LEVEL 2

LAND AND ENVIRONMENT PLAN GUIDELINES

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BY FARMERS. FOR FARMERS

steps

PREPARE FARM MAP
Map fences, waterways, etc. on to an aerial photo

MAP LAND RESOURCES
Identify areas of similar landform, slope, soil type etc

GENERATE LMU'S (A)
Group by similar requirements into Land Management Units

STRENGTHS AND WEAKNESSES (B)

RESOURCE CHART (C)
Describe resources by land type

NUTRIENT CHART
Describe resources by land type

YIELD GAP
Current vs potential pasture production estimate

RESPONSE PLANNING
Plan what, how, when and how much

IMPLEMENT
Carry out activities, review and update

REVIEW
Review and update at least annually

Level 2 LEP guidelines

These guidelines provide a step-wise approach for the preparation of Level 2 Land and Environment Plans. The principal aim is to identify Land Management Units (LMUs), which are used as a basis for nutrient budgeting, assessing strengths and weaknesses, and estimating farm yield gap.

To complete this Level 2 LEP will need an aerial photo for mapping purposes – refer to farm map section 1a).

Instructions

Preparing a Level 2 LEP involves mapping land into units, and then assessing those units for land and environment purposes. Key steps are summarised as:

- Stocktake the farm's land and soil resources
- Develop Land Management Units (LMUs)
- Use LMUs as a basis for nutrient budgeting, strengths and weaknesses analysis, and yield gap appraisal
- Summarise opportunities for more sustainable farming as a three-year response plan.

While Level 2 may be more challenging than a Level 1 LEP, you do not have to do it all on your own. Help and resources are often available from a range of sources e.g. some regional councils, or rural consultants can be contracted.

This LEP should be reviewed each year to assess progress, carry over any incomplete activities, and to consider new issues if and when they arise.

Contact you local Beef + Lamb New Zealand regional extension manager for assistance or further information about land and environment planning. Contacts are provided on back page.

By completing this Level 2 LEP you will be joining the growing number of farmers using good management tools to future-proof their farms.

1) Prepare a farm map

Create a farm map that shows sites of interest for land and environment planning

a) Obtain an aerial photo (copy)

- Most farmers already have an aerial photo or an orthophoto of their farm. These can be obtained on-line, from commercial suppliers, rural practitioners, or your local regional council may be able to help. Photography outlets, printers, copy centres and desktop publishers can provide large format copies and resizing.
- Orthophotos are strongly recommended because they have been digitally corrected to remove distortions caused by camera tilt, lense curvature, and terrain uneveness.
- Make at least three copies of the farm photo. Minimum size should be A3 (297 x 420 mm), but larger is always easier for farm mapping. Spanning the farm photo across two or three A3 size pages achieves a detailed scale but also retains manageability.
- Increasingly there are electronic mapping or planning packages available so you can create your map on your computer, including separate layers for different features e.g. waterways, fences, pipelines. Most packages can be integrated with other software such as Overseer® for nutrient budgeting, or farm business planning packages.

b) Map relevant features

- Mark in a North arrow and give the map a name (e.g. Smith's Farm Map).
- Map features of interest. These can be natural (e.g. wetlands, waterways) or constructed (e.g. buildings, tracks). Minimum features to map include:
  1. The farm boundary.
  2. All fencelines, including those adjacent to waterbodies.
  3. Key structures like buildings, storage sheds and yards, raceways, tracks, bridges, crossings or fords.
  4. Permanent and intermittent water courses, streams, drains (including tile drains), lakes, ponds or wetlands.
  5. Silage, offal or refuse pits, feeding or stock holding areas, effluent storage ponds, effluent blocks.
  6. Location of riparian vegetation adjacent to waterways, areas of significant indigenous biodiversity (identified in your local District Plan) or protected (covenanted or fenced) bush or landscapes.
  7. Woodlots or forestry, and sizeable areas of bush and scrub.
  8. Include any other features that may be relevant. Suggestions are given in the list below.
- Use symbols, lines, hatching and colour to differentiate features (see examples opposite).
- Create a legend that lists and describes what each map symbol represents.

Additional features for consideration

- Riparian zones
- Wetlands
- Fenced bush (QE II)
- Shelterbelts
- Stock fords
- Bores
- Waterways and unprotected riparian areas
- Conservation trees
- Woodlots/forestry
- Detention dams and other structures
- Dumps, offal holes
- Prevailing wind direction
- Archaeological sites
- Chemical storage sheds
- Runoff points to water (dips, yards, tracks)
- Power pylons, pipelines, easements
- Cultural sites
- Pest control areas

The endpoint of this step is a Farm Map for LEP purposes. An optional refinement is digitising or scanning the map for presentation purposes.

2) Map the land resource

Create a stock take of your farm's natural capital

a) Divide the farm into primary landforms

- Primary landforms are easy-to-recognise differences in the landscape associated with changes in geology, morphology (shape and form), slope, and other physical factors.
- Map out primary landforms on a separate aerial photo copy or layer (if using electronic mapping). Start with the obvious, like separating flat land from hilly areas. Then focus on each primary landform and break it down further. For example, it may be possible to break hilly areas into gorges, valley floors, steepland, rolling hills, etc.
- If only one landform is evident (e.g. a completely flat farm) then move onto the next step.

Landform examples

- Mountain land
- Hill country
- Alluvial flats
- Terraces
- Gorges
- Steepland
- Rolling hills
- Valley floors
- Scarp slopes
- Ridge tops
- Swamps
- Basins
- Glacial moraine
- Dunes
- Flood plains

b) Focus and refine

- Focus on a single landform. Are there areas within the landform that have other physical differences? Consider soil types, drainage, dryness, pasture production, and other physical characteristics and qualities. Examples are given below.
- Repeat the same exercise for each landform, mapping each major difference as a new land type.
- Create a legend with names that describe each land type.

Land characteristics and qualities to consider

- Natural drainage
- Dryness
- Iron or clay pans
- Changes in geology
- P retention status
- Soil depth
- Erosion – existing and risk areas
- Aspect
- Stoniness
- Flooding frequency
- Elevation
- Contour and slope
- Workability (easy to plough?)
- Soil texture (e.g. clayey, sandy, etc.)

Alternative methods

Some farms already have detailed land resource maps. This may be a soil map, or a Land Resource Inventory (LRI) and Land Use Capability (LUC) map surveyed by a regional council or catchment board at the farm scale (e.g. 1:5,000 to 1:20,000). These can be used as an alternative, rather than preparing a new land resource map.

All of New Zealand has been surveyed at the regional scale (1:50,000 and 1:63,360). While the level of detail is too coarse for farm management purposes, maps at this scale are useful starting points for further investigation. Soil maps are available for most areas. Land Resource Inventory Worksheets and the NZ LRI database are available for all of New Zealand. Copies or extracts may be obtainable from local libraries, on-line through CRIs such as LandcareResearch, farm mapping companies, fertiliser companies, and regional councils.

Coarse-scale soil and LRI information can be useful in most cases. However, when using at farm scales it is important to validate what these maps claim, and refine the detail so that they better reflect differences within farms.

The endpoint of this step is a map of farm land-resources which will be used as a basis for generating Land Management Units (LMU).

Example landform mapping

Each farm will be different in how it can be broken down into landforms. For this Waikato example, the following steps were used.

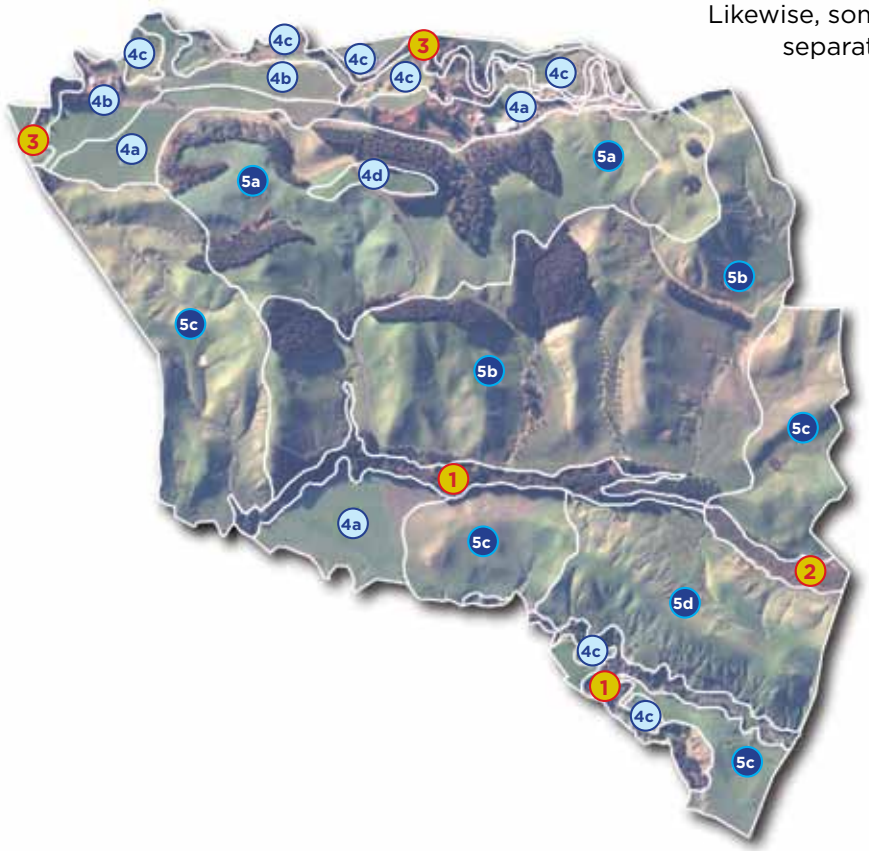
a) The most distinctive landforms were mapped.

1. Ungrazed gully systems.
2. A large wetland area retired from grazing.
3. River bed and adjacent areas that flood regularly.

These areas were easy to identify. Once they had been mapped out, then the remaining land could be focused on more clearly.

b) Flat areas were mapped.

- 4 Firstly, all flat areas were mapped as one unit. They were then broken down further according to the following differences:
- 4a Extensive elevated terrace that never floods, and has very deep and well drained soils.
- 4b Slightly lower river terrace that has flooded. Finer textured soils with relatively poor drainage.
- 4c Low river terraces that flood often. Sandy and droughty soils, and some patches of gravel.
- 4d High terrace +100m above the river. Absolutely flat and has river stones in the soil profile.



c) Hill country was divided into best and worse land

- 5a Front sandstone hill country. Easy rolling for the most part with deep free draining soils. Particularly good for winter brassicas. Catches the winter sun and less droughty than the back hills (5b).
- 5b Back sandstone hill country. Much steeper than the front hill country, with shallower and drier soils. Only one paddock can be cultivated. Slightly softer sandstone base because water channels can cut down quickly in heavy rain.
- 5c Strongly rolling hill country. Sandstone is mostly uncemented, and in places it is more like deep raw sand. High soil P levels and it grows good grass, but very prone to slumping and pugging in winter. This type of hill country has the highest local site index for growing radiata pine.
- 5d Steep and unstable hill country. Has the same sandy base rock as 5c, but the extra steepness makes erosion particularly active. Only thin soils remaining on the steepest parts. Gets very wet in winter (lots of rushes), but it's the first part of the farm to dry out in summer.

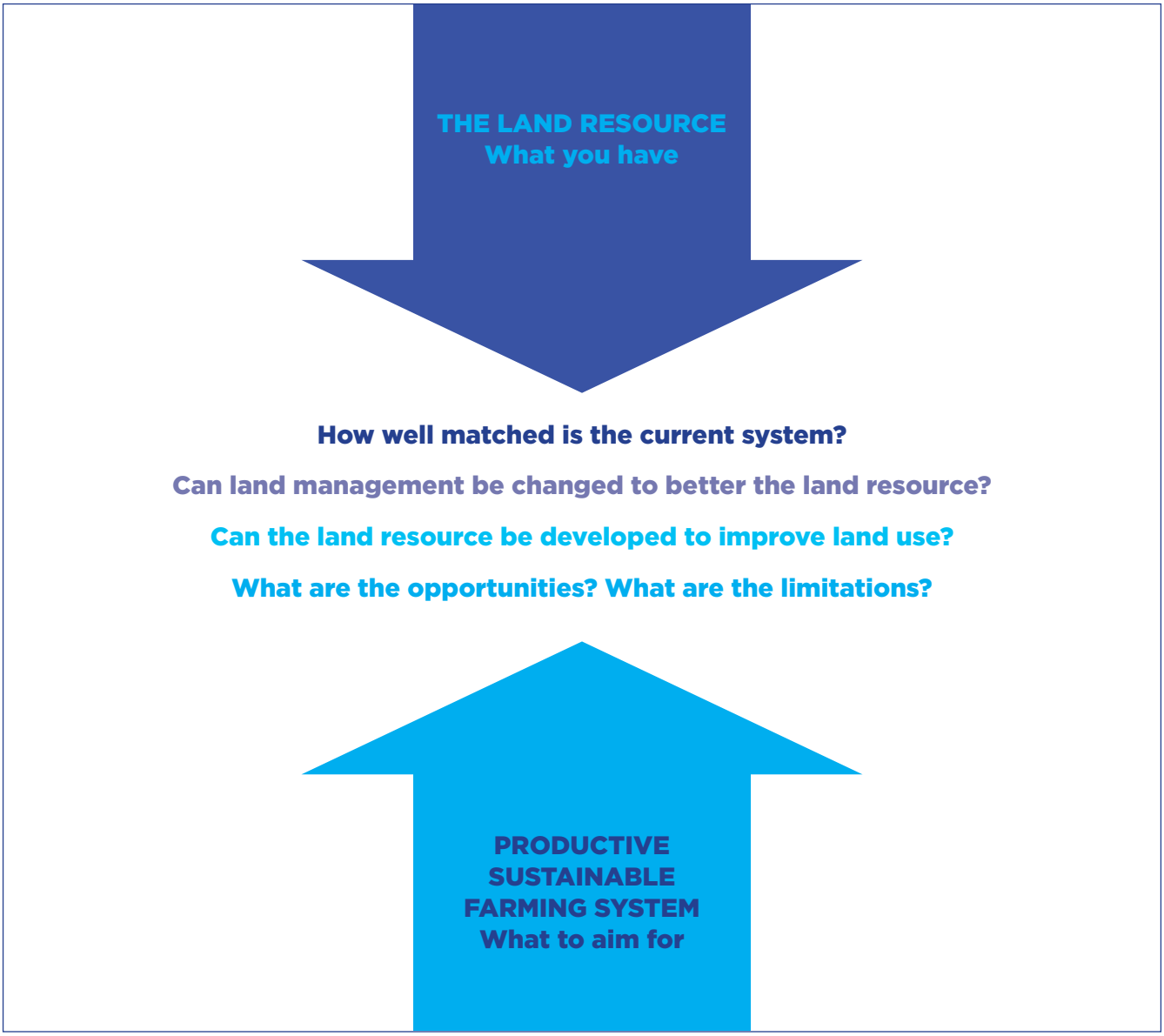
This map was refined further to identify all the potentially arable hill country, and patches of poorly drained soils found throughout the terrace flats. Likewise, some of the steepest slopes were mapped separately as potential woodlot sites.

3) Land Management Units (LMUs)

Land Management Units (LMUs) are areas of land that can be farmed or managed in a similar way because of underlying physical similarities. They can represent a static snapshot of how land is currently used, or an insight into how land could be used if all physical opportunities were realised.

Designing new Land Management Units involves three simultaneous steps. These include grouping similar land types (Step 3a), evaluating strengths and weaknesses (Step 3b), and developing a summary resource chart (Step 3c). Read through all the steps before starting on LMU design.

LMUs represent farming's interaction with the physical landscape. The idea is to better clarify what you have (the land resource) so it can be better matched with what you need (a productive sustainable farming system).



3a) Design Land Management Units (LMUs)

Create a map of Land Management Units

Group similar land types into LMUs

- Aim to aggregate the many different land types into a more manageable set of LMUs.
- Firstly, name all tree blocks (e.g. forestry, bush) as one or two LMUs. These areas require different management by default. Many small areas can be grouped as one LMU (e.g. patches of bush).
- For the remainder, consider each land type individually. What makes it different? Does it have favourable qualities? Unfavourable qualities? Can it be grouped with other similar land types?
- You may already have different management blocks. There may be a lambing block, beef unit block, cropping block, back country block, and so on. Map these existing management blocks against your Land Resource Map. Based on the resources, strengths and weaknesses identified, are there any opportunities or constraints in the current management blocks that could be changed to better use your land?
- Now is a good time to start a strength and weakness analysis (Step 3b) and resource chart (Step 3c). This is a 'chicken or egg' process because it requires describing the LMU, and assessing strengths and weaknesses of the LMU, as part of the actual LMU development process.
- LMUs are meant to be practical so use existing fencelines to define unit boundaries (unless you identify an opportunity that requires changes to fence lines). Other factors to consider when drafting LMUs are listed below.

Other considerations for the design of LMUs

- Riparian zones
- Areas at different stages of development
- Erosion management areas
- Areas that flood
- North and south facing slopes
- Wetlands
- Fragile soils
- Pugging management areas
- Weed or pest control areas
- Size: Is it big enough to be managed differently?
- Stock risk areas (gorges, liver fluke, tutu, tomos)
- Climate: Does exposure to wind limit options for use?
- Accessibility: Does access limit use?
- Distance from services and facilities

3b) Strengths and weaknesses

Evaluate the strengths and weaknesses of each LMU

List strengths and weaknesses of each LMU

- A strength is a favourable land quality, while a weakness is a not-so-favourable quality.
- What is defined as a strength or a weakness depends on the management purpose being considered. For example, stoniness may be a weakness for cropping, but it may represent a strength for winter grazing of cattle (to avoid pugging).
- Prepare a draft table of strengths and weaknesses for each (developing) LMU. As you work through the table you may identify opportunities that require LMUs to be modified. Examples of possible strengths and weaknesses are listed below.
- When LMUs are finalised, strengths and weaknesses are recorded in the resource chart (Step 3c).

Examples of possible strengths

- Free draining
- Deep topsoil
- Good soil moisture- holding ability
- High natural fertility
- Good soil structure
- Balanced soil texture (e.g. loam)
- Resistant to pugging
- Well aerated
- Optimum P,K,S levels
- Optimum pH
- Flat land
- Naturally sheltered
- Warm aspect
- Stable (no erosion)
- New pasture
- Good pasture quality
- Well sheltered by trees
- Artificially drained
- Low insect risk
- Low in weeds
- Good stock access to water
- Good machinery access

Examples of possible weaknesses

- Poorly drained
- Shallow topsoil
- Poor soil moisture- holding ability
- Low natural fertility
- Poor soil structure
- Too much clay or sandy
- Susceptible to pugging or compaction
- High water table
- High nutrient leaching
- High runoff risk
- Excessive stoniness
- Hot dry aspect
- Wet cold aspect
- Droughty
- Erosion prone
- Flooding risk
- Low quality pasture
- Excessively steep
- Exposed
- Weeds or pests are a problem
- Poor stock access to water
- Small or fragmented
- Poor machinery access

3c) Resource chart

Describe and record the characteristics, strengths, and weaknesses of each LMU

Describe the physical characteristics of each LMU

- Prepare a resource chart. An example is provided over the page. A chart can be written up on paper, or generated using a computer (e.g. a spreadsheet).
- Refer back to the farm resource-map to describe physical characteristics of each LMU.

Record strengths and weaknesses

- Record strengths and weaknesses under the appropriate headings.

The endpoint of Step 3 is a map of Land Management Units and a resource chart describing characteristics, strengths and weaknesses

Example of a resource chart

LMU	DESCRIPTION	STRENGTHS	WEAKNESSES	USES AND MANAGEMENT
1. Bush Blocks	Scattered bush fragments unfenced	• Shade and shelter • Aesthetics	• Possum refuge • Trees are not pasture	• Fence off and protect • Possum control
2. River flats	Flat sandy soils, stones in patches	• Cultivable • Sheltered • High K reserves • Well drained and resilient to pugging	• Dry • Patchy production • Minor flood risk • Small area away from main access	• Irrigation • Deer • Lamb finishing • Intensive beef
3. Gorge block	Steep sided gorge with sandstone bluffs and scrub	• Sheltered and dry • Accessible	• Steepness • Possums • Difficult to muster • Erosion prone • Flash floods in creek	• Emergency feed • Retire • Emergency protection for ewes after shearing
4. Stoney hills	Rolling hills with well developed but dry soils on gravels	• Well drained • Resilient to pugging • Easy contour	• Tunnel gullying • Dry • Poor pasture species • Gorse • Exposed	• Grapes • Cattle wintering • Requires shelter belts • K line irrigation
5. Wet hill country	Developed mudstone hill country	• Large area • Holds on through summer • High natural fertility	• Rushes • Earthflow erosion in spots • Pugs up in winter	• No cattle in winter • Add space planted trees

4) Nutrient budget

Purpose is to quantify farm nutrient balance using Land Management Units

Prepare LMUs for nutrient budgeting

- LMUs are a common basis for nutrient budgeting. Having already done the LMU component shortcuts the nutrient budgeting process.
- LMU areas need to be calculated for nutrient budgeting. The easiest approach is to add up the areas of individual paddocks contained within a given LMU. If this is not possible, then the next best method is to digitise LMUs using a computer and farm mapping software.

Choose a nutrient budgeting method

Two options are available for preparing a nutrient budget:

1. A basic nutrient budget template for nitrogen and phosphorus can be found in Appendix 1. It requires few inputs (fertiliser, estimate clover, wool yield, stock unit numbers) but is sufficient for gaining an understanding of N-leaching risk, and whether P is being accumulated, mined or lost in storm-water run-off.
2. Have someone qualified in nutrient management e.g. fertiliser rep, farm consultant, extension officer, prepare a nutrient budget using Overseer®. Extra input information is required, but the modelling is robust and outputs are more useful (N-leached, P-loss risk, nutrient depletion for working out fertiliser requirements, and a greenhouse gas budget). Visit the Overseer® web site www.overseer.org.nz to see how it works.

- Overseer® Nutrient budgets are fast becoming a standard component of good management practice (GMP) in modern farming, ensuring continuous improvement through efficient fertiliser use and to help minimise nutrient losses of-farm.

The endpoint of Step 4 is a nutrient budget.

5) Yield gap

Consider the difference between current and potential pasture production levels

Estimate whole-farm pasture yield (current)

- Calculate total stock units for the farm. There are several stock unit conversions available, but the ones below keep the exercise brief. Use your own conversion factors if required.

Calculate total stock units for the farm

Stock class	Enter Stock numbers		Conversion factor		Stock Units
Beef cows		×	5.5	=	
Beef dry		×	4.75	=	
Beef replacements		×	4	=	
Dairy cows		×	7	=	
Dairy replacements		×	4.25	=	
Other cattle		×	5.5	=	
Breeding ewes		×	1	=	
Sheep dry		×	0.8	=	
Sheep replacements		×	0.7	=	
Other sheep		×	0.8	=	
Hinds		×	1.9	=	
Deer for meat		×	1.8	=	
Stags for velvet		×	2.1	=	
Other Deer		×	1.8	=	
			Stock units for the whole farm =		

Convert stock units to dry matter demand

- Estimate the pasture utilisation factor. Sheep and beef farms generally achieve around 70-75% utilisation on average. Hard-hill low-quality pasture utilisation may be as low as 60-65%, while intensive cell grazing of beef may achieve upwards of 80-85% utilisation. Divide the % by 100 to get the factor (e.g. 80% utilisation = 80/100 = utilisation factor of 0.8).
- Calculate dry matter demand by multiplying total stock units by 550 kg DM/yr and the utilisation rate (%). This represents the minimum amount of pasture the farm must be growing to sustain current stock numbers.

Calculate whole farm pasture production (/ha)

Stock units			Utilisation factor*		Whole farm yield		Effective area (ha)		Yield per ha
	× 550	÷		=		÷		=	
			*Utilisation % divided by 100		kg DM/yr				kg DM/ha/yr

Estimate relative yield between LMUs

- Multiply the pasture yield estimate (kg DM/ha/yr) by farm effective area to get whole farm pasture yield.
- Distribute whole-farm yield between LMUs. There are several options:
  1. Repeat the stock unit calculations using stock numbers for each LMU. Most farmers are able to approximate where different stock are grazed across the farm. This option takes some time, but provides the best estimate.
  2. Use pasture cuts if available. It may be possible to transfer local pasture monitoring results according to similar land types.
  3. Use experience to estimate relative productivity as a percent (%). For example, 70% of the farm's production may be coming from the flats, while the remaining 30% comes from the hill country.
- Build a table that lists each LMU (refer to 3 c) Resource Chart) and the estimate for current pasture yield. Add another column with the heading 'Potential yield'.

Speculate potential pasture yield

- What could each LMU produce if all physical limitations were overcome? Think about how pasture yields or stocking rates could increase for each LMU if limitations could be removed. Examples are provided below.

Management activities to overcome physical limitations

- Achieve optimal pH
- Establish shelter
- Irrigation
- Ripping
- Fully effective pugging management
- Artificial drainage
- Flipping
- Aeration
- Achieve optimal nutrient status
- Optimal subdivision
- Stone picking
- Stopbanks
- Full stock access to water, shelter and shade
- New pasture species
- Fully effective weed and pest control
- Fully effective erosion control

List each new estimate of potential production in the table, and sum to see what it may mean for whole-farm production. If there are realistic opportunities to improve production build them into the response plan (next section).

6) Develop a response plan

This step brings it all together to develop a three-year response plan

Summarise opportunities and environmental issues

- Use the Response template to help you draw up a response plan. A sample reponse plan is shown.
- Review opportunities and environmental issues that were identified at each preceeding step. List each opportunity or issue then describe how it will be managed, addressed, or capitalised upon. Spread the responses across three years if necessary. Elaborate responses so they are SMART (Specific, Measurable, Achievable, Relevant, and Time-bound).
- Rank priority (which response will be implemented first, second, etc.).
- Include an estimate of cost.

RESPONSE PLAN

Issue or opportunity	**Priority** Rank each in order of priority	**Responses** Year 2012	Year 2013	Year 2014
Ongoing soil slip erosion in back country and Sam's.	1	25 Kawa poplar poles with sleeves starting in Sams. Minimum 10 metre spacings. Focus around the wet part of the track. Approx. $200 cost.	Another 30 poles + sleeves. Start planting across the slope heading towards back country. Approx. $230 cost.	Another 30 poles + Sleeves destined for the worst parts of back country. Approx. $230 cost.
Wind erosion in the fornt paddocks (Jame's, Corden and No.2) when cultivated.	4	No cultivation this year. Avoid hard grazing if soils go dry, and especially keep the bulls out.	October barkant turnips. Avoid over cultivating, espec the headlands, and sow early when soils still damp. No tillage no good here. Sow back into pasture before the NW winds start.	Same as 2012
Old man willows along stream have raised the bed and cause flooding and washouts along main access track.	2	1 Find out if the council is supposed to be dealing with the willows. 2 If not find out if it's OK with the council to spray them.	Aim to spray all willows with a helicopter in late summer. Find out cost and if a resource consent is needed. Keep an eye on any regrowth throughout the year.	Aim to get a digger in summer 2014 to clear the stream bed, rip out the willows, and pile the dead wood. Time it so the top two dams can be de-silted.

7) Implement, monitor and review

- Implement each response as indicated
- Monitor and record all your achievements
- Remember to review and reassess each year or earlier if your situation changes
- Register your completed plan at LEP@beeflambnz.com. This way you can be sure to receive the latest news on LEPs and be notified of the latest modules on topics relevant to on-farm land and environment issues.

Congratulations on designing a Land and Environment Plan specifically for your farm.

For full integration with farm business planning you may wish to refer to this LEP when making decisions about farm development and financial planning.

Taking your management to the next level

Level 3 LEPs

Level 3 Land and Environment Plans draw on standards and methods used by professional farm planners. The aim is to continuously improve your management performance and produce a LEP that is auditable by you (e.g. Audited Self Management) or by another person (2nd or 3rd Party Auditing). This enables you to provide demonstrable evidence of Good Management Practices in action on your farm.

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Appendix 1 Basic Nutrient Budget Template

Basic Nitrogen (N) Budget for dry-stock farmers

Inputs

1. Fertiliser

Divide your fertiliser N rating (%N) by 100 and then multiply by your rate of application.
(For example, urea is 46% N, while DAP is 18 percent N)

_____%N x _____kg/ha/yr = [ ] Fertiliser N input kg/ha/yr
100

2. Clover N fixation

Choose the clover N fixation corresponding to the clover content on your farm.

% average annual clover content	Very low 5%	Low 5 – 10%	Medium 15 – 20%	High 25%	Very high 35%
Clover N fixed Kg/ha/yr	35	70	120	180	250

= [ ] Clover N fixed kg/ha/yr

Note: in productive pasture without N fertiliser N, clover is normally about 15 – 20%

Add the shaded boxes from 1 and 2 to give **Total N Inputs =** [ ] Total N inputs kg N/ha/yr

Outputs

1. Stock

Some dry-stock farmers will be aware of their stock units while others prefer to keep track of liveweights as a measure of stock sold off the farm. Choose the measure that best suits your situation.

Multiply the amount of stock sold (SU/ha) by 2 to give you the amount of N/ha/yr you loose in animals.

Stock sold _____ SU/ha x 2 = [ ] N in animals kg N/ha/yr

OR

Multiply your total liveweight sold by 0.03 to give you the amount of N/ha/yr going off your farm in meat.

Total kg liveweight sold _____ x 0.03 = [ ] N in animals kg N/ha/yr

2. Wool

Multiply the amount of wool sold (kg/ha) by 0.165 to give you the amount of N/ha/yr in wool.

Wool sold _____ kg/ha x 0.165 = [ ] N in wool kg N/ha/yr

Add the shaded boxes from 1 and 2 to give **Total N outputs =** [ ] Total N outputs kg N/ha/yr

Note: Bought in feed and feed sold off the farm are additional inputs and outputs that could be included in a full nutrient budget.

Farm Nitrogen Surplus

Subtract your N outputs from you N inputs. This gives your total farm surplus of N – that is, the amount of N left in your system after your product leaves the farm as meat or wool.

N inputs – N outputs = farm N surplus

The higher your farm N surplus, the greater the potential amount of N leaching from your paddocks into drainage and ground water, reducing water quality. Use the table below to assess the N leaching potential on your farm, depending on your farm N surplus.

	Low leaching potential (ground water N below the drinking water standard)	Medium leaching potential (ground water N on or just under drinking water standard)	High leaching potential (ground water N above drinking water standard)
Farm N surplus	Less than 90	Around 115	Above 140

Basic Phosphate (P) budget for drystock farmers

Inputs

1. Fertiliser

Divide the percentage of P in your fertiliser (the P rating) by 100 and then multiply by your rate of application.
For example, superphosphate has about 9 percent P, while DAP and Triple super phosphate have 20 percent P.

_____%P x _____kg/ha/yr = [ ] Fertiliser P input
100 kg P/ha/yr

2. From soil

Add 3kg P/ha/yr to account for the P released by your soil = [ ] P released from soil
kg P/ha/yr

Add the shaded boxes from 1 and 2 to give **Total P Inputs =** [ ] Total P inputs
kg P/ha/yr

Outputs

1. Stock

Some drystock farmers will be aware of their stock units while others prefer to keep track of liveweight as a measure of stock sold off the farm.

Choose the measure that best suits your situation.

Multiply the amount of stock sold (SU/ha) by 0.5 to give you the amount of P_/ha/yr you loose in animals.

Stock sold _____ x 0.5 = [ ] P in animals
kg P/ha/yr

OR

Multiply your total kg of liveweight sold by 0.008 to give you the amount of P/ha/yr going off your farm in meat.

Total kg liveweight sold _____ x 0.008 = [ ] P in animals
kg P/ha/yr

2. Wool

Multiply the amount of wool sold (kg/ha) by 0.01 to give you the amount of P/ha/yr in wool.

Wool sold _____ kg/ha x 0.01 = [ ] P in wool
kg/ha/yr

Add the shaded boxes from 1 and 2 to give Total P Outputs = [ ] Total P Outputs
kg P/ha/yr

Note: Bought in feed and feed sold off the farm are additional inputs and outputs that could be included in a full nutrient budget.

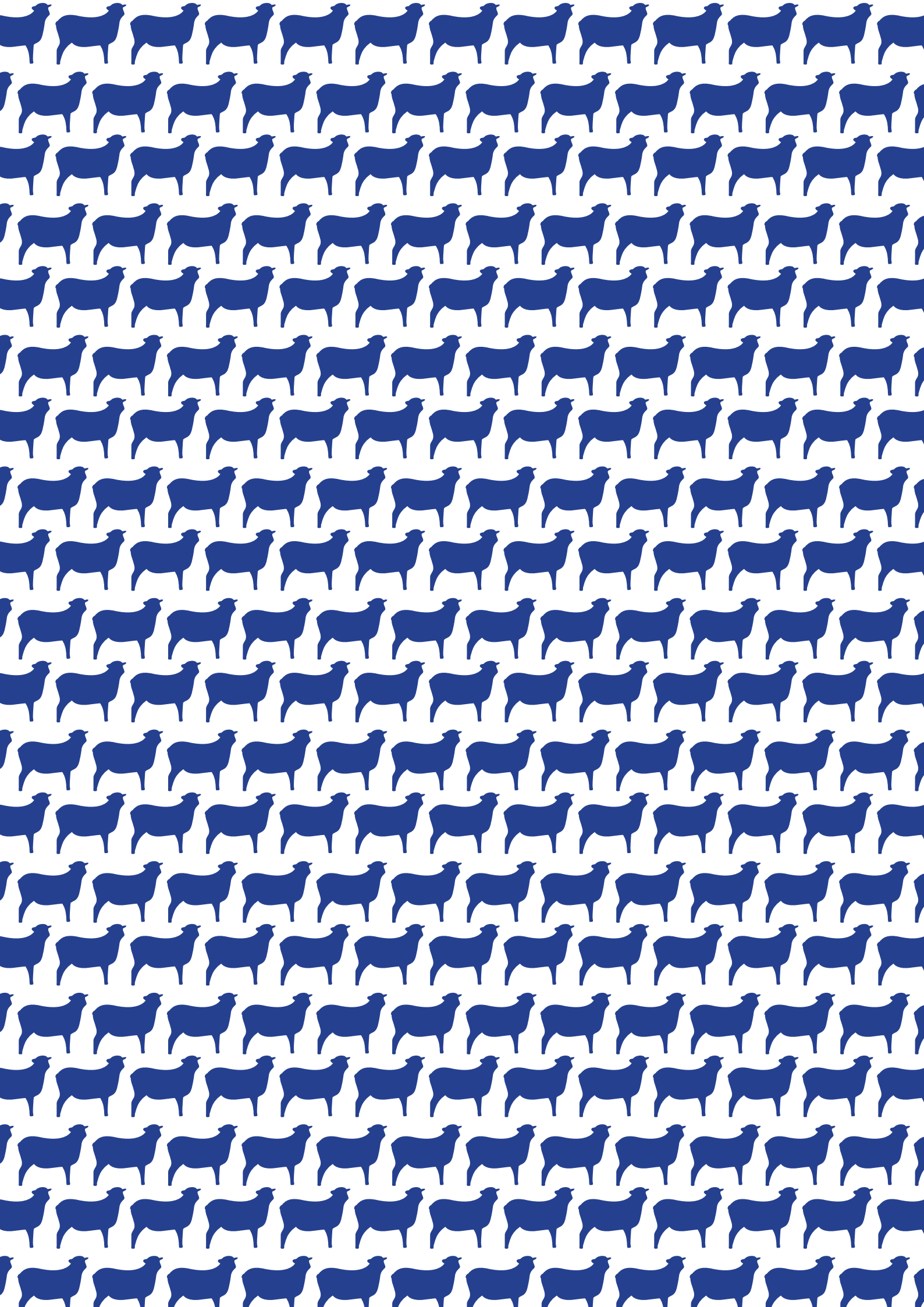
Farm Phosphate Surplus

Subtract your P inputs from your P outputs. This gives your total farm surplus of P – that is, the amount of P left in your system after your product leaves the farm.

P inputs – P outputs = farm P surplus / deficit [ ]

The significance of your farm P surplus depends on your soil's Olsen P status. Assuming your Olsen P is at the optimum level, use the table below to get an idea of the amount of P you are retaining in your soil. If your farm surplus is high, you are more likely to be loosing valuable P to waterways where it reduces water quality.

	Low (could be mining your soil P reserves)	**Medium**	**High** (may be accumulating soil P unnecessarily)
Farm P surplus	Less than 20	20 to 30	Above 30

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