments draining into the north eastern part of Lake Ellesmere/Te

Waihora. The surface water A allocation block limits for the October-April period are capped and incorporate all authorised takes of water in places as at 1 May 2007. No new entrants are permitted to access the block, and any water freed up through consents being relinquished or the stream depleting effects of groundwater takes being proven to be less than estimated will not be reallocated. Existing permit holders will be allowed to reapply for their permits but not to expand their permits. Provision is made for community drinking water requirements should it be shown that the bores from which the water is drawn cause stream depletion effects.

Where further abstraction from the A allocation block for the October-April period cannot be accommodated, provision is made via a B block. B block abstractors are required to cease abstractions at a higher level than the A block abstractors in order to protect the reliability of supply to the A block abstractors. There is also a gap between the A and the B block to provide particular protection to the flows of freshwater entering Lake Ellesmere/Te Waihora during the summer period.

CONSISTENCY WITH EXISTING POLICY, PLANS OR LEGISLATION

The flow and allocation regimes being recommended by are considered by staff to be consistent with the requirements of the operative RPS and proposed NRRP.

VIEWS OF AFFECTED AND INTERESTED PARTIES

The views of the affected parties were obtained via the CAG process. The distribution list of meeting minutes included parties who did not attend the meetings. All statutory consultation, as per Clause 3 of Schedule 1 of the RMA, has been undertaken.

Recommendation

That the Council adopt and publicly notify, in accordance with Schedule 1 of the Resource Management Act, as variation 6 (to amend Schedule WQN1 of Chapter 5 of the Proposed NRRP) to incorporate into the PNRRP the minimum flow and allocation regimes recommended in the attached staff report for four river catchments draining into Lake Ellesmere/Te Waihora (Halswell River including Knights Creek, L II River, Kaituna River and Prices Stream), and including the RMA Section 32 Report, and adoption of the attached CAG report.

Note: The variation number in the above recommendation has been changed to Variation 10 solely for administration reasons.

Part 3: Staff Report

Ellesmere 1 comprising

Halswell Catchment

- **Knights Creek at Jamieson's Property (a tributary of the Halswell River)**
- **Halswell River at Leadleys Bridge**
- **Halswell River at Ryans Bridge**
- **Halswell River at Tobecks Bridge**
- **Halswell River at Neills Road**

L II Catchment

- **L II at Moir's Property**
- **L II at Pannetts Road**

Kaituna Lagoon Catchment

- **Kaituna River at Kaituna Valley Road**
- **Prices Stream at Prices Valley Road**

Report prepared by Ray Maw
May 2007

Environment Canterbury
Your regional council

(This page is intentionally blank.)

Table of Contents

(This page is intentionally blank.)

1. Introduction

1.1 Minimum Flows

As part of its statutory responsibilities, Environment Canterbury is engaged in a process of setting minimum flow (commonly referred to as minimum flow) and allocation regimes for a number of streams and rivers. These always involve the setting of a minimum flow - the flow at which abstractions cease other than for fire fighting, stock water and domestic supplies. The minimum flow may be constant throughout the year, or it may vary from month to month. In addition, the flow regime could provide for other measures such as flow sharing, a cap on total allocation or the provision for flushing flows. When determining these flows the Proposed Natural Resources Regional Plan (NRRP), Variation 1, provides the relevant policy framework. In Chapter 5, Objective WQN1 states:

> *"Enable present and future generations to access the region's surface and groundwater resources to gain cultural, social, recreational, economic and other benefits, while:*
> *(a) safeguarding their existing value for efficiently providing sources of potable water for people and for stock;*
> *(b) safeguarding the life-supporting capacity of the water, including its associated aquatic ecosystems, significant habitats of indigenous fauna, and areas of significant indigenous vegetation;*
> *(c) safeguarding their mauri and existing value for providing mahinga kai for Ngai Tahu;*
> *(d) protecting wāhi tapu and other wāhi taonga of value to Ngai Tahu;*
> *(e) preserving the natural character of lakes and rivers and protecting them from inappropriate use and development;*
> *(f) protecting outstanding natural features and landscapes from inappropriate use and development;*
> *(g) protecting significant habitat of trout and salmon; and*
> *(h) maintaining, and, where appropriate, enhancing amenity values."*

This objective will be achieved by implementing Policy WQN3:

> "(1) For all water bodies where taking, using, damming, diverting or discharging of water occurs or is likely to occur, Environment Canterbury will progressively set flow or level regimes in Schedule WQN1 and Schedule WQN3 to meet the requirements of Objective WQN1, having regard to the matters listed in Policy WQN4, and also to meet the requirements of Chapter 4 – Water Quality Objective WQL1.1."

In achieving the cultural, social, recreational, economic and other benefits set out in the objective, the "while" part of the objective requires that the requirements of (a) – (h) need to be met. This is done for each stream by undertaking a weighing exercise that looks at the instream values and their significance, and the out of stream needs of abstractors. None of the waterbodies subject to this report provide significant habitat for salmon and therefore when the evaluation of (g) in Objective WQN1 has been done, salmon have been omitted to avoid confusion.

The indigenous vegetation factor relates to vegetation that inhabits the bed and banks of streams and whose presence is dependant on their being an adequate flow or level of water in a stream. Other indigenous vegetation that is not dependant on

being in, or close to water can play an important role in improving stream water quality and habitat e.g. by providing shading, filtering sediment and providing cover for fish. In some cases, provided it is permanent, good riparian vegetation can allow a lower minimum flow to be set.

In order to cover the range of values identified in Objective WQN1(a)-(h), Environment Canterbury used a technical panel consisting of a range of people with expertise in one or more of the values (a)-(h) to undertake assessments and recommend a minimum flow that adequately protects the values they have expertise in. They included:

Panellist	**Instream Value**
Gordan Glova (NIWA)	Trout
Mark Taylor (Aquatic Ecology Ltd)	Native fish
Trevor Partridge (CECS)	Indigenous vegetation
Sue McManaway (Boffa Miskell Ltd)	Natural character and general amenity
David O'Connell & Terianna Smith (Te Runanga o Ngāi Tahu & Te Taumutu Runanga)	Mahinga kai, mauri, wāhi tapu & wāhi taonga
Maurice Duncan (NIWA)	Hydrology advice and aquatic habitat provision

The technical panel undertook a field assessment of the streams in late March 2003 when flows were close to the seven-day mean annual low flow (7DMALF) levels. This enabled the panellists to see how well the flow requirements for their values are satisfied. Flow gauging was carried out for each stream prior to the site visits and the results, measured in litres per second (L/s), were made available to panel members, along with the calculated 7DMALF. It was possible to do the flow gaugings on the day prior to the site visits because most of the flows are from spring-fed groundwater and during dry periods flow changes are relatively slow. No significant rainfall occurred between the time of gauging and the site visits. Dialogue with adjoining landholders provided panel members with a local perspective on the values associated with the particular stream.

Each panel member independently ranked the relative importance of the in-stream value/s on a low, medium or high scale and provided a flow recommendation for each stream. The field notes are contained Appendix 3.1 of this report. Staff then considered the information provided by the panellists, along with the local knowledge provided, and recommend a minimum flow for each stream.

1.2 Allocation regimes

In many areas of Canterbury, the demand for surface water can be intense. The NRRP provides policy direction for setting allocation blocks to avoid over allocating the resource (to protect the reliability of supply to abstractors) and to protect instream values. Priority can be given for allocating blocks of water above that set aside for protecting instream values.

The primary allocation block, known as the A allocation block, provides for a reasonable reliability of supply to abstractors. Policy WQN14 (4) states that, unless an alternative catchment specific approach is more appropriate, the size of an A allocation block shall be set so that all takes from the block have a reliability that will provide, on average:

a) the full allocation rate 95% or more of the time during the period mid October to mid March in 6 years out of 10; and
b) the full allocation rate 75% or more of the time during the period mid October to mid March in 9 years out of 10.

NRRP provides for alternative catchment specific solutions where this reliability cannot be met. Consents to take water from the primary allocation block are referred to as “A” permits.

Additional water may be allocated from further blocks known as the B allocation block, the C allocation block etc. These blocks have progressively higher flows at which abstraction ceases and lesser reliability of supply. Flow sharing is not considered appropriate for these rivers because of their small size and relatively stable summer-flow regimes. It is also not appropriate where there is only a small flow available for allocation above the minimum flow because sharing a small amount of flow will be of little or no ecological value to the river.

1.3 Terms and abbreviations

A number of terms and abbreviations are used in this report. They are:

L/s	Litres per second.
7DMALF	7-Day Mean Annual Low Flow. It is derived in the following way. The 7-Day Annual Low Flow is calculated as the lowest flow recorded over seven consecutive days in a year. Each of the annual values available is averaged to give the 7DMALF. Where there is long-term river flow data there is a high level of confidence in the accuracy of the 7DMALF. Where there is only limited data for a stream, mathematical correlation is made against other longer-term records, for example, from nearby streams or groundwater levels. For each 7DMALF there is a standard error shown by the symbol “±”. The ± indicates the flow range within which the 7DMALF is likely to occur 95 percent of the time.

2. Recommended Environmental Flow Regimes

2.1 Knights Creek at the Jamieson property

This minimum flow site is located off Leadleys Road at or about NZMS 260 M36:738-335.

2.1.1 Description

This is a deep meandering spring-fed stream with an even flow regime along a low gradient. Large amounts of filamentous algae occurring along the bottom degrade the fish habitat. However, the habitat is suitable for shortfin eel. While the general amenity values are quite high, its natural character is low. Lack of shading contributes to the proliferation of emergent aquatic plants and filamentous algae. The indigenous vegetation on the bank margins is limited in extent and includes flax, rushes and the rare native climbing nettle. At the observed flow, the plants had their roots in water. Grazing animals have unrestricted access to the observed site and this may explain the limited extent of indigenous native plants.

Ngāi Tahu consider the quality of mahinga kai is compromised by stormwater discharges from industrial areas at the headwaters of the stream. Wāhi taonga values are present upstream.

2.1.2 Local knowledge

The Advisory Group did not provide any information about this site.

2.1.3 Current abstractions

At 1 September 2006, the consents database showed:

- three surface water permits to take 203 L/s for irrigation; and
- one groundwater permit for irrigation with a calculated stream depletion effect of 8.8 L/s.

Table 1 below sets out the permit holders, consented takes and flow restrictions.

Table 1: Consents to take water from Knight Creek

Water Permits		Consented take L/s		Volume Limits m^3	Current Minimum Flow L/s
		Surface water	Groundwater - stream depleting effect		
CRC020604	PG & AC King		8.8	9072 per 12 days	150
CRC962402.1	Rossendale Holdings Ltd	30		2160 per day	90
CRC930607	W & P Murphy	30		1296 per day 15 days in 24	64
CRC930603	W & P Murphy	30		1296 per day 7 days in 27	64
CRC930584	WW & AC Jamieson	113		4068 per day 20 days in 120	64

In addition, Environment Canterbury has identified 23 groundwater permits that are desk-top assessed as having stream depletion effects (SDE) with a combined depleting effect of 366 L/s. None of the 39 permits have minimum flow restrictions.

The details of the individual permits are set out in Appendix 3.2.

2.1.4 Ranking of objective criteria and flow requirements

Table 2 sets out the Technical Panel assessments of the relative importance of, and flow requirements for, the instream values identified in Objective WQN1 (a)-(h). Panellists had had access to the following flow information:

- gauging date 25/03/03
- gauged flow 142 L/s
- 7DMALF (Report U02/29[1]) 220 ± 60 L/s

Table 2: Instream value ranking and flow requirements for Knights Creek

Panellist	Instream Value	Ranking	Flow Requirement L/s
Glova	Trout	M	140
Taylor	Native fish	H	190
Partridge	Indigenous vegetation	M	50
McManaway	Natural character and general amenity	L M	150
O'Connell/Smith	Mahinga kai; mauri; and wāhi tapu & wāhi taonga	M M Present	250
Duncan	Aquatic habitats	M	125

2.1.5 Staff recommendations

A group of Environment Canterbury staff from the planning, water quality, water quantity and consent sections considered the information provided by the Advisory Group and the Technical Panel. As a result of that consideration, recommendations have been made in relation to minimum flows and allocation blocks.

(a) Minimum flow

The minimum flows put forward by the technical panel range from 50 to 250 L/s. Protecting native fish, particularly eel, has been ranked as highly important and 190 L/s was suggested by Taylor. The respective panellists gave a medium ranking to all the other in-stream values, with the exception of a low ranking for natural character.

It is generally assumed that minimum flows set for trout will be adequate to maintain native fish populations (NIWA[2], Report No U04/107). For Knight's Creek, Glova suggests that 140 L/s would be a suitable minimum flow for trout. Taylor's flow recommendation for native fish carries with it a comment that it would be "desirable" to have a flow greater than that observed (142 L/s) during the site visit. Staff consider that the suggested 190 L/s is too high given the NIWA report above and instead believe that setting the minimum flow at 150 L/s would be satisfactory for meeting the needs of the native fishery. It is a flow above that observed during the site visit and is also in line with the flow suggested for the protection of general amenity values.

O'Connell & Smith ranked tangata whenua values to be of medium importance and they suggested a minimum flow of 250 L/s is needed for their protection. With respect to mahinga kai, eels are likely to be the major species. A flow that protects the native

[1] Facer and Horrell, Estimates of Mean Annual low Flows for Lake Ellesmere Tributaries and Streams in the Little Rakaia Zone, May 2002

[2] Minimum flows for selected North Canterbury streams, August 2004, on page 8.

fishery is also likely to protect mahinga kai. As outlined above, staff consider that a flow of 150 L/s will achieve that protection. Also, a minimum flow of 150 L/s will ensure the protection of indigenous vegetation and hence any taonga values that such vegetation provides

O'Connell and Smith also outlined a number of concerns about water quality degradation associated with stormwater discharges from the industrial area in the headwaters of Knights Creek. Staff are of the opinion that their higher flow requirement is aimed at providing dilution to help improve water quality. It is considered by staff that it would be better to resolve those issues by controlling the discharges, or the activities that lead to the discharges, nearer to their source through other Resource Management Act instruments. It is therefore not considered that an extra 100 L/s is necessary to protect tangata whenua values and the minimum flow for the site should be set at 150 L/s.

The proposed minimum flow is likely to be a significant increase for the four surface water permit holders and therefore it has the potential to impact on their reliability of supply. However, the minimum flow is considerably below the seven-day mean annual low flow (7DMALF) and therefore they will still have a high reliability of supply. It is likely that restrictions will occur only during extreme events. Should it be necessary to incorporate minimum flow conditions into those groundwater permits with stream depleting effects but not currently subject to such restrictions, those permit holders will experience a decline in their reliability of supply. However, NRRP signals imposition of such conditions in any case.

Recommendation

That a minimum flow of 150 L/s be set for Knights Creek at the Jamieson property (at or about NZMS 260 M36:738-335). This recommendation adequately provides for the values set out in Objective WQN1 of the Proposed NRRP

(b) Allocation regime

There is insufficient flow data currently available to determine an allocation regime based precisely upon the Proposed NRRP (PNNRP) allocation and reliability of supply policies or guidelines. PNRRP recognises that existing users should be given priority over future users in order to protect their supply reliability. It also suggests that takes established prior to 1 January 2002 be used as a basis for determining this separation unless an alternative catchment specific approach is more appropriate. While the Advisory Group has not expressed any collective preference for protecting the reliability of supply for current abstractors, one member's view is that the level of reliability should be that which prevailed prior to 1 January 2002.

For Knights Creek, all current surface water permits and 23 out of 26 groundwater permits (with potential stream depleting effects) commenced prior to 1 January 2002. Those takes account for 541 L/s out of the 578 L/s currently authorised to be taken. Three groundwater permits account for the remaining 37 L/s. Staff consider that the reliability of supply to pre-1/1/02 abstractors would not be significantly jeopardised by the small overall increase on the block size arising from incorporating all consented takes in place as at 1 May 2007. Therefore, it is recommended by staff that the size of the October-April A allocation block is based on all consented takes in place as at 1 May 2007, i.e. 580 L/s (578 L/s rounded up).

There are two ways of calculating the size of the block. It can be calculated by using the average daily rate of abstraction (the flows averaged over a 24-hour period) or by using the instantaneous rate of take (pumping rate). However, averaging is not considered applicable for Knights Creek because there are only three surface water abstractors (four consents). There is also a lack of a well developed mechanism for incorporating and managing groundwater takes with stream depleting effects within a water users group. For those reasons, it is recommended by staff that the size of the allocation block be based on instantaneous rates, in this case 580 L/s, rather than the average daily rate.

As a result of the large size of the A Block, it is likely to have a lower reliability of supply than the PNRRP target level of reliability for the October-April period. Therefore, it would be prudent to cap the October-April A block at 580 L/s to protect whatever the current reliability is, and not allow any new entrants, nor any expansion of existing consents in terms of the time/days over which they can abstract within the October-April A block. However, current consent holders with authorisations lawfully established on or before 1 May 2007 will be allowed to replace their permits with similar rates of takes but subject to the reasonable and efficient use tests set out in Policy WQN17 of the PNRRP.

The size of the October-April A block is substantially influenced by the inclusion of 366 L/s attributed to groundwater takes considered to have potential stream depleting effects (SDE). It has been necessary to incorporate those takes to ensure there is provision for them in the A block should the SDE's be confirmed. The future process of reviewing groundwater takes on a bore-by-bore basis may result in a lesser SDE or the exclusion altogether from the allocation block of those shown not to have SDE's. Staff also consider that any water freed-up through the review of SDE's, through consents being relinquished, or rates of takes being adjusted downwards for whatever reason, should not be re-allocated in the meantime. This will provide further protection to the reliability of supply to the remaining abstractors in the A block.

In order to maintain an accurate allocation regime and to maximise the allocation of available water, the PNRRP signals that water should be allocated only for the period over which the water will be used. For example, a take for irrigation use will generally only apply to the October to April period because that is considered to be the irrigation season. Water could then be used to satisfy demand for storage during the May to September period, including access by other users if the current permit holders do not require it. Therefore, an A allocation block of 300 L/s for the May-September period is provided with a minimum flow of 150 L/s.

Because the October-April A block is capped and, as a result, fully allocated, new abstractors can only be accommodated by creating an October-April B block. Abstractors from a B block are required to cease abstraction at a higher cut-off limit to protect the reliability of supply to the A block abstractors. This cut-off limit often includes provision for a gap between the A and B blocks. The gap provides a buffer between the two blocks by preventing abstractions taking all the water above the minimum flow, an effect commonly referred to as 'flat-lining' the river. Flows of freshwater into Lake Ellesmere/Te Waihora play an important role in maintaining its aquatic ecosystem health, particularly during the summer months. While the precise freshwater quantity requirements are still under investigation, it is important some caution is exercised in allocating that water. A relatively large gap of 200 L/s is provided accordingly. The gap also provides for future upward movement of a minimum flow should monitoring data show that Objective WQN1 values are not being achieved.

There is little to indicate that the number of abstractors will increase greatly in the near future, and therefore it is difficult to foresee what levels of abstraction is reasonable for the B block. However, staff consider that some provision be made via a 200 L/s B block for additional surface water abstractions, or groundwater takes with SDE's greater than 1 L/s, during the October-April period. The cut-off limit of 930 L/s is calculated by adding the minimum flow for the A block (150 L/s) to the allocation limit for the A block (580 L/s) plus a gap of 200 L/s.

In the future, increased data from metering takes, information about freshwater input requirements for Lake Ellesmere/Te Waihora, and monitoring the minimum flows may allow for more precise calculations of the reliability of supply and whether there is scope to amend the allocation regime. In the meantime, the PNRRP provides adequate provisions for new domestic/stockwater use and firefighting requirements. The small-scale use of water is also provided for in PNRRP, i.e up to 10 cubic metres of water per day to be taken at a rate no greater than 5 L/s. Such provision is considered sufficient to cater for the rural-lifestyle type subdivisions that are common in the area.

Recommendation

That an allocation regime for Knights Creek incorporates:

(i) ***An A allocation block of 580 L/s for the period 1 October to 30 April with a minimum flow of 150 L/s; and***

(ii) ***No further permits be granted to take surface water, or groundwater with stream depletion effects greater than 1L/s, from the A allocation block applying to the period 1 October to 30 April; but permit holders may reapply for permits lawfully established prior to 1 May 2007 that have not expired for more than 6 months; and***

(iii) ***No reallocation of water freed up through consents being relinquished, or from stream depletion effects proven to be less than currently estimated, within the A allocation block for the period 1 October to 30 April shall take place; and***

(iv) ***An A allocation block of 300 L/s for the period 1 May to 30 September with a minimum flow of 150 L/s; and***

(v) ***A B allocation block of 200 L/s for the period 1 October to 30 April, with abstractions ceasing at a flow of 930 L/s***

2.2 Halswell River Mainstem

2.2.1 Catchment description

The Halswell River catchment consists of a hill country component that contributes runoff from rainwater with the balance of the area being flat plains land from which considerable amounts of spring-fed groundwater arise. Historically, flooding and drainage problems dominated water management requirements for the river. It provides an outlet for an extensive system of tributaries and drains, a number of which, along with the mainstem, are included in the Halswell Drainage District. Work is carried out to remove any obstructions to water flow, such as excess vegetation in the channel or on the banks, removing any blockages and ensuring the floodgates function.

In addition to drainage matters, agriculture utilises the flows in the river for stockwater and irrigation purposes. The underground springs that feed the river, either directly or via the extensive drainage network provide a consistent supply of water for such purposes. However, it is also recognised that the river is a substantial contributor of freshwater to Lake Ellesmere/Te Waihora and limits to the amount of water abstracted for irrigation purposes have been put in place.

A number of minimum flow sites exist along different reaches of the river for various reasons. While the sites have been established primarily for managing irrigation abstractions, there are sites where other information is collected, for example, flow gauging and water quality samples are collected at McCartney's Bridge off River Road. The sites subject to this review concern those associated with irrigation abstraction only.

2.2.2 Site descriptions

2.2.2.1 Leadleys Bridge

This minimum flow site is located on State Highway 75 at or about NZMS 260 M36:745-333. The river at this point is a low-gradient, gently flowing stream with large deposits of silt. The bottom provides poor habitat for invertebrate benthic communities and this limits the range of these species present. There is adequate riparian shading for trout and large eels and the flow is suitable for inanga and other fish species. Mahinga kai values are high and wāhi taonga sites are present in the upper reaches.

The picturesque amenity plantings are mainly exotic but the natural patterns of a meandering stream still remain. Some planted wetland vegetation exists on the banks while instream species include cress, musk and floating lemna.

2.2.2.2 Branthwaites Bridge

This minimum flow site is located on the Old Tai Tapu Road at or about NZMS 260 M36:740-283. At this point the River site is a highly channelised, artificial reach subject to dredging to reduce silt levels to maintain flood carrying capacity. While the channel is well buffered by riparian grasses, the excessive silt on the bed creates a poor environment for benthic invertebrate species. The macrophyte cover that exists along the banks provides some habitat for trout and inanga but the mid-channel is less suited. There is no holding water for big trout in this particular reach.

The highly modified nature of the reach means that natural character values are low. It has good access and recreational possibilities. There are very few indigenous aquatic plant species present and the banks are so modified by dredging that no indigenous vegetation values exist. The high mahinga kai value reflects the presence of eels.

2.2.2.3 Ryans Bridge

This minimum flow site is located on the Lincoln Tai Tapu Road at or about NZMS 260 M36:731-272. This reach has stable banks but a deeply silted bottom. The habitat for benthic invertebrate species is poor, even though there is a limited amount of macrophytic growth. The reach provides good holding water for large trout. Native fish habitat is suitable for inanga, bullies and shortfin eels.

Mahinga kai (eel) values are high and wāhi tapu and wāhi taonga areas exist in the general locality. The cumulative impacts of non-point discharges from the surrounding land use are evident in reduced water clarity at this site. A mix of exotic and indigenous species on the riparian edges helps to provide a sense of natural character. General amenity values are high. In the open aquatic areas, dense cress, lemna, musk and sweetgrass exists. Where partial shading occurs, the level of those aquatic species becomes less dense.

2.2.2.4 Tobecks Bridge

This minimum flow site is located on the Greenpark Road at or about NZMS 260 M36:708-262. The reach is channelised with steep banks and the bed is covered with moderate levels of silt. The water depth, flow and bank cover provide a reasonable habitat for trout and native fish. Angling is difficult because of the steep banks. Mahinga kai (eel) values are high.

The artificial appearance and modified vegetation and context reduce the sense of natural character. However, general access is good. Cress, musk, lemna and sweetgrass are present in the aquatic margin, potatoe vine occurs on the banks and indigenous plantings (carex and flax) have been undertaken.

2.2.2.5 Neills Road

This minimum flow site is located at the end of Neills Road at or about NZMS 260 M36:730-232. This reach is a highly modified straight channel with a flat silt/mud bed and little channel diversity. There are times when river water ceases to move because of high lake levels. Bullies, trout, shortfin eel and flounder are present but the reach is more likely to provide a conduit to the upper reaches. The bottom provides poor habitat for invertebrate benthic communities and this limits the range of these species present. High mahinga kai values existed when the traditional level of Lake Ellesmere/Te Waihora encompassed this site.

The reach possesses very little natural character in spite of some natural elements. Very few indigenous aquatic or terrestrial plant species are present.

2.2.3 Local knowledge

The Advisory Group has provided the following information applicable to the Halswell River generally:

- Maintenance of the river and "height" of the river should be considered, along with flows. All other measurements - temperature, oxygen availability, fish quantity - don't vary much at all;
- Because of the spring fed nature of the river, there is very little variation in flows - weed growth has more effect;

- 2002 is the first time since 1972 (approximately) that flows have been read at the same time as irrigation off-takes have been recorded. Correlation now possible.
- No new large abstractions are likely;
- In the past, irrigators have operated a roster system to take effect during drought and low flow conditions;
- Hydraulic connections in the Halswell and LII area are unlikely. (These are regarded by the group as not hydraulically connected to underlying aquifers, because of the higher strata around Lincoln);
- Consideration of new monitoring points recommended. (ie move from Ryans to McCartney's, where there is a confined/flat bottom);
- Run-off from the new suburbs above Halswell is believed to affect water quality;
- The question of whether or not the stream is hydraulically linked to groundwater on the plains is considered important; and
- Another question relates to who is responsibility for stream maintenance. The stream "hasn't been cleaned for years".

2.2.4 Current minimum flows

Depending on when water permits were issued, any one of ten different minimum flows referenced to one of four different sites exist for the Halswell River above the Halswell River Diversion Canal. Minimum flows were first established for the Halswell River in 1972 under section 14(3)(O) of the Water and Soil Conservation Act 1967 (WSC). The flows were negotiated with representatives of the North Canterbury Catchment Board, North Canterbury Acclimatisation Society, the Ellesmere and Paparua County Councils and Federated Farmers. The passing of the Resource Management Act 1991 required consideration of a broader range of in-stream values when assessing water permits. The first attempt to do this involved the use of mean annual low flows (MALF) and the then scientific advice that two thirds of that flow would maintain adequate habitat quality and quantity to support fish and associated values. At Neills Road, where flow records over a longer time period were available, two thirds of the seven-day mean annual low flow (7DMALF) was used.

Latterly, a process has been initiated involving the use of a technical panel, made up of people with expertise in particular in-stream values, undertaking field assessments. In 2000, a technical panel consisting of representatives from NIWA, Fish and Game, Boffa Miskell, Landcare Research, Department of Conservation and Environment Canterbury carried out an assessment and made recommendations. Those recommendations have been used to set minimum flows since then.

In 2002, Federated Farmers suggested to Environment Canterbury that it was inappropriate to have organisations with a vested interest in the flow regime outcome involved in helping set it. As a consequence, the technical panel makeup was narrowed to independent expert participants and in 2003 the panel reassessed the flow requirements and their recommendations are used for the basis of this report. Further technical investigations by Environment Canterbury hydrological staff have resulted in the calculation of 7DMALFs (with error bands) for each site (Report U02/29).

Table 3 below shows the gauging sites and the various minimum flows that are attached to water permits for the Halswell River. All figures are expressed in L/s and the full MALF or 7DMALF are included in brackets.

Table 3: Current minimum flows

Site	The basis for setting the minimum flow				
	S14 WSC Act L/s	2/3 Estimated MALF L/s	2/3 7Day MALF L/s	Technical Panel Suggestions 2000	2003
Leadleys Bridge	230	290(435)	-	370 L/s	
Branthwaites Bridge	230	310(465)	-	-	
Tobecks Bridge	280	405(610)	-	610 L/s	500 L/s
Neills Road	-	-	510(770)	650 L/s	

2.2.5 Current abstractions

At 1 September 2006, the consents database showed:

- 22 surface water permits to take 962.3 L/s for irrigation from the mainstem of the Halswell River;
- three hydraulically connected groundwater permits calculated to take have a stream depleting effect of 51.4 L/s; and
- in addition, there are three surface water permits to take 282 L/s from the Halswell River diversion canal (often called the Halswell Canal), of which two have minimum flows referenced to Neills Road.

Table 4 below sets out the permit holders, consented takes and flow restrictions.

Table 4: Consents to take water from the Halswell River

Water Permits		Consented take L/s		Volume Limits m^3	Current Minimum Flow L/s
		Surface water	Groundwater - stream depleting effect		
Leadleys Bridge					
CRC020579	RE McDrury		21.0	24480 per 10 days	370
CRC011564	JP & MP McDermott		14.4	25920 per 15 days	370
CRC961338	WR & MG Caesar	22.7		2620 per 40 days	290
CRC970298.1	ID & AM Crossen	6.0		130 per 2 days	290
CRC930583	WW & CA Jamieson	23.0		828 per day 7 days in 10	230
Sub Total		51.7	35.4		
Branthwaites Bridge					
No current abstractions attached					
Ryans Bridge					
No current abstractions attached					

Table 4 cont.

Water Permits		Consented take L/s		Volume Limits m^3	Current Minimum Flow L/s
		Surface water	Groundwater - stream depleting effect		
Tobecks Bridge					
CRC961364	RE McDrury	35.0		5040 per 10 days	610
CRC961810	Est. BA McCarthy	30.0		8640 per 15 days	610
CRC012272	GV & WA Butcher	8.0		2160 per 10 days	610
CRC020656	R Platt & BN Sewell	2.7		50 per day	610
CRC020769	JJ McCarthy		16	25920 per 18 days	610
CRC961088	EG & NB Moorhead	20.0		860 per day	610
CRC051008	JF & JA Bradshaw	7.0		252 per day	500
CRC961445	GW & WJ Cockram	6.0		216 per 7 days	405
CRC961467	DC Farmer	23.0		4975 per 7 days	405
CRC962029	RH & VG Arbuckle	3.8		109 per day	405
CRC962321	AR & JL Fiecken	15.0		1240 per day	405
CRC930628	RAC Tulett	53.0		3816 per day 14 days in 30	280
Sub Total		203.5	16		
Neills Road					
CRC011919	HJ Macartney	30.0		30240 per14 days	650
CRC012069	JA & CH Ferguson	12.0		4234 per 7 days	650
CRC970176	ML & BA Gilbert	152.0		76600 per 21 days	650
CRC970175	ML & BA Gilbert	23.0		4410 per 30 days	650
CRC900528	FM Redmond	38.0		11494 per 30 days	650
CRC961931	Motukarara Sports Centre Ltd	26.5		5725 per 30 days	510
CRC961592.1	WA & JT Scarlett	75.0		25929 per 14 days	510
CRC961455	RM & AE Manson	35.0		28980 per 14 days	510
CRC962248.1	CG & HL Vlaanderen	30.0		2400 per day	None
Sub Total		421.5			

Table 4 cont.

Water Permits		Consented take L/s		Volume Limits m^3	Current Minimum Flow L/s
		Surface water	Groundwater - stream depleting effect		
Halswell Canal					
CRC930636	JJ & JA Geddes	250.0		107568 per month	#1
CRC930637	JJ & JA Geddes	58.0		50115 per month	#1
CRC930591.1	Corrlea Cows Ltd	7.6		272 per day 8 days in 18	#1
CRC962247.1	AB & LA Goddard	30.0		2484 per day	#2
Old Halswell channel					
CRC970975	D Barrar	222.0		18382 per 30 days	#3
Sub Total		567.6			
Total Halswell		1244.3	51.4		

#1 280 L/s at Hodgsen Road Bridge
#2 510 L/s at Neills Road –reduce volume of take by 33% when below 510 L/s
#3 650 L/s at Neills Road

In addition, Environment Canterbury has identified 52 groundwater permits that are desk-top assessed as having stream depletion effects (SDE) with a combined depleting effect of 1118 L/s. None of the 52 permits have minimum flow restrictions.

The details of the individual permits are set out in Appendix 3.2.

2.2.4 Ranking of objective criteria and flow suggestions

Table 5 sets out the Technical Panel assessments of the relative importance of, and flow requirements for, the instream values identified in Objective WQN1 (a)-(h). Panellists had access to the following flow information:

- Gauging date 25/03/03
- Leadleys Bridge Gauged flow 348 L/s 7DMALF 487± 70 L/s
- Branthwaites Bridge Gauged flow 388 L/s 7DMALF 483± 94 L/s
- Ryans Bridge Gauged flow 329 L/s 7DMALF 515± 49 L/s
- Tobecks Bridge Gauged flow 488 L/s 7DMALF 631± 113 L/s
- Neills Road Gauged flow 516 L/s 7DMALF 636± 227 L/s

The use of seven-day mean annual low flow (7DMALF) is preferred to the mean annual low flow (MALF) because it provides a more reliable and meaningful statistical measure of the low flow. The ± parameter is a measure of the standard error or "degree of uncertainty" surrounding the value. Generally, the larger the number of gauging records, the narrower the standard error becomes.

Table 5: Instream value ranking and flow requirements for the Halswell River

	Leadleys Bridge		Branthwaites Bridge		Ryans Bridge		Tobecks Bridge		Neills Road	
Values	**Rank**	**Flow L/s**	**Rank**	**Flow L/s**	**Rank**	**Flow L/s**	**Rank**	**Flow L/s**	**Rank**	**Flow L/s**
Glova - trout	Medium	350	Low	320	High to-Medium	320	High to Medium	450	Medium	520
Taylor - native fish	Medium	320	Medium	450	High	300	High	450	Medium	450
Partridge - indigenous vegetation	Medium	300	Low	200	Low	225	Low to Medium	250-300	Low	500
McManaway - natural character general amenity	Medium Medium	360	Low Medium to Low	430	Medium Medium to High	350	Low Low	550	Low Low	600
O'Connell/Smith (Mahinga kai) (Mauri) (Wāhi tapu wāhi taonga)	High Medium Present upstream	450	High Medium Present upstream	500	High - Present locally	500	High Medium -	750	High - -	900
Duncan (Aquatic habitat)	Medium	300	Medium	450	High to Medium	400	High to Medium	500	Medium	500

2.2.5 Staff recommendations

A group of Environment Canterbury staff from the planning, water quality, water quantity and consent sections considered the information provided by the Advisory Group and the Technical Panel. As a result of that consideration, recommendations have been made in relation to minimum flow sites, minimum flows and allocation blocks.

(a) Minimum flow sites

There are a number of criteria that contribute to an ideal site for monitoring minimum flows. The site should:

(i) have a permanent water level recorder with information telemetered to Environment Canterbury and made available to users via the website;
(ii) reflect the hydrological behaviour of the river;
(iii) be upstream or downstream of all abstraction points;
(iv) have a stable bed;
(v) be easily accessible;
(vi) have flowing water; and
(vii) have flows unaffected by tides or other obstructions.

Historically, minimum flow sites were selected to cater for the needs of individual water permits. However, for rivers where multiple abstractions take place, consolidation of the number of sites is desirable and the above criteria become useful. The Halswell River falls into this category. The advantages of automating data collection over manual collection provided an opportunity for locating the best site for a permanent water level recorder. A site at Ryans Bridge was selected and in 1996 the recorder began providing water level data every 15 minutes. This data is telemetered back to Environment Canterbury twice a day and will be made available to water users via the website in due course.

It has been suggested by the Advisory Group that McCartneys Bridge is a better site than Ryans Bridge and it should be used instead. There has been a long history of manual gaugings taken at this site primarily for water quality monitoring. When consideration was given to locating a permanent recorder site for the Halswell River it was found that Ryans Bridge was superior because of its weed-free nature, stable shingle bottom and easy access for maintenance.

It will take some time to collect sufficient data before the relationship between Ryans Bridge and the sites at Leadleys Bridge, Tobecks Bridge and Neills Road becomes more precise. In the meantime, the use of the latter sites will continue and minimum flows will be set for them. A minimum flow will also be set for Ryans Bridge to provide for future use.

The technical panel assessed the site at Branthwaites Bridge. However, there are no current consents referenced to the site. Also, even with the limited data available from Ryans Bridge, there is a good relationship between the flows at Branthwaites Bridge and Ryans Bridge (Facer and Horrell, Report U02/29). Therefore staff consider that there is no need to continue with this site for the above reasons.

(b) Minimum flows

The rankings given to each of the in-stream values by the technical panellists are generally consistent for Leadleys Bridge, Ryans Bridge, Tobecks Bridge and Neills Road. Mahinga kai value has been ranked as highly important for all four sites while it is high for native fish at Ryans Bridge and Tobecks Bridge and medium at Leadleys Bridge and Neills Road. Trout values are ranked as medium to high at Ryans and Tobecks and medium at Leadleys Bridge and Neills Road.

Natural character and general amenity values are ranked as medium although natural character and general amenity values are lower for Tobecks and Neills Road. Aquatic habitat provision is high to medium for Ryans and Tobecks but only medium for Leadleys and Neills Road. Mauri is ranked as medium for Leadleys and Tobecks but not ranked for Ryans and Neills Road. Wāhi tapu and wāhi taonga values are present in the upper Halswell and in the area around Ryans Bridge. Indigenous vegetation values were ranked as low to medium.

The field assessment work carried out by the technical panel is undertaken when flows are low, ideally close to the 7DMALF, so that panellists can see how well the flow requirements for their values are satisfied. Of the four sites assessed, the flow viewed at Ryans Bridge had the lowest flow relative to the 7DMALF. For that reason the rankings and the flow requirements put forward by the technical panel for the other three sites should be considered against the Ryans Bridge site.

(i) Ryans Bridge

O'Connell & Smith and Taylor respectively ranked the protection of mahinga kai (eels predominantly) and native fish values to be of high importance. Flows of 500 L/s and 300 L/s have been suggested as necessary in each instance. Staff consider that 500 L/s is higher than is necessary because the native fishery can be protected at 300 L/s. While trout, natural character, aquatic habitat provision and general amenity values are ranked between medium and high, their flow requirements are somewhat higher than that suggested for the protection of native fish. The flow suggestions include 320

L/s for trout, 350 L/s for natural character and general amenity and 400 L/s for aquatic habitat provision. It is the opinion of staff that 350 L/s would be sufficient to adequately protect those values. The slight reduction to the 400 L/s suggested for the provision of aquatic habitat is not considered significant because of the slightly lower ranking relative to general amenity and trout values. 350 L/s is also higher that the flow requirements of the low-ranked indigenous vegetation.

Wāhi tapu and wāhi taonga are present only in the general area of Ryans Bridge rather than in the river itself. As a result, a minimum flow of 350 L/s is considered sufficient to protect those values rather than the 500 L/s suggested by O'Connell & Smith.

For the above reasons, it is considered that a minimum flow of 350 L/s at Ryans Bridge would adequately protect the instream values.

(ii) Leadleys Bridge (approximately eight kilometres upstream of Ryans Bridge)

The Halswell River gains inflows of water, both spring-fed and runoff from the hill country tributaries, as it progresses downstream. The flow gains are reflected in the 7DMALFs, being 487 L/s at Leadleys Bridge, 515 L/s at Ryans Bridge, 631 L/s at Tobecks Bridge and 636 at Neills Road. In general, the instream values that exist for the river do not significantly differ at the any of the four sites. Therefore, it would be expected that the minimum flows for each site would bear a relationship in keeping with the comparative rankings of the instream values and the 7DMALF relationships.

Staff note that at Leadleys Bridge the rankings by Glova and Taylor for the importance of fish values are lower than for Ryans Bridge, yet the flow requirements suggested by them are higher. Given their suggestion that the requirements for fish values would be satisfied with a flow of 320 L/s at Ryans Bridge, staff consider that such a flow would also be sufficient at Leadleys Bridge. The flow requirements for indigenous vegetation and aquatic habitat protection suggested by Partridge and Duncan respectively would be satisfied by 320 L/s

The rankings for the natural character and general amenity values provided by McManaway are equal to Ryans Bridge, yet the flow requirement suggested is slightly higher at Leadleys Bridge. Given that there is less flow at Leadleys Bridge compared with Ryans Bridge, staff consider that setting the minimum flow at 320 L/s instead of 360 L/s would not significantly compromise natural character and general amenity values.

The values for tangata whenua at Leadleys Bridge are ranked lower than or equal to Ryans Bridge, and the flow requirement of 450 L/s suggested is consistent with that. By ranking mahinga kai values as high, staff consider that O'Connell and Smith's flow requirement is primarily based on protecting those values. However, staff are of the opinion that the native fish flow recommendation by Taylor of 320 L/s would suffice for the protection of mahinga kai and that the mauri of the river would not be significantly compromised by such a minimum flow.

While it would appear that there might be a significant impact on the abstractor with a minimum flow restriction of 230 L/s, hydrological staff have assessed that the reliability of supply on average would fall by no more than 3%. Of the 65 gaugings (October to March) undertaken between 1959 and 2006, six have recorded flows less than 320 L/s (three have been less 320, one less than 290 and two less than 250). The impact on the abstractors with minimum flow restrictions set at 290 L/s are unlikely to experience more than a minor change. On the other hand, there will be a benefit to the abstractor with a present restriction set at 370 L/s.

(iii) Tobecks Bridge (approximately six kilometres downstream of Ryans Bridge)

Glova and Taylor ranked fish values to be highly important and suggested that 450 L/s would satisfy the flow requirements of trout and native fish. O'Connell & Smith also ranked mahinga kai values as high, and because mauri was given a lesser medium ranking, staff are of the opinion that protecting mahinga kai is the primary need for their suggested flow requirement of 750 L/s. However, staff believe that the suggested flow is too high given that fish would be protected by 450 L/s. Staff also consider that the mauri of the river would not be significantly compromised by setting the minimum flow at 450 L/s given its medium ranking.

Natural character and general amenity values are ranked by McManaway to be lower in importance compared with Ryans Bridge but the flow requirements suggested are significantly higher. While the river gains in flow between Ryans Bridge and Tobecks Bridge, in the opinion of staff, setting the minimum flow at 550 L/s to protect natural character and general amenity values is too high given their lower importance. Staff consider that 450 L/s would suffice for the adequate protection of those values.

Duncan has ranked the protection of aquatic habitats as high to medium and a suggested a flow of 500 L/s is required. Given that 450 L/s is considered by staff to suffice for the protection of fish, natural character and general amenity values, reducing the suggested flow by 50 L/s would not significantly jeopardise aquatic habitats. Nor would it compromise the lower ranked natural character and general amenity values.

The impact on abstractors from the proposed change to the minimum flow is variable. There would be a positive impact for the six abstractors with a current cut-off of 610 L/s, and the abstractor with the 500 L/s cut-off, because they would have a less restrictive regime. One the other hand, raising the cut-off level will have a negative impact on those currently with the 280 L/s (one) and 405 L/s (four) minimum flow restrictions. Hydrology staff have assessed that the average reliability of supply would fall by less than 4% as a result of changing from 280 L/s to 450 L/s, even less for the change from 405 to 450 L/s. Of the 49 gaugings (October to March) undertaken between 1985 and 2006, six have recorded flows less than 450 L/s (two have been less 405 but none less than 280).

There is also the possibility that flows will fall more quickly to the 450 L/s cut-off point because those abstractors who would currently cease abstraction when flows fall to 610 L/s would no longer be required to do so.

(iv) Neills Road (approximately 10 kilometres downstream of Ryans Bridge)

The nature of the river begins to change somewhat below Tobecks Bridge. While the 7DMALF indicates there is slightly more flow recorded at Neills Road compared with Tobecks Bridge, the gradient of the bed at Neills Road is flatter and the level of Lake Ellesmere/Te Waihora begins to influence the velocity of flow. O'Connell and Smith have ranked mahinga values to be of high importance and suggest that 900 L/s is required for their protection. On the other hand, Taylor suggests that 450 L/s is sufficient to protect the native fishery and hence mahinga kai. Trout and aquatic habitat have been ranked by Glova and Duncan to be of medium importance and they suggest 520 L/s or 500 L/s respectively would suffice for their protection. Partridge also suggests 500 L/s would be needed to protect indigenous vegetation although they are of low importance. A flow of 520 L/s is therefore considered by staff satisfactorily protect the above instream values.

McManaway has suggested that 600 L/s is necessary for the protection of natural character and general amenity values and she ranks them of low importance. As a consequence, staff consider that the values would not significantly compromised by lowering the flow to 520 L/s. However, staff further consider that little would be gained from increasing the existing minimum flow of 510 L/s to 520 L/s and therefore it should be retained.

For the above reasons, it is considered that a minimum flow of 510 L/s at Neills Road would adequately protect the instream values.

The impact on abstractors from the proposed change to the minimum flow is variable. There would be a positive impact for the five abstractors with a current cut-off of 650 L/s because they would have a less restrictive regime. One the other hand, there is also the possibility that flows will fall more quickly to the 510 L/s cut-off point because those abstractors who would currently cease abstraction when flows fall to 650 L/s would no longer be required to do so.

The Advisory Group suggests that weed clearance and water quality issues need addressing for the Halswell River generally. Both of those matters lie outside the scope of this flow review exercise. Weed clearance is a matter for the Halswell River Rating District. Water quality issues, arising from land use decisions and activities in the upper catchment, fall under other RMA instruments such as Chapter 4 of the NRRP and the Christchurch City Council District Plan.

The need to use both river level and flow rate has also been put forward by the Advisory Group. The reason for not using levels (stage height) is that the stage height is hugely dependent on the amount of weed growth. In a river like the Halswell, weed growth is significant, and during summer months it grows fast in patches. Flow rate is a much more consistent measure across all minimum flow sites along the river.

Recommendation

That the following minimum flows be set for the Halswell River:
(i) 320 L/s at Leadleys Bridge (at or about NZMS 260 M36:744-333);
(ii) 350 L/s at Ryans Bridge (at or about NZMS 260 M36:731-272);
(iii) 450 L/s at Tobecks Bridge (at or about NZMS 260 M36:708-262); and
(iv) 510 L/s at Neills Road (at or about NZMS 260 M36:730-232).

These recommendations adequately provide for the values set out in Objective WQN1 of the Proposed NRRP.

(c) Allocation regime

There is insufficient flow data currently available to determine an allocation regime based precisely upon the Proposed NRRP (PNNRP) allocation and reliability of supply policies or guidelines. PNRRP recognises that existing users should be given priority over future users in order to protect their supply reliability. It also suggests that takes established prior to 1 January 2002 be used as a basis for determining this separation unless an alternative catchment specific approach is more appropriate. While the Advisory Group has not expressed any collective preference for protecting the reliability of supply for current abstractors, one member's view is that the level of reliability should be that which prevailed prior to 1 January 2002.

For the Halswell River, 25 out of the 28 current surface water permits and 38 out of 55 groundwater permits (with potential stream depleting effects) commenced prior to 1 January 2002. Those takes account for 1990 L/s out of the 2324 L/s currently authorised to be taken. Three surface water permits totalling 45 L/s and 17 groundwater permits totalling 379 L/s account for the remaining 424 L/s. Staff consider that the reliability of supply to pre-1/1/02 abstractors would not be significantly jeopardised by the small (18%) overall increase on the block size arising from incorporating all consented takes in place as at 1 May 2007. Those abstractors may well hold a different view though. None-the-less, it is recommended by staff that the size of the October-April A allocation block is based on all consented takes in place as at 1 May 2007 i.e. 2325 L/s (2324 L/s rounded up). A minimum flow of 320 L/s at Leadleys Road Bridge, 450 L/s at Tobecks Bridge, or 510 L/s at Neills Road, will apply to the current surface water abstractions at the minimum flow site specified on their permits. As the stream depleting effects of individual groundwater takes are definitively determined, so to will their most appropriate minimum flow site be assigned.

There are two ways of calculating the size of the block. It can be calculated by using the average daily rate of abstraction (the flows averaged over a 24-hour period) or by using the instantaneous rate of take (pumping rate). However, averaging is not considered applicable for the Halswell River because there are only three surface water abstractors (four consents). There is also a lack of a well developed mechanism for incorporating and managing groundwater takes with stream depleting effects within a water users group. For those reasons, it is recommended by staff that the size of the allocation block be based on instantaneous rates rather than the average daily rate.

As a result of the large size of the A Block, it is likely to have a lower reliability of supply than the PNRRP target level of reliability. Therefore, it would be prudent to cap the October-April A block to protect whatever the current reliability is, and not allow any new entrants, nor any expansion of existing consents in terms of the time/days over which they can abstract within the October-April A block. However, current consent holders with authorisations lawfully established on or before 1 May 2007 will be allowed to replace their permits with similar rates of takes but subject to the reasonable and efficient use tests set out in Policy WQN17 of the PNRRP. It may also be sensible to provide for some future community drinking water requirements for settlements such as Taitapu. While it is likely that such needs will be provided for from deep groundwater, should use of a shallower source with potential stream depletion effects prove necessary, a provision of 20 L/s is provided for in the A block for that purpose. Therefore, the size of the October-April A block is 2345 L/s.

The size of the October-April A block is made up almost equally of surface water takes and groundwater takes considered to have potential stream depleting effects (SDE). It has been necessary to incorporate those groundwater takes to ensure there is provision for them in the block should the SDE's be confirmed. The future process of reviewing groundwater takes on a bore-by-bore basis may result in a lesser SDE or the exclusion altogether from the allocation block of those shown not to have SDE's. Staff also consider that any water freed-up through the review of SDE's, through consents being relinquished, or rates of takes being adjusted downwards for whatever reason, should not be re-allocated in the meantime. This will provide further protection to the reliability of supply to the remaining abstractors in the block.

In order to maintain an accurate allocation regime and to maximise the allocation of available water, the PNRRP signals that water should be allocated only for the period over which the water will be used. For example, a take for irrigation will generally only apply to the October to April period because that is considered to be the irrigation season. Water could then be used to satisfy demand for storage during the May to September period, including access by other users if the current permit holders do not require it. Therefore, an A allocation block of 1000 L/s is provided for the May-September period with a minimum flow of 320 L/s at Leadleys Road Bridge, or 450 L/s at Tobecks Bridge, or 510 L/s at Neills Road.

Because the October-April A block is capped and, as a result, fully allocated, new abstractors can only be accommodated by creating an October-April B block. Abstractors from a B block are required to cease abstraction at a higher cut-off limit to protect the reliability of supply to the A block abstractors. This cut-off limit often includes provision for a gap between the A and B blocks. The gap provides a buffer between the two blocks by preventing abstractions taking all the water above the minimum flow, an effect commonly referred to as 'flat-lining' the river. Flows of freshwater into Lake Ellesmere/Te Waihora play an important role in maintaining its aquatic ecosystem health, particularly during the summer months. While the precise freshwater quantity requirements are still under investigation, it is important some caution is exercised in allocating that water. A relatively large gap of 1000 L/s is provided accordingly. The gap also provides for future upward movement of a minimum flow should monitoring data show that Objective WQN1 values are not being achieved.

There is little to indicate that the number of abstractors will increase greatly in the near future, and therefore it is difficult to foresee what levels of abstraction is reasonable for the B block. However, staff consider that some provision be made via a 200 L/s B block for additional surface water abstractions, or groundwater takes with SDE's greater than 1 L/s, during the October-April period. The cut-off limit of 3695 L/s at Ryans Bridge is calculated by adding the minimum flow for the A block at Ryans Bridge (350 L/s) to the allocation limit for the A block (2345 L/s) plus a gap of 1000 L/s.

In the future, increased data from metering takes, information about freshwater input requirements for Lake Ellesmere/Te Waihora, and monitoring the minimum flows may allow for more precise calculations of the reliability of supply and whether there is scope to amend the allocation regime. The PNRRP provides adequate provisions for new domestic/stockwater use and firefighting requirements. The small-scale use of water is also provided for in PNRRP, i.e. up to 10 cubic metres of water per day to be taken at a rate no greater than 5 L/s. Such provision is considered sufficient to cater for the rural-lifestyle type subdivisions that are common in the area.

Recommendation

That an allocation regime for the Halswell River Creek incorporates:

(i) ***An A allocation block of 2345 L/s (including 20 L/s for community water supply and stock water requirements) for the period 1 October to 30 April with a minimum flow of 320 L/s at Leadleys Road Bridge, or 450 L/s at Tobecks Bridge, or 510 L/s at Neills Road; and***

(ii) ***No further permits be granted to take surface water, or groundwater with stream depletion effects greater than 1L/s, from the A allocation block applying to the period 1 October to 30 April; but permit holders may reapply for permits lawfully established prior to 1 May 2007 that have not expired for more than 6 months; and***

(iii) ***No reallocation of water freed up through consents being relinquished, or from stream depletion effects proven to be less than currently estimated, within the A allocation block for the period 1 October to 30 April shall take place; and***

(v) ***An A allocation block of 1000 L/s for the period 1 May to 30 September with a minimum flow of 320 L/s at Leadleys Road Bridge, or 450 L/s at Tobecks Bridge, or 510 L/s at Neills Road; and***

(v) ***A B allocation block of 200 L/s for the period 1 October to 30 April, with abstractions ceasing at a flow of 3695 L/s at Ryans Bridge.***

2.7 L II River

The L II River is located between the catchments of the Halswell River to the east and the Selwyn River to the west. The flows in the upper L II are mainly from springs and drainage associated with agricultural land uses. The L I Creek and the other tributaries lower down the catchment not only contribute spring-fed water to the L II River but also have associated discharge impacts arising from drainage linked to the town settlements of Lincoln and Springston. Two minimum flow sites currently exist in the L II. The first is in the upper reach (at Moir's property) and the lower site is at Wolfes Road approximately two kilometres from the outlet to Lake Ellesmere/Te Waihora. An alternative site to Wolfes Road is considered in this report.

2.7.1 L II River at Moir's property

The location of the minimum flow site for the upper reach is off Moir's Lane at or about NZMS 260 M36:692-280.

2.7.1.1 Description

This is a deep spring-fed stream of low gradient with slow-flowing clear water. While suitable for shortfin eel, the habitat is less desirable for trout due to lack of shade plants and the high level of emergent weeds. Traditionally, the importance of this area for eels related to providing habitat rather than food gathering because the area was once part of a deep swamp and would have been difficult to access for fishing.

The stream has little sense of natural character at the observed site. There are no native vegetation species within the riparian margin. There is extensive growth of cress, floating lemna and musk along the observed reach.

2.7.1.2 Local knowledge

The Advisory Group has provided the following information:

- Constant flow fed primarily from three large springs and confined to one large property;
- The health of the stream is good with plenty of eels, some trout and some flounder.
- There are no surface abstractions;
- Maintenance extremely significant - the amount of weed present determines change more frequently than flows; and
- There are many big springs just across from Moir's Lane gauging point
  " There are springs all the way down. It is difficult to know how much water comes from Yarr's Lagoon, which is "like a big sponge.

2.7.1.3 Current abstractions

At 1 September 2006, the consents database showed six surface water permits taking 133 L/s for irrigation referenced to this site. Table 6 below sets out the permit holders, consented takes and flow restrictions.

Table 6: Consents to take water from the L II River at Moir's property

Water Permits		Consented take L/s		Volume Limits m^3	Current Minimum Flow L/s
		Surface water	Groundwater		
CRC050144	Kajens Trading & Development Ltd	10	-	3600 per 10 days	350
CRC050143.2	K & D McIntosh Family Trust	10	-	3600 per 10 days	350
CRC050142.1	Kajens Trading & Development Ltd	10	-	3600 per 10 days	350
CRC012176.1	Kajens Trading & Development Ltd	10	-	3600 per 10 days	350
CRC042703	LS & LJ Greenslade	70 (42)*	-	-	200 (120)
CRC962145	Estate BR Moir & AS Moir	23	-	21865 per 14 days	120
Total		133			

* Two-staged permit – consent to take 70 L/s until flow falls to 200 L/s and then it is reduced to 42L/s with abstraction ceasing entirely when flows fall below 120 L/s

In addition, Environment Canterbury has identified three groundwater permits that are desk-top assessed as having stream depletion effects (SDE) with a combined depleting effect of 144 L/s. None of the permits have minimum flow restrictions.

The details of the individual permits are set out in Appendix 3.2.

2.7.1.4 Ranking of objective criteria and flow requirements

Table 7 sets out the technical panel assessments of the relative importance of, and flow requirements for, the instream values identified in Objective WQN1 (a)-(h). Panellists had access to the following flow information:

- gauging date -
- gauged flow Not able to be gauged
- 7DMALF Estimated to be 200 L/s. While 11 gaugings are recorded between 1977 and 2003, it has not been possible to date to establish a close relationship with any nearby long-term groundwater monitoring wells. This is necessary because spring flows are directly related to groundwater levels. Nor is there a close correlation with Ryans Bridge on the Halswell River, due in part to the difference in depth of the springs associated with the L II and the Halswell Rivers (Facer & Horrell, (U02/29 pg 23).

Table 7: Instream value ranking and flow requirements for the L II at Moirs property

Panellist	Instream Value	Ranking	Flow Requirement L/s
Glova	Trout	L-M	350
Taylor	Native fish	L	200
Partridge	Indigenous vegetation	L	200
McManaway	Natural character and general amenity	M-L M	350-400
O'Connell/Smith	Mahinga kai; mauri; and wāhi tapu & wāhi taonga	H (habitat) L Not ranked	450
Duncan	Aquatic habitats	L	200

2.7.1.5 Staff Recommendations

A group of Environment Canterbury staff from the planning, water quality, water quantity and consent sections considered the information provided by the Advisory Group and the Technical Panel. As a result of that consideration, recommendations have been made in relation to minimum flows and allocation blocks.

(a) Minimum flow

The minimum flows put forward by the technical panellists range from 200 to 450 L/s. Mahinga kai is the only high ranked instream value. The slow-flowing nature of the stream resulting from its low gradient, the abundance of aquatic plants and its deep silty bed, all contribute to the stream being more suited to indigenous fish species, particularly eel, than trout. Staff consider that providing a minimum flow that will protect the native fishery will therefore protect the mahinga kai values as well. According to O'Connell & Smith, the high ranking for mahinga kai is due in part to the historical situation where the L II was once part of a large swamp providing important eel habitat but fishing was too difficult because of poor access. They also note that water quality is degraded by the emergency discharge of sewage from Lincoln and gathering of mahinga kai does not occur because of this. A flow of 200 L/s is considered suitable by Taylor to adequately protect the native fishery. In so doing, it is considered this flow would also protect mahinga kai rather than the higher flow of 450 L/s.

The panellists that considered the needs of trout, indigenous vegetation, natural character, general amenity and aquatic habitats suggested flows of between 200 and 400 L/s. However, factors such as the absence of indigenous vegetation components, the presence of developed paddocks adjoining the stream and the lack of desirable trout habitat lead to a low to medium rankings of the values. Therefore, staff consider that the higher flow suggestions are not justified and a minimum flow of 200 L/s would provide adequate protection to those values.

The L II is the single largest source of fresh water flowing into Lake Ellesmere/Te Waihora. It is unclear exactly what role this plays in helping to maintain the aquatic ecosystem of lake. However, a significant reduction in freshwater inflows is likely to allow the lake to become more saline. In the absence of having adequate information about this, it would be prudent to take a cautious approach and maintain as far as possible the current inflows of freshwater. Preventing any further surface water and stream depleting groundwater abstractions would achieve that end without impacting on current abstractors. Consideration of this will be taken into account as part of the allocation regime.

There are operational difficulties in measuring the flow at this site. However, it is still considered important that this particular site is used because it gives an indication of the contribution to the L II of freshwater from the surrounding springs. Also, there are no current abstractions above this site.

The lowest of the 11 flow measurements recorded for this site is 216 L/s (11/09/01) and the recommended minimum flow is below this flow. As a result, there is unlikely to be any significant impact on the reliability of supply to the two abstractors currently subject to a minimum flow restriction of 120 L/s. The abstractors with a current minimum flow of 350 L/s would have less restrictive access to irrigation needs.

Recommendation

That a minimum flow of 200 L/s be set for the L II River at Moir's Property (NZMS 260 M36:692-280) This recommendation adequately provides for the values set out in Objective WQN1 of the Proposed NRRP.

(b) Allocation regime

There is insufficient flow data currently available to determine an allocation regime based precisely upon the Proposed NRRP (PNNRP) allocation and reliability of supply policies or guidelines. PNRRP recognises that existing users should be given priority over future users in order to protect their supply reliability. It also suggests that takes established prior to 1 January 2002 be used as a basis for determining this separation unless an alternative catchment specific approach is more appropriate. While the Advisory Group has not expressed any collective preference for protecting the reliability of supply for current abstractors, one member's view is that the level of reliability should be that which prevailed prior to 1 January 2002.

For the L II at Moir's property, one surface water permit out of the six current permits, and one groundwater permit out of the three current permits (with potential stream depleting effects) commenced prior to 1 January 2002. However, of the nine permits, two permit holders each hold two permits. In both cases, one permit commenced pre-1/1/07 and one post-1/1/02, and they account for 168 L/s of the total 287 L/s being abstracted. Staff therefore consider that there would be little overall loss to supply reliability from the size of the October-April A allocation block being based on all consented takes in place as at 1 May 2007, i.e. 290 L/s (287 L/s rounded up).

There are two ways of calculating the size of the block. It can be calculated by using the average daily rate of abstraction (the flows averaged over a 24-hour period) or by using the instantaneous rate of take (pumping rate). By averaging the rate, as Policy WQN14(3)(b)(i) of the PNRRP signals, utilisation of the water in the allocation block is maximised but this requires abstractors to operate flow-sharing arrangements, eg via a water users group. However, averaging is not considered applicable for the L II River at Moir's property because there is one relatively large surface water take (70 L/s), one that is smaller (23 L/s) and the other four are small takes (10 L/s each). Also, there is a lack of a well developed mechanism for incorporating and managing groundwater takes with stream depleting effects within a water sharing group. For those reasons, it is recommended by staff that the size of the allocation be based on instantaneous rates (290 L/s) rather than the average daily rate.

As a result of the relatively large size of the A Block, it is likely to have a lower reliability of supply than the PNRRP target level of reliability for the October to April period. Therefore, it would be prudent to cap the October-April A block at 290 L/s (287 L/s rounded up) to protect whatever the current reliability is, and not allow any new entrants, nor any expansion of existing consents in terms of the time/days over which they can abstract within the October-April A block. However, current consent holders with authorisations lawfully established on or before 1 May 2007 will be allowed to replace their permits with similar rates of takes but subject to the reasonable and efficient use tests set out in Policy WQN17 of the PNRRP.

A substantial part of the current abstractions is made up of two groundwater takes supplying the community drinking water requirements for Lincoln area. The combined takes amount to 105 L/s (rounded up from 103.9 L/s), drawing a total volume of 8977 cubic metres per day, an amount considered by staff to be sufficient to meet a sizeable expansion of Lincoln. It is noted that PNRRP (Policy WQN19 and rule WQN27) provides for 250 litres per person per day plus water for fire-fighting capability to be taken during periods when other abstractions are required to cease because of minimum flow conditions. It is also considered that 105 L/s is more than adequate because it may yet be shown that the stream depletion effect of the bores from which the community supply is drawn is substantially less than currently estimated, particularly given that the bores are approximately 34 metres deep.

Five litres per second is sufficient to provide for drinking water for approximately 37,000 stock units (based on lactating dairy cows requiring 70 litres per head per day). Given that the size of the whole of the L II catchment is 3,600 hectares, it is considered that approximately 10 L/s would be used currently for all of the stock water requirements of the whole catchment. The catchment area of the L II above Moir's property is approximately 25 percent of the whole catchment, and includes a substantial urban area. Stock water requirements are likely to be very small, are unlikely to substantially increase in the near future, and could be accommodated by 5 L/s. Therefore, it is recommended that community drinking water requirements and stock water needs are adequately provided for in the proposed size of the A allocation block but, none-the-less, up to 110 L/s should be specifically reserved within the block for such purposes.

The size of the October-April A block is made up almost equally of surface water takes and groundwater takes considered to have potential stream depleting effects (SDE). It has been necessary to incorporate those takes to ensure there is provision for them in the block should the SDE's be confirmed. The future process of reviewing groundwater takes on a bore-by-bore basis may result in a lesser SDE or the exclusion altogether from the allocation block of those shown not to have SDE's. Staff also consider that any water freed-up through the review of SDE's, through consents being relinquished, or rates of takes being adjusted downwards for whatever reason, should not be re-allocated in the meantime. This will provide further protection to the reliability of supply to the remaining abstractors in the block.

In order to maintain an accurate allocation regime and to maximise the allocation of available water, the PNRRP signals that water should be allocated only for the period over which the water will be used. For example, a take for irrigation use will generally only apply to the October to April period because that is considered to be the irrigation season. Water could then be used to satisfy demand for storage during the May to September period, including access by other users if the current permit holders do not require it. Therefore, an A allocation block of 300 L/s for the May-September period is provided with a minimum flow of 200 L/s.

Because the October-April A block is capped and, as a result, fully allocated, new abstractors can only be accommodated by creating an October-April B block. Abstractors from a B block are required to cease abstraction at a higher cut-off limit to protect the reliability of supply to the A block abstractors. This cut-off limit includes provision for a gap between the A and B blocks. The gap provides a buffer between the two blocks by preventing abstractions taking all the water above the minimum flow, an effect commonly referred to as 'flat-lining' the river. Flows of freshwater into Lake Ellesmere/Te Waihora play an important role in maintaining its aquatic ecosystem health, particularly during the summer months. While the precise freshwater quantity requirements are still under investigation, it is important some

caution is exercised in allocating that water. A relatively large gap of 200 L/s is provided accordingly. The gap also provides for future upward movement of a minimum flow should monitoring data show that Objective WQN1 values are not being achieved.

There is little to indicate that the number of abstractors will increase greatly in the near future, and therefore it is difficult to foresee what levels of abstraction is reasonable for the B block. However, staff consider that some provision be made via a 200 L/s B block for additional surface water abstractions, or groundwater takes with SDE's greater than 1 L/s, during the October-April period. The cut-off limit of 690 L/s is calculated by adding the minimum flow for the A block (200 L/s) to the allocation limit for the A block (290 L/s) plus a gap of 200 L/s.

In the future, increased data from metering takes, information about freshwater input requirements for Lake Ellesmere/Te Waihora, and monitoring the minimum flows may allow for more precise calculations of the reliability of supply and whether there is scope to amend the allocation regime.

Recommendation

That an allocation regime for the L II River at Moir's property incorporates:

(iii) An A allocation block of 290 L/s (including 110 L/s for community water supply and stock water requirements) for the period 1 October to 30 April with a minimum flow of 200 L/s; and

(iv) No further permits be granted to take surface water, or groundwater with stream depletion effects greater than 1L/s, from the A allocation block applying to the period 1 October to 30 April; but permit holders may reapply for permits lawfully established prior to 1 May 2007 that have not expired for more than 6 months; and

(iii) No reallocation of water freed up through consents being relinquished, or from stream depletion effects proven to be less than currently estimated, within the A allocation block for the period 1 October to 30 April shall take place; and

(vi) An A allocation block of 300 L/s for the period 1 May to 30 September with a minimum flow of 200 L/s; and

(v) A B allocation block of 200 L/s for the period 1 October to 30 April, with abstractions ceasing at a flow of 690 L/s

2.7.2 L II River at Pannetts Road

The location of this minimum flow site on Pannetts Road at or about NZMS 260 M36:657-234.

2.7.2.1 Description

This is a stable gently flowing spring-fed stream meandering through farmland. The silted bed supports many submerged macrophytes although the environment is not ideal for benthic invertebrates. The stream possesses good holding water for large trout and an abundance of in-stream cover.

Clear water, gentle meanders and gently sloping banks contribute a reasonable sense of natural character. General amenity, including access, is good. Mahinga kai values are high in relation to habitat rather than food gathering and the stream contributes significant freshwater input to Lake Ellesmere/Te Waihora. A big plant bed of native potamogeton is present at the observed site, along with the aquatic margin species of lemna, azolla, musk, cress and sweetgrass. No native plant species are present in the riparian margin near this site.

2.7.2.2 Local knowledge

The Advisory Group did not provide any information.

2.7.2.3 Current abstractions

At 1 May 2007, the consents database shows no surface water permits referenced to this site. Instead, a site approximately 1.5 kilometres downstream at Wolfes Road has five surface water permits, taking a total of 76.7 L/s, referenced to it.

Table 8 below sets out the permit holders, consented takes and flow restrictions.

Table 8: Consents to take water from the L II River at Wolfes Road

Water Permits		Consented take L/s		Volume Limits m^3	Minimum Flow L/s
		Surface water	Groundwater - stream depleting effect		
CRC001892	LN Curry	4.2	-		1500
CRC962116	PR & DT Lassen	5.0	-	3240 per 14 days	1330
CRC961484	AM & HM Bonniface & Duckworth	27.0	-	1020 per 10 days	1330
CRC930627	RAC Tulett	30.0	-	1080 per day 12 days in 30	1330
CRC930611	DJ & JA Heffer	10.5	-	604 per day	560
Total		76.7			

In addition, Environment Canterbury has identified 90 groundwater permits that are desk-top assessed as having stream depletion effects (SDE) with a combined depleting effect of 2210 L/s. None of the 90 permits have minimum flow restrictions.

The details of the individual permits are set out in Appendix 3.2.

2.7.2.4 Ranking of objective criteria and flow requirements

Table 9 sets out the technical panel assessments of the relative importance of, and flow requirements for, the instream values identified in Objective WQN1 (a)-(h). Panellists had access to the following flow information:

- Gauging date 25/03/03
- Gauged flow 897 L/s
- 7DMALF (Report U02/29) 1824± 42 L/s

Table 9: Instream value ranking and flow requirements for the L II at Pannetts Road

Panellist	Instream Value	Ranking	Flow Requirement L/s
Glova	Trout	H	900
Taylor	Native fish	H	900
Partridge	Indigenous vegetation	L	Not required
McManaway	Natural character and general amenity	M M	900
O'Connell/Smith	Mahinga kai; mauri; and wāhi tapu & wāhi taonga	H M Not present	1500
Duncan	Aquatic habitats	H	1000

2.7.2.5 Staff recommendations

A group of Environment Canterbury staff from the planning, water quality, water quantity and consent sections considered the information provided by the Advisory Group and the Technical Panel. As a result of that consideration, recommendations have been made in relation to minimum flow sites, minimum flows and allocation blocks.

(a) The minimum flow site

The current location of the site for monitoring the L II lower reach minimum flow is at Wolfes Road (NZMS 260 M36:655-217). Gauging flows at this site presents major operational difficulties. An alternative site at the bridge on Pannetts Road would alleviate those difficulties. It is less than two kilometres upstream from Wolfes Road but concurrent gaugings have not been undertaken to clearly confirm the relationship. However, there is no obvious reason to believe that the flows would be significantly different between the two sites and so shifting the monitoring site to the new site is favoured.

Recommendation

That the minimum flow site for the lower reach of the L II River be located at the bridge on Pannetts Road at or about NZMS 260-M36: 657-234.

(b) The minimum flow

Trout, native fish, boat passage and mahinga kai values have been ranked as highly important by Glova, Taylor, Duncan, O'Connell and Smith respectively. They suggest that flow requirements of 900, 1000 or 1500 L/s would be suitable for the protection of those values. Staff consider that 1000 L/s would satisfy most of the instream values. Protecting the fishery is likely to provide for mahinga kai values, especially given that fish species are the most likely food source, and the observation by

O'Connell & Smith that habitat rather than fishing is more important because of the emergency discharge of sewage from Lincoln.

Given the medium ranking of mauri by O'Connell & Smith, and the absence of wāhi tapu and wāhi taonga values, there is insufficient justification for the suggested 1500 L/s requirement. A minimum flow of 1000 L/s is therefore considered satisfactory by staff, as it would for the medium ranked natural character and general amenity values. Partridge suggested that adequate protection of indigenous vegetation is not dependant on setting a minimum flow requirement at this site.

The L II is the largest continuous source of fresh water flowing into Lake Ellesmere/Te Waihora. It is unclear exactly what role this plays in helping to maintain the aquatic ecosystem of lake. However, a significant reduction in freshwater inflows is likely to result in the lake becoming more saline and adversely impacting on ecosystems intolerant of such conditions. While ruppia beds may not be able to be re-established, they are species that require low saline conditions. In the absence of adequate information about this, it would be prudent to take a cautious approach and maintain as far as possible the current inflows of freshwater. At low flows and high lake levels, highly discoloured water, with a higher salinity than that present in the river, can penetrate some distance upstream of the mouth. Therefore, it is considered important that increased abstraction does not lead to a deterioration of the water balance of the lake or the water quality of the lower reaches. Preventing any increase in the current surface water and stream depleting effects of hydraulically connected groundwater abstractions would achieve that end without impact on current abstractors. Consideration of this will be taken into account as part of the allocation regime.

There will be no adverse effects on four of the five existing abstractors arising from the recommended minimum flow because it is less than those currently in place. The remaining abstractor holds a water permit (CRC930611) restricted by a minimum flow of 560 L/s. That permit has been in place for at least 25 years and the abstraction rate has remained largely the same over that period. The permit is for a small amount of water relative to the overall total volume flowing in the L II River. Given the location of the permit holder's property and the abstraction point on the river, it may be more appropriate that the minimum flow for this permit be referenced to the upstream site at Moirs property (NZMS 260 M36:689-277).

Recommendation

That a minimum flow of 1000 L/s be set for the lower L II River at Pannetts Road (NZMS 260-M36: 657-234). This recommendation adequately provides for the values set out in Objective WQN1 of the Proposed NRRP.

(c) Allocation regime

There is insufficient flow data currently available to determine an allocation regime based precisely upon the Proposed NRRP (PNNRP) allocation and reliability of supply policies or guidelines. PNRRP recognises that existing users should be given priority over future users in order to protect their supply reliability. It also suggests that takes established prior to 1 January 2002 be used as a basis for determining this separation unless an alternative catchment specific approach is more appropriate. While the Advisory Group has not expressed any collective preference for protecting the reliability of supply for current abstractors, one member's view is that the level of reliability should be that which prevailed prior to 1 January 2002.

For the L II River at Pannetts Road, the five current surface water permits, and 65 out of 90 groundwater permits (with potential stream depleting effects), commenced prior to 1 January 2002. Those takes account for 1369 L/s out of the 2287 L/s currently authorised to be taken, the surface water permits only amounting to 77 L/s of the 1369 L/s. The 25 post-1/1/02 groundwater permits account for the remaining 918 L/s. Establishing an A allocation block based on permits that commenced prior to 1 January 2002 would be to create two groups of permit holders, predominantly groundwater users, when one group currently exists.

The 70 pre-1/1/02 permit holders would form the A block and account for nearly 60 percent of the current abstractions. Their reliability of supply would appear to be improved by excluding the post-1/1/02 permits. However, 65 of the 70 permit holders would not be experiencing reliability of supply problems currently because they do not have minimum flow conditions attached to their permits. For the five surface water permit holders there may be some reliability benefit although there have been very few instances of restrictions in the past.

Like the pre-1/1/02 groundwater permit holders, the 25 post-1/1/02 permit holders will only experience the effects of the allocation regime and minimum flow conditions as take effect when the environmental flow regime is made operative and consents are called in under review provisions. There appear to be two options for determining the size of the A block and what consents get included in it.

Option 1 A block size based on permits in place as at 1/1/02 with post 1/1/02 permits being allocated B block status:

- this is consistent with PNRRP and pre-1/1/02 permit holders would have their supply reliability protected; However
- the reliability of supply to B block abstractors would be much less; and
- it may be seen as inequitable by the B block abstractors because they have made invests in irrigation infrastructure under the same conditions that have prevailed to the pre-1/1/02 abstractors. This is because neither group has minimum flow conditions currently in place nor has the post-1/1/02 group been lead to believe that the A block was fully allocated at the time their permits were granted.

Option 2 A block size based on permits in place as at 1 May 2007:

- pre-1/1/02 abstractors would have a lower reliability of supply;
- post -1/1/02 abstractors have a better reliability of supply than Option 1;
- while restrictions would start earlier for everyone, all parties would have some water for longer;
- all permit holders would have made investment decisions based on their permits as issued, and a sudden change in reliability would be avoided.

The PNRRP provides for a community to have their own catchment specific regime if they wish to depart from the PNNR target reliability of supply as outlined in Policy WQN14. When comparing the two options, staff consider that, on balance, the current abstractors should share equally the current level of supply, whatever that should be. Therefore, it is recommended by staff that the size of the October-April A allocation block is based on all consented takes in place as at 1 May 2007, i.e. 2290 (2287 L/s) rounded up.

There are two ways of calculating the size of the block. It can be calculated by using the average daily rate of abstraction (the flows averaged over a 24-hour period) or by using the instantaneous rate of take (pumping rate). However, averaging is not considered applicable for the L II River at Pannetts Road because there are only five surface water abstractors. There is also a lack of a well developed mechanism for incorporating and managing groundwater takes with stream depleting effects within a water users group. For those reasons, it is recommended by staff that the size of the allocation block be based on instantaneous rates, in this case 2290 L/s, rather than the average daily rate.

As a result of the relatively large size of the A Block, it is likely to have a lower reliability of supply than the PNRRP target level of reliability for the October-April period. Therefore, it would be prudent to cap the October-April A block at 2290 L/s to protect whatever the current reliability is, and not allow any new entrants, nor any expansion of existing consents in terms of the time/days over which they can abstract within the October-April A block. However, current consent holders with authorisations lawfully established on or before 1 May 2007 will be allowed to replace their permits with similar rates of takes but subject to the reasonable and efficient use tests set out in Policy WQN17 of the PNRRP.

The October-April A block is made up almost entirely with groundwater takes considered to have potential stream depleting effects (SDE). It has been necessary to incorporate those groundwater takes to ensure there is provision for them in the block should the SDE's be confirmed. The future process of reviewing groundwater takes on a bore-by-bore basis may result in a lesser SDE or the exclusion altogether from the allocation block of those shown not to have SDE's. Staff also consider that any water freed-up through the review of SDE's, through consents being relinquished, or rates of takes being adjusted downwards for whatever reason, should not be re-allocated in the meantime. This will provide further protection to the reliability of supply to the remaining abstractors in the A block.

In order to maintain an accurate allocation regime and to maximise the allocation of available water, the Proposed NRRP signals that water should be allocated only for the period over which the water will be used. For example, a take for irrigation will only apply to the October to April period because that is considered to be the irrigation season. Water could then be used to satisfy demand for storage during the May to September period, including access by other users if the current permit holders do not require it. Therefore, an A allocation block for the May-September period is provided with a minimum flow of 1000 L/s.

Because the October-April A block is capped and, as a result, fully allocated, new abstractors can only be accommodated by creating an October-April B block. Abstractors from a B block are required to cease abstraction at a higher cut-off limit to protect the reliability of supply to the A block abstractors. This cut-off limit often includes provision for a gap between the A and B blocks. The gap provides a buffer between the two blocks by preventing abstractions taking all the water above the minimum flow, an effect commonly referred to as 'flat-lining' the river. Flows of freshwater into Lake Ellesmere/Te Waihora play an important role in maintaining its aquatic ecosystem health, particularly during the summer months. While the precise freshwater quantity requirements are still under investigation, it is important some caution is exercised in allocating that water. A relatively large gap of 1000 L/s is provided accordingly. The gap also provides for future upward movement of a minimum flow should monitoring data show that Objective WQN1 values are not being achieved. The also provides for future upward movement of a minimum flow should monitoring data show that Objective WQN1 values are not being achieved.

There is little to indicate that the number of abstractors will increase greatly in the near future, and therefore it is difficult to foresee what levels of abstraction is reasonable for the B block. However, staff consider that some provision be made via a 200 L/s B block for additional surface water abstractions, or groundwater takes with SDE's greater than 1 L/s, during the October-April period. The cut-off limit of 4290 L/s is calculated by adding the minimum flow for the A block (1000 L/s) to the allocation limit for the A block (2290 L/s) plus a gap of 1000 L/s.

In the future, increased data from metering takes, information about freshwater input requirements for Lake Ellesmere/Te Waihaora, and monitoring the minimum flows may allow for more precise calculations of the reliability of supply and whether there is scope to amend the allocation regime. It may provide the confidence to reduce the size of the October-April A block whereby a B block may become feasible. In the meantime, the PNRRP provides adequate provisions for new domestic/stockwater use and firefighting requirements. The small-scale use of water is also provided for in PNRRP, i.e up to 10 cubic metres of water per day to be taken at a rate no greater than 5 L/s. Such provision is considered sufficient to cater for the rural-lifestyle type subdivisions that are common in the area.

Recommendation

That an allocation regime for the L II River at Pannetts Road incorporates:

(i) ***An A allocation block of 2290 L/s for the period 1 October to 30 April with a minimum flow of 1000 L/s; and***

(ii) ***No further permits be granted to take surface water, or groundwater with stream depletion effects greater than 1L/s, from the A allocation block applying to the period 1 October to 30 April; but permit holders may reapply for permits lawfully established prior to 1 May 2007 that have not expired for more than 6 months; and***

(iii) ***No reallocation of water freed up through consents being relinquished, or from stream depletion effects proven to be less than currently estimated, within the A allocation block for the period 1 October to 30 April shall take place; and***

(vii) ***An A allocation block of 1000 L/s for the period 1 May to 30 September with a minimum flow of 1000 L/s; and***

(v) ***A B allocation block of 200 L/s for the period 1 October to 30 April, with abstractions ceasing at a flow of 4290 L/s***

2.8 Kaituna River at Kaituna Valley Road

This minimum flow site is located adjacent to the Kaituna Valley Road at or about NZMS 260 M36:844-166.

2.8.1 Description

This stream has a natural form with pools and gravel riffles. It meanders along the flood plain carrying runoff from the surrounding hill country. Silting of the gravel/cobble bed occurs in slow flowing pools and lower reaches. Stock access to the stream has accentuated bank erosion and stream nutrient enrichment. The reach has some bully habitat, and trout and inanga are present.

The stream has very high cultural values, including mahinga kai, and was the source of important plant species. While the reach is part of a modified farm environment, its well-defined meandering form and clear water provide a degree of naturalness. There is some amenity value in its rural setting. There are minimal native vegetation species present in this reach although that is not the case lower down the stream.

2.8.2 Local knowledge

The Advisory Group has provided the following information:

- The question of whether or not the stream is hydraulically linked to groundwater on the plain is considered important; and
- Another question relates to the responsibility for stream maintenance. The stream "hasn't been cleaned for years"

2.8.3 Current abstractions

At 1 May 2007, the consents database showed the following consents referenced to the Kaituna River :

- two surface water permits to take a total of 46 L/s for irrigation; and
- one surface water permit to take up to 75 L/s for storage. This consent is primarily for abstraction into storage when river flows are higher. It is in three steps, 75 L/s can be taken when flows exceed 750 L/s, 50 L/s when flows are between 500 L/s and 750 L/s and 25 L/s can be taken when flows are between 325 L/s and 500 L/s.

Table 10 below sets out the permit holders, consented takes and flow restrictions.

Table 10: Consents to take water from the Kaituna River

Water Permits		Consented take L/s		Volume Limits m^3	Minimum Flow L/s
		Surface water	Groundwater - stream depleting effect		
CRC002148	DN & NL Thomas	25 25 25	- - -	-	325 500 750
CRC940278	DN & NL Thomas	23	-	1904 per day	60 plus abstraction
CRC940279	DN & NL Thomas	23	-	1904 per day	60
Total		121	-		

In addition, Environment Canterbury has identified 2 groundwater permits that are desk-top assessed as having stream depletion effects (SDE) with a combined depleting effect of 24 L/s. Neither have minimum flow restrictions.

The details of the individual permits are set out in Appendix 3.2.

2.8.4 Ranking of objective criteria and flow requirements

Table 11 sets out the Technical Panel assessments of the relative importance of, and flow requirements for, the instream values identified in Objective WQN1 (a)-(h). Panellists had access to the following flow information:

- gauging date 25/03/03
- gauged flow 34 L/s
- 7DMALF (Report U02/29) 32 ± 10 L/s

Table 11: Instream value ranking and flow requirements for the Kaituna River

Panellist	Instream Value	Ranking	Flow Requirement L/s
Glova	Trout	L	30-40
Taylor	Native fish	M	80
Partridge	Indigenous vegetation	L-M	40
McManaway	Natural character and general amenity	M-H L	100
O'Connell/Smith	Mahinga kai; mauri; and wāhi tapu & wāhi taonga	H H Not present	No abstractions October-May
Duncan	Aquatic habitats	M-L	80

2.8.5 Staff recommendations

A group of Environment Canterbury staff from the planning, water quality, water quantity and consent sections considered the information provided by the Advisory Group and the Technical Panel. As a result of that consideration, recommendations have been made in relation to minimum flows and allocation blocks.

(a) Minimum flow

The minimum flows put forward by the technical panel range from 30 to 100 L/s with O'Connell & Smith suggesting no abstractions between October and May. Protecting the mahinga kai and mauri values has been ranked by O'Connell & Smith as highly important. Restricting all abstractions between October and May was suggested as a way to meet that protection. The ranking of natural character, native fish and the provision of aquatic habitat values was accorded medium importance by McManaway, Taylor and Duncan respectively although natural character tended towards high and aquatic habitat tended towards low. Flows of 80 L/s to 100 L/s were suggested for their protection. Partridge and Glova ranked indigenous vegetation and trout values respectively as low and flows of 30 to 40 L/s were suggested for their protection. McManaway suggested 100 L/s for the protection of general amenity even though its importance was ranked as low.

In its natural state, the average seven-day low flow in this river is likely to range between 22 to 42 L/s. The flows largely respond to rainfall falling on the surrounding hillsides. In the absence of rainfall, particularly in the summer, flows fall rapidly to the low flow state. Staff do not believe that current abstractions exacerbate the rate at which flows tend to, or a held at, a low-flow situation sufficiently to justify prohibiting those extractions in order to protect tangata whenua values. Similarly, it is unlikely that setting a minimum flow of 80L/s or 100L/s would be effective in protecting the moderately important native fish and general amenity values because the flows are less than 80 L/s for about 40 percent of the summer period anyway.

The ranking by Taylor of the importance of native fish values in the neighbouring catchment, namely Prices Stream, is similar to that given for Kaituna River but the flow suggestion for Prices Stream of one that is only a little above the average low flow. While the Kaituna River is a slightly larger catchment, its other characteristics are similar. Therefore, staff consider that a flow closer to the low flow average, say 60 L/s, would suffice for the protection of native fish values in the Kaituna River. A flow that protects native fish is also likely to protect mahinga kai values and for the other instream values in keeping with their relative importance.

The recommended minimum flow is consistent with the existing minimum flow for the two irrigation abstractions and so the impact on the permit holders will be neutral. The permit to take water for storage is in effect an abstraction from a B allocation block and it contains a gap between the blocks and conditions that assist in maintaining the flushing effects of freshes. Such a regime is important for rain-fed streams such as the Kaituna. It is therefore considered by staff that the current gap of 219 L/s remains between the storage take permit and the two irrigation takes. The impact on the current abstractor would not be changed.

If new groundwater abstractions take place in the catchment and stream depletion effects arise, that allocation will need to come from another block with a higher minimum flow.

Recommendation

That the minimum flow site for the Kaituna River is located adjacent to the Kaituna Valley Road at or about NZMS 260 M36:844-166 and the minimum flow of 60 L/s be set for the site. This recommendation adequately provides for the values set out in Objective WQN1 of the Proposed NRRP.

(b) Allocation regime

There is insufficient flow data currently available to determine an allocation regime based precisely upon PNRRP allocation and reliability of supply policies or guidelines. While the Advisory Group has not expressed any collective preference for protecting the reliability of supply for current abstractors, one member's view is that the level of reliability should be that which prevailed prior to 1 January 2002. For the Kaituna River, all three current surface water permits (121 L/s) and the two groundwater permits (with potential stream depleting effects of 24 L/s) commenced prior to 1 January 2002 and they are all held by the same landowner. Therefore, the allocation regime can be based on those consents in place as a 1 May 2007.

There are two ways of calculating the size of the A allocation block. It can be calculated by using the average daily rate of abstraction (the flows averaged over a 24-hour period) or by using the instantaneous rate of take (pumping rate). Because

there is only one landowner involved, averaging is not considered applicable for the Kaituna River and it is recommended by staff that the size of the allocation blocks be based on instantaneous rates.

It is noted that consent CRC002148 is to take 75 L/s of water for storage and there are stepped minimum flow conditions. 75 L/s can be taken when flow exceeds 750 L/s, 50 L/s when flow exceeds 500 L/s and 25 L/s when flow exceeds 325 L/s. These minimum flow conditions are much higher than those applying to the other two surface water permits. It is in effect a take from a B block. As a result, the A allocation block can be made up of the two remaining surface water permits and the two groundwater permits with potential stream depletion effects. Therefore the size of A allocation block becomes 70 L/s.

In order to maintain an accurate allocation regime and to maximise the allocation of available water, the PNRRP signals that water is allocated only for the period over which the water will be used. For example, a take for direct use for irrigation will generally only apply to the October to April period because that is considered to be the irrigation season. Water could then be used to satisfy demand for storage during the May to September period, including access by other users if the current permit holders do not require it. Therefore, an A allocation block of 70 L/s is provided for the October-April period as well as an A allocation block of 70 L/s for the May-September period, both the A blocks having a minimum flow of 60 L/s.

For the Kaituna River, there is little to indicate that the number of abstractors will increase greatly in the near future, and therefore it is difficult to foresee what level of abstraction is reasonable for the B block. It is important that the size of the B allocation block, if increased, does not interfere with the magnitude and frequency of freshes that flush periphyton and sediment from the river in the summer. Currently, conditions to achieve instream benefits of freshes are used. Staff consider that a further 50 L/s would be sufficient to provide for future needs, along with conditions to achieve instream benefits of freshes. Therefore, the B block becomes 125 L/s when flow exceeds 1000 L/s, 100 L/s when flow exceeds 875 L/s, 75 L/s when flow exceeds 750 L/s, 50 L/s when flow exceeds 500 L/s, and 25 L/s when flow exceeds 325 L/s.

In the future, increased data from metering takes and monitoring the minimum flows may allow for more precise calculations of the reliability of supply and whether there is scope to amend the allocation regime.

Recommendation

That an allocation regime for the Kaituna River incorporates:

(i) An A allocation block of 70 L/s for the period 1 October to 30 April with a minimum of 60 L/s; and

(ii) No further permits be granted to take surface water, or groundwater with stream depletion effects greater than 1L/s, from the A allocation block applying to the period 1 October to 30 April; and

(iii) An A allocation block of 70 L/s for the period 1 May to 30 September with a minimum flow of 60 L/s; and

(iv) A B allocation block made up of 125 L/s when flow exceeds 1000 L/s, 100 L/s when flow exceeds 875 L/s, 75 L/s when flow exceeds 750 L/s, 50 L/s when flow exceeds 500 L/s, and 25 L/s when flow exceeds 325 L/s.

2.9 Prices Stream at Prices Valley Road

Currently, there is no designated minimum flow site for Prices Stream.

2.9.1 Description

This is a steep single thread stream with a gravel/cobble bottom. Extensive bank erosion occurs along this reach resulting in siltation of the slow-flowing areas. Stock access and siltation also contribute to poor habitat for invertebrates. The habitat diversity for trout and native fish is enhanced by the physical makeup of the stream. There is good substrate cover for bullies and yearling trout.

The lower valley has very high wāhi taonga value associated with the Waikakahi Pa site. The tightly looping stream flowing through farm paddocks provides a scenic context within a quiet valley. Low water level reduces what would otherwise be a strong sense of natural character. The floodplains are covered in exotic grass along with musk and sweet grass. The banks contain scattered carex and rushes along with some willow upstream. Greater indigenous diversity exists downstream of this particular reach.

2.9.2 Local Knowledge

The Advisory Group has provided the following information:

- Currently there are no abstractions from the stream; and
- The predominant opinion seems to be that there is no strong reason to impose a minimum flow.

2.9.3 Current abstractions

At 1 May 2007, the consents database showed there are no water permits referenced to this site.

2.10.4 Ranking of objective criteria and flow requirements

Table 12 sets out the Technical Panel assessments of the relative importance of, and flow requirements for, the instream values identified in Objective WQN1 (a)-(h). Panellists had access to the following flow information:

- gauging date 25/03/03
- gauged flow 19 L/s
- 7DMALF 22±22 L/s
  Note that this has a very high error band and it is therefore not a reliable statistic. More gaugings are necessary at low flows to improve its reliability.

Table 12: Instream value ranking and flow requirements for Prices Stream

Panellist	Instream Value	Ranking	Flow Requirement L/s
Glova	Trout	L	20
Taylor	Native fish	M	25
Partridge	Indigenous vegetation	L-M	40-50
McManaway	Natural character and general amenity	M M	65 65
O'Connell/Smith	Mahinga kai; Mauri; and wāhi tapu & wāhi taonga	H L Present	No abstractions October-May
Duncan	Aquatic habitats	L	22

2.9.5 Staff Recommendations

A group of Environment Canterbury staff from the planning, water quality, water quantity and consent sections considered the information provided by the Advisory Group and the Technical Panel. As a result of that consideration, recommendations have been made in relation to minimum flows and allocation blocks.

(a) Minimum flow

The minimum flows put forward by the technical panel range from 20 to 65 L/s with one suggestion of no abstractions between October and May. O'Connell & Smith ranked the protection of tangata whenua values as highly important, with the exception of a low ranking for mauri, and suggest that restricting all abstractions between October and May is necessary to achieve their protection. The ranking of native fish, natural character, general amenity and indigenous vegetation values was accorded medium importance although indigenous vegetation tended towards low. Protective flows of 25 L/s for native fish (Taylor), 40 to 50 L/s for indigenous vegetation (Partridge) and 65 L/s for natural character and general amenity (McManaway) have been suggested. Aquatic habitat and trout values were ranked as low and Duncan and Glova respectively suggested flows of 20 and 22 L/s would satisfy those values.

Based on the limited hydrological data currently available, the seven-day low flow for this stream is likely to range between 0 and 44 L/s. The flows in the stream are largely derived from rainfall falling on the surrounding hillsides. In the absence of rainfall, particularly in the summer, flows fall rapidly to the low flow state.

Staff do not believe that the protection of tangata whenua values demands prohibiting abstractions from October until May. Instead, it is considered that setting a minimum flow is more in accordance with achieving overall sustainable management of the water resource. A minimum flow of 40 L/s would protect indigenous vegetation, albeit that this is at the lower end of the 40 to 50 L/s range suggested by Partridge but bearing in mind the ranking given is only low to medium. Such a flow would also cater for native fish, trout and aquatic habitat values given their flow requirements are 20 or 25 L/s.

The flow suggested for the protection of natural character and general amenity values is 65 L/s. However, the natural 7DMALF, as calculated from the limited flow data, would intimate that those values are frequently subjected to flows below 65 L/s. Irrigation abstraction, in the absence rainfall, does accelerate the rate at which flows reduce. Staff believe that the rate at which the flows fall naturally from 65 L/s to 7DMALF is such that very little significant protection to the natural character and general amenity values arise in the range between 7DMALF and 65 L/s. Therefore it is considered by staff that a minimum flow of 40 L/s (the upper end of the 7DMALF range) would suffice for their protection.

Currently, no irrigation abstractions take place, probably as a result of the poor reliability of supply and limited land suitable for irrigation development. Therefore, there will be no impact on abstractors. There is a local view that a minimum flow is not required for this stream. However, staff considered it is more efficient to incorporate this stream in the review investigations and a proactive planning mechanism in case abstraction applications are lodged in the future.

Recommendation

That the minimum flow site for Prices Stream is located adjacent to the Prices Valley Road at or about NZMS 260 M36:863-149 and the minimum flow be set at 40 L/s. This recommendation adequately provides for the values set out in Objective WQN1 of the Proposed NRRP.

(b) Allocation regime

There is insufficient flow data currently available to determine an allocation regime based precisely upon the Proposed NRRP allocation and reliability of supply policies or guidelines. While the Advisory Group has not expressed any collective preference for protecting the reliability of supply for current abstractors, one member's view is that the level of reliability should be that which prevailed prior to 1 January 2002. However, as there are no authorised abstractions from Prices Stream at present, this is not applicable.

There is a limited amount of low-flow data but staff consider that an A allocation block of 20 L/s could be provided for future abstractions. In order to maintain an accurate allocation regime and to maximise the allocation of available water, the Proposed NRRP signals that water should be allocated only for the period over which the water will be used. For example, a take for irrigation will only apply to the October to April period because that is considered to be the irrigation season. Water could then be used to satisfy demand for storage during the May to September period. Therefore, an A allocation block of 20 L/s is provided for the October-April period as well as an A allocation block of 20 L/s for the May-September period, both the A blocks having a minimum flow of 40 L/s.

In the future, increased flow data will allow for more precise calculations of the reliability of supply and whether there is scope to extend the A block. Also, no B allocation block has been provided because the A block has no current allocations.

Recommendation

That an allocation regime for Prices Stream incorporates:

(i) An A allocation block of 20 L/s for the period 1 October to 30 April with a minimum flow of 40 L/s; and

(ii) An A allocation block of 20 L/s for the period 1 May to 30 September with a minimum flow of 40 L/s.