

Crown Pastoral Land Tenure Review

Lease name : BERWEN STATION

Lease number : PO 209

Due diligence report (including status report) - Pt 2

This report and attachments results from a pre tenure review assessment of the pastoral lease for the purpose of confirming land available for tenure review and any issues, rights or obligations attaching to it. The information is gathered from files and other sources available to the LINZ contractor.

Part of the information relates to research on the status of the land, resulting in a status report that is signed off by a LINZ approving officer.

The remainder of the information is not analysed for relevancy or possible action until required, and LINZ does not guarantee its accuracy or completeness as presented.

The report attached is released under the Official Information Act 1982.

January 05

WAITAKI CATCHMENT COMMISSION AND REGIONAL WATER BOARD
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S.W.C.P. No. 32
Berwen Run Ltd., A.W.J. Aubrey, Omarama.

Commission

PROGRAMME REVIEW

1. Works Completed to Date

<u>Job No.</u>	<u>Year</u>	<u>Description</u>	<u>Dimensions</u>
1	1976/77	Conservation fencing	2880 m
Pt 3	1977/78	Windbreak	600 m
Pt 4	1976/77	Cattleproofing	3300 m
Pt 6	1977/78	O.S.T.D.	150 ha

Total Costs to Date: \$10 389

Total Subsidy to Date: \$5 621

2. Evaluation of Programme

Little change has occurred since the programme commenced, the works carried out last year being severely affected by drought. The oversowing and topdressing response cannot be assessed before next spring and some replacement of drought killed trees will be necessary.

3. Stock.

No change has been recorded in numbers or performance.

4. Specifications

Unchanged.

5. Estimates, Balance of Programme

<u>Job No.</u>	<u>Description</u>	<u>Total Cost</u>	<u>Rate</u>	<u>Subsidy</u>	<u>Local Share</u>
<u>1978/9</u>					
Pt. 6	OSTD Sellars. 150 ha	\$2 818	1:1	\$1 409	\$1 409
2	Cattleproof Sanders 1 360 m	730	1:1	365	365
5	Dams Claycliffs - 3	2 013	1:1	1 006	1 007
Pt. 9	Cattleproof Burns Block 1 000 m	537	1:1	268	269
		<u>\$6 098</u>		<u>\$3 048</u>	<u>\$3 050</u>
<u>1979/80</u>					
Pt. 8	OSTD Sanders 90 ha	3 140	1:1	1 570	1 570
Pt. 10	OSTD Sanders 80 ha	2 791	1:1	1 396	1 395
7	Fence Maternity Gully 1 160 m	1 968	1:1	984	984
11	Windbreak Smith/ Steels 1 000 m	1 745	2:1	1 163	582
		<u>\$9 644</u>		<u>\$5 113</u>	<u>\$4 531</u>

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<u>Job No.</u>	<u>Description</u>		<u>Total Cost</u>	<u>Rate</u>	<u>Subsidy</u>	<u>Local Share</u>
<u>1980/81</u>						
Pt. 8	OSTD Sanders	90 ha	\$1 691	1:1	\$845	\$846
Pt. 10	OSTD Sanders	80 ha	1 503	1:1	751	752
Pt. 12	OSTD Sanders	70 ha	2 442	1:1	1 221	1 221
Pt. 13	OSTD Steels	60 ha	2 094	1:1	1 047	1 047
			<u>\$7 730</u>		<u>\$3 864</u>	<u>\$3 866</u>
<u>1981/82</u>						
Pt. 12	OSTD Sanders	70 ha	1 315	1:1	658	657
Pt. 13	OSTD Steels	60 ha	1 127	1:1	564	563
Pt. 14	OSTD Claycliffs	100 ha	3 489	1:1	1 745	1 744
			<u>\$5 931</u>		<u>\$2 967</u>	<u>\$2 964</u>
<u>1982/83</u>						
Pt. 14	OSTD Claycliffs	100 ha	1 879	1:1	939	940
Pt. 3	Windbreak	400 m	698	2:1	465	233
Pt. 4	Cattleproof	1100 m	1 624	1:1	812	812
			<u>\$4 201</u>		<u>\$2 216</u>	<u>\$1 985</u>
<u>Totals</u>			<u>\$33 604</u>		<u>\$17 208</u>	<u>\$16 396</u>
Works Completed to Date:			\$10 389		\$5 621	
			\$43 993		\$22 829	
Previous Financial Approval			\$45 161		\$23 161	
<u>Balance</u>			<u>\$1 168</u>		<u>\$332</u>	

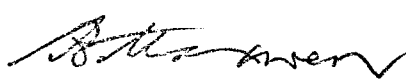
6. Recommendation

That the 1978/79 programme be approved.

A.W. Robinson
Soil Conservator

20 June 1978

Recommendation endorsed.


R.V. Maxwell
Chief Soil Conservator

20 June 1978

Council

Soil and Water Conservation Plan No. 32

"Berwen" Run Ltd., A. Aubrey, Omarama.

1. Physical Description

1.01 Location/Access

"Berwen" lies on the western faces of the Ewe and Hawkdun Ranges straddling the watershed of the Manuherikia and Little Omarama Streams. The Homestead at the northern end is 10 km from Omarama township and 136 km from Oamaru. The separate Claycliffs property is 24 km from the Homestead via Omarama although a 5 km cross-country stock route terminates in a swing bridge over the Ahuriri River.

1.02 Legal Description

Pastoral Lease	"Berwen" Run 322e Ahuriri Hawkdun and Gala S.D's. Pt Sec 5 Blk 3 Ahuriri S.D.	6970.1481 ha
<u>Stock Limitation:</u>	3,800 (1,000 ewes), 110 cattle, Rent \$320	
Renewable Lease	"Claycliffs" Sec 6 Blk 3 Ahuriri S.D. Pt Run 536 Ahuriri S.D.	1641.0003 ha
		<u>8611.1484 ha</u>

Section 6 is freehold

1.031 Climate

Rainfall at "Berwen" Homestead is 500 mm. Precipitation increases, and mean temperatures decrease in a southerly direction from the Homestead with precipitation probably averaging 1000 mm in the Manuherikia and 1250 mm along the summit of the Hawkdun Range. "Claycliffs" precipitation is in the 500 - 600 mm range. Annual temperature range on both parts of the property is -11° to 35°C and both parts are exposed to severe north-west and south-west winds.

1.032 Geology

The basement rocks of the northern end of "Berwen" are low grade schist, the balance being greywacke. The Hawkdun fault extends south wards over the watershed of the Little Omarama Stream and the Manuherikia and along the western base of the Hawkdun Range. Remnants of tertiary clay occur on the northernmost fans discharging to the Little Omarama Stream, the recent terraces of which are the flat areas of the property.

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"Claycliffs" is the southern end of a discontinuous upthrust ridge of pliocene gravel-capped tertiary sediments flanked by fans and terraces laid down in pleistocene and recent times. Basal erosion of the cliffs has caused the formation of the steep cliffs and spectacular columnar erosion from which the property takes its name.

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 1.033 Soils - See Land Inventory Map

Recent soils (680 ha, 8%) include 164 ha of deep gley soils and 320 ha of shallow soils. Brown-grey earths (109 ha, 1%) are limited to north facing steeplands at the northern end of "Berwen". The balance of the readily improvable soils on "Berwen" and "Claycliffs" are yellow-grey earths (2418 ha, 28%).

Apart from 50 ha of lowland yellow-brown earths, high country yellow-brown earths (5092 ha, 59%) make up the rest of the area, those on the summit of the Hawkdun Range being severely or completely eroded. From 30-50% of the 700 ha of fan and terrace soils in this group have an irrigation development potential.

Soils derived from lowgrade schist mapped on the northern end of "Berwen" appear to have a greater resistance to erosion than their greywacke counterparts.

1.034 Relief

"Berwen" falls steeply to the west of the summit ridge of the Hawkdun (1830 m) and Ewe (1200 m) ranges, running on to rolling downs at the head of the Manuherikia (760 m) and the broad fan of the Little Omarama Stream (550 m).

"Claycliffs" is generally rolling to hilly on the upthrust part and ranges between 500 and 680 m.

1.035 Vegetation

Alpine herbfield on the summit of the Hawkdun Range gives way to an association of snowgrass and blue tussock at 1200 m. Below this altitude snowtussock assumes dominance in association with fescue tussock, sorrel and raoulia subsericea. From 900 m down, short tussock associations dominate although these are modified by the inclusion of annual ephemerals on depleted sunny faces. A typical species list on lower sunny country is: hairgrass, cheatgrass, sorrel, haresfoot trefoil and scabweed, while on dark faces fescue tussock dominates. Matagouri occurs throughout the lower altitude range.

Dominant vegetation on "Claycliffs" is fescue-silver tussock associated with poa pratensis and chewings fescue on the hill country. The shallow soils of the terraces carry fescue tussock and sorrel. Briar grows vigorously on previously bare sites - notably at the base of the eroded cliffs and is frequently associated with matagouri and olearia.

Erosion

Areal Erosion: "Berwen"

Severe wind and sheet erosion have denuded the summit ridge of the Hawkdun Range. Below this lies a zone of moderate - severely eroded country and although most of the dark facing fescue tussock country is now fairly well covered, sunny faces generally remain bare to wind and rain.

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An upsurge in rabbits, only recently controlled, has nullified the improvements effected by improved grazing control.

"Claycliffs"

Although initial rabbit control work resulted in increases in vegetative cover, improvement is still required on a few sunny faces and on wind eroded shallow terrace soils.

Summary

Slight	2654 ha	31%
Moderate	3041	35
Severe	1087	13
Extreme	432	5
Complete	1397	16
TOTAL	<u>8611 ha</u>	<u>100%</u>

Localised Erosion

On "Berwen" shattering associated with the Hawkdun fault determines the occurrence of localised erosion. The headwaters of the Little Omarama Stream contain a number of actively eroding gullies and debris avalanches, while some debris is also being supplied to the Upper Manuherikia from Johnstone's Creek. Stabilisation of the Upper Little Omarama has second priority in catchment revegetation works in the Waitaki Catchment Scheme.

Columnar erosion of tertiary sediments occurs on "Claycliffs". Although the primary cycle of erosion is still fairly active it is supplying debris to the Ahuriri at only one point and is probably less important than a secondary cycle, which is taking place on the out-wash fans of the primary cycle. Here, gullies are actively cutting back along drainage channels.

Stream bank Erosion

"Berwen"

Control of the Little Omarama Stream will be required as irrigation development of the adjacent land proceeds. Some work has already been carried out on the section of the Omarama Stream near the Homestead, and additional work to prevent bank scour and over flow will be required in the future.

"Claycliffs"

Some siltation and damage to fencing near the Ahuriri River has occurred in the past, below the swing bridge. River control problems are likely to increase in future unless a programme of willow control is mounted in the lowest 30 km of the Ahuriri River.

(Willows could be on Crown land?)
 Check status of Park Bed. - Crown Land

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1.05 Land Use Capability

Land Use Capability is the standard Waitaki Catchment Commission classification of which the relevant units are set out below.

CLASS III Moderate Limitations to Arable Use

IIIw1 169 ha

Deep flat fertile high country gley recent soils - Dobson soils. Climate imposes a moderate limitation on cropping use of this land.

IIIe3 303 ha

Upland and high country yellow-brown and yellow-grey terrace and fan soils and recent soils in these environments, of moderate depth, moderate to weak structure and medium fertility. The wind hazard is increased by deficiencies in fertility, depth and structure. Moisture is adequate for most of the year but the other limitations imply that cropping should be undertaken with care and the safeguards of windbreak establishment, prudent cultivation and crop rotation. They include slightly and moderately eroded Struan, Pukaki, Dalgety and Omahau soils.

CLASS IV Severe Limitations to Arable Use

151 ha (dry land)

IVe1 455 ha (irrigation)

Shallow fan and terrace soils in the yellow-grey and yellow-brown and brown-grey earth environments. Shallowness, low fertility and weak structure make these soils especially vulnerable to wind erosion under cultivation. Windbreaks are essential and minimal cultivation is desirable. Adequate fertilizer and irrigation increase production while reducing erosion risk but in general cropping should be limited to winter feed crops. Soils in this group include moderately eroded and shallow Ranfurly, Becks, Wetherburn, Ruapuna, Hororata, Pukaki, Dalgety, Omahau. Acheron and MacKenzie soils enter this group where they are capable of irrigation.

IVe2 308 ha

Easy rolling slight and moderately eroded yellow-grey and yellow-brown soils the arable use of which is limited both by their topographical limitation to irrigation and further by climatic and fertility limitations. Structure to control runoff are desirable where long slopes are encountered and cropping should be limited to winter feed cropping. Soils in this unit are Opuha, Kakahu, Tekapo, Ohau, Omahau, Craigieburn, Mesopotamia and Cass.

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IVe3 69 ha

Rolling phases of yellow-grey and yellow-brown earths formed on loess with severe limitations of climate, structure and fertility. Although these soils are suited to the occasional winter feed crop during pasture renewal they require very careful cultivation, and the carefully planned use of runoff control structures and sub-surface water control measures. Although slopes are usually too steep for the formation of diversion banks of adequate cross-section pasture furrows can be established after sowing down. Soils in this group are Sherwood, Opuha, Rapuwai and Kakahu.

CLASS VI Moderate Limitations for Pastoral Use

VIe1 801 ha (dryland)
497 ha (irrigation)

Flat, shallow, bouldery terrace and fan soils moderately eroded or with a moderate erosion risk. These soils are usually moderately to severely leached, and although fertilizer and seed applied either by aeroplane or sod seeder can help to establish perennial cover in the yellow-grey and yellow-brown earth environments conservation of financial resources frequently means that these soils are treated last in a conservation programme. Limited areas may have their organic matter status raised by feeding out of hay, but this treatment can seldom be achieved over large areas. In the event of such treatment not being practicable limited success will result from controlling grazing to encourage establishment of a low producing perennial cover. This unit includes MacKenzie and Acheron soils and presupposes the non-availability of irrigation water. Should irrigation water become available these soils would advance to a unit of Class IV.

VIe5 107 ha

Severely eroded brown-grey earth hill and steepland soils. The techniques recommended for unit VIe4 are satisfactory but are more difficult to apply and are not usually so rapid in effect. Aerial seeding results in some cover establishment and is worthwhile where limited financial resources preclude the more effective and thorough treatment of fertilizer plus seed.

VIe6 599 ha

Slightly eroded yellow-grey hill and steepland soils. These soils respond to molybdenum, and moderate to high rates of sulphur and phosphorous. Some grazing control is required especially on sunny country. Soils in this group include Omarama, Tengawai, Meyer.

VIe7 1190 ha

Moderately eroded yellow-grey hill and steepland soils. Fertilizer responses are outlined in unit VIe6 above, and the drought risks associated with establishment of an introduced sward are lower than those on brown-grey earths. Conventional pasture species and strains are

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satisfactory in this environment. Grazing control is of greater importance than on unit VIe6, especially on the unimproved sites, as also rabbit control. Vegetation is fescue tussock, scabweed, some matagouri and low producing introduced grasses - browntop and sweet vernal, snowgrass on the upper fringe.

VIe9 12 ha

Slightly eroded hill and steepland yellow-brown earths with no climatic or fertility barrier to economic pastoral development by oversowing and topdressing. These soils respond to high rates of phosphorous, sulphur, and molybdenum, although the sulphur requirement is lower in relation to phosphorous. Conventional pasture species and strains are satisfactory and the risks of drought failure are minimised by damper environment. Included are Hurunui, Tekoa and Kirkliston soils. Moderate care in grazing management is usually sufficient to prevent damage. Vegetation is as for yellow-grey earths with more snowgrass.

VIe10 133 ha

Moderately eroded hill and steepland yellow-brown earths with no climatic or fertility barrier to economic pastoral development by oversowing and topdressing. Treatment by plant introduction is as in unit VIe9 above. Grazing control is of greater importance particularly on unimproved sites. Aerial seeding is unlikely to be effective in this group.

VIe12 329 ha

Tiroiti hill and steepland, subject to mass movement resulting from geological instability. Recommended treatment is establishment of deep rooting vegetation (poplars etc.) Retirement from grazing may be necessary in some cases, to aid establishment of poles.

CLASS VII Severe Limitations to Pastoral Use

VIIe3 158 ha

Slightly eroded hygrous yellow-brown earth steplands at high altitude - Kaikoura Steplands. These soils occupy sites which by retaining a cover of snow have tended to escape the damaging effects of fire. Although of weak structure the soils have been protected from erosion by dense cover, (often a monoculture) of snow grass. Controlled summer grazing is a use compatible with water production and the maintenance of vegetative cover.

VIIe4 81 ha

Moderately eroded Benmore steepland soils. Resistance to erosion resulting from the development of some structure in the sub-soil is offset by low fertility and harsh climate. Short term grazing is possible, December - May, but care is needed to ensure spelling for at least 50% of this period. Vegetation - snow tussock, sorrel, and heath like plants.

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VIIe5 1475 ha

Moderately and severely eroded Kaikoura steepland soils, severely eroded Benmore steepland soils and slightly and moderately eroded Bealey soils. Severe erosion and/or weak structure indicate the extreme care needed in grazing management to prevent further deterioration. Control of deer is important. Vegetation - snow tussock, sorrel and heaths.

VIIe6 133 ha

Slightly eroded Puketeraki and Glen Lyon soils. As these soils are usually associated with adjacent eroded steeplands in large blocks it is often difficult to achieve separate treatment in practice. Although of weak structure and low fertility their rolling topography renders them less liable to sheet erosion and it is sometimes possible to site fence lines along their boundaries. Vegetation - snow tussock, *Festuca matthewsii*, carpet grass, turpentine.

VIIe7 729 ha

Moderately and severely eroded Kirkliston soils and moderately eroded Puketeraki soils. As with the soils in VIIe6 above, these soils represent a topographic sub-division. Increased erosion however, dictates more careful use following possible sub-division. Vegetation - as for e6.

CLASS VIII Not Suited to Pastoral Use

VIIIe2 33 ha

Completely eroded low altitude hill and steepland soils. Limited in extent such areas usually occur near faults or other localised geological phenomena, and reflect the weakness of the rocks underlying the soils. Where practicable fencing and cover established by tree planting or oversowing should be attempted. Vegetation - nil.

VIIIe4 608 ha

Extremely eroded high altitude yellow-brown earths. Although eroded, these areas offer some hope of revegetation with prostrate trees and shrubs of which *alnus viridis* appears the most promising at present. Exclusion of grazing animals will encourage a limited amount of revegetation by the resident species which are not, however, good colonizers of such difficult sites. Vegetation is snow grass and sub-alpine scrub.

VIIIe5 1074 ha

Completely eroded high altitude yellow-brown earths and Alpine steeplands. On these soils little hope of revegetation remains although remnants indicate the former presence of complete profiles of the high altitude yellow-brown earths. Exclusion of grazing animals will however prevent the extension of such complete erosion into the extremely eroded areas (VIIIe4) which are usually adjacent. Occasional snow tussock and alpine herbs are the only vegetation.

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2. Conservation Programme and Work Section
- 2.01 Soil and Water Conservation Problems
- 2.011 Severe - Complete erosion on Basin and Pass blocks, the summit of the Hawkdun Range, including areas supplying debris to Little Omarama and Manuherikia.
- 2.012 Control of roughage on Downs, Basin and Pass blocks. These blocks all carry heavy snowgrass and matagouri in the gullies. Past control has been by burning. Roughage control is also important on parts of the Claycliffs.
- 2.013 Moderate and moderate to severe erosion of Omarama, Arrow, Alexandra and Acheron soils in Shearing Front, Taylors and Steeles blocks.
- 2.014 The risk of wind erosion on Acheron, Pukaki and Twizel soils on Little Omarama Stream flat and at the western portion of Claycliffs.
- 2.015 The shortage of stock water on Claycliffs consequent on more sub-division and the build-up of cattle numbers.
- 2.016 Slumping and associated gullying at the elevated toes of outwash fans of tertiary sediments, on Claycliffs.
- 2.017 Bank erosion at various points in the Omarama stream.
- 2.018 Threat of bank erosion and overflow on Ahuriri river frontage of Claycliffs.
- 2.019 Maximising water yield from Omarama and Manuherikia catchments.

The Upper Omarama catchment is likely to be fully or over-committed to supply of irrigation and stock water regardless of possible supporting development of communal irrigation schemes served by the Ahuriri. The importance of the ephemeral Little Omarama stream to the Omarama stream trout fishery is not yet fully assessed.

2.02 Previous Soil and Water Programme - Objectives and Works

- 2.021 Prior to preparation of a comprehensive S.W.C.P. for Berwen in 1968 the following works were carried out.

Individual Jobs

3200 m	Conservation Fence	Berwen	1957
2900 m	" "	Claycliffs	1964
6800 m	" "	Berwen (OCB)	1966

Works in Advance of Plan

120 ha	O.S.T.D.	Berwen
1600 m	Con. Fence	Claycliffs
4000 m	C'Proofing Bdy.	"
1300 m	C'proofing Int.	"

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All works have been effective apart from the O.S.T.D. of 120 ha of the Berwen Shearing block where establishment was unsuccessful.

2.022 Objectives and Performance of S.W.C.P. programme 1968 - 1973.

- a) Retirement of Basin and Pass from sheep grazing (1050 su) - partial replacement with cattle (200 su) net stock to have been retired 850 su.

Physical retirement is well advanced with the completion of the 3300 m in retirement fence north of the Basin. Cattle grazing of the retired area may not reach the estimated 200 su. Provision of alternative grazing was originally proposed at 1:1 subsidy on the actual number of stock units removed, with any shortfall in income to be met by expansion of the cattle enterprise. The economic basis of the plan has been destroyed by the collapse of the beef market and it is proposed to reassess the alternative grazing provision on the basis of 1:1 subsidy on twice the number of stock units retired.

The number of stock units to be retired is 1050, and as the retired area will eventually revert to the Crown with an indeterminate amount of permit cattle grazing on a year to year basis, the total alternative grazing required is for 2100 su, or twice the number to be retired on 1:1 subsidy basis. The 300 ha already oversown and topdressed carries 725 su and provision must now be made for 1375 su.

- b) Improvement of cover on Shearing, Front, Taylors and Steels blocks. Although the improved grazing management resulting from additional sub-division was beginning to take effect, the build-up of rabbits prior to Pest Board amalgamation nullified improvements. Recent rabbit control appears to have been effective but the 1976 drought has prevented any rapid recovery.
- c) Roughage control with Cattle. Despite a slower increase in numbers than anticipated roughage control is being accomplished in most areas. Numbers are approximately double, but further increases are not envisaged due to feed shortages experienced in droughts over the past few years.
- d) Provision of Stock Water. Not yet actioned, but still required.
- e) Windbreak Establishment. One 1000 m windbreak partially established - not complete.

Works Completed

O.S.T.D. Alternative grazing	300 ha
Fencing Alternative grazing	6700 m
Retirement Fencing	3300 m
Conservation Fencing	3600 m
Cattleproofing	10800 m

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2.03 Proposed Programme

The original programme was prepared before the introduction of Job Numbers. The works in the proposed programme are therefore the first to be identified in this way. Proposals carried over from the previous programme are marked with an asterisk in the financial programme.

The programme will complete the provision of alternative grazing for the retirement of Basin and Pass blocks by the oversowing and topdressing of 550 ha, supported where necessary by additional fencing. It is proposed to develop one further 150 ha O.S.T.D. block on Berwen and five blocks of approximately 80 ha at Claycliffs. At 2.5 su/ha the 300 ha already O.S.T.D. plus the 550 ha now proposed will provide the required alternative grazing for 2100 su. (Jobs 6, 8, 10, 12, 13 & 14). 550 ha represents an increase of 425 ha on original proposals.

Job 1 (Conservation fence - Sanders block). Job 2. (Cattleproofing Sanders boundary) and Job 7 (Fencing, Alternative grazing, Maternity Gully) are all concerned with the provision of alternative grazing through Jobs 3, 10 and 12. Job 1 which sub-divides sunny country from dark country on the Claycliffs provides a framework to support the additional sub-division considered necessary to create three approximately 80 ha blocks at Claycliffs.

Job 2 will be realigned to that end, and Job 5, provision of water supply by construction of dams at Claycliffs, is also related to the provision of alternative grazing and consolidation of the use of cattle to control roughage. Jobs 13, (60 ha O.S.T.D. - Steels) and 14, (100 ha O.S.T.D. Claycliffs) complete the alternative grazing.

Job 3 is the partially completed windbreak at Berwen and Job 11 is an additional windbreak aligned to protect land to be cultivated as part of future irrigation development.

Jobs 4 & 9 are cattleproofing of Taylors block and Burns block, works carried over from the previous programme. Additional fencing for cattle is necessary to achieve adequate roughage control on these areas.

Annual Programmes (Includes 10% contingencies and Scale fees)

<u>Job No.</u>		<u>Total Cost</u>	<u>Subsidy Rate</u>	<u>Subsidy</u>	<u>Local Share</u>
Year 1 - 1976/77					
1	Conservation Fence Sanders Block 2880 m	4638	1:1	2319	2319
*	2 Cattleproofing Sanders Block 1360 m	730	1:1	365	365
*	3 Windbreak, Berwen 1000 m	1745	2:1	1163	582

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<u>Job No.</u>		<u>Total Cost</u>	<u>Subsidy Rate</u>	<u>Subsidy</u>	<u>Local Share</u>
* 4	Cattleproofing Taylors Block 4400 m	2362	1:1	1181	1181
* 5	Dams, Water Supply Claycliffs 3	2013	1:1	1006	1007
<u>Year 2 - 1977/78</u>		11488		6034	5454
6	O.S.T.D. Sellars (Alt. grazing) 150 ha	8052	1:1	4026	4026
7	Fence, Maternity Gully (Alt. grazing) 1160 m	1968	1:1	934	934
8	O.S.T.D. Sanders (Alt. grazing) 90 ha	4831	1:1	2416	2415
		14751		7376	7375
<u>Year 3 - 1978/79</u>					
* 9	Cattleproofing, Burns Block boundary 1000 m	537	1:1	268	269
10	O.S.T.D. Sanders (Alt. grazing) 80 ha	4294	1:1	2147	2147
11	Windbreak, Smiths/ Steels 1000 m	1745	2:1	1163	582
		6576		3578	2998
<u>Year 4 - 1979/80</u>					
12	O.S.T.D. Sanders (Alt. grazing) 70 ha	3758	1:1	1879	1879
<u>Year 5 - 1980/81</u>					
* 13	O.S.T.D. Steels (Alt. grazing) 60 ha	3220	1:1	1610	1610
* Pt14	O.S.T.D. Claycliffs (Alt. grazing) 100 ha	5368	1:1	2684	2684
		8588		4294	4294
TOTALS		45161		23161	22000
<u>Summary</u>					
Windbreaks - Berwen 2000 m		3490	2:1	2326	1164
Dams, Water Supply Claycliffs 3		2013	1:1	1006	1007
Fencing, alt. grazing 4040 m		6506	1:1	3253	3253
O.S.T.D. alt. grazing 550 ha		29523	1:1	14762	14761

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	<u>Total Cost</u>	<u>Subsidy Rate</u>	<u>Subsidy</u>	<u>Local share</u>
Cattleproofing, Sanders Taylors, Burns blocks 6769 m	3629	1:1	1314	1815
	<u>45161</u>		<u>23161</u>	<u>22000</u>

2.04

Management Patterns

Stock numbers have not increased to the levels envisaged at the outset of the programme, sheep being slightly reduced while cattle have doubled. Unit production has increased markedly.

Over the period 1968 - 1975 the following changes have occurred.

<u>Sheep</u>		<u>Cattle</u>	
1968	1975	1968	1975
2640 ewes	2300	85 cows	178
2090 wethers	1900	30 heifers	80
640 hoggets	760	30 heifer calves	31
55 rams	60	2 bulls	9
18 killers			3 bull calves
<u>5403 halfbred</u>	<u>5020</u>	<u>147</u>	<u>301</u>
<u>Lambing</u> 85%		<u>Calving</u>	
85%	96%	87%	92%
<u>Wool/head</u>			
3.3 kg	4.1 kg		

The intended cattle policy of retaining young cattle for over wintering and disposal as fats or forward stores has not proved feasible but over 250 cows are now run to produce store calves.

Grazing management changes have resulted in a reduction of grazing of Pass and Basin blocks by 50% but the long-term cattle grazing potential of these blocks has not been determined.

As originally proposed, more wethers and dry cattle have been accommodated on the lower steep land blocks of Berwen as a result of conservation fencing and cattleproofing, while ewes and cows have been concentrated on the Berwen flats, and on the developed part of Claycliffs. These practices have been assisted by unsubsidised oversowing and topdressing at Claycliffs as well as by the development of alternative grazing.

The currently proposed programme will consolidate the works undertaken to date by completing the provision of alternative grazing and other works carried over from the initial programme.

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2.041 Future Tenure - Retired Land

The runholder, Department of Lands & Survey field staff, and Commission staff have jointly agreed that following retirement the land be surrendered, from the permanent lease and with adjoining future retired areas (Otamatapaio) be the subject of a management plan, a feature of which will be the permit grazing of up to 200 su as cattle. An essential provision of the management plan will be the safeguarding of stock driving access between pastoral lease lands severed by the management area.

Provision of alternative grazing for the total number of stock units retired is undertaken because of the undetermined amount of cattle grazing likely to be available on the management area and the fact that such grazing will be on a year to year permit basis with no guarantee of permanent availability.

2.05 SpecificationsConservation and Retirement Fencing

4 strainer assemblies	\$40.00
60 posts	93.00
50 tiedowns	50.00
350 lightning droppers	78.75
4.5 x 50 kg/12 1/2 g wire	112.50
2.5 x 50 kg at \$31.50	78.75
Freight	247.00
Labour	500.00
	<hr/>
	\$1200.00/km

O.S.T.D. - initial and follow-up

<u>Initial:</u>	Fertilizer:	250 kg Mo 200 S super	\$10.00
	Seed:	2 kg white clover	3.50
		1 kg red clover	1.50
		2 kg alsike	3.00
		2 kg cocksfoot	3.00
	Freight:		2.00
	Flying:		3.00
			<hr/>
			\$26.00
			<hr/>
<u>Follow-up:</u>	Fertilizer:	250 kg S super	9.00
	Freight:		2.00
	Flying:		3.00
			<hr/>
			\$14.00
			<hr/>
		<u>TOTAL</u>	\$40.00/ hectare

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Cattleproofing:

150 posts/waratahs	\$225.00
1 barb	77.50
Freight	22.50
Labour	75.00
	<hr/>
	\$400.00
	<hr/>
<u>TOTAL</u>	<u>\$400.00/km</u>

Dams:

Estimate 3 at Total Cost \$1500.00
Detailed investigation required.

Windbreak Treeplanting:

Conservation fencing as above	\$1200.00/km
3 rows P. nigra/planting	100.00/km
	<hr/>
	\$1300.00/km

2.06 Financial Analysis - Economic Assessment

As the programme is incomplete only interim assessments are possible. A 15% increase in productivity has been achieved, which is sufficient to cover increased maintenance costs on programme works and return a reasonable reward to the property.

Total Soil Conservation subsidies invested in the property since commencement of works in 1957 are \$7950 on \$20,000 works costs. This investment has engendered substantial beneficial management changes which are still going on. (See Section 2.02 above).

Future programme expenditure will be more than double that of the past largely due to cost inflation, but only a limited range of conservation works will remain to be completed thereafter.

For a total expenditure of \$65,000 (\$31,000 subsidy) over 25 years from 1957, conservation works will achieve the retirement from grazing of 3,400 ha for watershed protection and erosion control, the improvement of cover on 2,000 ha of eroded lower altitude steeplands and hills and the virtual elimination of burning as a management technique.

2.07 Legal Agreement

Operative if plan approved.

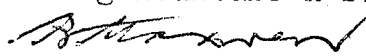
2.08 Plan Prepared by:

A.W. Robinson

Acknowledgements:

W.R. Chalmers - Department of Lands & Survey
G.H. McFadden - Ministry of Agriculture & Fisheries.

Certified for approval.


R.V. Maxwell
Chief Soil Conservator

2.7.76

Recommend Run Plan be allowed
Note further to page 13 for further cover indicated
file off

SFC

ANNUAL PROGRAMME AMENDMENT

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A. Catchment Authority: Waitaki Catchment Commission

B. Name and Number of Soil and Water Conservation Plan, and Programme Year:

"Berwen", SWCP No. 32. R.A. Aubrey, "Berwen", Omarama. Year 1970/71.

C. Original Programme

		<u>Cost</u> (including soil con. fee.)	<u>Rate</u>	<u>Subsidy</u>
Fencing - offsite	200ch	\$1847	1:1mo	\$ 923
O.S.T.D - offsite	1050ac	6064	1:1	3033
Cons. fencing	315ch	5094	2:3	2037
Cattleproofing	1227ch	7086	2:3	2834
Stock ponds	6	624	1:1	312
Windbreak	50ch	880	1:1	440
Fencing - Grant	160ch	2464	Grant	2464
Oncost		<u>123</u>	Grant	<u>123</u>
		\$24182		\$12166

D. Revised Programme

Cattleproofing	160ch $\frac{1}{2}$ share	\$ 462	2:3	\$ 185
		<u>\$24644</u>		<u>\$12351</u>

E. Additional Works for which approval is Sought:

Cattleproofing				
B'-B-C	150ch	\$ 866	2:3	\$ 553
		<u>\$25510</u>		<u>\$12904</u>

F. Reasons for Change

The steady increase in cattle numbers coupled with somewhat disappointing results from topdressing due to drought, has meant that more cattle are being run on the front country of Berwen. Cows have now risen to 110 with an additional 100 head of dry stock. Noticeable benefits in roughage control have been recorded. Although mentioned in the original draft of the programme it was not then expected the work would be done in this programme.

Signature: *[Signature]*
Chief Soil Conservator

Date: 21 August 1970.

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1. LOCATION: "Berwen" (Pt 322e) lies on the western faces of the Ewe and Hawkdun ranges straddling the watershed of the Manuherikia and Little Omarama streams. The homestead is 6 miles from the Omarama township. The Claycliffs property of 4054 acres is 15 road miles from the homestead via Omarama, although a 3-mile cross-country stock-route terminates in a swing bridge over the Ahuriri river. The homestead is 85 miles from Oamaru.

2. LEGAL DESCRIPTION:

Pastoral Lease	"Berwen"	(Pt. Run 322e, Ahuriri, Hawkdun & Gala S.Ds. (Pt. Sec 5, Blk 3, Ahuriri S.D.	17,160.0.00
Renewable Lease	"Claycliffs"	(Pt. Run 536 Ahuriri S.D. (Run 537 " "	2,244.0.00 1,810.0.00
			21,214.0.00

3. CLIMATE: Rainfall at "Berwen" homestead is 20". Rainfall increases and mean temperatures decrease in a southerly direction from the homestead, with precipitation probably averaging 40" in the Manuherikia and 50" along the summit of the Hawkdun Range. "Claycliffs" rainfall is in the 18"-20" range. Some snow risk exists on the southern part of "Berwen." Annual temperature range on both parts of the property is 20° - 90° F. and both parts are exposed to severe northwest and southward winds.

3.1 TOPOGRAPHY: "Berwen" falls steeply to the west of the summit ridge of the Hawkdun (6000') and Ewe (4000') ranges, running onto rolling downs at the head of the Manuherikia (2500') and a flat fan on the Omarama side (1800').

"Claycliffs" is the southern end of a discontinuous ridge of tertiary sediments rising 300 feet from the floor of the Omarama basin. It is flanked by flat fans and terraces at 17-1800 feet. Basal erosion of the ridge by the Ahuriri River has caused the formation of the steep cliffs from which the property takes its name.

3.2 GEOLOGY: The basement rocks of "Berwen" are low-grade schist. The Hawkdun fault extends southwards over the watershed of the Little Omarama Stream and the Manuherikia and along the western base of the Hawkdun range.

The main ridge of "Claycliffs" is formed of tilted tertiary beds and is surrounded by fans and terraces of greywacke laid down in recent times.

3.3 VEGETATION: Alpine herbfield on the summit of the Hawkdun Range gives way to an association of snowgrass and blue tussock at 4000 feet. Below 4000 feet snow tussock assumes dominance in association with fescue tussock, sorrel and raoulia subsericea. From 3000 feet down short tussock associations dominate although these are modified by the exclusion of annual ephemerals on depleted sunny faces. A typical species list on lower sunny country is:- hairgrass, cheatgrass, sorrel, haresfoot, trefoil and scabweed, while on a dark face fescue tussock dominates. Matagouri occurs throughout the lower altitude range.

Dominant vegetation on "Claycliffs" is fescue-silver tussock associated with poa pratensis and chewings fescue on the hill country. The shallower soils of the terraces carry fescue tussock and sorrel. Briar grows vigorously on previously bare sites - notably at the base of the eroded cliffs, and is frequently associated with matagouri.

3.4 SOILS: See Soil Map -- W.C.Comm. 10011/2.

The soils on "Berwen" might be expected to have slightly higher natural fertility than corresponding soils on greywacke, but this is probably of little practical significance. Completely eroded phases of Kaikoura and Puketeraki occur on the summit of the Hawkdun range.

The soils on "Claycliffs" which are derived from the weathering of Tertiary sediments have high natural fertility. The shallow soils on more recent sediments are of low fertility.

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Severe mass and sheet erosion have denuded the summit ridge of the Hawkdun range. Below this lies a zone of moderate-severely eroded country, and although most of the dark facing fescue tussock country is now fairly well covered sunny faces generally remain bare to the ravages of wind and rain.

"Claycliffs." Although much improvement in cover has taken place as a result of rabbit control some sunny country and the areas of shallow terrace soils which are pedestalled still require cover improvement.

Spectacular columnar erosion of tertiary sediments occurs on the faces overlooking the Ahuriri River, and it is from this feature that the property takes its name. Although the primary cycle of erosion is still fairly active it is probably less important than a secondary cycle which is taking place on the outwash fans of the primary cycle. Here gullies are actively cutting back along drainage channels.

An analysis of inventory data shows that erosion falls into the following broad classes:

1. Slight Up to 20% topsoil exposed 10,400 ac. 50%
2. Moderate 20% subsoil exposed to 20-40% subsoil exposed or 40-60% topsoil exposed 5,000 ac. 24%
3. Severe Over 40% of subsoil exposed or 20-40% scree or where soil is underlain by weak sediments actively gulling or likely to gully 5,814 ac. 26%

3.6 NOXIOUS ANIMALS & WEEDS: Rabbits have been a serious problem on "Claycliffs" and the lower parts of "Berwen" in the past, and their control remains an important factor in reducing erosion. Following rabbit control briar has become much more apparent, especially on the Ahuriri faces of "Claycliffs." A few areas of "Claycliffs" are also thickly infested with low-growing matagouri.

4. LAND INVENTORY AND CAPABILITY:

4.1 LAND INVENTORY: See W.C.Comm. No. 10011/1

4.2 LAND CAPABILITY: See W.C. Comm. No. 10011/3

LEGEND

Units follow those used by Prickett & Howard in detailed surveys

Capability Unit Description

Land Suited to Arable Use

Class III	<u>Moderate Limitations</u>	
367ac.	W1	Dobson soils
Class IV	<u>Severe limitations</u>	
1573ac.	e1	Dalgety, Naseby, Pukaki, Twizel, Tasman & Middlemarch - all slightly eroded
622ac.	e2	Grampians, Kurow, Ranfurly, slight - moderate erosion.

Land not suited to arable use

Class VI	<u>Moderate Limitations</u>	
1852ac.	e1	Acheron, Tasman, shallow, MacKenzie shallow soils
3637ac.	e2	Hurunui, Meyer Hill, Omarama, Tiroiti Hill, Kurow - all slightly eroded.
1291ac.	e3	Dalgety bouldery soils. Case soils - slightly eroded.
467ac.	e4	Omarama, - moderately eroded. Tiroiti Hill - moderately to severely eroded.

Severe Limitations

Class VII	287ac.	e1	Waitaki soils - severely eroded.
	3002ac.	e3	Kaikoura and Benmore - slightly eroded - Tekoa soils - slightly - moderately eroded.
	413ac.	e4	Kaikoura and Benmore soils - moderately eroded.
	1474ac.	e6	Kirkliston, Puketeraki soils - severely eroded.
	686ac.	e7	Kirkliston - Puketeraki soils - moderately eroded.

Land not suited to pastoral use

Class VIII	2449ac.	e2	Kaikoura and Benmore Steepland soils - severely eroded.
	3094ac.	e3	Kaikoura and Puketeraki soils - completely eroded.

5.0 SUBDIVISION AND WATER SUPPLY:

Some subdivision has been carried out on both "Berwen" and "Claycliffs" since the property was taken over by Mr. Aubrey in 1946. Earlier fences were built to hold sheep only, but later fences have been erected to cattleproof standard. A fence of major importance as a single-practice work which integrates well with the current proposals is the fence cutting off the high country from the lower country in the Manuherikia catchment.

Subdivision currently proposed at "Claycliffs" will necessitate the development of a number of existing springs in small catchments to provide water for cattle. It is proposed to run a substantial proportion of the wet cattle at "Claycliffs".

5.1 MANAGEMENT:

Present Sheep Nos.	2640 ewes	<u>Present Cattle Nos.</u>	85 cows
	2090 wethers		30 heifers
	640 hoggets		30 " calves
	55 rams		2 bulls
	18 killers		<u>147</u> Hereford
	<u>5403</u> - $\frac{1}{2}$ bred		

No cattle were run at "Berwen" or "Claycliffs" until 1960, and management was generally aligned about running part of the ewe flock at "Claycliffs," the remainder at "Berwen" on the paddocks and lower front country, and the wether flock on the higher eroded country of the Pass and Basin Blocks.

The only significant alteration to this general pattern was the erection of the fence cutting off the lower country in the Manuherikia, which has improved control of the wether country.

Hoggets and the "Berwen" portion of the ewe flock are wintered in the paddocks on 3500 bales of hay and 18-20 acres of turnips, but all other stock are wintered on the hill.

Burning has been used for roughage control on the wether country until comparatively recently, and this is reflected in the vigour of the vegetation, which is snowgrass dominant.

Cattle numbers are increasing and in the event of proposed management changes proving satisfactory may reach over 500 in 1972. These would comprise 200 cows and replacements together with 250 yearling and 2 year-old cattle

6.0 CONSERVATION PROGRAMME

6.10 PROBLEMS

- 6.11 The severe erosion of the two wether blocks on the Hawkdun Range. These include 5543 acres of Classes VIIIe2 and VIIIe3.
- 6.12 Control of roughage on Downs, Basin and Pass blocks; these blocks all carry heavy snowgrass and matagouri in the gullies. Control has been by burning in the past, and growth on some sites since the cessation of burning is such that stock access problems are increasing. Roughage control is also important on parts of "Claycliffs".
- 6.13 Moderate and moderate to severe erosion of Omarama, Waitaki and Acheron soils in Shearing, Front, Taylors and Steeles blocks.
- 6.14 The risk of wind erosion on Acheron, Pukaki and Twizel soils on Little Omarama Stream flat and at the western portion of "Claycliffs."
- 6.15 The shortage of stock water on "Claycliffs" consequent on more intensive subdivision and the build-up of cattle numbers.
- 6.16 Slumping and associated gullying at the elevated toes of outwash fans of tertiary sediments.

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6.2 PROPOSALS:

The major proposals are centred on the retirement of Basin and Pass blocks from sheep grazing and partial replacement with cattle.

Secondary proposals deal with:-

- (a) The improvement of cover on Shearing, Front, Taylors and Steeles blocks, mainly by the use of cattle.
- (b) The control of snowgrass and matagouri by using cattle.
- (c) The provision of water for cattle at "Claycliffs" where the 200 cow breeding herd will be grazed for much of the time.
- (d) The establishment of windbreaks to protect Pukaki and potentially arable Twizel soils on the little Omarama Stream flat.

Please note that Conservation fencing is identified by the use of higher case letters while for cattleproofing lower case letters are used.

6.21 FENCING:

a. Provision of Offsite Grazing.

1. Fence A-B divides V1e2 and 4 country from V1e, and 1Ve, creating blocks of 754 acres (hill) and 286 acres (flat).
2. Fence C-D divides Steeles block, cutting off an area of substantially V1e land from 1Ve2 and 1Ve; Block sizes are 620 acres and 420 acres.
3. Fence K-L divides V1e2 and 1Ve2 from 1Ve and 2 land to give blocks of 280 and 365 acres.

b. Conservation Fencing.

1. Fence E-G divides V1e 3, 6, & 7 from V1e 1, 2 & 3 and 1Ve. The fence lies a little below the snow tussock boundary to minimise possible snow damage and the block above the proposed fence therefore includes some moderately eroded Omarama soils with the moderate to severely eroded yellow brown earths.
2. Fence F-H forms the northern boundary of that area of the Basin which it is proposed to retire from sheep grazing, and the southern boundary of the area of moderately to severely eroded yellow brown earths noted in the foregoing paragraph. This fence, together with boundary fences and the Downs block fence formerly erected as a work in advance of the plan will form the boundaries of the 8440 acres to be retired from sheep, and the fence is accordingly proposed as a grant fence.
3. Fence I-J subdivides the 2700 acre Downs block cutting V1e3 from V1e2 and V1e2. The purpose of the fence is to provide manageable areas so that modified mob-stocking can be practised with wethers and cattle to control roughage. Satisfactory control of this vigorous snow tussock without burning can only be achieved at fairly high stock intensities.

6.22 CATTLEPROOFING:

None of the original subdivision or boundary fences is cattleproofed, and meriono fences have been erected even in comparatively recent years prior to the introduction of cattle. The work planned during the forthcoming programme is expected to integrate with the major retirement plan, to assist in the revegetation of eroded Omarama and Waitaki soils and to improve roughage control on dark country and swampy riverbeds at "Claycliffs" and snowgrass country on "Berwen."

- a. "Berwen"
 1. Lengths a-b-c-d, b-e, f-c, g-h and i-h-j total 890 ch., are all cattleproofing of "Berwen" front country, the sunny faces of which are still moderately to severely eroded following severe rabbit damage. Of these lengths only g-h and i-h-j, totalling 415ch. are planned for the current programme.
 2. Length j-k, 240 ch., is boundary cattleproofing of the Basin block to permit the grazing of cattle only under the retirement plan.
 3. Length l-m, 130 ch. is boundary cattleproofing of the Downs block to permit cattlegrazing for roughage control on that block. Some extension of this work may be required in the future to completely cattleproof the boundary of the block and to strengthen the lower parts of the Pass block boundary.

- b. "Claycliffs"
 1. Length q-s is 42 chains of boundary not completed under the approval for works in advance of the farm plan.
 2. Length q-r 140 chains is the western fence of block 10, parts of which carry heavy growth of chewings fescue, fescue tussock and matagouri.
 3. Length o-p 60 chains is a continuation and completion of the Ahuriri Downs boundary, part of which was cattle-proofed in advance of the farm plan.
 4. Length n-o 210 chains is the cattleproofing of an open river boundary, which is sheep proof. Block 1 carries a good deal of scrubby roughage and swampy growth adjacent to the river. Cattleproofing will require the erection of a three barbed-wire fence, the cost of which will exceed the usual cost of \$5 per chain.

6.23

TOPDRESSING AND SEEDING:

All proposed topdressing and seeding is for the provision of offsite grazing. The area required to accommodate the 1050 stock units involved in retirement of wethers from Pass and Basin blocks is 1050 acres, as it is estimated that an increase of one stock unit per acre will result from the treatment. The area will be spread over the better soils in five blocks; that is, where Acheron soils or other shallow stony soils are included in the block area, these will not be treated.

Blocks and areas to be treated are:-

"Berwen"	4b	-	240	acres
	6a		200	"
	6b		150	"
"Claycliffs"	2a		260	"
	2b		200	"

				1050 "

6.24

TREEPLANTING:

Although a series of windbreaks are tentatively planned to protect wind-eroded Acheron soils near the little Omarama stream only one is likely to be established within the current planning period. Protection of potentially arable Twizel and Tasman soils will also be achieved.

6.25

STOCKPONDS:

The increased use of cattle for roughage control at "Claycliffs" will necessitate the provision of water with stock ponds in blocks 2a, 2b, 3a, 3b, 5 and 6.

6.26 UNSUBSIDISED WORKS:

In addition to the topdressing and oversowing in connection with the provision of offsite grazing 340 acres at "Berwen" and 250 acres at "Claycliffs" will be topdressed. It is proposed to develop 100 acres of new hay paddocks to provide winter feed to balance increases in summer feed. Further subdivision is planned at "Claycliffs."

7.00 SCHEDULE OF COSTS:

7.01 CONSERVATION FENCING:

3	strainer/stay @ \$4.50	0.45	per chain
1	post @ \$1.10	1.10	" "
7	standards @ 55c.	3.85	" "
6	No. 8 wires @ 35c.	2.10	" "
1	barbed wire @ 50c.	0.50	" "
	Freight	2.00	" "
	Labour	4.00	" "
	Estimate	14.00	" "

7.02 Fencing - offsite grazing provision - materials only, as in 7.01 above.

Estimate 8.00 per chain

7.03 Aerial Topdressing and Oversowing

Fertilizer	1½ cwt 400S super @ \$1.50/cwt	\$2.25	per acre
Seed	2 lbs Apanui cocksfoot @ 70c.	1.40	" "
	1 lb white clover @ 35c.	0.35	" "
	1 lb red " " "	0.35	" "
	½ lb alsike @ 30c.	0.15	" "
	5 lbs Arika ryegrass @ 10c.	0.50	" "
	Estimate	\$5.00	" "

7.04 Cattleproofing

1	barbed wire @ 50c.	0.50	per chain
1	post @ \$1.10	1.10	" "
3	standards @ 57c.	1.70	" "
	Freight	0.40	" "
	Labour	1.30	" "
	Estimate	\$5.00	" "

7.05 Cattleproofing: Ahuriri River Frontage n-0

2	posts @ \$1.10	\$2.20	per chain
4	droppers @ 10c.	0.40	" "
3	barbed wires @ 50c.	1.50	" "
	Freight	0.40	" "
	Labour	2.50	" "
		\$7.00	" "

7.06 Treeplanting

Fencing - as in 7.02 above	14.00	per chain
Trees - 4 rows P. Ponderosa @ \$4/100	1.30	" "
Estimate	\$15.30	" "

7.07 Stock Ponds

Estimate \$90.00 each.

8.00 DETAILED ESTIMATES - including 10% contingencies and 5% conservation fee.

1968/9	Total Cost	Subsidy Rate	Subsidy	Net Cost to Farmer
Fence A-B 65ch.	600	1:1 m.	300	611
C-D 60ch.	554	1:1 mo.	277	564
E-F 135ch.	2183	2:3	873	1247
G-H 160ch.	2587	Grant	2587	-
I-J 180ch.	2911	2:3	1164	1663
K-L 75ch.	693	1:1 mo.	347	705
Topdress & Seed block 4b "Berwen"				
"Berwen" 240ac.	1386	1:1	693	834
Topdress & Seed block 2a				
"Claycliffs" 260ac.	1502	1:1	751	903
	<u>12416</u>		<u>6992</u>	<u>6527</u>
Cattleproof n-o 210ch.	1698	2:3	679	970
" q-r 140ch.	808	2:3	322	462
" q-s 42ch.	243	2:3	97	139
" o-p 60ch.	346	2:3	138	198
Stockponds 2a, 2b, 3a, 3b, 5 & 6 "Claycliffs"	624	1:1	312	310
	<u>16135</u>		<u>8540</u>	<u>8606</u>
69/70				
Topdress & seed 6a, 6b				
"Berwen" 350acres	2021	1:1	1011	1214
Topdress & seed 2b				
"Claycliffs" 200 acres	1155	1:1	578	695
Cattleproof l-m 150ch.	866	2:3	346	495
" j-k 240ch.	1386	2:3	554	792
Totals 2nd Year	5428		2489	3196
70/71				
Cattleproof i-h-j 210ch.	1213	2:3	484	693
" g-h 195ch.	1126	2:3	450	640
Windbreak B-B 50ch.	<u>880</u>	1:1	<u>440</u>	<u>440</u>
Totals - 3rd year	3219		1374	1773
	24782		12403	13575
<u>Summary of Programme</u>				
Fencing - Offsite 200 ch.	1847	1:1 m.o.	924	
Fencing 315 ch.	5094	2:3	1037	
" Grant 160 ch.	2587	Grant	2587	
T.D.S. 1050 ac.	6064	1:1	3033	
CPno 210 ch.	1698	2:3	679	
C.P.- 1037 ch.	5988	2:3	2391	
remainder				
Stockponds 6	624	1:1	312	
Windbreak 50 ch.	<u>880</u>	1:1	<u>440</u>	
	24782		12403	

9. 0 RECOMMENDATION:

I recommend the programme outlined above for subsidy on the following conditions:

1. That the grazing changes outlined on the proposed grazing for Pass and Basin Flocks be carried out.
2. That cow numbers are increased to 200 by 1973.
3. That windbreak trees that die are replanted.

ACKNOWLEDGEMENTS:

The assistance of the Lands Department staff, the North Otago Farm Improvement Club's advisor, and the Farm Advisory Officer, Oamaru, are gratefully acknowledged.

A.W. Robinson
Soil Conservator
28. 2.63

I concur in the above recommendation.

R.V. Maxwell,
Chief Soil Conservator
29. 3.68

Appended:

- | | |
|------------|--|
| Appendix A | Current and Proposed Grazing Management. |
| " B | Economics of Providing Offsite Grazing. |

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APPENDIX BECONOMICS OF PROVIDING OFFSITE GRAZING

1. ANNUAL EXPENDITURE: Retirement of part of the Basin block and all of the Pass block from sheep grazing will require the following work to provide offsite grazing for the 1050 stock units represented by the current grazing of sheep on the blocks:-

		<u>Net cost to farmer</u>
Fencing A-B, C-D, K-L	200 ch.	1880
T.D.S.	1050 ac.	3646
Stock ponds	2	<u>103</u>
		\$5629

a. Interest on \$5629 @ 6% gives an annual charge of \$338

b. Maintenance charges

Fencing

200 ch. @ 25c. = \$50

T.D.S.

1050 ac. @ \$1.30 \$1365

Dams

4

\$1419

\$1419

Total Annual Maintenance Charges Offsite

Grazing \$1757

2. ANNUAL INCOME

Cattle grazing of Pass and Basin blocks is 255 ewe equivalents.

Cattle gross margin per ewe equivalent is \$7.00.

Income from cattle on retirement blocks \$1785.

3. Income from cattle on retirement area is sufficient to cover the farmer's share of the cost of providing offsite grazing.