

File Ref: 8021

20 September 1993



Mr & Mrs A W & K F Simpson  
P O Box 91  
LAKE TEKAPO

Dear Mr & Mrs Simpson

**APPLICATION TO AFFOREST PART OF LEASE**

I am pleased to advise that the Commissioner of Crown Lands on 15 September 1993, consented to the application made by the New Zealand Forest Research Institute Limited. The areas to be afforested are indicated on the attached map 1 submitted by the Institute. The Commissioner's consent is specifically for three trial sites and to expand the two existing sites subject to the seven conditions set out below.

1. That prior to any planting of trees that all statutory consents are obtained under the local authority by-laws and regulations and also the Resource Management Act 1991. In any case the applicant must notify the District Council of its intention to afforest up to 78ha of land on Balmoral Station.
2. That consideration be given by the applicant to landscape issues.
3. Future wilding tree spread is to be strictly controlled on a yearly basis beyond 100m from the perimeter of the proposed trial sites.
4. That this consent is granted to the head lessee who shall remain responsible for ensuring all covenants of the principle lease conditions of this consent are complied with.
5. That the lessor be advised prior to logging operation commencing and consent obtained to any soil disturbance which would occur outside the designated area.
6. That immediately following clear felling the area, consent is obtained from the lessor for future use.
7. That the joint venture agreement, when formalised, be subject to the consent of the Commissioner of Crown Lands.

TIMARU OFFICE  
1ST FLOOR, PUBLIC TRUST BLDG  
CNR CHURCH & SOPHIA STREETS  
PO BOX 564  
TIMARU, NZ  
PHONE 0-3-684 8340  
FAX 0-3-688 0407



If there is any matter that is not clear or that you have any difficulty with, please contact either myself or Ken Ellis. A copy of this letter has been forwarded to the Forest Research Institute. Note that the consent has been granted to yourselves as lessees, therefore in the agreement you make with the Forest Research Institute, you should ensure that the obligations you have as lessee are enforced on FRI in the joint venture agreement.

Yours faithfully  
LANDCORP PROPERTY LIMITED

(for) R A Ward-Smith  
Manager

cc: New Zealand Forest Research Institute  
P O Box 465  
Rangiora

Attention: Nick Ledgard/Gordon Baker

Copy for your information and attention.

Released under the Official Information Act 1982

File Ref: 8021



24 September 1993

Department of Conservation  
Private Bag  
CHRISTCHURCH

**Attention: Graham Ayers**


Dear Sir

**APPLICATION TO FOREST PART OF LEASE: BALMORAL**

Enclosed please find for your information a copy of the approval granted by the Commissioner of Crown Lands to the FRI trial sites on Balmoral Station. I can assure you that the Commissioner of Crown Lands was made aware of your concerns and a copy of your letter was forwarded to him. Note also that there is a specific requirement on the applicant to notify the District Council of its intention even if it is not necessary for them to obtain a formal consent.

Thank you for your assistance on this matter and continuing co-operation.

Yours faithfully  
LANDCORP PROPERTY LIMITED

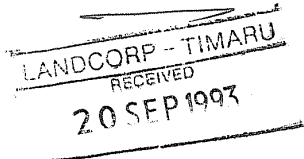
  
R A Ward-Smith  
Manager

R1754

TIMARU OFFICE  
1ST FLOOR, PUBLIC TRUST BLDG  
CNR CHURCH & SOPHIA STREETS  
PO BOX 564  
TIMARU, NZ  
PHONE 0-3-684 8340  
FAX 0-3-688 0407

8021

FILE



September 9, 1993

"Balmoral"  
L. Tekapo  
Private Bag  
FAIRLIE

Ray Ward -Smith  
Landcorp Properties  
P.O. Box 564  
TIMARU

**Proposed FRI trials on "Balmoral"**

Dear Ray

As you are aware the NZ Forest Research Institute is planning to plant forestry trials on this station. I believe that they have sent you copies of the trial plans, but I attach a another location map as the trial size has changed since their first draft.

This letter is to formally seek approval for the plantings, the total area of which is 26.7 ha.

I would be grateful to hear back from you in the reasonably near future as the Institute wishes to carry out the planting towards the end of this month.

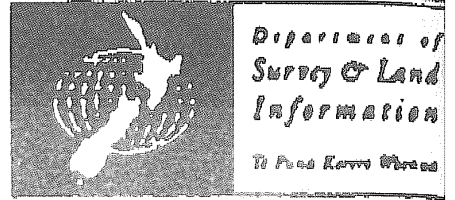
Yours sincerely



Andrew Simpson

Released under the Official Information Act 1982

FACSIMILE MESSAGE



OFFICE OF CROWN LANDS

to Ray Ward-Smith  
 name Landcorp Property Limited

LOCATION: Timaru

PHONE: 03 688 0407

FROM: David Gullen

DATE: 15 September 1993

FILE REFERENCE: S200-10-DB

PAGE 1 OF 1

(If complete message is not received please phone)

SUBJECT: Forestry Trials - Balmoral

Charles Ferguson Building  
 Bowen Street  
 Private Box 170  
 Wellington  
 New Zealand  
 Phone 0-4-473 5022  
 Fax 0-4-472 2244

The Commissioner of Crown Lands has  
 consented to the planting as per your  
 recommendations of 10 September 1993.

Gullen  
 RB

Released under the Official Information Act 1982

**SUBMISSION TO  
COMMISSIONER OF CROWN LANDS**

**Application for consent under Section 108, Land Act 1948**

**LCP Ref:** PT 8021

**OCL Ref:**

**Case No:**

**Property Name:** Balmoral Station      **Lessee:** Andrew Simpson

**Location:** On Braemar Road, 10km west of Tekapo township

**Proposal:** The New Zealand Forest Research Institute (NZFRI) is proposing to establish three new trial research sites within the Balmoral Pastoral Lease as highlighted yellow on the attached topographical plan and expand two existing sites. The NZFRI are negotiating a joint venture agreement with the lessee of Balmoral Station and intend to encompass an area of up to 78ha of Pastoral Lease land which will be made exclusively available to NZFRI. The expected term of the agreement being effective from 1 September 1993 and shall terminate when the trees are deemed mature with a maximum term of 60 years. The share of net revenue from harvesting and sale of the trees will be a percentage apportionment between the lessee and NZFRI.

**Area:**

	Year			
	93	94	95	
Existing Trial Sites	1.0ha	1.0ha	1.0ha	
New Rehabilitation Trial	6.0ha	6.0ha	6.0ha	
New Spacing (Silver Culture) Trial	10.7ha	-	-	
Agroforestry Trial	10.0ha	-	-	
<b>Total</b>	<u>27.7ha</u>	<u>7.0ha</u>	<u>7.0ha</u>	41.7ha

Allowance has been made for fringe wilding tree spread from the three new trial sites, up to 100m from the trial perimeters which may be accepted in the trial and managed. As a result, by year 20 a further 36ha may be encompassed.

**Reason:**

To ascertain whether forestry is a viable, practical and sustainable land use option within the High Country and if so will it provide a positive return from the land.

	<u>Rehabilitation Trial</u>	<u>Spacing (Silver Culture) Trial</u>	<u>Agroforestry Trial</u>	<u>Existing Trial (A)</u>	<u>Existing Trial (B)</u>
<b>Vegetation Type:</b>	Predominantly hieracium up to 40% - 50%. Balance depleted fescue tussock.	Predominantly short tussock and hieracium.	Predominantly short tussock and hieracium.	Predominantly short tussock and hieracium.	Predominantly hieracium up to 40% - 50%. Balance depleted fescue tussock.
<b>Altitude:</b>	700m asl	730m asl	730m asl	730m asl	700m asl
<b>Rainfall:</b>	595mm	595mm	595mm	595mm	595mm

<b>Luc Class:</b>	IVe	IVe	IVe	IVe	IVe
<b>% Bare Ground:</b>	40%-50%	20%-30%	20%-30%	20%-30%	40%-50%
<b>Proposed Trees:</b>	Corsican Pine	Corsican Pine Ponderosa Pine Hybrid Pine	Corsican Pine	Corsican Pine	Corsican Pine

**Visual Impact:** The Mackenzie District Council recently employed an independent organisation to determine the effects of afforestation within the Mackenzie Basin. Bofa Miskell Partners Limited 1992 classed the proposed sites as a "high visual vulnerability" category. NZFRI intend to fringe plant the spacing and agroforestry trial sites with silver birch and European larch along the northern, western and southern boundaries. These fringe trees will be planted with some gaps to show conifers (pine trees) behind.

**Effect on Water:** Nil

**DOC Comment:** Refer attached letter dated 27 August 1993.

Rehabilitation Trial (DOC Ref: Trial A)

Limited conservation values as long as the applicant undertakes regular wilding tree control on adjacent lands.

Spacing (Silver Culture) Trial & Agroforestry Trial (DOC Ref: Trial B)

DOC do not support this trial on landscape and wilding tree spread risk grounds.

**Other Authorities:** The Ministry of Forestry supports this research work.

**Recommendations:** That consent be granted to plant the three trial sites and expand the two existing sites as shown on the attached plan subject to:-

1. That prior to any planting of trees that all statutory consents are obtained under the local authority by-laws and regulations and also the Resource Management Act 1991. In any case the applicant must notify the District Council of its intention to afforest up to 78ha of land on Balmoral Station.
2. That consideration be given by the applicant to landscape issues.
3. Future wilding tree spread is to be strictly controlled on a yearly basis beyond 100m from the perimeter of the proposed trial sites.
4. That this consent is granted to the head lessee who shall remain responsible for ensuring all covenants of the principle lease conditions of this consent are complied with.
5. That the lessor be advised prior to logging operation commencing and consent obtained to any soil disturbance which would occur outside the designated area.

6. That immediately following clear felling the area, consent is obtained from the lessor for future use.
7. at the joint venture agreement, when formalised, be subject to the consent of the Commissioner of Crown Lands.

Signed for Landcorp Property Limited

*J M Ellis*

Consultant 10 / 9 / 93

*[Signature]*

Manager 10 / 9 / 93.

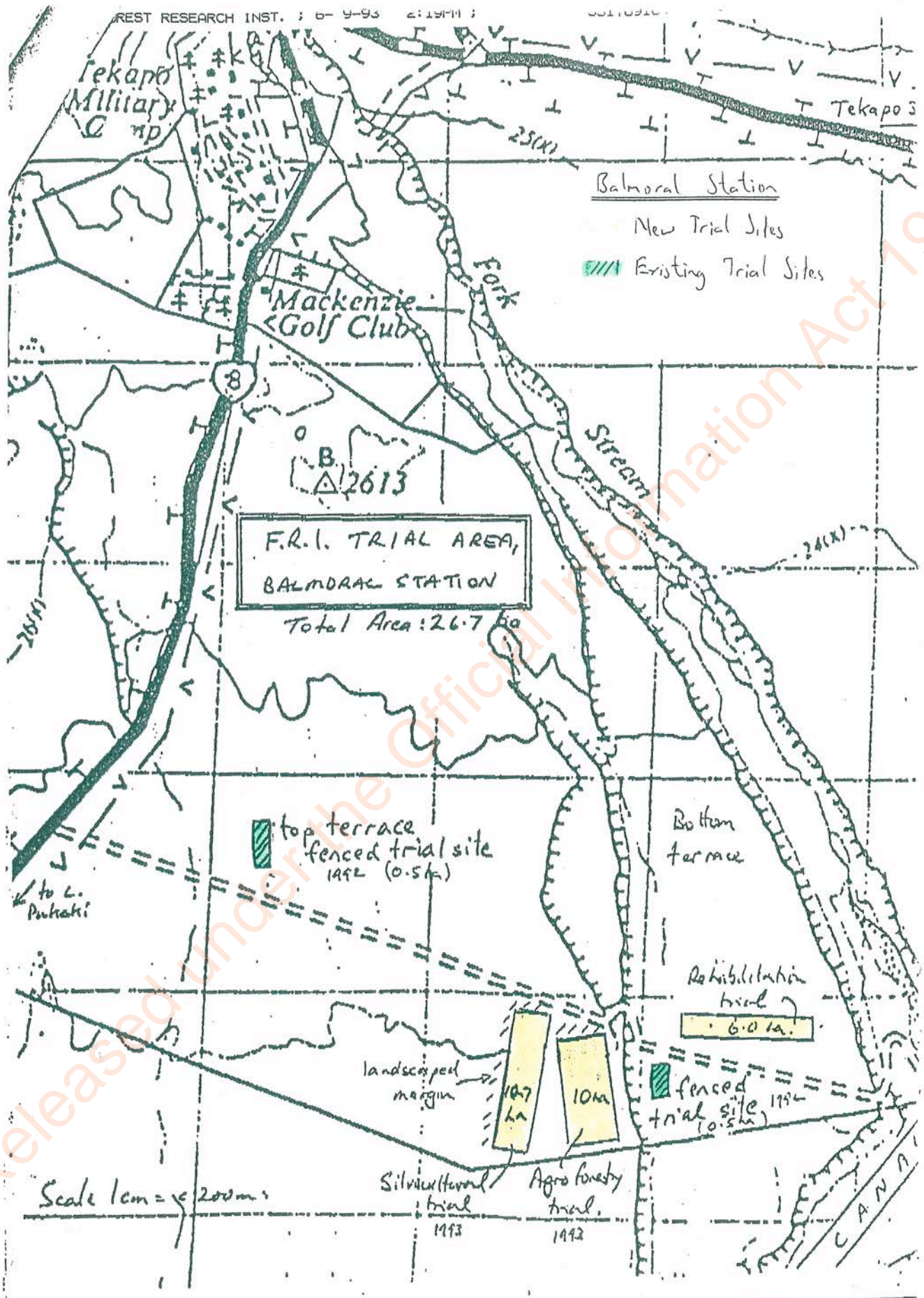
**APPROVED/DECLINED**

\_\_\_\_\_  
Commissioner of Crown Lands

/ /

Released under the Official Information Act 1982





Tekapo Military Camp

Tekapo S

Balmoral Station

New Trial Sites

Existing Trial Sites

Mackenzie Golf Club

Fork

Stream

F.R.I. TRIAL AREA,  
BALMORAL STATION  
Total Area: 26.7 ha

B. 2613

top terrace fenced trial site 1992 (0.5ha)

Bottom farm

Rehabilitation trial 6.0 ha.

fenced trial site 1994 (0.5ha)

landscaped margin

10.7 ha

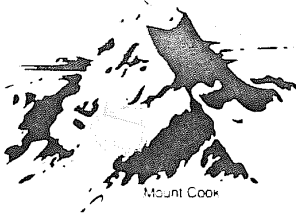
10ha

Silvicultural trial 1993

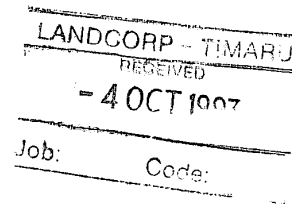
Agro forestry trial 1992

Scale 1cm = 200m

CANAL



8021  
Mackenzie District Council *Rob*



REF: P 6/1/4

30 September 1993

Mr Andrew Simpson  
Balmoral Station  
LAKE TEKAPO

Dear Sir

**FORESTRY PLANTING BALMORAL STATION**

Thank you for your notification of your intentions to carry out afforestation. I assume this relates to Balmoral Station and would comment accordingly.

Councils District Plan currently allows for a maximum of 50 hectares, and no greater than 25% of site coverage for production forestry. Should you reach this limitation then you will be required to obtain planning consent before proceeding with further planting.

Councils plan change may alter this situation if it is successful. However, I would not recommend planting in anticipation of the outcome.

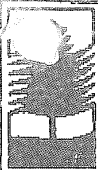
Please involve Council prior to commencing any significant planting and especially if you wish to exceed the limitations of the District Plan.

Yours faithfully

**JOHN MCKENZIE**  
**MANAGER - PLANNING AND REGULATIONS**

JJM:MLG

Copy: Mr Ray Ward-Smith  
Landcorp Property Ltd  
PO Box 564  
TIMARU

	<b>New Zealand Forest Research Institute Ltd</b>		
	57 Oxford Road P.O. Box 465 Rangiora, New Zealand	Telephone: +64 (03) 313-8053 Facsimile: +64 (03) 313-8051	
TO:	K. M. Ellis	COUNTRY / CITY:	Ch/Ch
COMPANY:	Landcorp Properties	FAX No.:	03 688 0407
FROM:	Nick Ledgard/Gordon Baker	NO. PAGES (incl. cover):	
SUBJECT:	FRI Trials-Balmoral Station	DATE:	September 5, 1993

In reply to your FAX'ed letter of September 7.

\* **Wildings.** Our plan for wilding control remains as described in the trial proposal. Basically we will remove all distant spread (>100 m) before coning. We may decide to manage the fringe spread (<100 m) if it grows at sufficient density and uniformity of age to be of natural good form. If it does not, it will be removed before coning age.

\* **Area.** Approximately 27 ha will be planted this year. Next year we will plant a second repeat of the rehabilitation trial (6 ha) on the bottom terrace followed by a third repeat in 1995. In addition we will probably repeat annually for at least 3 years the species establishment trial (<1 ha) first put in in 1992 (marked on map). This is in order to follow seasonal variation in establishment. So by the end of 1995 the total area planted will be around 43 ha. IF we were to accept a fringe wilding strip extending out to 100 m (at the most) from the 3 main trials a further 36 ha would be in existence by about age 20. It is unlikely that we will want such an area of spread as it would conflict with present research objectives. However, if we did allow such spread, the total area in trees would be about 80 ha, divided approximately evenly between the top and bottom terraces.

\* **Proposed joint venture.** This is purely a draft proposal to Andrew Simpson and we would be grateful if the contents could be kept totally confidential. It is only being discussed at this stage. Our main interest is in guaranteeing access to trials for the future. The figure of 100 ha was only used for the sake of having a figure in the proposal. The actual areas which could be involved are outlined above.

Hoping this gives you sufficient information to process the matter further.

Regards

Nick Ledgard

*New Zealand Forest Research Institute Ltd.*

*A Crown Research Institute of New Zealand based at Rotorua, Christchurch and Rangiora.*



File Ref: 8021

7 September 1993

New Zealand Forest Research Institute  
P O Box 465  
RANGIORA

Dear Sir

**TREE TRIALS - BALMORAL STATION**

Further to your discussions with Ray Ward-Smith of this office, we require some additional information before we can send our submission to the Commissioner of Crown Lands.

Can you please indicate the total number of hectares to be planted each year and the total trial areas at the end of all plantings, this includes any fringe spread of wilding trees that is to remain as part of the trials. We are aware that 26.7 hectares will be planted this spring, but under the joint venture agreement with the lessee, approximately 100 hectares of land is to be set aside for the forestry research trials.

Your early attention to this matter would be much appreciated so as we can process this application for you.

Yours faithfully  
LANDCORP PROPERTY LIMITED

A handwritten signature in cursive script, appearing to read "K M Ellis".

K M Ellis  
Property Consultant

K1277

TIMARU OFFICE  
1ST FLOOR PUBLIC TRUST BLDG  
CNR CHURCH & SOPHIA STREETS  
PO BOX 564  
TIMARU, NZ  
PHONE 0-3-684 8340  
FAX 0-3-688 0407



CONSERVATION  
TE PAPA ATAWHAI

our ref:

August 27, 1993

Mr K Ellis  
Landcorp Property Ltd  
PO Box 546  
TIMARU

Dear Sir

**APPLICATION TO PLANT TREES BALMORAL PASTORAL LEASE**

You have requested the Department of Conservation to comment on the above application.

The department supports the objectives of both A and B trials, but wishes to make the following comments in relation to conservation and landscape effects.

**A Trail:**

It is accepted that there will be little effect on Conservation values immediately associated with the site.

**Landscape:**

The proposed site is in an area of low to medium visual vulnerability. The department has no objections to this site on landscape grounds. It should be noted however that the MacKenzie District Councils provisional plan does set out criteria and design for the planting of plantations. These criteria should be referred to in any trial planting in the MacKenzie Basin.

**Wilding Spread:**

The department strongly supports active wilding tree control and urges the applicant to undertake regular control on adjacent lands. A covenanted area of land lies within the risk zone the department could provide the exact location of the area to the applicant. The applicant is urged to discuss wilding control measures with the Department of Conservation.

The Commissioner of Crown Lands is asked to note that the applicant has acknowledged that this site and the siting for proposal B are both high wilding tree spread risk areas. The applicant has published papers on wilding tree risk and may need to refer to the appropriate papers on 'take off' sites.

**B Trail:**

The siting of the trial area is not supported on landscape and wilding Tree spread risk grounds.

Landscape:

With reference to the Boffa-Miskell Partners study titled "Landscape Change in the MacKenzie Waitaki Basin" map 8 on visual vulnerability.

Planting in this area would seriously affect the only views of the MacKenzie Basin to the east ie. from Balmoral Camp to Simons Pass)

The applicant has suggested that the 'dark line' impact posed by the planting of conifers could be lessened by fringe planting of non-conifers. The department acknowledges the applicant is endeavouring to address landscape impact but questions the planting of non-conifers to achieve this. Both suggested species larch and silver birch are known in the MacKenzie for their wilding spread potential. The department suggests that more thought should be given to the design of the planting within the sites.

Wilding Spread:

The departments comments are the same as for trial site A.

Both sites are close to the southern boundary of the Balmoral lease therefore management regimes of the adjoining property will have to be taken into account for control. The terrace in particular would seem to be a risk area as a take off site.

An alternative site with lesser visual impact is available further to the north of the terrace area. The department would be willing to discuss alternative sites with the applicant.

General:

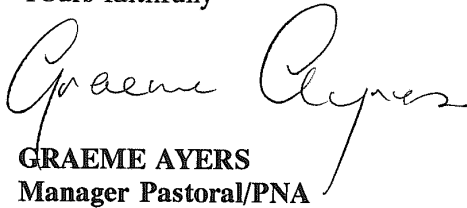
In recent discussions with the applicant it has been suggested that the trees in the trial sites could be removed at the end of the trial period (20 years).

The department recommends this suggested be adopted as a condition of approval.

The departments requests the Commission of Crown Lands to note the applicant intends to manage wilding pines adjacent to the trial site, this will increase the overall size of the sites being applied for.

The applicant has only investigated one other alternative site in the MacKenzie Basin for these trial purposes. The department suggests other sites may be available in lesser visually vulnerable areas. The association of forage legume systems is mentioned in relation to site B. The department is interested in the type of legumes which are intended to be established.

Yours faithfully

  
**GRAEME AYERS**  
**Manager Pastoral/PNA**

Released under the Official Information Act 1982

Ministry of Forestry, P.O. Box 25-022 Christchurch

LANDCORP - TIMARU  
RECEIVED

13 AUG 1993



Job: \_\_\_\_\_  
Code: \_\_\_\_\_

12 August 1993

file 18.3.6

K M Ellis  
Landcorp Property Limited  
P O Box 564  
TIMARU

Dear K M Ellis

**BALMORAL PASTORAL LEASE - APPLICATION TO PLANT TREES**

Thank you for the letter of 9 August inviting our comment on the proposed Forest Research Institute trials on Balmoral Pastoral Lease.

The Ministry of Forestry supports this research work which is important for developing sustainable land use on low rainfall sites, and notes that considerable attention has been devoted in the proposal to wilding tree spread control and visual values.

We have no other comments to make.

Yours sincerely

John Novis  
for General Manager (Policy)



File Ref: 8084

9 August 1993

The Manager  
New Zealand Forest Research Institute  
P O Box 465  
RANGIORA



Attention: Mr G Baker

Dear Sir

**BALMORAL PLANTING TRIALS**

Further to your correspondence and discussion with Ray Ward-Smith of this office, we wish to alert you to the following points.

1. From the information provided it appears that the total trial area is nearer to 50 hectares rather than 30 hectares as quoted in your letter dated 11 July 1993. If the trial area is greater than 50 hectares, statutory consent will be required from the Mackenzie District Council as forestry will not then be classified as a permitted use.
2. The Mackenzie District Council recently employed an independent organisation to determine the effects of afforestation within the Mackenzie Basin. Bofa Miskell Partners Limited 1992 classed the proposed sites as a "high visual vulnerability" category.
3. The top terrace proposed trial block is within an area the Department of Conservation recommends a management agreement to protect views of the Mackenzie Basin.

We understand that you are investigating an alternative site on Glenrock Station, Haldon Road. Landcorp has already conveyed the consent of the Commissioner of Crown Lands to the lessee for this site. We look forward to your decision as to the preferred sites and areas.

Yours faithfully  
LANDCORP PROPERTY LIMITED

A handwritten signature in black ink, appearing to read "K M Ellis".

K M Ellis  
Property Consultant

TIMARU OFFICE  
1ST FLOOR, PUBLIC TRUST BLDG  
CNR CHURCH & SOPHIA STREETS  
PO BOX 564  
TIMARU, NZ  
PHONE 0-3-684 8340  
FAX 0-3-688 0407

File Ref: 8021

9 August 1993



Field Centre Manager  
Department of Conservation  
Private Bag  
TWIZEL

**Attention: Mr R Young**

Dear Sir

**BALMORAL PASTORAL LEASE - APPLICATION TO PLANT TREES**

The New Zealand Forest Research Institute is proposing to establish two research sites within the Balmoral Pastoral Lease as highlighted yellow on the attached topographical plan. It is proposed to plant a total area of approximately 50 hectares.

The two trials are part of a Government funded programme of the New Zealand Forest Research Institute to study the rehabilitation of depleted and degraded high country, with emphasis on the development of integrated sustainable land use systems using timber tree species and forage legumes.

Details of the trial objectives, trial design, and tree species, are attached for your information.

Can you please provide within the next ten working days, your written comments as to any conservation concerns you may have on the above.

Yours faithfully  
LANDCORP PROPERTY LIMITED

A handwritten signature in black ink that reads "K M Ellis".

K M Ellis  
Property Consultant

cc: G Ayers  
Department of Conservation  
Christchurch

TIMARU OFFICE  
1ST FLOOR PUBLIC TRUST BLDG  
CNR CHURCH & SOPHIA STREETS  
PO BOX 564  
TIMARU NZ  
PHONE 0-3-684 8340  
FAX 0-3-688 0407

U

File Ref: 8021

9 August 1993



General Manager  
Ministry of Forestry  
P O Box 25022  
CHRISTCHURCH

**Attention: Mr J Novis**

Dear Sir

**BALMORAL PASTORAL LEASE - APPLICATION TO PLANT TREES**

The New Zealand Forest Research Institute is proposing to establish two research sites within the Balmoral Pastoral Lease as highlighted yellow on the attached topographical plan. It is proposed to plant a total area of approximately 50 hectares.

The two trials are part of a Government funded programme of the New Zealand Forest Research Institute to study the rehabilitation of depleted and degraded high country, with emphasis on the development of integrated sustainable land use systems using timber tree species and forage legumes.

Details of the trial objectives, trial design, and tree species, are attached for your information.

Can you please provide your comments and advice before such a proposal is to take place.

Your early attention to this matter would be much appreciated, and if you require any further information, please contact myself.

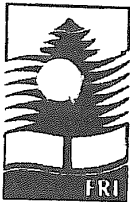
Yours faithfully  
LANDCORP PROPERTY LIMITED

A handwritten signature in black ink, appearing to read "K M Ellis".

K M Ellis  
Property Consultant

K1239

TIMARU OFFICE  
1ST FLOOR, PUBLIC TRUST BLDG  
CNR CHURCH & SOPHIA STREETS  
PO BOX 564  
TIMARU, NZ  
PHONE 0-3-684 8340  
FAX 0-3-688 0407



NEW ZEALAND  
FOREST RESEARCH INSTITUTE.

P.O. Box 465, Rangiora  
Telephone: +64 (03) 313-8053  
Facsimile: +64 (03) 313-8051

11 July 1993

Landcorp Property  
P O Box 564  
TIMARU  
Attention: Mr. R Ward-Smith

LANDCORP - TIMARU  
RECEIVED  
16 JUL 1993  
Job: Code:

Dear Mr Ward-Smith

**Balmoral Planting Trials**

For your information I enclose a map showing the location of 2 research trials which are proposed for planting in September 1993 on Balmoral Station, Tekapo. Details of the trial objectives, trial design, and tree species are attached. It is proposed to plant a total area of approximately 30 ha.

These trials are part of a Government funded programme of the N Z Forest Research Institute to study the rehabilitation of depleted and degraded high country, with emphasis on the development of integrated sustainable land use systems using timber tree species and forage legumes.

Please contact me if you require any further information.

Yours faithfully

KE

Gordon Baker

*Please commence processing. Admin  
Doc.*

*These people have absolutely  
no sensitivity to landscape  
& just put squares on  
the landscape to suit themselves.  
I have my garden and he is to  
send more landscape info.  
R.*

*T-Jel  
C. Bradley  
Mof*

## BALMORAL TRIALS - 1994

(version 13/7/93)

### A. Rehabilitation trial

#### Objectives

- \* To monitor the changes in dryland ecosystems (soils, microclimate, plants and animals) resulting from five densities of tree planting.
- \* To test establishment survival and early growth over three seasons.

#### Background

Overgrazing, rabbits, *Hieracium* and erosion are causing serious production losses and degradation on many high country properties, particularly in low rainfall (< 600 mm) areas. Forestry is increasingly being regarded as a viable, practical and sustainable landuse option for arresting degradation and providing a positive return from the land.

This trial aims at quantifying the changes that occur once a vertical element (namely trees) are established on a traditionally flat, exposed land surface. The site would be one of the harshest in the country where the risk of failure is much higher than normal. Much will depend on weather conditions in the first season. For this reason one replicate will be established each year for 3 seasons.

#### Site

Balmoral Station, L. Tekapo. Bottom terrace.

A flat terrace at the junction of the Forks Stream and the Tekapo/Pukaki canal.

*Altitude* - 700 m.

*Exposure* - flat, exposed, particularly to winds from the north - the terrace is bounded on the west by a 30 m high scarp slope which tends to force the prevailing westerly winds to become more northerly.

*Rainfall* - probably slightly drier than neighbouring L. Tekapo which averages 595 mm annually with a range of 319-985 mm. A simple meteorological station was established on site in October, 1992.

*Soil* - a light Forks soil (of the Acheron set) with very stoney topsoils varying in depth from 0-20 cm above compacted gravels. The pH is around 5.0.

*Vegetation* - scarce. Predominantly *Hieracium*, covering around 40-50% of the ground.

*Animals* - Sheep have regularly grazed the sites for over 100 years but have been absent for 2 years. Similarly with rabbits; populations have gone through 'boom and bust' stages a number of times over the last century, but have been virtually at zero level for the last 2 years. On-going poisoning means significant numbers are unlikely to arise in the near future.

Species - Corsican pine (*Pinus nigra*)

Treatments

- 5 spacings - 150 spha (single row 50 x 2.0 m)
- 300 spha (double row 2.0 x 2.0 m alt) x 50 m
- 500 spha (10.0 x 2.0 m)
- 1000 spha (5.0 x 2.0 m)
- 2000 spha (2.5 x 2.0 m)
- plus a control (no trees)

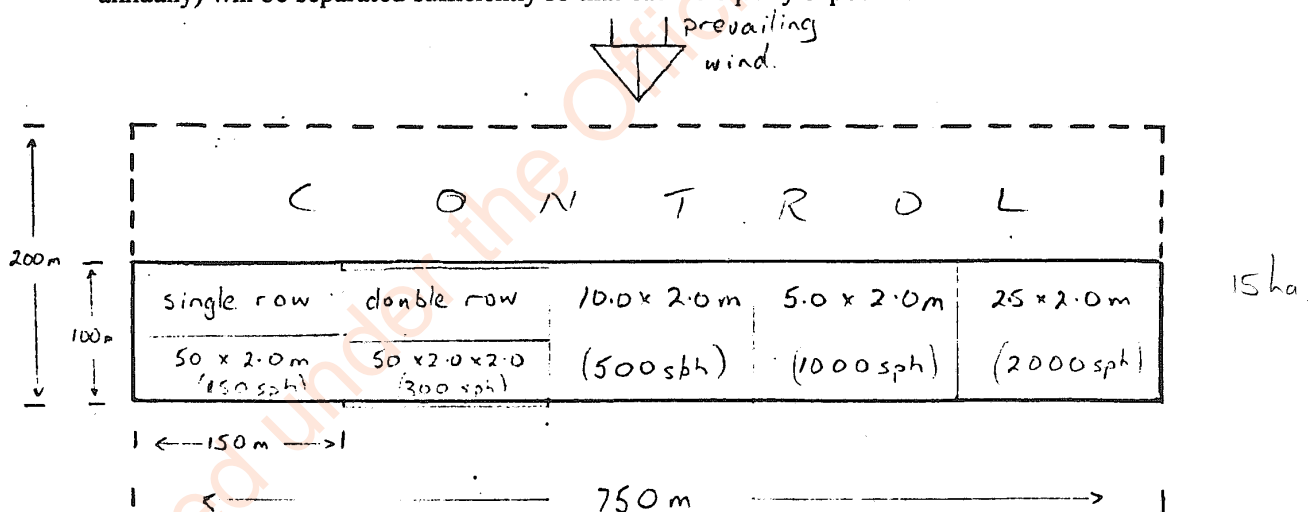
Plot size. 1.5 ha - 150 m (at 90° to the prevailing wind) by 100 m. Total area planted per replicate per year = 7.5 ha (plus an unplanted control of same area).

Replicates - three (one planted/year for 3 years)

Planting stock. 3/0 seedlings ex FRI's Rangiora nursery.

	675 (225/year)	needed for	90 spha	treatment
	1,350 (450/year)	"	"	300 "
	2,250 (750/year)	"	"	500 "
	4,500 (1500/year)	"	"	1000 "
	9,000 (3000/year)	"	"	2000 "
	-----			
<b>TOTAL</b>	<b>17,775 (5,925/year)</b>	<b>seedlings</b>		

Layout. The 5 tree treatments will be alongside each other with a 100 m wide (by 750 m long) strip adjacent upwind acting as the control. No surround trees or fencing. The 3 replicates (one planted annually) will be separated sufficiently so that each is equally exposed to the wind.



Establishment. By machine planting in the spring. Post-plant weed control by herbicide application. Rabbit repellent??

Climatic/edaphic monitoring. To be set up in 1994 once success of first planting is assured. Exact monitoring equipment needed has yet to be determined. GB to seek assistance/advice from Geography Department (Andy Sturman) of Canterbury University.

## B. Agroforestry trial

### Objective

To examine the influence of trees planted in high country drylands on soil nutrient levels, subsequent pasture/forage species establishment and animal behaviour.

### Background

Overgrazing, rabbits, *Hieracium* and erosion are causing serious production losses and degradation on many high country properties, particularly in low rainfall (< 600 mm) areas. Forestry is increasingly being regarded as a viable, practical and sustainable landuse option for arresting degradation, improving soil and microclimatic conditions for better plant and animal growth, and, in the longer term, providing a positive return from the land.

This trial aims at establishing trees at a range of densities to determine the appropriate densities for successful agroforestry and the influence of tree/pasture/forage combinations on animal feeding patterns and general behaviour.

### Site

Balmoral Station, L. Tekapo.

A flat terrace just south of the Tekapo golf course between the main road and the junction of the Forks stream and the Tekapo/Pukaki canal.

Altitude - 730 m.

Exposure - flat, exposed to winds from all directions.

*Rainfall* - probably slightly drier than neighbouring L. Tekapo which averages 595 mm annually with a range of 319-985 mm. A simple meteorological station was established on site in October, 1992.

*Soil* - A Pukaki soil with a light, stone-free topsoil extending down to a stoney base at 40-50 cm.

Available P is reasonable (Bray-2P = 18 ppm) and pH is around 4.7.

*Vegetation* - bare ground 20-30%, the remaining area covered mainly by *Hieracium pilosella* and hard tussock (*Festuca nova-zelandiae*). The *Hieracium* is of very low stature but forms a surprisingly compact 'turf' over the top 5-10 cm of soil. There is a scattered occurrence of woody plants such as *Cyathodes* and *Carmichaelia* species.

*Animals* - Sheep have regularly grazed the sites for over 100 years but have been absent for 2 years. Similarly with rabbits; populations have gone through 'boom and bust' stages a number of times over the last century, but have been virtually at zero level for the last 2 years. On-going poisoning means significant numbers are unlikely to arise in the near future.

\* NB. Site variation and layout. The site is flat and appears very uniform from a distance.

However, closer examination reveals scattered patches which present poorer planting sites. These are usually shallow depressions with thinner topsoil and more stones, varying in size from a few m<sup>2</sup> to some hundreds of m<sup>2</sup>. There is a lesser incidence of other site types (such as old fungal "fairy rings" where the soil can be drier) where seedling establishment can be uneven. In other words the variation over the site is not sequential or clinal but randomly located. For this reason it was felt better to use large treatment blocks (as opposed to small randomised plots) which can later be stratified according to seedling survival and growth and then subdivided into appropriate plot-sized replicates.

## The Trial

Species - Corsican pine (*Pinus nigra*)  
 Ponderosa pine (*P. ponderosa*)  
 Hybrid pine (*P. radiata x attenuata*)

85% (all treatments)  
 5% (1 treatment in 1 rep only)  
 5% ( " )

### Treatments

a) 2500 spha (2.5 x 1.5)  
 b) 1600 " (2.5 x 2.5)  
 c) 800 " (5.0 x 2.5)  
 d) 400 " (5.0 x 5.0)  
 e) 200 " (7.0 x 7.0)  
 f) control (no trees)

plus ~ 5000 spha (Corsican, ponderosa and Hybrid at 2.0 x 1.0 m), 1 block each in 1 rep only

Species block size - 1.2 ha (120 x 100 m)

Plot size - 0.2 ha (50 x 40 m)

Replicates - Species blocks replicated 3 times with sufficient room in each block for 6 x 0.2 ha plots.

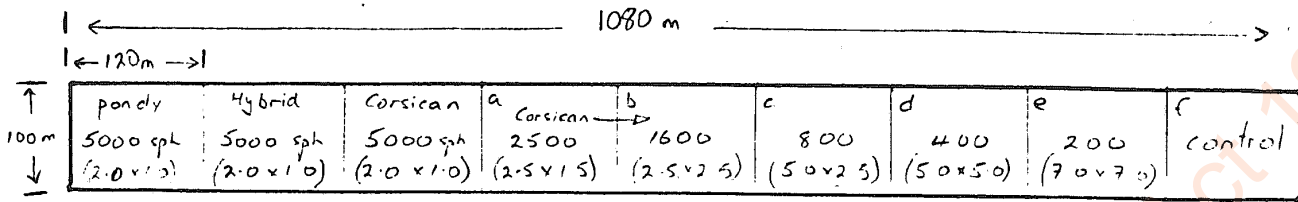
Planting stock. 3/0 Corsican and ponderosa pine, 2/0 Hybrid pine.

	Corsican	Ponderosa	Hybrid
Treatment a)	9,000	0	
" b)	5,760	0	
" c)	2,880	0	
" d)	1,440	0	
" e)	720	0	
" f)	0	0	
plus	6,000	6,000	6,000 (for 1 x 5000 spha block each)
TOTALS	25,800	6,000	6,000 = 37,800 trees

Layout. See diagram below. Three replications of each treatment block occupying 1.2 ha, and capable of containing 6 x 0.2 ha plots (including surrounds). In the first replicate treatments will run in sequence from the most dense (5,000 - three species) to the least dense. The other two replicates will be randomised and will not contain the 5,000 spha treatment. In all replicates the controls (no trees) will be situated at the ends. In order to minimise the influence of site variation (see foot note \* NB above) replicates will be located separately in areas of most uniform ground surface. The rows of trees will run north/south. There will be no surround trees and no fencing.



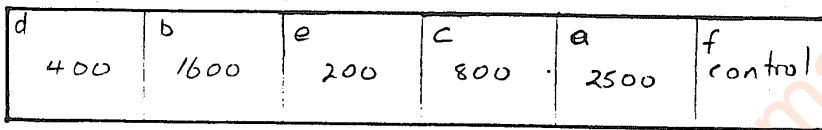
**Layout**



Rep 1.

10.8 ha.

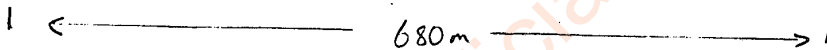
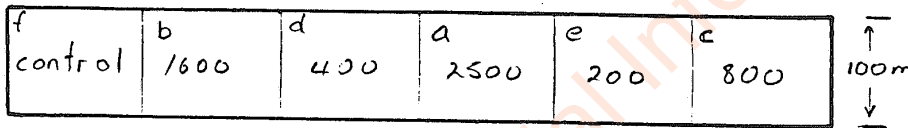
Rep 2



14.4 ha.

Total 32.4 ha.

Rep 3



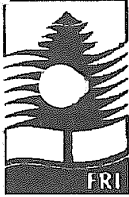
" 25.2 ha

**Establishment.** By machine planting in October, 1993. Weed control by post plant herbicide application. Rabbit control by on-going poisoning operations.

**Introduction of pastoral species.** This will begin in 1994 once the success of the planting is verified.

**Introduction of grazing.** This will not be before year 5. An individual replicate will be fenced off and sheep introduced. They will be allowed free access to all treatments so that the influence of tree stocking and agricultural treatments on feeding/defecating patterns (and hence nutrient cycling) and day-to-day behaviour can be monitored.

Released under the Official Information Act 1982



NEW ZEALAND  
FOREST RESEARCH INSTITUTE.

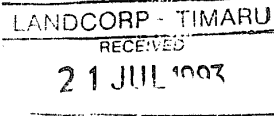
P.O. Box 465, Rangiora

Telephone: +64 (03) 313-8053

Facsimile: +64 (03) 313-8051

July 16, 1993

Ray Ward-Smith  
Landcorp Properties  
P.O. Box 564  
TIMARU



**FRI trials on Balmoral station - landscaping**

Dear Ray

Please find attached our plans for landscaping the major plantings we plan for Balmoral this coming spring. Apologies for not including them in the original proposals sent to you. We do not have the stock to plant up the complete fringe this year, and, in any case, we would want to spread the establishment risk with such species over at least 2 seasons.

Thanks for your assistance.

Yours sincerely

Gordon Baker

---

*New Zealand Forest Research Institute Ltd.*

*A Crown Research Institute of New Zealand based at Rotorua, Christchurch and Rangiora.*

## BALMORAL TRIALS, 1993

### Landscaping

These trials are comprised of conifers, predominantly Corsican pine. From a landscape point of view the most important profile will be from the main road (SH 8) approximately 800-1000 m to the west. The distance of the trial from the road is such that even at full height they will not block out the low hills to the east. Without fringe planting of non-conifers the trial (whatever its actual shape on the ground) would appear to most visitors travelling past as a short, low, dark line on a flat plateau. It is intended to mask the 'dark line' impact by fringe planting with silver birch and European larch along the northern, western and southern boundaries. The range of fringe planting species suitable is limited due to the harsh site and the fact that grazing in later years precludes the use of shrubby species. The fringe species will be planted with some gaps to show the conifers behind. It is considered that this will be less disruptive to the existing landscape than a solid line of deciduous broadleaf species.

The accompanying map gives the location and numbers of fringe trees.

Released under the Official Information Act 1982

MAP. 1

F.R.I. TRIAL AREA,  
BALMORAC STATION

top terrace  
fenced trial site

bottom  
terrace

fenced  
trial site

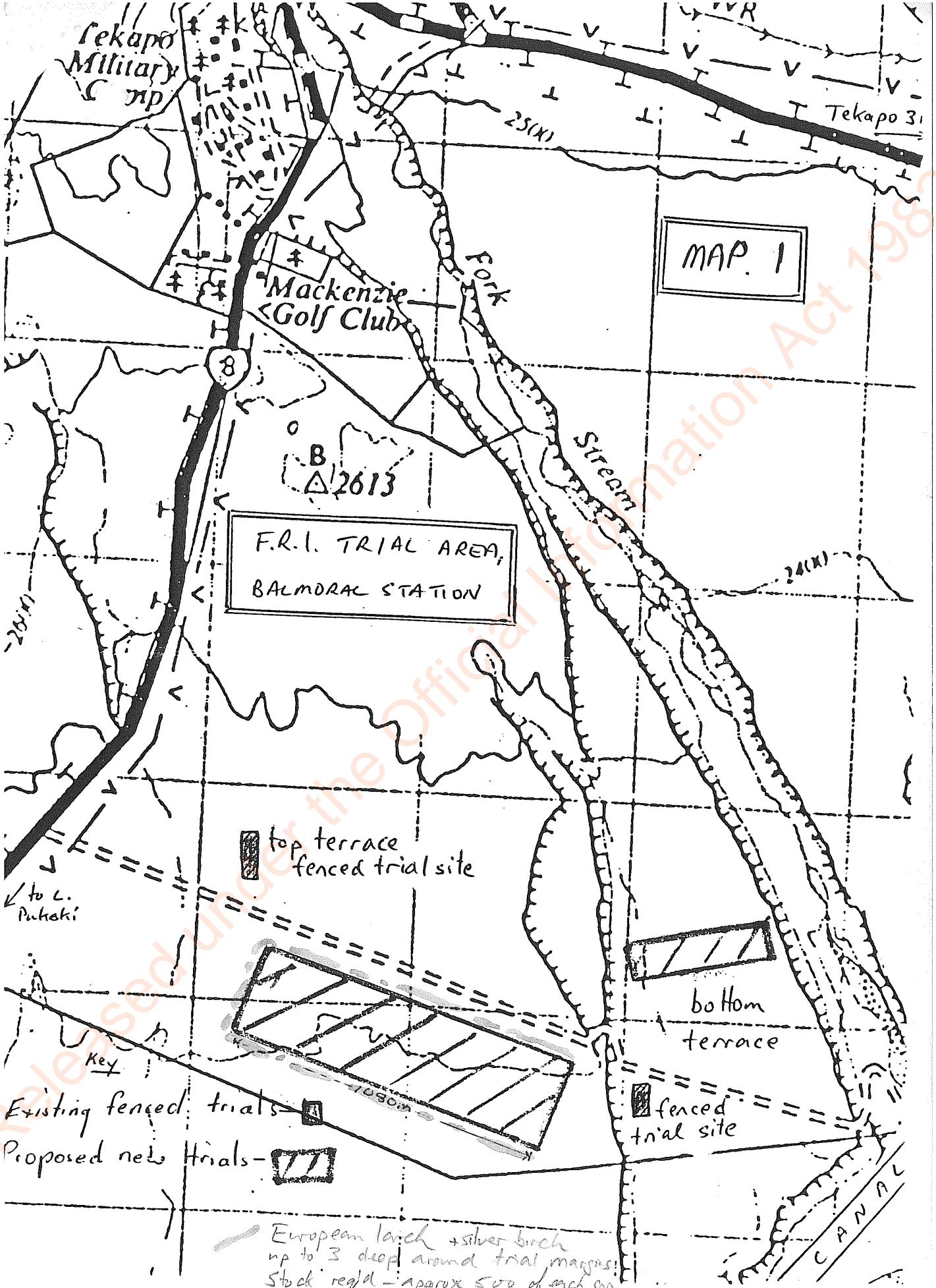
to L.  
Pukaki

Key

Existing fenced trials - [Symbol]

Proposed new trials - [Symbol]

European larch + silver birch  
up to 3 deep around trial margins.  
Stock req'd - approx 500 of each spp.  
= 1000 trees.



**FOREST RESEARCH INSTITUTE**

Phone: +64 (03) 313-8053  
Fax: +64 (03) 313-8051

57 Oxford Road  
P.O. Box 465  
Rangiora, New Zealand

Fax No: 03 688 0407

Pages: 2

To: Landcorp Properties

Date: 23 - 7 - 93

Attn: Ray Ward-Smith

From: G Baker

URGENT / NON-URGENT

Ray, Attached sheet - FRI trials on Balmoreal Station - Wilding spread - this should have been sent with the landscaping plans.

Regards,

Gordon Baker.

Released under the Official Information Act 1982

15 July, 1993

## BALMORAL TRIALS, 1993

### Wilding spread - risk and management

#### Risk

Wilding tree spread risk has been estimated on FRI's assessment sheet. Both sites registered a high score (top terrace 15, bottom terrace 16 - the scale goes from 0 to 20 with any score over 12 regarded as high) indicating a high spread risk unless appropriate 'risk reduction' management is undertaken.

#### Management

Although, in both trials, an objective is to monitor the effect of varying tree densities, pastoral management and grazing levels on the incidence of wilding spread, contingency plans for controlling spread are necessary.

**Top terrace.** Spread from mature adjacent stands indicates that dense fringe spread will occur within 100 m of the parent trees. On the better quality Pukaki soils present here pasture improvement (followed by annual mob stocking) or even cultivation (as has been undertaken nearby this year) is viable and will be undertaken within 100 m of the S and E edges of the trial. An exception will be made if it is decided to encourage fringe spread as the basis of a new managed tree crop; in this case the control zone will be moved to the next 100 m strip downwind. Outlier trees occurring beyond this zone will be removed by hand.

**Bottom terrace.** The light, stoney Forks soils here are much more exposed and inhospitable to spread than on the top terrace. Even though seed has been falling on this site for at least 20 years no wildings have been able to establish, as compared to the adjacent Forks soils where a number of wildings have been removed over recent years. This could mean that the spread risk is lower on this terrace. However, the same control provisions as outlined for the top terrace will apply to this trial. Particular attention will have to be paid to the banks of the Forks Stream and the Tekapo Canal where heavier scrub cover and zero grazing (respectively) could increase the chances of successful wilding establishment.