Examples of completed Land and Environment Plans
A brief history of Land and Environment Plans in NZ

Techniques of land and environment planning were first adapted from the United States for New Zealand conditions in the late 1940s. The ideal was to identify the most productive and profitable system of land use according to farm-unique characteristics and capabilities of land, soil and other base resources.

Uptake in NZ was widespread. A total of 4730 farm plans representing 50% of NZ’s total farmland were prepared between 1950 and 1990. Most had a selective or limited usefulness because of the organisations who prepared them. The most recent estimate added a further 1200-1450 new farm plans to the total (1991 and 2001).

Land and environment planning today is characterised by a wide diversity of different approaches. The technique is still widely practiced, but modern use has been criticized as being sometimes too biased toward environmental goals. The LEP Tool Kit aims to help offset this problem, by placing land and environment planning into the hands of the farming community.
INTRODUCTION

Land and Environment Planning (LEP) has a long history, extending as far back as the 1930s when it was first used to tackle the seemingly uncontrollable Dust Bowl wind-erosion problems in the United States. It was officially adapted for New Zealand farming in the 1950s, and has since evolved into many land and environment plan types:

- Conservation Farm Plans
- Soil and Water Conservation Plans
- Sustainable Land Management Plans
- Property Environmental Plans
- Environmental Farm Plans
- Farm Environmental Programmes
- Comprehensive Farm Plans
- Whole Farm Plans
- Nutrient Management Plans
- Property Stocktaking
- Farmsure Management Plans
- Environmental Management Systems

The best examples are still based on original principles – that each unit of land should be farmed within its limits, and that achieving sustainability does not need to come at the cost of production or profit.

The purpose of this booklet is to demonstrate some of the different types of LEP currently used in New Zealand. Nine examples are examined according to LEP Levels (diagram below). Many other types are currently in use, but this selection should provide sufficient overview. Links to additional examples and reports are provided in the LEP Reference Guide.
LOWHOLME FARM
Environment Plan Map

Map Legend
- Bush & scrub areas
- Shed area
- House
- Significant waterways
- Tracks

Priority areas
- A Van Damme’s Slump
- Slip erosion hotspots
- C Bush block under QE II Trust consideration
- D Sheep yard runoff to stream + dip disposal
- E Possible wetland with Ducks Unlimited

Map prepared by Qualby Surveyors, 1986.
Lowholme Farm
ENVIRONMENTAL MANAGEMENT PLAN

Introduction
Lowholme Farm is a 973 ha sheep and beef property south of Te Kuiti in the King Country. It has been farmed by the Andersen family since the late 1930s (three generations), and the current owners – John and Margaret Andersen – are aiming to leave the farm in better condition than when they started.

John and Margaret prepared their own basic environmental management plan from a paddock map. It represents an example of a Level 1 LEP.

The farm
A 973 ha (885 ha effective) sheep/beef breeding and finishing farm producing 8,500 kg DM/ha/yr pasture and running 8370 stock units (9.5 su/ha) mostly as sheep (70:30 sheep:cattle). Main flock is a Coopworth Composite cross (consistent 138% lambing), while the breeding herd is predominantly Angus/Hereford crosses (120 ma cows).

Three land types are evident. Hard-hill country runs the length of the southern boundary. Rock type is mostly papa mudstone on the steeper slopes, with occasional patches of old ash along ridge lines. Soil is Mapara loamy sand, which has low natural fertility and an erosion problem. Middle part of the farm is rolling hill country with some extensive flat/undulating areas, all of which has a deep cover of young ash (Kaharoa and Taupo ash) with Tihoi type soils. The front of the farm is mostly river flats made up of alluvium and river-deposited pumice/ashes, dissected by steep gully systems. Manunui sandy loam is the dominant soil. Natural fertility is generally low and scrub control across the property is a priority.

Environmental issues
A paddock map was used to identify priority areas for environmental management (map opposite). Erosion is an issue, particularly with slips on the steeper hill country and a large active slump that represents an ongoing threat to fences and access to the western end of the farm. Location of the sheep yards is a water quality risk, with runoff from half the yards draining directly into a stream. There is also a natural wetland that could be developed into a wildfowl habitat, and a large area of virgin bush at the back of the farm that provides a home to the local goat population.

Environmental plan
Location of priority areas were marked on the paddock map. Each issue was examined in terms of:
1. What is the issue?
2. What are we going to do about it?
3. When will it be dealt with?
4. Is it going to cost anything?
Responses to these questions formed the basis of the environmental plan (see below). Some of the activities were undertaken immediately, while others required more investigation and subsequent planning. The idea was to plan for the year ahead, but to recognise that some responses need further work for implementation in other years.

Environmental Management Plan
Lowholme Farm

A. Van Damme's Slump
The issue: Large slump in Tim’s paddock is slowly moving. If it lets go in a big storm then it will take out the bottom fence and track. This would cut off access, and would be difficult to fix (new track would need to go around the top of the slump).
Response: Don’t know. Dad planted 10 willows across the slump but they seem to have had little effect. Terry Knight thinks the council might have some ideas, so I’ll start by ringing them.
When: As soon as I’ve got a free day in the office.
How much: Nil this year.

B. Slip erosion
The issue: Parts of the hill block that always seem to have bad erosion after a storm (Pinnacle, Lefty Angus, and Back Paddock 3). Not bad compared to some farms in the valley, but enough to be noticeable. The dam at the top of Beaker’s track completely silted up with slip wash during the 1998 storm.
Response: Space planting poplar trees seems to be the best option. This was done next door and they seem to be working. The council sells bundles of 20 poles at $3 a pole.
When: Start on the worst paddock this winter (Pinnacle), and I’ll work across the others over the next 2 years. Will need to get at least 4 bundles of poles in early July, and find out if I can borrow or make a rammer.
How much: Best estimate is $250-$500 for this year because not sure if protector sleeves are needed. Less poles needed for the other paddocks, so possibly another $500-$800.

C. Bush block
The issue: Virgin bush block at the back of the farm that’s infested with goats. Hard to control unless they come out of the block, but don’t get up to that corner of the farm too often.
Response: We’ve been thinking about protecting it under QEII covenant. We don’t graze it anyway, and it is a good example of what the bush used to be like before it was all cleared. Goats and maybe possums are causing a lot of undergrowth damage. Our response will be to find out more about QEII covenants, and whether they will control the goats or put up better fences.
When: Margaret’s project. She is going to look into this week (August), but we won’t be looking to do anything until next year at the earliest.
How much: Nothing yet.

Postscript
The Andersens couldn’t see an easy way of managing the large slump effectively, so they approached the local regional council for advice. They found out that their farm was once mapped as part of a catchment board scheme, and there are actually several areas on the farm at risk of developing new slumps. The council provided a copy of the map, and the Andersens were intending to use this as a basis for planning a more comprehensive erosion management strategy.
Property Stocktaking was developed as part of a M&WNZ Monitor Farm programme in the Waikato. Maramarua Farm was one of two properties involved in the project. Purpose was to develop a Land and Environment Planning technique suitable for sheep and beef farmers. Property Stocktaking is an example of a Level 1 Land and Environment Plan.

The farm
A 689 ha summer-dry breeding and finishing property located at Maramarua, wintering 7200-7300 stock units (60:40 sheep:cattle). The flock includes 1750 Romney ewes, 700 Finn-Romney ewes, and 50 Suffolk ewes, with a lambing percent ranging between 144% and 159% (2004/05). Cattle include 195 ma cows (mostly Angus, 44 R2 heifers, 121 R1 heifers, 65 R1 steers, 45 R1 bulls, 55 R2 steers, and 7 breeding bulls.

Native bush fragments are a feature, and reduce grazed area to 560 ha. Most of the farm (~80%) is easy to medium hill country, with the remainder as flat to gently rolling downlands. Subdivision is into 55 main paddocks averaging 12 ha each. Soils are dominated by low to medium fertility Maramarua silty clay loam, which are prone to winter pugging by cattle.

Property Stocktaking approach
Landforms were marked onto an aerial photo as resource units, along with farm and paddock boundaries, waterways, tree blocks, wetlands and native bush fragments. Units were broken down further according to known differences in production, soil wetness/dryness, and other factors affecting day-to-day management. Soils were described according to five characteristics – texture (e.g. silt loam, fine sandy loam, etc.), structural form, colour, rooting depth and compaction resilience.

Resource units were aggregated into Land Management Units (LMUs) – areas of land with similar physical characteristics that require the same general approach to management, fertiliser, drainage, etc. Fourteen different LMUs were identified (map over the page), which were then assessed in terms of strengths and limitations (including environmental ‘limitations’ such as erosion and pugging).

THE PROPERTY STOCKTAKING APPROACH

1. Break the farm down into its underlying resources.
2. Identify blocks by landform, contour, vegetation variances, etc.
3. Mark on an aerial map and describe on Resource chart.
4. Describe the soils in each block.
5. Group similar blocks into land management units (LMU’s).
6. Undertake SWOT* analysis of each LMU.
7. Identify current and potential production levels and constraints.
8. Develop an action plan.

* Strengths, Weaknesses, Opportunities, Threats
Maramarua Farm
Land Management Units

Map key:
- Stream Flat
- Wet Block
- Hogget Blocks
- Bull Block
- Airstrip Block
- South Block
- Dry Block
- Connors Blocks
- Shedelerd Block
- Hill Block
- Bush blocks
- Slump
- Streams
- Wind turbine sites

Streams

Hill Block

C

Connors Block 1

Shelted Block

Wet Block

Dry Block

Wet Block

Airstrip Block

South Block

Dry Block

Connors Blocks

Hogget Block

Bush blocks

Slump

Streams

Wind turbine sites

Maramarua Farm

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Bush blocks

Slump

Streams

Wind turbine sites
Current levels of production were estimated for each LMU based on existing stocking rates, pasture production (kg DM/ha), or product per hectare. Relative LMU yield was adjusted to ensure the estimates from all LMUs summed to whole farm production. The exercise was repeated for potential pasture yield – what could be achieved if all management-related constraints were removed (e.g. overcoming low nutrient status, optimal pasture control and subdivision, draining wet land).

**Action plan and monitoring**

Key considerations were summarised in a resource chart (see table below). Actions were listed for each LMU, both as opportunities for realising production potentials and as constraints to sustainable farming. Recommendations were made on how to monitor improvements in the quality of soils, streams, bush, and nutrient status (based on monitoring kits).

<table>
<thead>
<tr>
<th>Resource description</th>
<th>Streams &amp; tracks (km)</th>
<th>Total area (ha)</th>
<th>Pasture (ha)</th>
<th>Bush (ha)</th>
<th>Strengths</th>
<th>Limitations</th>
<th>Current &amp; potential production (su/ha)</th>
<th>Realising potential &amp; addressing constraints</th>
</tr>
</thead>
</table>
| LMU 1: Connors       | 174.5                | 128.4          | 48.1         |           | Warmer    | Contour    | 13.0 15.0                           | Subdivision N-fertiliser
If sheltered – why not lambing?
Mgmt – cows/calves in July-Nov |
|                      |                      |                |              |           | Sheltered | Subdivision Soil |                                  |                                             |
|                      |                      |                |              |           | Shade     |                        |                                  |                                             |
|                      |                      |                |              |           | Vista     |                        |                                  |                                             |
|                      |                      |                |              |           | Good winter pasture       |                        |                                  |                                             |
|                      |                      |                |              |           | Fertility |                        |                                  |                                             |
| LMU 2: South Face    | 100.5                | 82.0           | 18.5         |           | Shade     | Western end exposed     | 13.5 15.5 | Subdivision N-fertiliser
Monitoring – water quality |
|                      |                      |                |              |           | Sheltered | Limited winter growth   |                        |                                  |                                             |
|                      |                      |                |              |           | Reticulated water |                        |                                  |                                             |
|                      |                      |                |              |           | Summer country |                        |                                  |                                             |
|                      |                      |                |              |           | Fertility |                        |                                  |                                             |
| LMU 3: Hill Block    |                      |                |              |           |           |                        |                                  |                                             |
| Totals               | 27.4                 | 688.5          | 555.6        | 132.9     |           |                        |                                  |                                             |

*Table: Example of strengths and limitations of resources, current and potential production, and actions required to realise potentials and address constraints.*

**Take home message from the project**

With land the biggest capital investment in farming, it is important to have a good understanding and documentation of these resources to ensure maximum economic gain and to be aware of any activities that are likely to constrain future opportunities. Property stocktaking provided the opportunity to calculate yield gaps, and to develop a better understanding about how land units contribute to farm production. It also helped identify constraints to production, and provided a robust framework for monitoring key environmental challenges.

**Acknowledgements:** John and Jan Marchant (Maramarua), MWNZ, Sally Hobson (AgFirst), Ross Abercrombie (Environment Waikato), Alec Mackay (AgResearch).
Best practice sites

- Scargill Creek
  - Exclude heavy stock grazing with temporary fencing, or ideally, permanent fencing.
  - Establish stock drinking points.
  - Consider riparian plantings
  - Manage willows

- Offal pit
  - Consider improving pit design and use
  - Consider composting

- Silage pits
  - Minimise any risk of leachate escaping

Map prepared as an example

RESOURCE CARE FARM ASSESSMENT
Trefusis Farm
Introduction

A ‘Resource Care Farm Assessment’ was prepared for Trefusis Farm by Environment Canterbury. The farm was the North Canterbury Meat and Wool NZ monitor farm from 2003 to 2006, and is owned and operated by Chris and Jane Earl. Assessments focus on highlighting on-farm environmental problems and making suggestions on how they can be improved. This example represents a Level 1 LEP.

The farm

A summer-dry (780mm/yr) 529 ha sheep and beef farm located in Scargill Valley, Canterbury. Approximately 38% of the farm is river terraces; 46% as clay based rolling downland; and 16% is rolling hills. Soils include good Glenmark and Tiapapa soils on the hilly and rolling areas, and poorer Glasnevin and other stoney soils across the alluvial flats.

Resource care assessment

A resource care assessment involves an environmental specialist – someone versed in the issues, best practices and regional council policies – visiting the property to point out problems and make suggestions on how those problems can be addressed. Emphasis is on using environmental indicators – such as stream flow, habitat, clarity, biodiversity and bank shading – to help identify potential problems. Three key areas were identified.

1. Scargill Creek
   - Indicators suggest that the creek was in good health.
   - Cattle entering the creek were highlighted as an issue. Suggestions were made for temporary fencing, permanent fencing, confined access for drinking water, riparian planting, and willow management.

2. Offal pit
   - The offal pit was highlighted as having a potential for groundwater contamination. Suggestions were made to speed decomposition and reduce leaching risks.
   - Composting dead stock was suggested as an alternative disposal. Detailed specifications where given on constructing decomposition windrows and bins, and the process of effective composting.

3. Silage pits
   - Two silage pits were noted for their potential to contaminate water with leachate. Both were assessed as having minimal leachate, although proximity to a stream of one pit was considered a risk. Suggestions were made to ensure leachate risks can be minimised.

Suggestions were also made regarding agrichemical storage and disposal, soil health and nutrient management, and stock shade and shelter.

Acknowledgements: Chris and Jane Earl (Trefusis), Donna Woodley and Phil McGuigan (Environment Canterbury).
**Shelter Plan 111**

**ML and CG Famer, Payton Farm**

Disclaimers: Although this map has been prepared using the best information available at the time of publishing, the regional council accepts no responsibility for actions taken by any individual or agency based upon the information presented within this map.

Copyright Topographic and cadastral data is copyright LINZ.
Introduction
Shelter Plans are an example of very focused LEPs used in areas with a high wind erosion risk. The following example is prepared for Payton Farm by Greater Wellington Regional Council. It has been adapted to include biodiversity and water quality considerations, and is designed to be implemented over a ten-year period. It is considered a Level 1 LEP, albeit a more advanced version because of detailed schedules and budgeting.

The Farm
A 121 ha hill country runoff property near Martinborough, Wairarapa. The farm is dominated by Land Use Capability (LUC) classes 4 and 6 with moderately-well drained Wharekaka soils formed from loess (wind blown dust) overlying greywacke. Soils have a high wind erosion risk, particularly when cultivated. The remaining land is flatter LUC class 3 with imperfectly-drained Kokotau soils formed from loess over gravels.

Plan objectives
- Reduce wind-related impacts by strategically locating shelter, space-planted poplars, and woodlots.
- Locate plantings to maximise animal welfare (shade and shelter).
- Improve water quality and biodiversity with targeted riparian management.
- Protect and enhance bush fragment biodiversity.

Ten year plan and budget
Having a Shelter Plan qualifies the farm for a cost sharing grant from the council. Proposed works are shown in the map opposite, with specific activities and their costs summarised as a schedule and budget:

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Cost</th>
<th>Cost share</th>
<th>Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pine woodlot</td>
<td>2.45 ha</td>
<td>$3,022</td>
<td>Nil</td>
<td>$3,022</td>
</tr>
<tr>
<td>30% Grant:</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Euc nitens shelter</td>
<td>275 m</td>
<td>$2,430</td>
<td>$729</td>
<td>$1,701</td>
</tr>
<tr>
<td>3-m Poles</td>
<td>200 m</td>
<td>$320</td>
<td>$96</td>
<td>$224</td>
</tr>
<tr>
<td>Poplar shelter</td>
<td>710 m</td>
<td>$7,178</td>
<td>$2,153</td>
<td>$5,025</td>
</tr>
<tr>
<td>Pine shelter</td>
<td>440 m</td>
<td>$2,873</td>
<td>$862</td>
<td>$2,011</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>$12,801</td>
<td>$3,840</td>
<td>$8,960</td>
</tr>
</tbody>
</table>

YEAR 1

YEAR 2 - 10

RADIATA SHELTER

<table>
<thead>
<tr>
<th>Location</th>
<th>Size</th>
<th>Cost</th>
<th>Cost share</th>
<th>Farmer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Poplar/alder shelter</td>
<td>660 m</td>
<td>$4,297</td>
<td>$1,289</td>
<td>$3,008</td>
</tr>
<tr>
<td>Planting</td>
<td></td>
<td>$2,376</td>
<td>$713</td>
<td>$1,663</td>
</tr>
<tr>
<td>Fence construction</td>
<td></td>
<td>$2,250</td>
<td>$675</td>
<td>$1,575</td>
</tr>
<tr>
<td>Pole-planting</td>
<td>800 m</td>
<td>$1,992</td>
<td>$598</td>
<td>$1,394</td>
</tr>
<tr>
<td>Poplars + sleeves</td>
<td></td>
<td>$2,448</td>
<td>$734</td>
<td>$1,714</td>
</tr>
<tr>
<td>Year 2 - 10 Total</td>
<td></td>
<td>$33,766</td>
<td>$10,130</td>
<td>$23,636</td>
</tr>
</tbody>
</table>

Acknowledgements: M & C Farmer (Payton Farm), Don Bell (Greater Wellington Regional Council).
LAND MANAGEMENT UNITS

Dougal McIntosh
Wanganui

LMU 1  Flat & easy rolling country (208 ha)
LMU 2  Moderate hill country (179 ha)
LMU 3  Steep hill country pastoral (172 ha)
LMU 4a Steep hill non-forestry (part 464 ha)
LMU 4b Steep hill forestry (part 464 ha)
LMU 5  Retired native bush 102 ha

Perennial waterways that are, or soon will be, protected as forestry or bush
Perennial waterways not protected from stock

Date:  -  Surveyors:  -
Property owner(s): Dougal McIntosh  Survey scale: 1:10,000
Property:  -  Aerial photo:  -
Introduction
A Land Management Plan was prepared by Dougal McIntosh for his Ratamarumaru Farm through the Soils Underpinning Business Success (SUBS) initiative. SUBS is a 12-month programme that aims to assist farmers in the collection and use of soil information for business development and resource management. The Land Management Plan is equivalent to a Level 2 LEP.

The farm
Ratamarumaru is a 1180 ha (858 ha effective) hill-country property located 25 km northwest of Wanganui City, running 9821 stock units (11.4su/ha) mostly as a sheep and beef breeding operation (79:21 sheep:beef ratio). As of 1999, the farm was at a development level, with 60 ha retired as native bush, and a further 490 ha allocated to forestry. Approximately 135 ha is flat to easy rolling, with the remainder being hill and steepland.

SUBS Approach
Groups of 8-10 farmers attend 12 workshops to receive instruction in soil mapping, preparing Land Management Units (LMUs), strengths/weaknesses assessment, and farm planning. Instruction is provided by a soil scientist, farm consultant and regional council representative. Each workshop is held on a different property, and one farm is taken through a complete farm planning exercise to demonstrate what can be achieved.

Farm soil mapping and resource description
Dougal mapped and described eight distinctively different soils for his property. Each soil was briefly described according to its key properties. The farm has a versatile mix of soil resources which can be used for a variety of purposes.

Refine and develop Land Management Units
Soil types were aggregated according to similar management requirements into Land Management Units. Five LMUs were identified for Ratamarumaru (summarised over the page). Each unit was assessed in terms of strengths, weaknesses, and potential uses consistent with long term aspirations.

Designing and evaluating options
Ratamarumaru was taken through a full farm planning exercise to demonstrate how soil information can be used in farm planning. LMU 4 was assessed as having a marginal contribution to farm performance and a high erosion risk, while LMUs 1 and 2 were identified as performing well below their potential. The best option was to afforest 50 ha of LMU 4 each year for four years, while lifting LMUs 1 and 2 to offset the loss of pastoral land to forestry. Proposed changes were evaluated using Stockpol and the Agroforestry Estate Model. The evaluation suggested a 25% increase in profitability matched by improvements in land management and sustainability. Perennial streams were later examined to identify potential riparian zones for areas where stock have unmanaged stream access.
<table>
<thead>
<tr>
<th>Land Management Unit</th>
<th>Dominant soil type</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Uses</th>
</tr>
</thead>
</table>
| 1. Flat/easy rolling (0-12 degrees) 135 ha | - Egmont black silt loam  
- Westmere hill soil  
- Parakino sandy loam            | - Contour (easy)  
- Free draining  
- Versatility  
- Response to fert  
- Weed free                         | - Exposure  
- Isolated  
- Low fertility  
- Wind erosion if cultivated          | - Sheep & cattle  
- Finishing  
- Deer  
- Cropping  
- Very few constraints |
| 2. Moderate hill country (13– 25 degrees) 265 ha | - Westmere hill soil  
- Mangaweka hill soil | - Deep, stable soils  
- Summer safe  
- Good shelter  
- High production potential  
- Weed free  
- Good access                   | - No cropping  
- Southerly aspects  
- Mostly isolated  
- Low fertiliser input  
- Pasture quality            | - Sheep & cattle breeding  
- Agroforestry |
| 3. Steep hill country pastoral 180 ha | - Mangaweka hill soil  
- Pohangina steepland soil | - Sunny aspect  
- Location  
- Low weeds  
- Shelter from steep areas  
- Wintering potential               | - Erosion prone  
- Pasture quality  
- Low fertility  
- Shallow soil  
- Inadequate subdivision  
- Summer mgt issues             | - Sheep breeding  
- Wintering  
- Beef breeding?  
- Lambling |
| Steep hill country forestry use 490 ha | - Taihape steepland soil  
- Pohangina steepland soil          | - Soil suitable for forestry  
- Good access for harvesting       | - Very steep  
- Shallow soils  
- Summer dry  
- Weeds + poor pasture  
- Very low fertility  
- Location & access  
- Boundary fencing                | - Forestry  
- Retirement  
- Hogget block                        |
| 5. Retired native bush 60 ha | -                                      | - Ecological corridor                                      | - Pests  
- Some fencing required             | - Ecological tourism                        |
| (6. Runoff at Westmere) | - Westmere silt loam                       | - High fertility  
- Versatile  
- Saleable  
- Summer safe  
- Easy contour  
- Winter production                | - Distance  
- Exposed flats  
- Wetness  
- Under fertilised  
- Facial Eczema             | - Finishing (all classes)  
- Some cropping |

Table: Summary of Land Management Unit characteristics and qualities for Ratamarumaru Farm.

Acknowledgements: Dougal McIntosh, AgResearch, Horizons Regional Council, Tony Rhodes (PGG Wrightson Consulting), Alan Palmer (Massey University), Funded by Meat NZ and WoolPro.
Introduction
Mike and Jackie Carter developed a Land and Environment Management Plan for their farm through the Project Green. The Land and Environment Management Plan component represents a Level 2 LEP, but the whole assurance programme aims to be a more advanced level of Land and Environment Planning.

The farm
A 1,258 hectare Te Kuiti hill country farm running 4500 breeding ewes (as of year 2002), 200 Fresian cross breeding cows, and 500 bull calves (sold at 18mths). An elite flock of 3336 ¼ to ½ Finn ewes are mated to a Highlander ram to produce replacements. The remaining 1154 ewes are mated to a Primera or Poll Dorset terminal sire and all progeny fattened (160% lambs docked).

The farm has 140ha of alluvial flats and easy country, 400ha of rolling to moderate hill country, and 430ha of harder steepland. Approximately 972ha is pasture, with the remainder being in forestry (46ha), bush & wetland (65ha), and QEII protected bush (175ha).

Approach
The plan was developed together with a consultant, who had a working knowledge of land resources and the environmental challenges relevant to the King Country area. Three components were covered.

1. Describing the farm resource: Resources were described by breaking the farm into Land Management Units (map overleaf), which were described in terms of landforms, parent materials, major LUC units, areas of each unit, and dominant vegetation types (table below).

<table>
<thead>
<tr>
<th>LMU</th>
<th>Area (ha)</th>
<th>Landform</th>
<th>Parent material</th>
<th>LUC</th>
<th>Vegetation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68</td>
<td>River flats</td>
<td>Alluvium</td>
<td>3 e1</td>
<td>Semi improved pasture</td>
</tr>
<tr>
<td>2</td>
<td>75</td>
<td>Flat and rolling</td>
<td>Ash</td>
<td>4 e1</td>
<td>Semi improved pasture</td>
</tr>
<tr>
<td>3</td>
<td>221</td>
<td>Rolling downlands</td>
<td>Ash over mudstone</td>
<td>4 e3</td>
<td>Semi improved pasture</td>
</tr>
<tr>
<td>4</td>
<td>-</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Each LMU was then assessed in terms of strengths & weaknesses, potential uses, and conditions of use (table below).

<table>
<thead>
<tr>
<th>LMU</th>
<th>LUC</th>
<th>Strengths</th>
<th>Weaknesses</th>
<th>Conditions of use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>3 e1</td>
<td>Contour, versatile and robust soils. Weed free, location, access, summer moist</td>
<td>Poor drainage, flooding, exposed, size</td>
<td>Intensive sheep, beef and deer, fodder crops. Few constraints except in winter. Shelter required. Water course protection.</td>
</tr>
<tr>
<td>2</td>
<td>4 e1</td>
<td>Contour, versatile soils, good drainage, responsive to fertiliser, access, location, size, easily subdivided</td>
<td>Wind and rill erosion, exposed</td>
<td>Intensive livestock, cropping. Few limitations. Requires shelter.</td>
</tr>
<tr>
<td>3</td>
<td>4 e3</td>
<td>Location, access, winter dry stock, conservation</td>
<td>Contour, fragile when wet, weeds, some instability (slump)</td>
<td>Selective cattle in winter, conservation plants (space planted poplars)</td>
</tr>
</tbody>
</table>

Page 17
2. **Assessment of environment issues**: Seven top order issues were assessed (Soil Health, Water Quality, Shade & Shelter, Pasture, Biodiversity, Biosecurity, and Greenhouse Gases). Each issue was broken down to its components (e.g. Soil health encompasses erosion, nutrient balance, physical soil health, and chemical contamination) and assessed for each LMU, including a prioritisation and outline of mitigation solutions.

Minimum entry standards are required for Project Green. These were set by defining current levels of environmental protection against required levels (essentially benchmarking where they were at, and where they needed to go).

3. **Land and environment action plan**: A list of specific actions for addressing the Carter’s environmental issues was compiled for a five year period. This was broken down by year, and a more detailed plan was prepared for the first year. The table extract below is for Year 1.

<table>
<thead>
<tr>
<th>Issue</th>
<th>Location</th>
<th>Specific actions</th>
<th>Planned cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>EROSION e.g. Planting programme Area retirement Debris dams Stocking rates</td>
<td>LMU 3  LMU 4  LMU 6 (paddocks 5 &amp; 38)</td>
<td>Planting of poplar/native trees in water courses for slope stabilisation – started in 1995. 20 trees for current year. Requires possum control.</td>
<td></td>
</tr>
<tr>
<td>STREAM HEALTH e.g. Riparian planting Retirement, fencing, eco-sourcing</td>
<td>LMU 9 (paddock 5)</td>
<td>Encouraging the growth and spread of the native water cress. Possum control. Weed control on 10 ha. 60% of the river and stream system fenced and planted</td>
<td></td>
</tr>
</tbody>
</table>

**Reporting**

A key component of the Project is an annual inspection by an independent operator, to check that progress is being made. Focusing on progress rather than an endpoint recognises that Rome wasn’t built in a day, and that good things take time. Progress is recorded as a positive or negative stamp that indicates whether previously agreed actions have been completed.

**Acknowledgements**: Mike & Jackie Carter (Te Kuiti), Project Green Charitable Trust ([www.projectgreen.co.nz/trust.html](http://www.projectgreen.co.nz/trust.html)).
Introduction

Environmental Programmes are prepared by Environment Bay of Plenty (EBoP) to help landowners conserve soil, improve water quality, reduce nutrient loss, and protect biodiversity. They are based on partnerships between farmers, district councils, the Department of Conservation and EBoP itself. Lakeside Farm is an example of a Level 2 Land and Environment Plan.

The farm

Lakeside is a long 158 ha sheep and beef farm bordering Lake Te Aute. Approximately 80 ha is native bush, which is grazed occasionally when feed is short. Annual rainfall is high at 2,200 mm/yr. Land Use Capability (LUC) classes 4 and 6 dominate the top of the farm, while steeper class 7 land appears towards the lake end of the property. Soils are formed from a mix of ash and pumice (Manawahe and Pukemaku soils), which are particularly susceptible to sheet erosion (from rain and runoff) and gully erosion.

Environmental issues

The first step in the preparation of an Environmental Programme is the assessment of soil, water, biodiversity and pest issues. Issues targeted will generally include:

- Streambank protection
- Water supply and quality
- Erosion and farm runoff
- Plant and animal pests
- Protection of springs and wetlands
- Protection of indigenous forest remnants and other natural features
- Protection of landscape and natural values
- Use of chemicals
- Farm dumps and offal holes

Five issues were identified for Lakeside Farm. Sheet erosion on steeper slopes bordering the lake was noted, and two gully floors feeding into the lake were considered at risk from both an erosion and a contaminant-delivery perspective. Stock also have unrestricted access to the lake shore, and the lake itself.

Lake Te Aute and its margin are recognised as being a regionally significant wildlife habitat, and the area around the lake is officially targeted as a Recommended Area for Protection (RAP). Some of this area represents fragmented and remnant rewarewa, kamahi and mangeao forest. Blackberry is a persistent plant pest, and rabbits, hares, possums and wallaby are environmental problems requiring control.

Objectives

- To protect the soil on the property and the water quality of Lake Te Aute.
- To protect native forest on the property classified as RAP.

These objectives will be achieved by:

- Fencing to exclude stock from the Protection Areas (see map opposite), including the lake margin.
- Planting the Protection Areas with a range of native plants to act as a nutrient and sediment buffer.
- Controlling pest plants and pest animals in order to allow native species to establish successfully.

Programme of works

An environmental programme has a five-year planning period. For Lakeside Farm, the works schedule (overleaf) is mostly based on two Protection Areas (map opposite). Protection Area 1 is all of the retired land that adjoins Lake Te Aute. Protection Area 2 is the thin strip of bush further inland.
### Table: Programme of Works

<table>
<thead>
<tr>
<th>Year ending 30 June 2007</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Protection Area 1: An alternative water supply will be constructed. Approximately 2,900 m of protection fence will be constructed. Pest control will begin.</td>
</tr>
<tr>
<td></td>
<td>Protection Area 2: Pest animal control and pest plant control will begin.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year ending 30 June 2008</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Protection Area 1: 3,000 native plants will be established. Pest plant and pest animal control will continue.</td>
</tr>
<tr>
<td></td>
<td>Protection Area 2: 1,700 metres of protection fence will be constructed. Pest animal control and pest plant control will continue, 300 native plants will be established.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year ending 30 June 2009</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Protection Area 1 and 2: Pest animal and pest plant control will continue. The native plantings will have a releasing spray around each plant to kill competing vegetation.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year ending 30 June 2010</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Protection Area 1 and 2: Native plantings will have a releasing spray around each plant to kill competing vegetation. Pest plant and pest animal control will continue.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Year ending 30 June 2011</th>
<th>Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Protection Area 1 and 2: Pest plant control will continue.</td>
</tr>
</tbody>
</table>

### Programme budget

The following table provides a summary of cost estimates for each activity. The numbered areas noted in the table refer to the Protection Areas shown on the previous map. Environmental Programmes attract community grants from both the regional and district council (up to 75% of costs for certain activities).

### Table: Budget (example)

<table>
<thead>
<tr>
<th>Year</th>
<th>Area</th>
<th>Activity</th>
<th>Cost</th>
<th>Cost Share</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>Protection Fencing</td>
<td>$27,693</td>
<td>$20,770</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternative water supply - bore</td>
<td>$40,000</td>
<td>$4,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Alternative water supply - troughs</td>
<td>$8,000</td>
<td>$4,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pest plant control</td>
<td>$3,136</td>
<td>$2,352</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pest animal control</td>
<td>$2,568</td>
<td>$1,926</td>
</tr>
<tr>
<td>2006/07</td>
<td>1</td>
<td>Protection Planting</td>
<td>$14,850</td>
<td>$10,868</td>
</tr>
<tr>
<td>1</td>
<td>2</td>
<td>Protection Fencing</td>
<td>$15,438</td>
<td>$8,491</td>
</tr>
<tr>
<td>2</td>
<td>All</td>
<td>Pest plant control</td>
<td>$2,262</td>
<td>$1,698</td>
</tr>
<tr>
<td>2007/08</td>
<td>1.2</td>
<td>Protection Planting</td>
<td>$882</td>
<td>€€€</td>
</tr>
</tbody>
</table>

### Commitment

Grants allocated through Environmental Programmes can be substantial, so councils require the signing of a legal agreement to protect the investment of public money. This is an agreement to preserve protection areas and other works, and is registered against the property title.

### Acknowledgements

Acknowledgements: Mel Whiting (Environment Bay of Plenty).
Introduction
The Sustainable Land Use Initiative (SLUI) aims to reduce accelerated hill country erosion in the Manawatu-Wanganui Region, primarily through the preparation of Whole Farm Plans for farmers by Horizons Regional Council. Whole Farm Plans are a Level 3 LEP with a strong business emphasis. The Rainey Farm was one of the first to go through the SLUI Whole Farm Plan approach.

The farm
A 357ha summer-moist hard-hill country property producing 8020kg pasture DM/ha/yr, and running 3420 su mostly as a high performance sheep flock (89:11 sheep:cattle) across an effective area of 335 ha (10.2 su/ha). Approximately 90% is hill & steepland with a mudstone/sandstone base, with only 14 ha being suitable for cultivation.

SLUI approach
Three professional planners are involved in the preparation of a SLUI Whole Farm Plan. Firstly, an independent surveyor visits the property to map Land Resource Inventory (LRI) and Land Use Capability (LUC) with help from the farmers. A wide range of sustainability issues are assessed, including pasture potential and nutrient management. Recommendations are made on opportunities for production improvement, sustainable resource management, and best management practices for environmental management.

Secondly, a business farm consultant undertakes a production and financial review of the farm business. Benchmarking is used to compare farm performance against local performance indicators. New business options for achieving farm goals and aspirations are identified in consultation with the farmers, and analysed to determine possible improvements.

Thirdly, a regional council officer negotiates the development of a five-year strategic plan. This includes an environmental programme and a business strategy. The council officer will help with plan implementation (including sourcing regional grants), and should aim to review progress of the plan annually.

Land and environment assessment
Land resources of the Rainey Farm were assessed by an independent specialist according to the Land Use Capability (LUC) technique. Water resources and natural heritage were also examined. Each LUC unit was broken down according to its characteristics, strengths, limitations, & considerations for future use. Erosion severity ranged from slight to moderate, mostly as soil slip, gully, and earthflow erosion types. The farm contains five sub-catchments, 10.4km of perennial waterways, and 25 dams & ponds. Many waterways already have good riparian vegetation. Sediment contribution via surface erosion in one catchment was likely to be high. There are three sizeable bush fragments and a large wetland, none of which are protected from livestock. Scrub continues to colonise a few low-fertility areas of some of the more marginal steepland.

Pasture potential
Current & potential levels of pasture production were calculated from LUC units, stocking rates & pasture cuts. Current whole farm pasture yield = 8020kg DM/ha/yr, while potential yield =10,400kg DM/ha/yr. Realising the potential is mostly dependent on attaining Olsen P values of 20 across the hill country. Subdivision into a further 6-10 paddocks would improve utilisation.
Flat to gently undulating terraces with yellow grey earths developed on loess.

River flat terraces with sandy or stony free draining soils.

Rolling to strongly rolling slopes formed from patchy andesite tephraover siltstone or mudstone.

Steep to very steep slopes of consolidated siltstone.

Moderate steep to steep slopes of consolidated sandstone.

Steep to very steep slopes of consolidated massive sandstone.

Very steep slopes formed from moderately consolidated sandstone and siltstone.

Steeply to very steeply sloping terraces formed from loessisols with alluvial soils varying in texture from course sandy to bouldery.

Steeply to very steeply sloping terraces formed from loessisols with alluvial soils varying in texture from course sandy to bouldery.
<table>
<thead>
<tr>
<th>Issue</th>
<th>Description</th>
<th>Location</th>
<th>Priority</th>
<th>Best practice</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND</td>
<td>Surface erosion</td>
<td>Vle8</td>
<td>3</td>
<td>Care with cultivation to prevent severe rill and sheet erosion.</td>
</tr>
<tr>
<td>LAND</td>
<td>Surface erosion</td>
<td>Vle2, Vle8, Vle15</td>
<td>3</td>
<td>Maintain pasture sward through grazing management and fertility.</td>
</tr>
<tr>
<td>LAND</td>
<td>Streambank erosion</td>
<td>Ilisi2</td>
<td>2</td>
<td>Strategic armouring of streambanks at pressure points using willows and poplars. Particularly important near infrastructure.</td>
</tr>
<tr>
<td>LAND</td>
<td>Slump &amp; earthflow erosion</td>
<td>Vle8, Vle13</td>
<td>2</td>
<td>The first objective is to protect the toe of the slope using space planted poplars. The second priority is to plant up ephemeral watercourses. Some existing planting needs more poplar planting to increase the density to an effective level.</td>
</tr>
<tr>
<td>WATER</td>
<td>Stream protection</td>
<td>Stock access to streams</td>
<td>Watercourses</td>
<td>2</td>
</tr>
<tr>
<td>WATER</td>
<td>Water supply</td>
<td>Some of the dams are providing poor quality water and need cleanout to stock.</td>
<td>Pastoral hill country</td>
<td>2</td>
</tr>
<tr>
<td>WATER</td>
<td>Contaminants</td>
<td>Sediment or nutrients in surface runoff</td>
<td>Pastoral units</td>
<td>3</td>
</tr>
<tr>
<td>WATER</td>
<td>Fertilizer use</td>
<td>Discharge to watercourse</td>
<td>Overuse</td>
<td>Pastoral units</td>
</tr>
<tr>
<td>BIODIVERSITY</td>
<td>Indigenous bush</td>
<td>Formal protection</td>
<td>Bush blocks</td>
<td>3</td>
</tr>
<tr>
<td>BIODIVERSITY</td>
<td>Possums</td>
<td>Bush blocks</td>
<td>3</td>
<td>Shooting and poisoning.</td>
</tr>
<tr>
<td>BIODIVERSITY</td>
<td>Exotic plantings</td>
<td>Replace old poplars</td>
<td>Road face &amp; Lanes</td>
<td>1</td>
</tr>
<tr>
<td>BIODIVERSITY</td>
<td>Shading effects of poplars and multiple leaders</td>
<td>Pastoral units</td>
<td>2</td>
<td>Form pruning of poplars for ease of future management. This will require pruning to one main leader in year three.</td>
</tr>
</tbody>
</table>

**Table: Environmental assessment and summarised recommendations for the Rainey farm (extract).**

**Fertiliser & nutrient management**
Land Management Units were created for a full fertiliser & nutrient analysis using the Overseer Nutrient Budget tool. Low Olsen P values for two LMUs are limiting production significantly, and partly explain poor legume performance in one unit. Lifting Olsen P values to 20 across the whole farm will provide the property with a noticeable boost to production. Risk of N-leaching & P-runoff is small. Greenhouse gas emissions were slightly above the NZ farm average.

**Production & financial assessment**
Production and financial position were described and evaluated independently using the Profit Check database system. Analysis showed good performance against common farm business indicators, which demonstrates the property is currently operating under excellent management & strong all-round business performance. Key limitations include the challenging production environment, and the current scale of operation.
Environmental works programme
Mitigations & solutions were recommended for erosion, water resources, and natural heritage. A Works Programme map was produced to show where activities should be directed (map opposite). This was backed with a 5-year planning schedule to break the recommended activities down into manageable steps (table below). A budget was produced to show how much it would cost. Key recommendations include:

- Space planting soil conservation trees across hill faces and gullies with the greatest erosion risk.
- Maintain existing soil conservation plantings (including some felling & removal).
- Install 6 small sediment retention dams in the at-risk catchment
- Consider fencing some bush areas under the QEII National Trust. Protect the natural wetland.
- Evaluate the economics of the forestry blocks.
- Eradicate Old Man’s Beard.
- Formalise retirement of Class 8 land. Begin retiring the marginal scrub blocks into native bush.

### Five year proposed works programme

<table>
<thead>
<tr>
<th>Issue</th>
<th>Specific issue</th>
<th>Priority</th>
<th>Year 1</th>
<th>Year 2</th>
<th>Year 3</th>
<th>Year 4</th>
<th>Year 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>LAND</td>
<td></td>
<td></td>
<td><strong>Surface erosion</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Care with cultivation to prevent unnecessary sheet &amp; rill erosion</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>→ ongoing activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Maintain pasture sward through grazing management &amp; fertility</strong></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>→ ongoing activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Streambank</strong></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Protection of streambanks using willows &amp; poplars. Minimise stock access.</td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>→ ongoing activity</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Slump/ earthflow</strong></td>
<td>2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Poplar planting @ toe of erosion. Increase density of existing plantings.</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Gradually aim to space plant the ephemeral waterways</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>→</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Soil slip erosion</strong></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Space planting of alders in Mongrel &amp; Whare paddocks</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Space planting 100 poplars middle and Sues paddocks</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Space plant 150 poplars in Goodys &amp; Richards</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Space plant 150 poplars in Marks and McCoards</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Space plant 150 poplars in Kristins, Bunny’s and Bills</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Evaluate benefit of planting Block with Cypress lucitania.</strong></td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Plant Lane paddock with poplars at 10 metre spacings</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Evaluate 2008 cost-benefit of planting Block A with Cypress lucitania</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Planting of Block C with native species</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td><strong>Nutrient balance</strong></td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Completely retire</td>
<td>→</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>→</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
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<td></td>
<td></td>
<td></td>
<td><strong>Soil slip</strong></td>
<td>2</td>
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<td>Soil tests &amp; nutrient budgets</td>
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<td>Soil testing and nutrient budgeting</td>
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<td>Soil testing and nutrient budgeting</td>
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</tr>
</tbody>
</table>

Table: An extract from the proposed works programme.

Business strategy
Business was analysed in terms of how it can support the Rainey’s personal & professional aspirations. Good all-round performance actually limits the identification of future business opportunities. Meeting longer term goals requires the development of a succession plan and a business growth plan.

Monitoring & follow up
Horizons Regional Council will follow up on the plan with advice, implementation support, and any future considerations. Monitoring actual environmental changes was recommended through the use of practical monitoring kits.

Acknowledgements: Jim & Ruth Rainey, AgResearch, Horizons Regional Council (funding & initiative), Greg Sheppard Farm Consultancy (business), and LandVision (land & environment).
RECOMMENDED WORKS

J & R RAINLEY
Kawhatau Valley Road

Afforestation A block (7 ha)
Afforestation B block (3.9 ha)
Afforestation C block (0.8 ha)
Wetland enhancement (0.3 ha)
Indigenous bush retirement (10.2 ha)
Managed retirement (28.7 ha)
Debris dams
Gully plantings
Space planted poplars

The Sustainable Land Use Initiative (SLUI) aims to prepare Whole Farm Plans for:
1. Half the Region’s most at-risk farms by 2015
2. Half of all the Region’s farms by 2015
3. 90% of the Region’s most at-risk farms by 2020

Information produced by Landvision Ltd, 2006. Map by AgResearch. Aerial photography flown Jan 2005 by Laurie Collins & Associates Ltd. 50cm resolution. Orthorectified to remove camera & terrain distortion by AgResearch.

This map is reproduced as the Operational Plan to show the breakdown of works on an annual basis.

Page 27
Introduction
Comprehensive Farm Plans are Level 3 type LEPs prepared for farmers by the Hawkes Bay Regional Council.

The farms
Foley Bros is an agribusiness run by Rob & Sandra Foley and Will & Kirsten Foley that encompasses several farming blocks across the Hawkes Bay. The Comprehensive Farm Plan is for the Takapau blocks, totalling 616 hectares of flats (39%), rolling downlands (33%) and hill country (18%), which is used primarily for finishing lambs, steers and bulls, along with a degree of cash and fodder cropping. The Foley Bros operation employs 3 fulltime and two part-time staff, winters 12 500 stock units (peaks at 20 000 su), and runs 7000 Romney breeding ewes at 145% lambing.

Foley Bros is one of the farming operations involved in MWNZ’s Hawkes Bay High Performance Farming Systems programme, and they were recently awarded the FMG Rural Excellence Award. They are regarded as one of the industry’s top agribusinesses.

Resource description & assessment
Resources were described according to the Land Resource Inventory (LRI) system, where five physical factors are recorded by land unit (rock type, soil, slope, erosion & vegetation). Soils were described in detail (table below).

<table>
<thead>
<tr>
<th>Soil type</th>
<th>Parent material &amp; LUC</th>
<th>Site</th>
<th>Soil profile</th>
<th>Physical mgt</th>
<th>Profile drainage</th>
<th>Other info</th>
</tr>
</thead>
<tbody>
<tr>
<td>Takapau sandy loam</td>
<td>Allophanic (107.3ha)</td>
<td>Flat terrace</td>
<td>30-60 cm to gravels</td>
<td>Yellow brown</td>
<td>Well drained</td>
<td>High P retention</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandy loam to gravels</td>
<td></td>
<td>Rapid infiltration Water table &gt;120cm</td>
<td>Allophanic Cultivate</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weakly developed Fine crumb</td>
<td></td>
<td></td>
<td>when moist</td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Irrigation efficiency</td>
</tr>
<tr>
<td>Poporangi silt loam</td>
<td>Pallic (21.4ha)</td>
<td>Flat terrace</td>
<td>45-60 cm to duripan</td>
<td>Yellow Brown grey</td>
<td>Imperfect drainage pan at 60cm water perches between 30-60cm</td>
<td>Mole drain above the pan</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Silt loam (35cm) over gravel on silty gley layer with pan</td>
<td></td>
<td></td>
<td>P retention medium to high</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Weakly developed Fine crumb</td>
<td></td>
<td></td>
<td>Cultivate when moist</td>
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</tr>
<tr>
<td>Tukituki sandy loam</td>
<td>Recent (10.9ha)</td>
<td>Flood plain – semi-active</td>
<td>15-30 cm on gravels</td>
<td>N/a</td>
<td>Imperfect drainage after wet periods due to location, otherwise well drained</td>
<td>Cultivation difficult due to stoniness</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>Sandy loam to gravels</td>
<td></td>
<td></td>
<td>Low P retention</td>
</tr>
</tbody>
</table>

Table: Soil legend extract showing the level of detail achieved in this Comprehensive Farm Plan.
LRI was classified into Land Use Capability (LUC) units (see map on previous page). Eleven capability units were identified, most of which rated highly in terms of land use versatility, with 94% of the farm capable of sustaining intensive farming practice.

LUC units with similar qualities were further grouped as six suites of Land Management Areas (similar in idea to Land Management Units) for further assessment. Each LMA was assessed in terms of (a) strengths, (b) weaknesses, (c) conditions to ensure sustainable management, and (d) the most suitable land uses, enterprise and management types according to resource capability.

**Productivity potential**
Effective area was calculated by mapping out bush, forestry and other non-pastoral vegetation. Current and potential stocking rate was estimated for each LUC unit (based on pasture growth prediction and local monitoring sites). One particular block was identified as having an appreciable potential for improvement if managed well.

**Soil quality & compaction**
Soil quality was evaluated using Visual Soil Assessment (VSA). Almost all the soils scored highly with a moderate to good ranking. Only one paddock scored appreciably low. However, large areas were rated as having a high compaction risk under cultivation and cattle wintering. A compaction risk map was created to help plan winter stocking and cropping regimes.

**Water quality**
A Riparian Habitat Assessment was undertaken for seven streams. Where streams were fenced and vegetated, the scores rated highly, but unfenced zones where stock had direct access rated poorly.

**Resource management plan**
A wide spectrum of land and environment issues were ranked in terms of priority (low, medium or high), and specific, targeted mitigation solutions and control measures were recommended. In recognition that some work was already underway, stocktaking was provided on where the Foley’s are currently with their land and environment management, and where to direct future activities. An action plan was prepared for erosion, riparian management, shade & shelter, and biodiversity & wetlands (map opposite).

**Summary of the process**
This is an example of an Advanced Level LEP prepared by a professional. A council surveyor visited the farm, consulted with the Foley’s, and then described the resource, assessed land capability, and prepared a comprehensive report that included a full environmental management plan and cartographically-correct farm maps. Achieving a professional standard qualified the farm for regional grant funding (financial assistance to help implement environmental works).

**Acknowledgements:** Rob and Sandra Foley and Will & Kirsten Foley, Simon Stokes (HBRC), Meat and Wool NZ.
Recommended management
- Archaeological sites
- Drain management
- Riparian management
- Riparian management + wetland + woodlots
- Paddocks with, or require, shelterbelts
- Recommended for slope planting

1 - 7 Streams requiring special management as discussed in the Farm Plan document
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NEW ZEALAND

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Examples of completed Land and Environment Plans