beef+lamb new zealand

GISBORNE

FARM ENVIRONMENT PLAN GUIDELINES

By farmers. For farmers

INTRODUCTION

Gisborne is facing unique challenges with land use and water quality. The Proposed Gisborne Regional Freshwater Plan aims to address these, with Farm Environment Plans (FEP) as its greatest potential tool for implementing the rules and achieving the objectives set by the plan.

While the Beef + Lamb New Zealand FEP can be completed as a standalone document, it is recommended that a Level One Land and Environment Plan is completed first, either at a workshop or as a desktop exercise. Level One guidelines and workshops both offer an introduction to farm environmental risks which will help farmers in completing the Beef + Lamb New Zealand FEP.

A Beef + Lamb New Zealand FEP allows farmers to tailor responses and time frames to their individual businesses. These can be managed one step at a time. Continuous improvement is key and more realistic than expecting everything to be done in one year.

The Beef + Lamb New Zealand FEP is intended to be a living document which is reviewed and updated annually to reflect changes in the business, new risks, and account for actions to manage risks in the previous year. It is intended that this document will help meet farmer's requirements under the Proposed Gisborne Regional Freshwater Plan, and provide a useful tool for farmers to manage their resources using good practice guidelines.

STEPS

ONE
PREPARE FARM MAP

TWO
DEFINE AND DESCRIBE LMUS

THREE
IDENTIFY STRENGTHS AND WEAKNESSES FOR EACH LMU

FOUR
REVIEW NUTRIENT BUDGET INFORMATION

FIVE
LIST ENVIRONMENTAL OBJECTIVES AND OUTLINE CURRENT PRACTICES

SIX
IDENTIFY NEW ACTIONS BASED ON IDENTIFIED RISKS

SEVEN
IMPLEMENT, MONITOR AND REVIEW

GUIDELINES

GISBORNE FARM ENVIRONMENT PLAN

Note that one FEP is needed per property or farming enterprise which may include a number of properties in common ownership. If you own more than one property in the same catchment then one FEP may be enough—check this with the Gisborne District Council.

This guide provides a step-wise approach for the preparation of Gisborne Farm Environment Plans (FEPs).

It has been developed to help Gisborne farmers complete a FEP which satisfies Gisborne District Council (GDC).

An FEP is a way to demonstrate good management to the council, but also identify opportunities for efficiency gains within your business, while showing the wider community that sheep and beef farmers are good caretakers of the land and recording the unique aspects of your property for future management.

An FEP is good for your business as well as the environment.

To complete this FEP you will need:

- An aerial photo or farm map
- The information required to complete the workbook.

We recommend that you complete a B+LNZ Level One Land and Environment Plan (LEP), before doing this FEP, as a way of familiarising yourself with environmental risks that need to be addressed here.

INSTRUCTIONS

This guide includes:

- GDC defined environmental objectives
- A list of common good management practices
- Examples of LMUs (Land Management Units), a map, descriptions, strengths and weaknesses.

Accompanying this guide are:

- GDC and B+LNZ guidelines on stock exclusion from waterways
- GDC information sheets which provide details on bridge and culvert requirements and general FEP requirements for your catchment

By completing this Gisborne FEP and implementing your plan you will be joining the growing number of farmers future-proofing their business.

This FEP should be completed at a B+LNZ workshop or with support from a farm advisor, council representative or other technical advisor. GDC staff, as well as B+LNZ approved advisors will be available at free workshops to answer your questions and help you prepare your FEP. If the seven steps on the left are completed, the workshop facilitator will sign your Farm Environment Plan at the end of the workshop.

ONE
PREPARE A FARM MAP

Create a farm map that shows sites of interest for farm environmental management planning.

Obtain an aerial photo (copy)

Many farmers already have an aerial photo or an orthophoto of their farm. These can be obtained online (e.g. Google Earth), from commercial suppliers, rural practitioners, or GDC. 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, lens curvature, and terrain unevenness.

Make at least three copies of the farm photo. Minimum size should be A3 (297 x 420 mm), but bigger is better for farm mapping. Spanning the farm photo across two or three A3 size pages achieves a detailed but manageable scale.

Increasingly there are electronic mapping or planning packages available so you can create your map on your computer, including separate layers for different items, e.g. waterways, fences, pipelines.

Colour maps or aerial photos are needed—and available from GDC—rather than black and white.

Map relevant features (required)

1. Mark in a north arrow and give the map a name (e.g. Smith's Farm Map).
2. Map features of interest. These can be natural (e.g. wetlands, waterways) or constructed (e.g. buildings, tracks).
3. Minimum features to map include:
   - The farm boundary.
   - All fencelines, including those adjacent to water bodies.
   - Key structures like buildings, storage sheds and yards, raceways, tracks, bridges, crossings or fords.
   - Permanent and intermittent water courses, streams, drains (including tile drains), lakes, ponds or wetlands.
   - Contaminant sources including silage, offal or refuse pits, feeding stock-holding areas, dumps, and chemical storage sheds.
   - Location of riparian vegetation adjacent to water bodies,
   - Areas of significant indigenous biodiversity (identified in your local District Plan) or protected (covenanted or fenced) bush or landscapes,
   - Woodlots or forestry, and sizeable areas of bush and scrub. Any other relevant features, such as those listed below
4. Use symbols, lines, hatching and colour to differentiate features.
5. Create a legend that lists and describes what each map symbol represents.

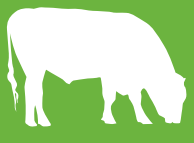
Additional features for consideration (optional)

- Shelter belts
- Bores
- Conservation trees
- Detention dams and other structures
- Prevailing wind direction
- Archaeological sites
- Runoff points to water (dips, yards, tracks)
- Power pylons, pipelines, easements
- Cultural sites
- Pest or weed control areas.

Land use capability mapping

For information on LUC mapping please contact the Land and Soil department at Gisborne District Council on 0800 653 800.

This information is important to consider at this mapping stage of your FEP development and also in the nutrient budgeting section further on.



The endpoint of this step is a **farm map** for FEP purposes.

TWO

LAND MANAGEMENT UNITS

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:

1. Grouping similar land types
2. Evaluating strengths and weaknesses
3. Developing a resource chart.

If a part of the farm is managed uniquely then it should be a separate unit.

How well matched is the current system?

Can land management be changed to use the land resource better?

Can the land resource be developed to improve land use?

What are the opportunities? What are the limitations?

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).

DESIGN LAND MANAGEMENT UNITS

Create a map of Land Management Units (LMUs).

Group similar land types into LMUs

Aim to aggregate the many different land types into a more manageable set of LMUs.

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 (either on a second copy, or on the one already prepared if it is not too cluttered).

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 opposite.

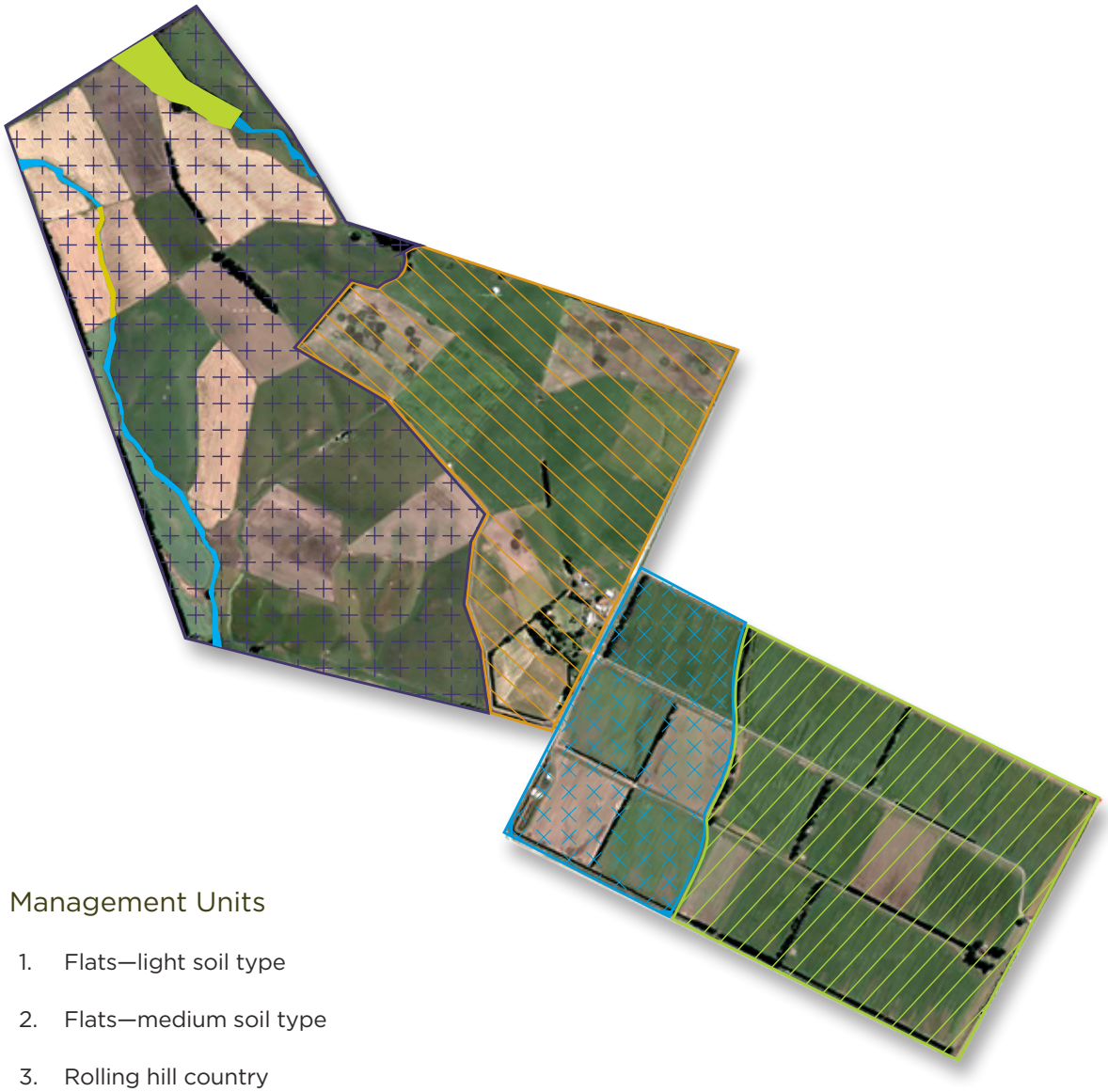
Other considerations for the design of LMUs

- Riparian zones
- Soil type
- Natural drainage
- Dryness
- Iron or clay pans
- Changes in geology
- Soil depth
- Erosion—existing and at risk areas
- Aspect
- Stoniness
- Flooding frequency
- Elevation
- Contour and slope
- Workability
- Soil texture (e.g. clayey, sandy, etc.)
- Areas at different stages of development
- Erosion management areas
- Wetlands
- Fragile soils
- Pugging management areas
- Weed or pest control areas
- Stock risk areas (gorges, tutu, tomos)
- Fertiliser policy
- Irrigation (separated by type)
- Climate
- Accessibility
- Distance from services and facilities.

LAND AND SOIL INFORMATION

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. Detailed Gisborne soil information is available at **smap.landcareresearch.co.nz/home**

SMap soil factsheets also include Overseer® input information for soil types.



Land Management Units

1. Flats—light soil type
2. Flats—medium soil type
3. Rolling hill country
4. Dryland rolling hill
5. Forestry
6. Fenced riparian areas
7. Unfenced riparian areas

Note

The above map is a fictional example but the type and number of LMUs are reasonably common. It shows only LMUs—not all the other things that need to be identified on a farm map (outlined in section one, e.g. waterways, crossings etc).

THREE
STRENGTHS & WEAKNESSES

Evaluate the strengths and weaknesses of each LMU.

List strengths and weaknesses of each LMU

What is defined as a strength or weakness depends on the management purpose being considered. For example, stoniness may be a weakness in terms of higher for nitrogen leaching loss, but it may represent a strength for winter grazing (to avoid pugging).

Think about strengths and weaknesses for each block for nutrient loss, livestock access to waterways, irrigation management (if applicable), as well as other factors.

Record strengths and weaknesses under the appropriate headings in the resource chart on page 2 of your workbook. Include environmental risks related to nutrient, soil, and waterway management. As you work through the table you may identify opportunities that require LMUs to be modified. Examples of possible strengths and weaknesses are listed to the right.

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 fertility
- Optimum pH
- Flat land
- Naturally sheltered
- Warm aspect
- Stable (no erosion)
- New pasture
- Good pasture quality
- Shelter—maybe good lambing or fawning blocks
- 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
- 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
- Weed or pest problems
- Poor stock access to water
- Poor machinery access
- Inefficient irrigation system.

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 on the next page.

Refer back to the farm resource map to describe physical characteristics of each LMU.

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? Consider adding these to the Additional Actions on page 11 of the workbook.

Example of a resource chart

LMU	DESCRIPTION	STRENGTHS	WEAKNESSES	USES AND MANAGEMENT
A1+A2	**Hill country** **Main block**	Medium water holding capacity Free draining Uniform soil type Some shelter (west) High P retention Good access Good infrastructure	Susceptible to grass grub New grass every four years Can be wind prone Susceptible to N leaching Drought prone/looses moisture High P retention	Sheep breeding Beef breeeding Deer Pasture
B	**Easy rolling hill country** **Lucerne**	Medium water holding capacity Free draining Uniform soil type Some shelter (west) High P retention Good access Good infrastructure warm early country Minimal frosts 50% Better than grass—can yield up to 22 tonne	Susceptible to grass grub Can be wind prone Susceptible to N leaching Drought prone/looses moisture High P retention Variation in yield 12-22 tonne	Hill country cropping Lucerne
C	**River flats**	Warm—sheltered Low P retention Heavy soil—holds moisture Low P retention	Winter wet Isolated Pugging with cattle in winter Seasonal surface water Long narrow block	Pasture Some cattle wintering Commercial cropping

The endpoint of this step is a **map of Land Management Units** and a **resource chart** describing characteristics, strengths and weaknesses.

FOUR
NUTRIENT BUDGET

Basic phosphate (P) budget for dry stock farmers.

Inputs

1. Fertiliser

Divide your phosphate P rating (%P) by 100 and then multiply by your rate of application. For example, superphosphate is about 9% P.

= [ ] Fertaliser P input kg/ha/yr

_____ %P x _____ kg/ha/year
100

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 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 0.5 to give the amount of P/ha/yr you loose in animals.

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

OR

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

Total kg liveweight sold _____ x0.008 = [ ] P in animals kg P/ha/yr

2. Wool

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

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

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

FARM PHOSPHATE SURPLUS

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

P inputs – P outputs = farm P surplus = _____

The significance of your farm P surplus depends on your soil's P olsen 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 farming surplus is high you may be losing valuable P to waterways where it reduces water quality.

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

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% N.

= [ ] Fertaliser N input kg/ha/yr

_____ %N x _____ kg/ha/year
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, clover is normally about 15–20-%

Add the shaded boxes from 1 and 2 to give **N total 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 trackof 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 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 kg liveweight sold by 0.03 to give the amount of N/kg/yr going off your farm in meat.

Total kg liveweight sold _____ x0.03

= [ ] N in animals kg N/ha/yr

2. Wool

Multiply the amount of wool sold (kg/ha) by 0.165 to give 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 an 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 your N inputs. This gives yor 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.

Leaching potential (ground water N in drinking water standard)	Low	Medium	High
Farm N surplus	Less than 90	Aournd 115	Above 140

FIVE
ENVIRONMENTAL OBJECTIVES

Demonstrate how you will manage environmental risks and continue farming sustainably.

FEPs need to contain a set of actions that describe how environmental risks are managed within a business, including changes that will be made where necessary.

This section looks at meeting objectives for managing farm environmental risks. You should use the following objectives here as the basis for meeting GDC's requirements.

Objectives

1. **Nutrient management:** To maximise nutrient use efficiency while minimising nutrient losses to water.
2. **Soil management:** To maintain or improve the physical and biological condition of soils in order to minimise the movement of sediment, phosphorus and other contaminants to waterways.
3. **Wetlands and riparian management:** To manage wetland and waterway margins to avoid damage to the bed and margins of a water body, avoid direct input of nutrients, and to maximise riparian margin nutrient filtering.
4. **Livestock management:** To manage wetlands and water bodies so that stock are excluded from water in accordance with the Riparian Margins Wetlands section of the Proposed Gisborne Regional Freshwater Plan to avoid damage to the bed and margins of a water body, and to avoid the direct input of nutrients, sediment, and microbial pathogens. Talk to a Gisborne District Council staff member or see factsheets in FEP pack for details on what the stock exclusion rule requires.
5. **Irrigation management:** To operate irrigation systems (if applicable) that are capable of applying water efficiently and management that ensures actual use of water is monitored and is efficient.
6. **Offal pits:** To manage the number and location of offal pits to minimise risks to human health and water quality.
7. **Cropping Management:** To manage the preparation, harvest and grazing of the crop, to avoid the movement of sediment and other contaminants to waterways and to avoid or mitigate soil compaction.
8. **Containment sources:** to manage other containment sources e.g. fuel supplies, chemical mixing areas, fertiliser loading areas.

Note: if collected animal effluent is part of your farm system—e.g. imported dairy or pig farm effluent—this will need to be included in your FEP with an objective to minimise environmental impacts of its use. Current management will need to be described and risks identified (e.g. runoff, leaching). GDC staff and workshop facilitators can assist with this if it is relevant to your farm.

Now complete the table starting on page 6 of your workbook.

The objectives need to be listed first, then under each one record the practices you employ to help you meet it and the evidence you could show to demonstrate this to an auditor.

Appendix one lists a large range of good management practices—use this for ideas. Examples of ways to demonstrate good practices range from visible evidence on farm to record keeping.

Every farm will have different issues and practices—if there is something relevant that you do to manage a risk is not listed in the appendix, it should still be recorded.

The endpoint of this step is a completed table of **written objectives**—as listed above or modified for your local situation—with a list of current, relevant, good management practices under each objective.

EXAMPLE

Objective one—To maximise nutrient use efficiency while minimising nutrient losses (specifically nitrogen and phosphorus) to water in order to meet specified nutrient allowances.

What practices help you achieve objective one?	How can you demonstrate this?
We leave a minimum 3m wide uncultivated margin along streams in winter feed paddocks. When grazing we fence this with a single hot-wire to prevent cattle access and maintain the vegetated strip	Farm diary records fertiliser application dates, rates, soil temperature and rainfall
All fertilisers are applied in lower risk months (no N applied in May–July, and no P applied June–September)	Proof of placement maps retained for all fertiliser applications in last five years
Soil temperature is above 6^{0}C and rising, and pasture is at least 25mm high (1000kg DM/Ha) before nitrogen is applied	Annual nutrient budgets and fertiliser recommendations retained
Certified contractor used for all fertiliser application, with calibrated equipment and GPS technology. No fertiliser applied directly into waterways	

Some common examples of practices to achieve the objectives include:

- Nutrient budget prepared for farm and for each LMU—reviewed annually
- Nutrient budget used in assessment of options for minimising nutrient loss and maximising nutrient efficiency
- Key sites for phosphorus and sediment losses identified on map
- Olsen-P maintained at optimum levels
- No super-phosphate application in high-risk months (June–September)
- No May, June, July applications of N fertilisers
- Avoid excessive N-fertiliser rates (>50kg N/application or >150kg N/ha/yr (on pasture)
- Equipment used for fertiliser application is suitably calibrated.
- N applied when soil temperature above 6^{0}C and rising
- Use of technical advisor to determine nutrient management policies
- Alternative sources of stock water in each paddock (e.g. reticulated water in troughs)
- Stock moved off wet soils in winter
- Stock excluded from waterways and wetlands in accordance with GDC requirements
- Culverts or bridges at frequently used stock crossings
- Soil testing/plant analysis programme
- Afforestation of erosion prone areas or use of poplar poles for erosion control
- Matching stock class to soil type and land capability
- Direct drilling or minimum tillage used in preference to conventional cultivation
- Wider riparian buffers provided at low points to filter any run-off
- Risks of leachate from silage pits identified and managed
- Rubbish dumps and offal pits located in an area where there is no risk of contamination of groundwater
- Weather forecasts and soil temperature monitored and used in irrigation decision making
- Soil moisture monitored and used for irrigation decision making.

See a longer list in appendix one for further ideas.

Note: these do not apply to every farm situation but should offer a prompt.

SIX
ADDITIONAL ACTIONS

You have recorded the good things you do in a way that will help you demonstrate good management.

This final step is where you record issues or opportunities you have identified to further improve your business.

This list of actions will be different for every farm; depending on your system, current practices and degree of environmental challenge. You might only have a short list of additional responses or you might have identified a number of opportunities to improve.

Use the appendix you used in the last section again for ideas. Note that good practices can be highly catchment and farm specific in terms of their relevance and practicality.

It is likely your progress will be measured against this list in the future through an independent farm plan audit—so make sure the listed actions are realistic.

It is important not to try and do everything in one year. Completing an FEP is an achievement in itself. The actions identified should be prioritised and handled as the business capability allows.

Consider actions listed in the appendix and use the template provided to draw up a list of additional actions. An example is shown below.

Review opportunities and environmental issues identified at each preceding step.

Consider your nutrient budget—specifically N and P loss to water and whether there is opportunity to reduce these. Is your nutrient budget up to date?

Ensure responses are SMART (Specific, Measurable, Achievable, Relevant, and Time-bound). This means using the list in the appendix for ideas but modifying what you write for your own operation to make it specific. Appendix four shows examples of specific responses.

EXAMPLE—ADDITIONAL ACTIONS IDENTIFIED

Issue	Response	Timeframe	Responsibility
Phosphorus loss and soil damage in winter feed paddocks	Graze young stock only on Gisborne hill soil winter feed paddocks Shift breaks towards streams instead of away from to maximise runoff filtering benefit of crop Leave vegetated buffer strip next to waterways in all winter feed paddocks—3m minimum width	Starting with next Autumn sowing and ongoing after that—review in 2016	Manager
Ongoing problem with soil erosion on back hill	Phone Regional Council for advice on which options will successfully treat erosion From next year, plant 40 poplar poles on back hill annually for three years	2014-2017	Manager

SEVEN
IMPLEMENT, MONITOR & REVIEW

Congratulations on designing a Farm Environment Plan specific for your farm.

Implement each response according to your timeline

- Monitor and record all your achievements
- Remember to review and reassess each year
- Register your completed plan at www.beeflambnz.com. This way you can be sure to receive the latest news on FEPs and be notified of the latest modules on topics relevant to on-farm land and environment issues

Once your plan is complete, sign the document on page 14 of the workbook as appropriate.

APPENDIX ONE
GOOD MANAGEMENT PRACTICES

Note these do not apply to every farm situation but should offer prompts

NUTRIENT BUDGETING

- Nutrient budget prepared for farm and for each LMU/block
- Nutrient budget reviewed annually and revised if necessary
- Nutrient budget used in assessment of options for minimising nutrient loss and maximising nutrient use efficiency
- Use of technical advisor to determine nutrient management policies.

PHOSPHORUS AND SEDIMENT LOSS

- Stock excluded from at-risk streams with fences or other methods
- Culverts or bridges at frequently used stock crossings
- Key sites for phosphorus and sediment losses identified
- Alternative sources of stock water in each paddock (e.g. reticulated water in troughs)
- Consider strategic vegetated-buffer areas where runoff converges
- Vegetated riparian buffer strips maintained around waterways (intensely farmed areas)
- Olsen-P maintained at optimum levels
- No direct application of P-fertiliser application into waterways
- Maximise use of slow release P-fertiliser
- No super-phosphate application in high-risk months (June–September)
- No over-grazing of pastures prone to drying out
- Phosphate fertiliser application rates consistent with nutrient budget rates
- Fertiliser application rates based on advisor's recommendations
- Regular soil tests (specify frequency) undertaken as aid to determining P needs
- Plant analysis undertaken as aid to fertiliser needs
- Equipment used for fertiliser application is suitably calibrated
- Maximum fertiliser application rates set
- GPS technology used for precise application of all P fertiliser
- Cattle grazed on and off fodder block
- Straw bales placed in low spots to adsorb runoff from fodder crop block
- Strip next to riparian margins grazed last when break feeding winter feed crops
- Ensure runoff from areas of high animal concentration (e.g. yards, frequently used tracks and stock camps) is discharged onto land rather than into waterways
- Move troughs and gateways away from areas of high water flow
- Manage or retire bogs and swampy areas
- Provide deer wallows away from waterways
- Cultivate along contours rather than up and down slope where slope >3 degrees.

RUBBISH, OFFAL AND SILAGE EFFLUENT MANAGEMENT

- Offal pits located in areas where there is no risk of contamination of groundwater
- Offal pits covered and or fenced—think of child safety and vermin
- Composting used for dead stock disposal
- Risks of leachate from silage pits identified and managed
- No runoff of leachate from silage pits to waterways including drains
- Farm rubbish dumps located in an area where there is no risk of contamination of groundwater
- The offal pit is situated in the best location on farm so that it is away from waterways, wetlands, bores and property boundaries and is in an area that is not prone to flooding and ponding
- Surface runoff water is directed away from the offal pit
- The offal pit is only used for waste originating from this property
- The base of the pit should be no less than 1 metre above the highest level of the water table.

NITROGEN LOSS

- No May, June, July applications of N fertilisers
- Nutrient allocation Zone N loss limits met (see GDC information sheet for local rules)
- No N fertiliser applications when heavy rain is forecast
- Avoid excessive N-fertiliser rates (>50 kg N/ application or >150 kg N/ha/yr (on pasture; crops may be higher))
- Ensure other nutrients are non-limiting (maximise N-uptake opportunity)
- Undertake a comprehensive nutrient analysis using nutrient budgets
- N fertiliser application rates based on Advisor's recommendations
- N fertiliser application. rates based on industry crop models e.g wheat calculator

- Deep soil N tests used as basis of N applications to crops
- Plant analysis used as tool to determine N application rates
- Equipment used for N application is suitably calibrated
- N application rates set to match growth cycle of pasture or crop
- Pasture is at least 25mm high (1000kg DM/Ha) before nitrogen is applied
- N applied when soil temperature above 6°C and rising
- N is not applied when soils are at field capacity as measured using soil moisture equipment
- N is not applied to severely compacted soils
- Cultivation practices and timing adjusted to minimise N losses.
- GPS technology used for precise application of all N fertiliser spread
- When feeding winter fodder crops, stock stood off block for at least four hours
- Crop rotation designed to utilise residual nitrogen in soil, e.g. cereals following fodder crops.

SOIL AND EROSION MANAGEMENT

- Move stock off wet soils in winter
- Soil testing/plant analysis programme
- Heavy machinery restricted to specified pathways
- Regular checks for soil compaction undertaken for high risk soils
- Crop residue retained to improve soil structure
- Significant soil compaction managed through soil aeration
- Differences in soil susceptibility to compaction recognised and managed to minimise damage
- Space planted poplar poles on hill slopes at appropriate densities
- Retirement from grazing of severely erosion prone areas, particularly those with marginal production value
- Retirement or afforestation of erosion prone areas
- Use of containment structures for certain erosion types (e.g. debris dams)
- Strategic tree planting to protect key infrastructure from erosion (fences, tracks, buildings, public roads)
- Design or locate tracks, fences, etc. in a way that minimises the risk of erosion damage
- Engage a regional council advisor/officer or similar specialist for advice on erosion and soil management
- Stabilisation planting such as flaxes, small trees, willows to prevent stream bank erosion
- Contour fencing
- Reducing weight of stock on erodible country (e.g. replacing cattle with sheep or moving to a younger stock class)
- Direct drilling or minimum tillage used in preference to conventional cultivation in high erosion risk situations
- Regular checks for erosion from channelled runoff, (i.e. from wheel ruts, tracks etc.), and fast remedial action
- Eroding areas on the property identified and appropriate management applied
- Deer mobs separated to reduce pacing and erosion on fence lines
- Fence lines/corners planted to reduce deer pacing behaviour and erosion
- Areas of stream bank erosion are identified and controlled.

WATERWAYS AND BIODIVERSITY

- Refer to the B+LNZ factsheet on stock exclusion from waterways and the GDC information sheet on stock exclusion requirements
- Stock excluded from all waterways and wetlands in accordance with GDC rules
- Culverts or bridges at frequently used stock crossings
- Alternative sources of stock water in each paddock (e.g. troughs)
- Vegetated riparian buffer strips around waterways.
- Approaches to stock crossings are managed to avoid runoff to waterways
- Drain cleaning is undertaken in a manner that minimises sediment losses
- Riparian margins are of sufficient width to adequately filter run-off (1-10m)
- Wider riparian buffers provided at low points to filter any run-off
- Minimum or no-till cultivation techniques used when high risk of run-off from cultivated blocks
- Runoff from stock tracks and races directed away from waterways or filtered through riparian buffers
- Riparian planting programme planned/ implemented
- Permanently/frequently wet areas within paddocks are managed to avoid contamination from stock or fertiliser
- Legally protected wetlands on farm identified and protected
- Legally protected areas of indigenous biodiversity on farm identified and protected
- Weeds and pests within protected areas are managed
- Enhancement programme in place for identified areas of indigenous biodiversity
- Reticulate stock water
- Plant shade trees away from waterways
- Riparian planting.

IRRIGATION

New irrigation

- Irrigation carried out in accordance with your consent
- System designed with site specific knowledge of soil, climate and crop needs
- Independent evaluation of irrigation design undertaken before development
- System meets flow meter, flow rate, volume and area irrigated requirements
- All new irrigation infrastructure is installed in accordance with Installation Code of Practice for Piped Irrigation Systems (Irrigation New Zealand, January 2012)
- Post installation checks of application rate and distribution uniformity undertaken
- Commissioning tests show that system performs to desired specifications for: system capacity, application depth, intensity and uniformity and return interval.

Existing Irrigation

- Soil moisture assessed—detail method and frequency
- Decision rules used (i.e. no irrigation after 10mm rain etc.)
- Rainfall forecasts and soil temperature monitored and used in decision making
- Deficit irrigation used within soil moisture trigger points
- Crop irrigation scheduling model used
- Spray line shifts made to suitable plan (e.g. GPS on bike; follow map)
- Application to non-target areas is minimised
- System closed down if runoff and/or ponding occurs
- Rotation adjusted according to ET, soil moisture status and rainfall
- Daily checks for runoff/ponding
- Daily checks for irrigation problems and problems fixed
- Annual audit of system completed to identify efficiency improvements
- Audit upgrades identified in work plan with timelines for completion
- Application depth and uniformity checks pre-season, and through season
- Wetted width widened on outer spans on long pivots or on slopes
- System evaluation by certified evaluator 5-yearly
- Program to remedy problems in 5-yearly evaluation implemented
- Annual water use checklist completed
- Variable rate irrigation together with soil EM mapping used to maximise water use efficiency.

CROPPING

- Establish in-field grass buffer strips on sloping paddocks
- Put in silt traps to settle out sediment from water before it enters drains
- Install bunds along paddock edge to prevent water flow onto or off paddock
- Reduce soil cultivation by adopting strip tillage or direct drilling, and minimising the number of passes over the paddock
- Cultivate along contours (rather than up and down the slope) where slopes greater than 3°
- Strip graze parallel to and towards waterways, rather than away from them
- Use controlled grazing regimes on winter crops (back-fencing and on-off grazing) to reduce risk of run off, soil loss and compaction
- Use wheel track ripping and wheel track dyking to slow run off and reduce erosion
- Plant maize or other deep rooted crops to utilise or 'mop up 'nutrients from high fertility soils
- Reduce fallow time by sowing another crop/grass to cover losses and harvest nutrients
- Prepare a pre-season nutrient budget for each crop, taking into consideration a realistic crop yield (use your long term average yield as a guide) and likely soil supply of N (from soil tests) and amount of residue from the previous crop
- Prepare a post-season nutrient budget to show how well your risk assessment and management practices are improving the nutrient management on your farm. A nutrient budget is an example of a post—season nutrient budget
- Manage intensive grazing to reduce the risk of nitrogen leaching. Where possible choose paddocks away from light stony soils. Use on-off grazing to distribute urine patches more widely, and if you can, use a quick growing mop-up crop in late winter/early spring to take up soil nitrate to reduce leaching
- Measure and record Olsen P levels regularly. Reduce phosphorus fertiliser applications if levels are above the target levels for your soil-type and crop
- Consider the type of phosphorus fertiliser being applied. Losses are more likely from products with readily soluble forms of P.

APPENDIX TWO
RECORD KEEPING FOR NUTRIENT BUDGETING

Good record keeping makes use of nutrient budgets simpler and ensures more accurate results.

Gisborne District Council requires you to keep the following information:

- Identification of the land area of the farm
- A map or aerial photograph showing the different blocks within the farm.
- Annual stocking rate (numbers, types and classes) including a breakdown by stock class for each month.
- A description of the farm management practices used on each block including (where applicable):
  - (i) Ground cover—pasture, crops, non-grazed areas (including forestry, riparian and tree areas)
  - (ii) Stock management—lambing/calving/fawning dates and percentages, any purchases and sales and associated dates, types and age of stock
  - (iii) Fertiliser management practices—types, quantities, timing, location and rates of application and details of varying procedures for different blocks
  - (iv) Winter management of cattle grazed off—including the use of feed pads, grazing off or standoff pads
  - (v) Crop management practices—area cultivated, method of cultivation, crop types, rotations, timing of sowing and harvesting, resulting use of crop, where and when it is fed out on farm or when it is exported and where to
  - (vi) Supplementary feed brought onto the farm—feed type, annual tonnage, dry matter content, feed quality, nitrogen content
  - (vii) Use of nitrification inhibitors and any other verifiable nitrogen leaching inhibitors.

  Note: Where any of the matters (i) to (vii) have not been implemented on a particular block then that should be stated.
- Copies of annual accounts to verify the above information.
- Farm animal effluent, pig farm effluent, feed pad and stand-off pad effluent management including:
  - (i) Area of land used for irrigation
  - (ii) Annual nitrogen loading rate and nitrogen load rate per application
  - (iii) Instantaneous application rate
  - (v) Clean water irrigation in terms of areas irrigated, rates of water applied and irrigation systems used
- Copies of invoices or receipts for purchases of stock, fertiliser, supplements imported or exported.

APPENDIX THREE
OPTIMUM SOIL TEST VALUES

Target soil test ranges for New Zealand sheep and beef farms (New Zealand Manufacturers' Research Association Inc. and New Zealand Pastoral Agriculture Research Institute Ltd, 1994)

Soil Test	Ash	Sedimentary	Pumice	Peat
Target Olsen-P	20-30	20-30	35-45	35-45
Target soil test K	7-10	5-8	7-10	5-7
Sulphate-S	10-12	10-12	10-12	10-12
Organic-S	15-20	15-20	15-20	15-20
Target soil test Mg (pasture)	8-10	8-10	8-10	8-10
Ideal soil test Mg (animal)	25-30	25-30	25-30	25-30
pH	5.8-6.0	5.8-6.0	5.8-6.0	5.0-5.5 (0-75mm)
				undeveloped 4.5-5.0 (75-150mm)

APPENDIX FOUR
EXAMPLES OF POSSIBLE SPECIFIC RESPONSES

MAINTENANCE OF EXISTING WORKS

- Replace 10 missing space-planted poplars on slip-prone slope in Big Hill paddock.
- Annual silviculture for the conservation tree block and two forestry blocks.
- Check fences and repair if necessary on two wetlands, the bush block and the river fences every six months.
- Annual check on the silt build up in the drains, four dams and the six silt traps. Bi-annually clear silt out and distribute back on to paddocks—rotate which paddocks receive it.
- In late summer, early autumn check all tracks and repair as necessary. Also check the two runoff diversion walls and repair any damage.

HILL COUNTRY EROSION

- Retire shady face reverting to scrub in Flax paddock. Afforest slip on Rough paddock to prevent further erosion.
- Space plant 50 poplars and 30 willows to stabilise hill faces above Main river.
- Space plant 20 poplars above main access track in Paddock 1 to protect it from future erosion. Plant a wood lot behind woolshed to stabilise bank and prevent damage to shed.
- Assess all tracks and other infrastructure in next 12 months to determine if any additional planting is required to protect it.
- Ensure all new infrastructures (e.g. tracks), including the new fence in Back paddock, are not going to cause any extra erosion by considering contour and soil type.
- Explore opportunities for drainage in the spring of Number 3 paddock
- Careful planning of new tracks and crossings.

WATER QUALITY

- Over the next 12 months, put up a one-wire electric along Main creek to keep cattle out. In the next three months, put up a stock-proof fence around the wetland area.
- In next six months scope out a water reticulation system for the five back paddocks. Implement over following six months.
- Complete 10km of fencing in riparian areas on either side of Main river.
- Fence the two runoff convergence zones (e.g. headwaters) on Main creek and Dog Burn.
- Ensure the fertiliser company and farm manager understand the avoidance of superphosphate applications if rain is forecast.
- Install four dams in Number 4 paddock and three in Number 6 paddock for trapping sediment.
- Investigate low solubility types of P-fertiliser before next application due and determine if this will work for the farm. If it will, work out if it is an affordable option.
- Install culvert in Bog paddock and a bridge over Dog Burn to prevent stock accessing waterways.
- Look at soil test results and determine if Olsen-P levels are at or below the biological optimum—maintain them.
- Speak to top-dressing pilot to ensure he is not applying fertiliser directly to water bodies.
- Adjust super phosphate plan to apply in April rather than June, July, August or September.
- Adjust fertiliser plan to reduce N-application rates from 170 kg N/ha/year to below 150 kg N/ha/year*
- Ensure the annual N-based fertiliser is applied in autumn and spring if necessary, but not winter.
- Site offal holes, dumps, septic tanks, dips away from water and leaching-sensitive areas.

* *NB. Urine patches rather than N-fertiliser are the key source of N-leaching in most pastoral systems.*

WIND EROSION

- Assess cultivation practices and where possible move to conservation tillage on Back Flats where crop is used.
- Plant a shelter belt on River-Flat paddock. Carry out an annual check in autumn and repair any damage as required.
- Investigate plant species to stabilise the sand country in paddocks 7, 8 and 9. Consider if there are containment structures that may also help. Implement if suitable
- Grazing sandy soils.

PUGGING AND COMPACTION

- Identify the high-risk paddocks when wet, and the low-risk paddocks when wet. Outline a policy to move stock prior to the high-risk paddocks getting wet and inform all staff of the policy.
- Install drainage in Number 2 and Boggy paddocks. Check drainage is functioning annually and repair any damage if necessary.
- Establish policy on soil conditions for cultivation. Policy will outline no cultivation when at-risk soils are wet and shiny (i.e. plastic).
- Develop and outline grazing policy residuals to all staff to ensure over-grazing is not occurring.

SEEK LOCAL OR EXPERT ADVICE

- Regional council officers
- Farm consultants/advisors
- B+LNZ Extension Manager
- Workshop facilitator
- Fertiliser reps
- Universities and research
- Neighbours
- Other...

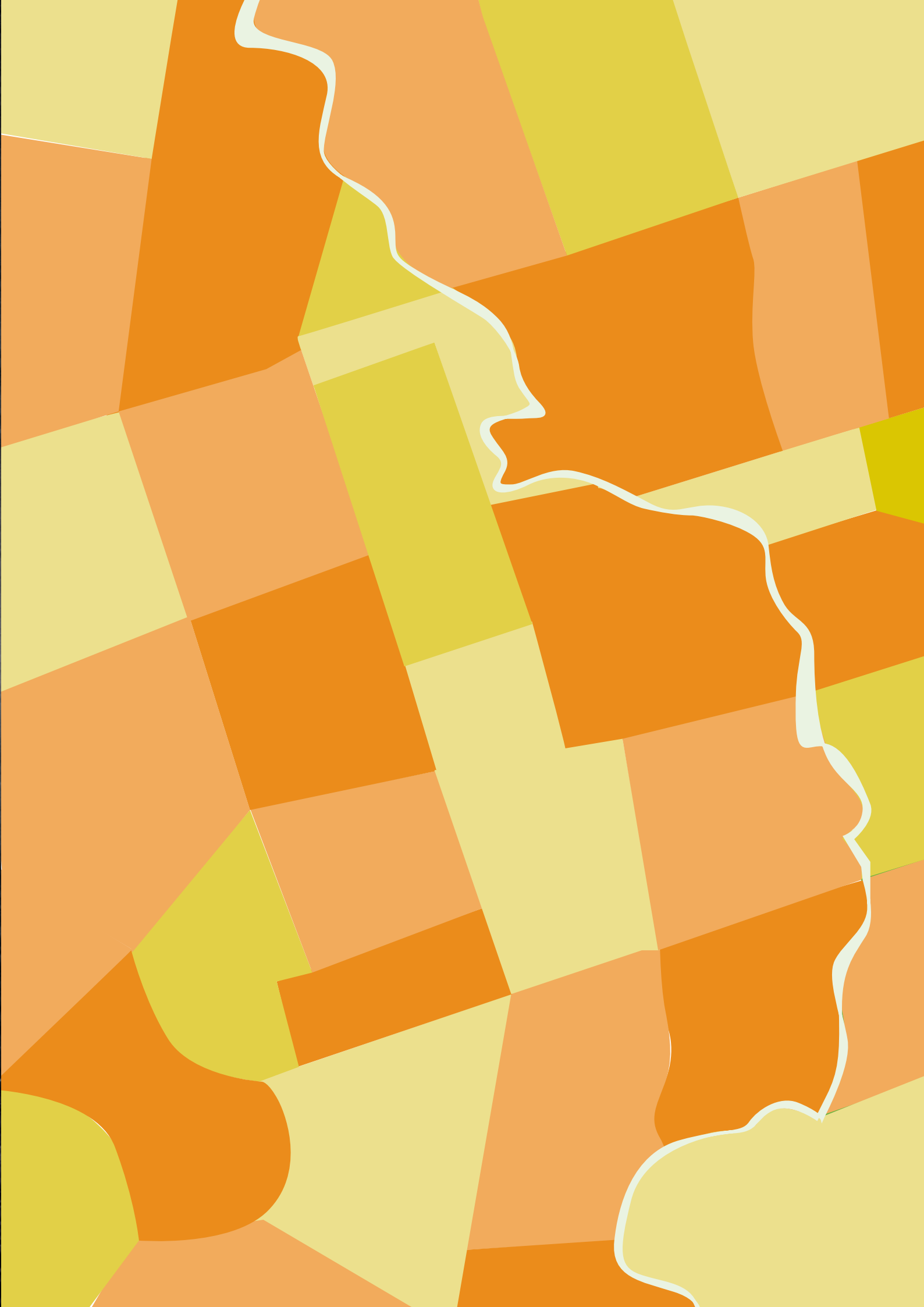
SEEK ADDITIONAL INFORMATION

- www.beeflambnz.com
- www.landcare.org.nz
- Regional councils
- Rural newspapers
- Field days, conferences or workshops
- Libraries.

beef+lamb new zealand

By farmers.
For farmers

Beef + Lamb New Zealand
Level 4, Wellington Chambers
154 Feathersotn Street
Wellington 6011
Phone: 04 473 9150



beef+lamb new zealand

By farmers. For farmers