IRISHMAN CREEK STATION LIMITED

Information re Applications CRC O84263, CRC O11846, CRC O11845 and Farm Environmental Management Plan

To be read in conjunction with Section 42A Officer's Report of Claire Penman

A. BACKGROUND

Irishman Creek Station lies 14 kms south west of Lake Tekapo at 2,300 feet in the Mackenzie Basin. The climate is characterised by hot, dry summers (35ºC) and cold, dry winters (-25ºC). Rain occurs mainly in spring and autumn, nominally 600 mm per annum but with significant variations.

The land is held under a Crown Pastoral Lease. The farm operates on traditional lines, utilising low intensity grazing to produce fine Merino wool, and 190 beef cows spread over 10,000 hectares.

The consents sought are exclusively renewals to continue using water from the Irishman Creek for:

(a) micro hydro electricity generation;
(b) irrigating 48 ha of pasture using border dykes.

The former has been in operation since 1925, the latter since 1969.

B. CRC O84263, CRC O11846

BACKGROUND

These cover the applications to continue micro hydro electricity generation. The activity and the plant itself has important historical significance, having been designed, built and installed by Bill Hamilton in 1925 thus enabling him to power his workshop which led him to becoming one of New Zealand's foremost and famous engineers. The power house, workshop, and associated water works are a registered Historic Site.

The design incorporates a Francis turbine which is capable of efficient production of power up to 20 Kw. The governor regulates the water volume to meet the load required. Thus water used is at its minimum during the summer months. The water requirement thus varies from a maximum of 500 L/sec to less than 250 L/sec.

SECTION 42A REPORT

The applicant accepts this report as an excellent analysis subject only to the following:

(1) the contradiction between para 34 (d) and (e), which states:

> "The bed is gravel and quite porous, resulting in considerable losses into the underlying water table. Approximately 5 km downstream of the Tekapo Canal (SH8) the creek disappears below ground, preventing the passage of migrating fish and any further use.
>
> "There are no migratory fish, and due to the shallowness of the lower creek the number of resident fish (predominantly trout, but also some small native fish) is low. The river bed attracts river birds, especially ducks and cormorants".

and para 35 (a) which states:

> "Irishman Creek contains a popular trout fishery. It has a high naturalness and is in good health providing a rewarding experience for the wilderness angler. The stream is an important spawning tributary for the rainbow and brown trout populations of the Tekapo River and Lake Benmore. It also provides a suitable habitat for its own resident trout population".

The former paragraphs are correct with regard to the upper Irishman Creek where the activity takes place.

(2) The subheadings of the two top photographs on page 17 have been transposed.

(3) A suitable fish screen is already in place to prevent the ingestion of fish and debris into the penstock and turbine. However, the associated waterways are permanent and open to the creek and have provided a habitat for wildfowl and fish since construction in 1925.

(4) The requirement of paras 21(c), referring to the minimum flow regime, and para 21(e) referring to water metering appear unnecessary for a non consumptive use. No variation in use will affect the minimum flow, and the governor system is incapable of using more than 500 L/sec. We therefore request that these requirements be waived.

The requirement to cease generation at times of low Creek flow would be unduly restrictive because the use of water for this purpose does not reduce the flow downstream of the power canal.

Rule 2(3) of the WCWARP states that the taking and returning of water for hydro power generation in the vicinity of the take or diversion point is exempt from the allocation limits in Table 3. The exemption from Table 3 is acknowledged both in Claire Penman's Report 2A Attachment 6, and in her S42A report, but continues on to recommend a minimum flow.

We therefore request that these requirements be waived.

C. CRC O11845

This covers the application to continue irrigating on 48 ha border dykes.

BACKGROUND

Irishman Creek Station Homestead and its surrounding area is situated just far enough east to receive sparse NW rains, and too far west to receive any easterly precipitation. The most rain occurs when slow moving low pressure systems stall over the Mackenzie Basin. The nominal rainfall is 600 mm per annum, but this can vary by 30% in any given year. The difference between a drought and a good year can be two critical rains.

The Homestead is at 2,300 feet asl and this factor combined with the very clear air results in frosts occurring throughout the year (only one month in the last 6 years has been frost free). Temperatures in winter can drop to -30ºC, and regularly do fall to -20ºC.

In this climate it is imperative that the stock receive supplementary winter feed. It was to ensure the availability of this feed that Bill Hamilton designed and built the border dyke system.

The Irishman Creek rises on the south eastern flank of Mt. Stevenson, being the eastern most outcrop of the Gammack Range. It thus receives less precipitation than the headwaters of the streams that feed Lake Tekapo and Lake Pukaki, and is narrower and steeper accordingly. Spring fed, it runs throughout the year, supplemented in spring by melting snow which guarantees reasonable flows (> 1000 L/sec) until December. Thereafter the flow rate is highly dependent on rainfall in the catchment area.

Thus the summer and autumn creek levels are extremely volatile with flow rates capable of rising extremely quickly and then subsiding over 7 – 10 days.

Water is abstracted at a maximum rate of 140 l/s from Irishman Creek at map reference NZMS 260 I38:974-802 and is conveyed via open race system to a border dyke scheme covering 48 hectares of pasture. All water abstracted from the Creek is used within the scheme – there is no discharge of water.

In March 1993 the creek rose to an estimated 85 cu mecs, flooding the plain east of the Homestead, closing SH8, and even threatening the integrity of the Tekapo/Pukaki canal.

SECTION 42A REPORT

The applicant accepts this report as a good overview and wishes to address the concerns listed below.

(1) Efficiency of Use.

(a) **Existing System**

The system represents a substantial investment using technology that was the best available at the time. It has worked well since 1969, providing essential winter feed supplements.

(b) **The System Design Philosophy**

To make best use of the available variable resource, taking climate into account. Thus the original take rate of 230 L/sec was reduced to 140 L/sec to preserve the residual flow levels and lengthen the period during which irrigation could be undertaken. It was recognised that this would decrease efficiency, but it was felt to be the optimum use of the resource.

The system can be activated quickly when water becomes available to replenish large soil moisture deficits that may have occurred meanwhile.

The system is impervious to frost.

(c) **Volume Used**

The legislation requires us to apply for the maximum volume that might be taken in ideal conditions, i.e. adequate flow levels throughout the irrigation season, coupled with high evapotranspiration rates on the irrigated area.

In view of the climate and the variation in water availability the system is operated from mid October to mid April, i.e. 182 days. Autumn irrigation is particularly useful in providing late feed going into winter. Application of relatively warmer water late in the season can prolong the growing season.

The volume applied for represents 59 days watering during the whole season, i.e. an average return period of 30 days.

Our experience of water requirements to maintain pasture growth is that 6mm per day is insufficient, and leads to pastures browning off. In our environment 7mm per day is required.

7mm per day over 182 days	=	611,520 cum p.a.
Allowing 10% race losses	=	672,670 cum p.a.

If the consent is granted we can plan for system improvements to reduce our volume used from 720,000 cum p.a. to 672,670 cum p.a.

These improvements will be achieved by a combination of:

Better sills
Improved gate seals
More advanced timers
Re-contouring some border dykes
Identifying areas of particular race losses

We would be able to complete these efficiencies within four years of the consent being granted.

(d) **Minimum Flow**

There are no other significant users of Irishman Creek water. Therefore no flow sharing regime is required. The minimum flow gauging site is below the proposed activity. Therefore the only necessary restriction on the taking of water in terms of this application for irrigation purposes is that it should cease when the creek falls below 350 L/sec at the gauging site.

Because the annual volume of water requested appears to exceed Ecan's strict definition of efficiency, the applicant proposes to cease abstraction whenever the flow in Irishman Creek at SH8 Bridge is at or below 350 l/s. This flow rate is 50 l/s higher than the minimum flow specified in the Table 3, row iv of the WCWARP.

This mitigation has been accepted by Claire Penman in her S42A report. However her recommendation in her report 2A also includes a flow sharing regime. Part (a) of the proposed condition only allows the taking of water at the maximum rate of 140 l/s when the flow at the minimum flow site exceeds 600 l/s. Part (b) of the condition requires a straight line reduction in take when the flow at the minimum flow site is between 490 l/s and 350 l/s.

The reference to 600 l/s appears to be an error and should read 490 l/s.

Both Richard de Joux and Dave Boraman have provided hydrological evidence, and make comment on the injustice in applying a flow sharing regime for abstractions that are located upstream of a minimum flow site.

In this instance, the proposed flow sharing retains more water at the minimum flow site than is required under the WCWARP.

More importantly, Table 3, row iv of the WCWARP specifies that "for all reaches, no flow sharing regime".

We request that the minimum flow condition should be amended to simply state that "Whenever the flow in Irishman Creek, as estimated by the Canterbury Regional Council, at map reference NZMS 260 I38:978-766 falls below 350 litres per second, the taking of water in terms of this permit shall cease."

(e) **Summary**

The system already exists, utilises no power inputs (and therefore has a negligible carbon footprint), and is well designed for the variable water availability and climatic conditions. It provides an essential resource from which winter supplementary feed is grown.

The Station has no economic alternative. The installation of a spray system would be very costly both in terms of capital and running expenses, uneconomic given the insecurity of water supply, subject to frost damage, and unable to make up moisture deficiencies following periods of non-use.

(2) Water Quality

The Section 42A report notes the lack of information regarding both the local effects and cumulative effects on the water quality of this proposal.

(a) **Local Effects**

The applicant wishes to take issue with paragraph 58 of the Section 42A Report. This refers to our assertion that, as this is a replacement application, we consider the effects on water quality will continue to be minor.

Paragraph 58 then reads: "I do not agree that this is an appropriate starting point for the assessment of the water quality effects associated with these applications. In my

view there can be no presumption that the effects of the use of water authorised under the previous consents will continue to be authorised under any new consent."

We do not see these two sentences as logical corollaries. We accept the latter, but we maintain that the fact that the water in the Irishman Creek has remained pristine over 150 years of extensive pastoral grazing, 85 years of power generation, and 40 years of small scale border dyke irrigation is an excellent relevant starting point. It would certainly be regarded as such if the water leaving the Station were not pristine.

The applicant has drawn up a Farm Environmental Plan which includes evidence of the pristine nature of the water quality in the Irishman Creek based on extensive chemical and invertebrate analysis.

The FEMP also includes an OVERSEER Programme Analysis showing the calculated whole farm N & P loss.

This confirms that the Station operates well within the calculated limits for the property.

It also confirms that the Station utilises the mitigation systems and practices assumed in the Overseer programme.

The stocking rates on Irishman Creek are very low (approximately 1 SU per ha) and have changed very little since 20 years ago.

Fertiliser use is very low and has also remained fairly constant over the period, averaging 200 tonnes p.a. Nitrogen is only applied during crop establishment and is drilled with the seed, otherwise the Station depends on clovers and other legumes for nitrogen fixation.

We would add that the filtering effects of the underground gravels through which all waters seep from a point 5 km below the Station boundary for the next 10km are also a positive factor.

(b) **Cumulative Effects**
Whilst calculation of these cumulative effects are highly complex and technical, particularly the assessment of subsurface water flows, nevertheless it is possible to assess cumulative impacts from surface water chemistry and aquatic biodiversity.

According to the MWRL Water Quality Study, Irishman Creek Station is located within the Tekapo groundwater, and Mary Burn surface water catchments. For this property, the Lake Benmore mitigation requirements are the most stringent. The calculated nutrient mitigation requirement of the receiving environments determined in the MWRL Study has identified the N and P thresholds for the property. These are shown in the table below.

"OVERSEER® has been run by a qualified person to model the N and P outputs from the existing farming system. The results of the model have been incorporated in to the table below. This table shows that the applicant can meet the property thresholds.

	Nitrogen Threshold	Phosphorous Threshold
MWRL Water Quality Study Property Thresholds	29,286	2,026
OVERSEER® outputs	24,061	476

Although the results show that the nutrient budget is within the property thresholds, the MWRL Study identified that the applicant still has to consider specific on farm effects and the impacts these activities could have on the local receiving environment. This requires a specifically developed Farm Environmental Management Plan (FEMP) to identify and implement appropriate mitigation measures. The draft FEMP is attached to this evidence.

Given that the N and P thresholds from the MWRL Study can be met, and the applicant's commitment to addressing on farm risks with the implementation of the FEMP, the effects of the use of water on water quality for both the local receiving environment and cumulative effects are considered to be minor

(c) **Mitigation Measures**
These are listed in the FEMP, Section 5.

Summary
The applicant understands the importance of maintaining the environment in as pristine a state as possible. The scale of the application and the long history of its use without affecting water quality is evidence of this.

The applicant does have concerns regarding pollution of the area and its waterways from sources other than agriculture.

(3) Cultural Values

(a) The applicant is unaware of any site of Maori cultural significance in the area concerned.

(b) No mixing of water will occur as a result of the activity.

Te Runanga O Ngai Tahu submitted on all applications in the catchment, seeking that all applications be declined.

The primary reasons for this were that the applications were considered to be inconsistent with the policies and objectives of the WCWARP, and also at odds with the cultural objectives of the RMA.

This application is a discretionary activity in terms of the WCWARP, and therefore, it is entirely within the limits defined by the WCWARP. Te Runanga O Ngai Tahu had considerable input into the creation of the WCWARP.

However, it is acknowledged that Te Runanga O Ngai Tahu have a significant relationship with the Waitaki Catchment, and as such, appropriate minimum flow conditions, and management of water quality effects, is proposed by the applicant to ensure that the potential effects on the environment, including tangata whenua values are minor.

(c) The Station represents considerable historical importance for Pakeha, having been developed by Sir William Hamilton, and where the Jet Boat was invented. The Station has a museum open to special interest groups displaying the life and works of Bill Hamilton including the establishment of the shelter belts and enclosed border dyke areas.

The present runholder is a relative of Bill Hamilton.

Summary

The costs of the current consent process far exceed the economic benefit that may result if the consents are granted.

However, the applicant has persisted determinedly in the belief that the historical values should be preserved, and that the small scale hydro-power generation and crop irrigation for winter feed to enable traditional style farming in the upper Mackenzie Basin is both desirable and has the support of the general New Zealand public.

Figure One – location map