L&M Group New Zealand Phosphate Project

August 2024

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Background - L&M Group

- Established 1935
- Operations and Exploration activities have included:
  - Industrial Minerals
  - Oil & Gas
  - Gold in NZ, PNG, South America
  - Coal Seam Gas
  - Uranium
  - Coal

Why explore for phosphate in NZ?

- NZ soils are naturally deficient in P. The use of phosphorus based fertilisers is vital for the success of New Zealand agriculture.
- Security of supply: NZ is the 9th largest global importer with most imports from Africa. There are potential risks to existing supply chains.
- Carbon: we estimate that NZ-sourced phosphate would more than halve the carbon emmisions associated with phosphate fertiliser application

Phosphate is critical for our economy

THE VALUE OF PHOSPHORUS FERTILISER TO THE NEW ZEALAND ECONOMY

The Fertiliser Association of New Zealand commissioned a study to analyse the value of phosphorus fertiliser to the primary sector, both at the farm gate and to the wider New Zealand economy. The study assesses the economic impact of the decline in soil fertility if phosphorus fertiliser was not available. Here is a summary of the key findings.

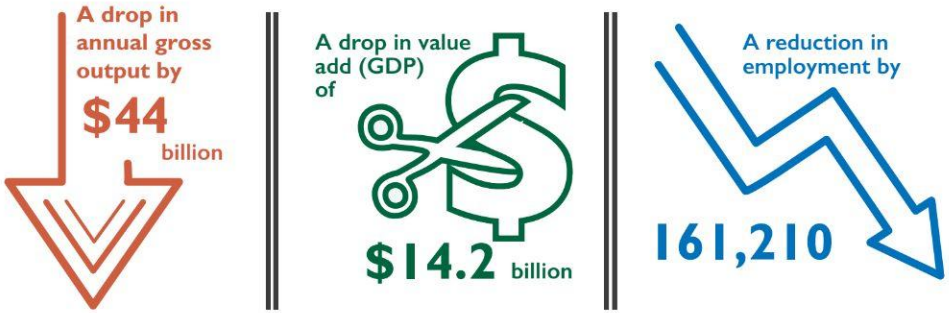
Financial impact at the farm gate

While the removal of phosphorus as a farm input would reduce (by a small amount) farming impacts on water quality and green house gas emissions, at the farm gate this is estimated to cost:

$8 billion

On-farm impacts ($million)

Impact on the New Zealand economy



Source: Fertiliser Association of NZ

New Zealand On-Shore Phosphate

- There are numerous records of phosphate occurrences within mid Tertiary sediments particularly on the South Island east coast
- Limited exploration was carried out in early 1900's, in the 1940's, 1970's & 2010-2013
- The most detailed studies have been carried out at Clarendon in Otago

L&M's Work to Date

- The current programme started in 2020
- Five Prospecting Permits granted over 1,740 km^2
- Field mapping and sampling has continued
- Most sample analysis is by portable XRF, with backup by lab-based testing
- A scout drilling programme has been completed at Clarendon
- Beneficiation and market studies continuing

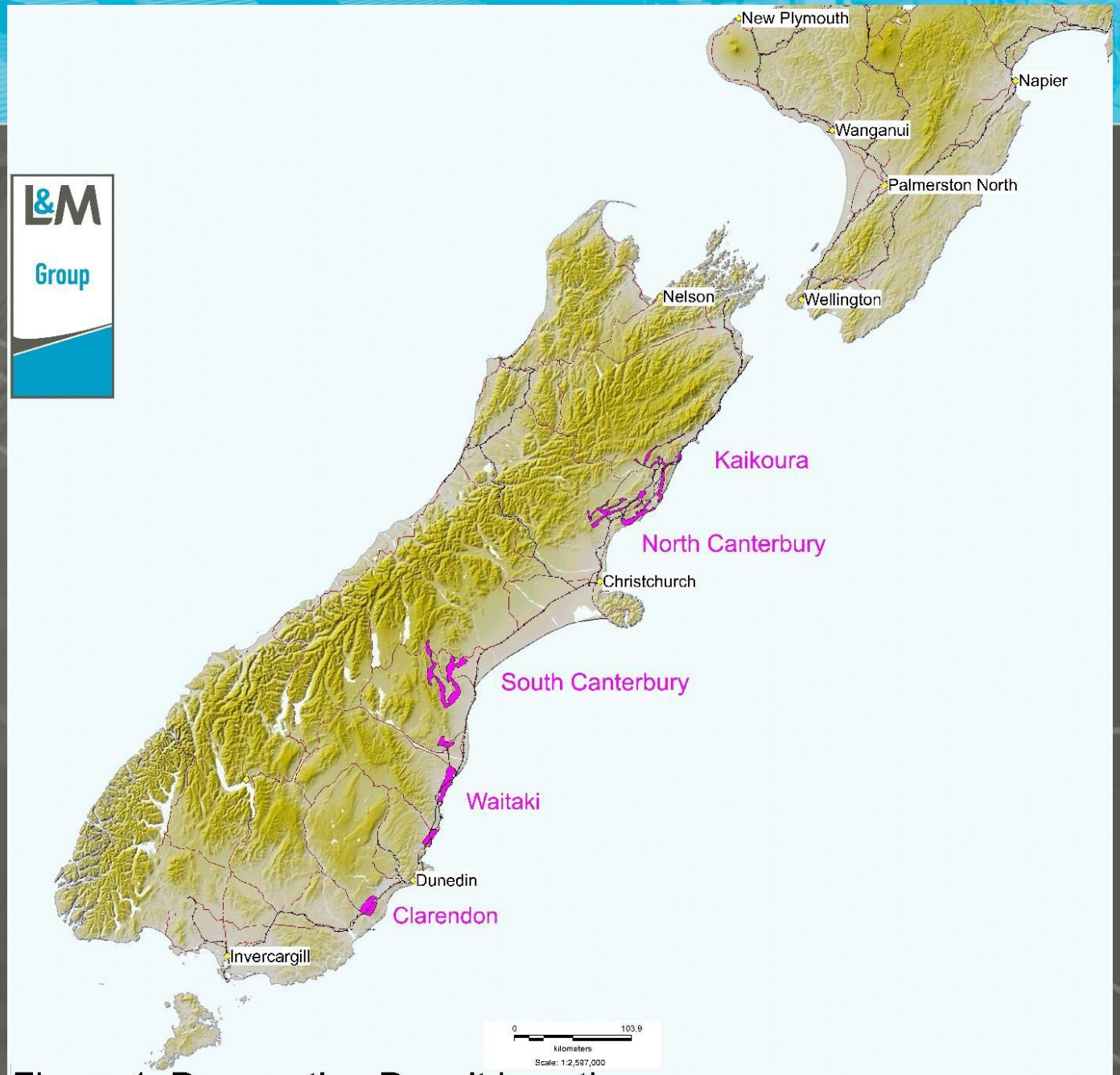


Figure 1: Prospecting Permit Locations

Date: 1/07/2022	Author: David Manhire

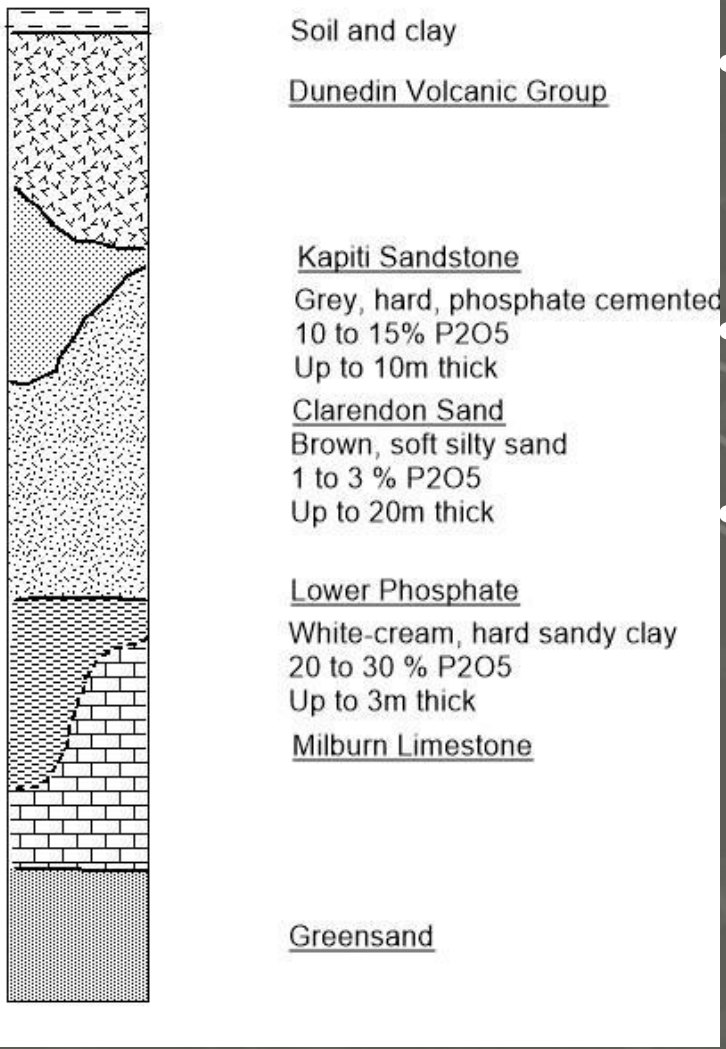
Clarendon

A long history of phosphate exploration and development since 1900

Clarendon Exploration

- Initial mapping, pitting and mining during the early 1900's
- 1940's exploration included 287 drillholes and trenches plus other detailed studies
- Ravensdown carried out exploration between 2009 and 2013; pitting, drilling and bulk sampling
- L&M's studies have comprised exhaustive literature reviews, mapping, sampling and drilling and have led to the development of a new geological model
- This reinterpretation indicates that the deposit is highly prospective

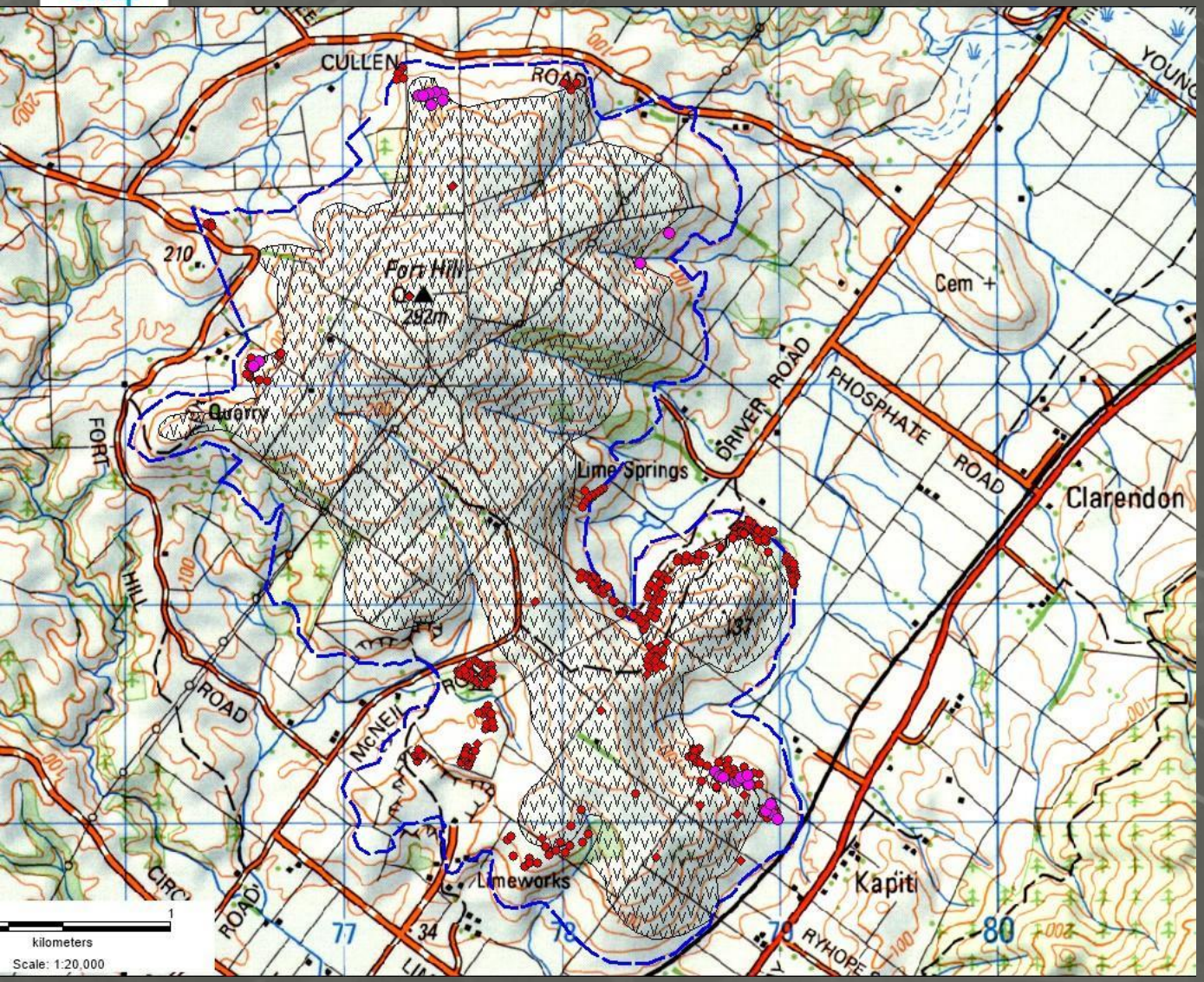
Clarendon Phosphate deposit



Phosphate bearing sediments in 3 zones:

- Basal zone: above Milburn Limestone & greensand. Averages about 2m thick. Grade 20% to 30% P_2O_5.
- Middle: Clarendon Sand. 1 to 3% P_2O_5,. Up to 20m thick, generally much less.
- Upper: Kapiti Sandstone. Discontinuous. Averages 6 to 8m thickness, average grade is about 12% P_2O_5.

Clarendon Phosphate deposit



A 25 hole drilling programme was completed this year

The aim was to extend resources from known blocks and to verify results from earlier drilling

Results indicate that the resource potential is greater than earlier estimates

Clarendon Phosphate deposit

Phosphate: North Canterbury & Kaikoura

- The only prior exploration was carried out by Speight & Wild in 1917-18
- Black points show locations of sediments where phosphate has been reported
- Main sources include Speight & Wild, NZGS Measured Sections, L&M studies

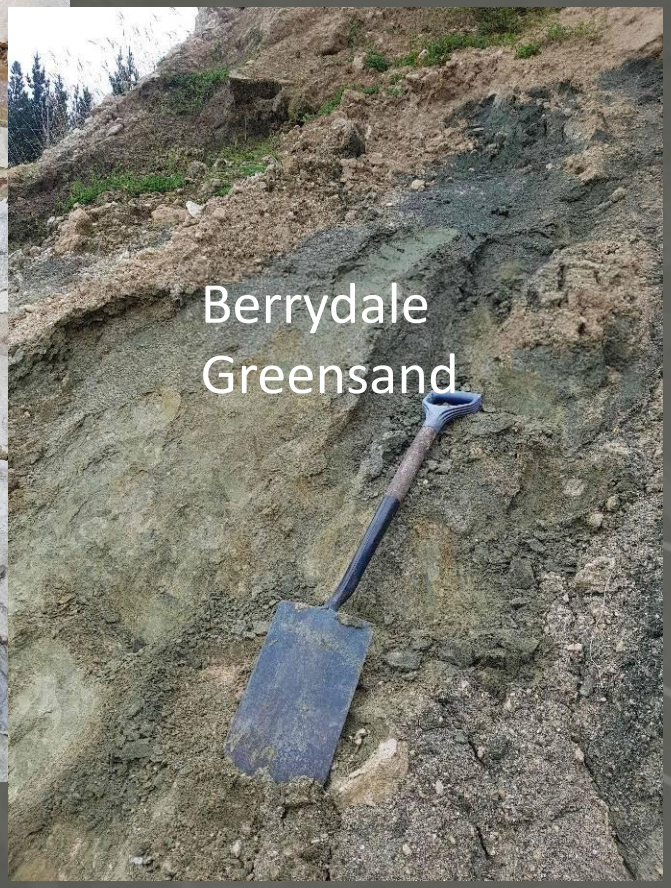
Phosphate: North Canterbury

Group	Formation/Member	Phosphate presence	Age
Motunau	Mt Brown Fm: Whiterock Limestone Member	Phosphatic band at base over Isolated Hill Limestone	Early to mid-Miocene ~ 18-14 MYA
	Waikari Fm: Pahau Siltstone	Base contains phos nodules	Early Miocene ~ 20 MYA
	Spy Glass Fm	Almost everywhere	Late Oligocene-early Miocene ~ 25-21 MYA
	Omihi Fm; Isolated Hill Lst, Weka Pass Stone, Gorries Ck Gsd, Berrydale Gsd	Phos reported in all these members	Late Oligocene-Early Miocene ~ 27-21 MYA
	Cookson Volcanics & Tekoa Fm	Phosphate at the base	Oligocene ~27-25 MYA
REGIONAL UNCONFORMITY			
Eyre	Amuri Lst	Phosphatic at top	Late Cretaceous to early Oligocene ~ 50-27 MYA
	Ashley Mudstone	Phosphate nodules locally at base & middle.	Eocene ~50-35 MYA

The target zone is the unconformity at the top of the Eyre Group

Main overlying sediments are Weka Pass Stone, Berrydale Greensand, Gorries Creek Greensand and Spy Glass Formation

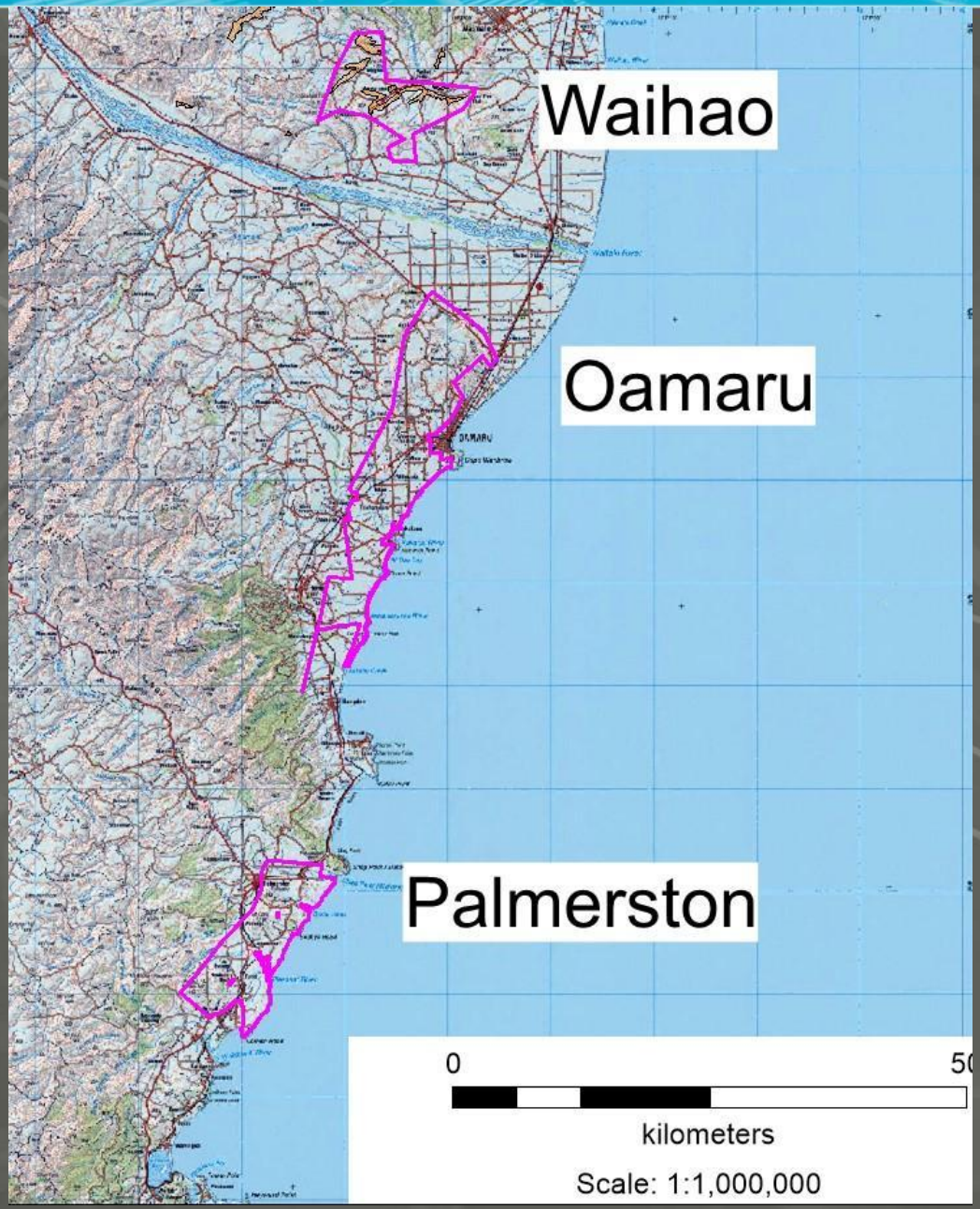
Phosphate: North Canterbury



rth Canterbury

- Spy Glass Formation at top of Amuri Limestone, nth of Motunau
- Phosphate grade up to 18% P_2O_5 in this material

Waitaki Permit



Main targets:
- Waihao Forks
- Oamaru area
- Palmerston-Waikouiti

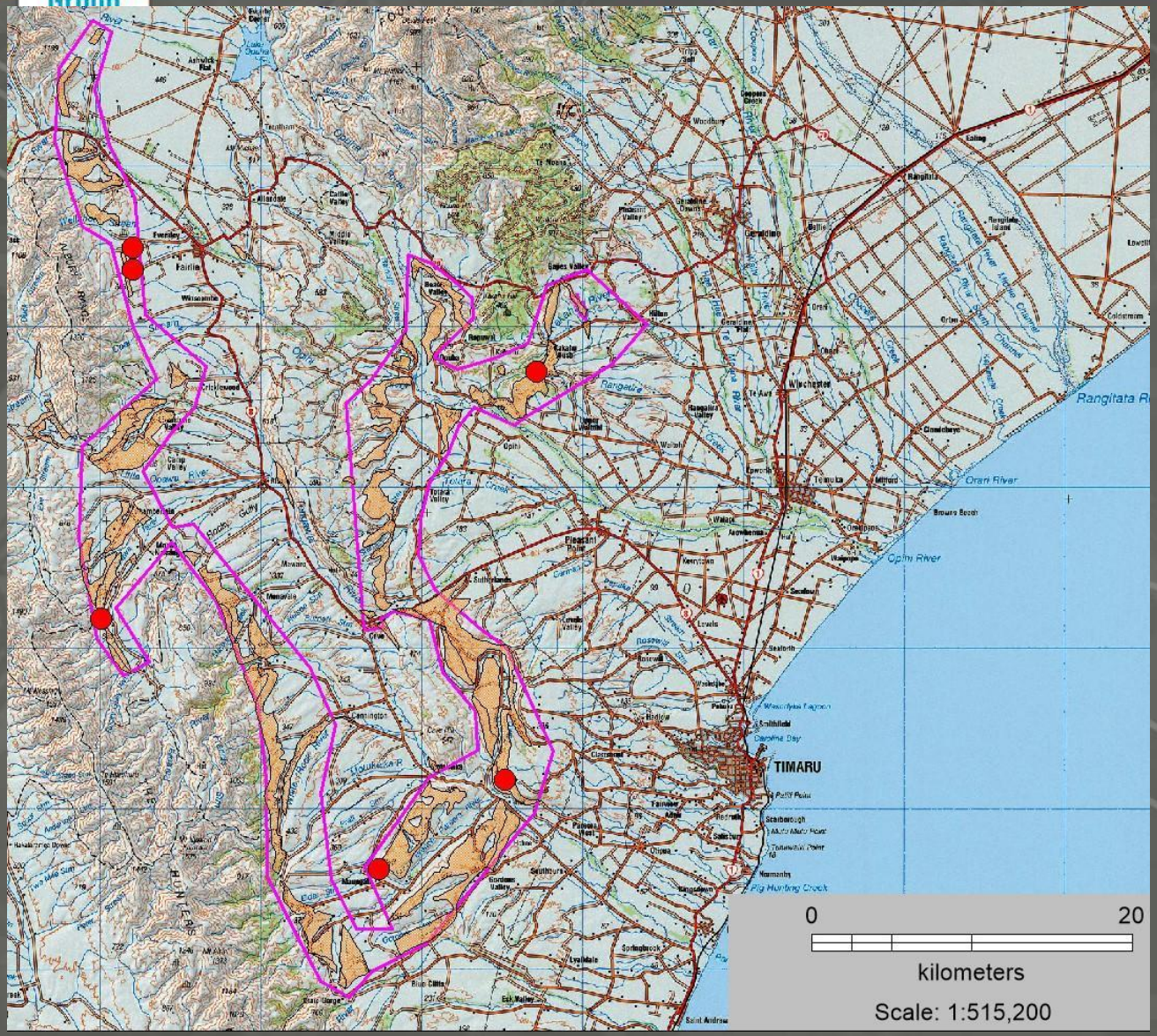
Investigations by AMOIL in 1970's did not find an economic resource but showed some promising results at both Waihao and Palmerston-Waikouiti

Gage (1957) made numerous references to phosphate deposits in the Oamaru area

Waitaki Permit

Group	Formation/Member	Phosphate presence / Reference	Age
Otakou	Gee Greensand	Gage, NZGS	Late Oligocene-early Miocene ~ 20 MYA
Kekenodon	Otekaike Limestone	Speight & Wild, Gage	Late Oligocene ~ 25 - 20 MYA
	Concord	Lateral equivalent to Clarendon Sand. AMOIL	Oligocene ~ 22- 25 MYA
	Kokoamu Greensand	Speight & Wild, Gage, AMOIL	Oligocene ~ 25 MYA
REGIONAL UNCONFORMITY			
Alma	Ototara Limestone	Phosphatic at top (Gage)	Late Eocene to early Oligocene ~36-30 MYA

South Canterbury



- Large permit area (498 km^2)
- Contains a similar sedimentary sequence to Waitaki and North Canterbury
- Kokoamu Greensand is prospective and is the main target.
- Further work to be carried out this Spring

Beneficiation

Date	Method	Head Grade % P_2O_5	Screen size	Product Grade % P_2O_5
1940's	Crush & Screen	12.50	0.07 mm	24
1940's	flotation	10.40	0.1 mm	24.5
1940's	flotation	2.50	0.1 mm	5.5
2023-4	Crush & Screen	12.4	-212µ	18.7
2023-4	Crush & Screen	3.15	-212µ	9.9
2023-4	Crush & Screen	14.6	-212µ	24
2023-4	Crush & Screen	12.9	1mm	16.9

Potential phosphate products

- 3 main use options:
- Direct Application – requires soluble phosphate i.e. citric solubility of 30% or better. P_2O_5 Grade 20 % +
- Partial acidulation - mixing rock phosphate with double or triple superphosphate P_2O_5 Grade 15 % +
- Superphosphate feedstock. P_2O_5 Grade 30% +