AIC
ENVIRONMENTAL
COLLECTIVE

AMURI IRRIGATION CO

WINTER MANAGEMENT GOOD MANAGEMENT PRACTICE (GMP)

HANDBOOK

1. INTRODUCTION

Winter stock management can have high environmental risks, particularly for loss of nitrogen (N), phosphorous (P), sediment and faecal material to water. Winter management can also pose animal welfare risks, while not considered in this document, these too need to be carefully planned and mitigated where necessary.

Given the nature of the risks and the variation in farming systems and situations, minimising one risk may compromise the ability to minimise another risk which calls for careful planning and good judgement on a case by case basis.

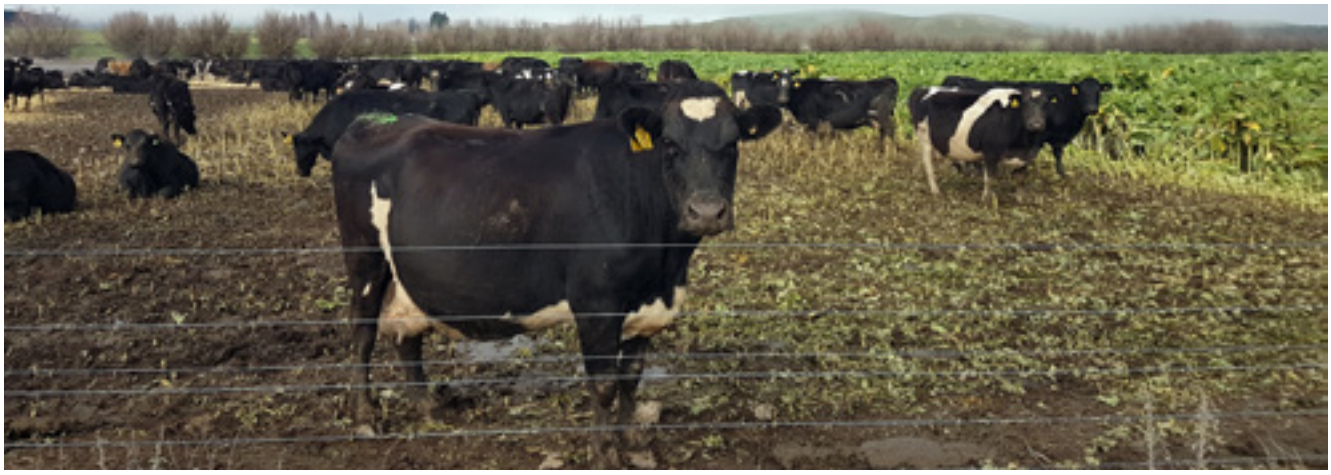
Winter management without exception requires careful management to minimise a range of environmental risks.

In some cases, environmental risk mitigation may not resolve welfare risks and may (in some cases) compromise welfare. Similarly, good welfare management may not meet good environmental management.

The government is likely to set a maximum soil pugging standard for the mitigation of animal welfare concerns from the winter of 2021. This will require pugging to be no deeper than 20cm and cover less than 50% of the paddock.

Farmers should start considering now how their winter management plan will meet this requirement.

The most effective approach to good winter management is to actively plan for winter early, carefully assess and evaluate likely risks and adopting appropriate mitigating measures rather than adhering to a fixed set of rules.



2. AIC ENVIRONMENTAL COLLECTIVE WINTER MANAGEMENT GOOD MANAGEMENT PRACTICE (GMP)

Effective winter management of stock to minimise risks is not about ticking boxes:

It demands:

- **Early Planning;**
- **Careful Risk Evaluation; and**
- **Appropriate Mitigation Selection.**

The AIC Environmental Collective has adopted a winter management GMP standard that is based on the Planning, Risk Evaluation and Mitigation Selection approach.

WINTER MANAGEMENT GMP

OBJECTIVE
Winter stock management is planned, and stock are wintered to manage identified risks to the environment, animal welfare and staff.

OUTCOME ON FARM
Environmental risks are identified, and various mitigations and management practices are planned and implemented to effectively manage risks and provide contingencies for extreme weather events.

TARGETS

- T1 Prepare a written winter management plan early, ideally when crops are being planned for the coming season.
- T2 Identify the risks associated with each wintering block and the mitigation measures needed for these. Note these on your winter management plan.
- T3 Consider the likely impact of extreme weather events and what contingencies are available to ensure a difficult situation does not turn into a crisis.

The purpose of this new GMP standard is to reduce the environmental impacts of winter stock management and keep Environmental Collective members well placed during a time of increasing scrutiny of farming practices by the public and government.

The Collective will be adopting this GMP standard for application in Farm Environment Plans (FEPs) and FEP Auditing from winter 2021. It will be adopted as an advisory action for all members for winter 2020.

3. PLANNING AND USE OF A WINTER MANAGEMENT PLAN

Winter stock management presents several environmental and animal welfare risks. Managing these risks is a year-round process involving a range of farm staff and contractors.

THE FOUR STAGES OF WINTER MANAGEMENT

The four stages of winter forage grazing demonstrate that it requires year-round care to ensure good management.

STAGE 1	**Paddock selection and Planning**	**August to September**
STAGE 2	**Block set-up**	**Early summer to pre-grazing**
STAGE 3	**Crop grazing**	**April to August**
STAGE 4	**Post grazing management**	**August to September**

A written winter management plan is essential, particularly when several risk factors are involved. A plan need not be complicated and may be a simple farm map with wintering blocks, risks and mitigations identified with particular instructions for staff (e.g. *Stack baleage here, graze from top of slope or standoff area*). An example of an effective yet simple written winter management plan is shown in Figure 1 on the next page.

It is better to have a simple map that can be accessed and understood by staff than a complicated plan than takes a lot of preparation but is never used.

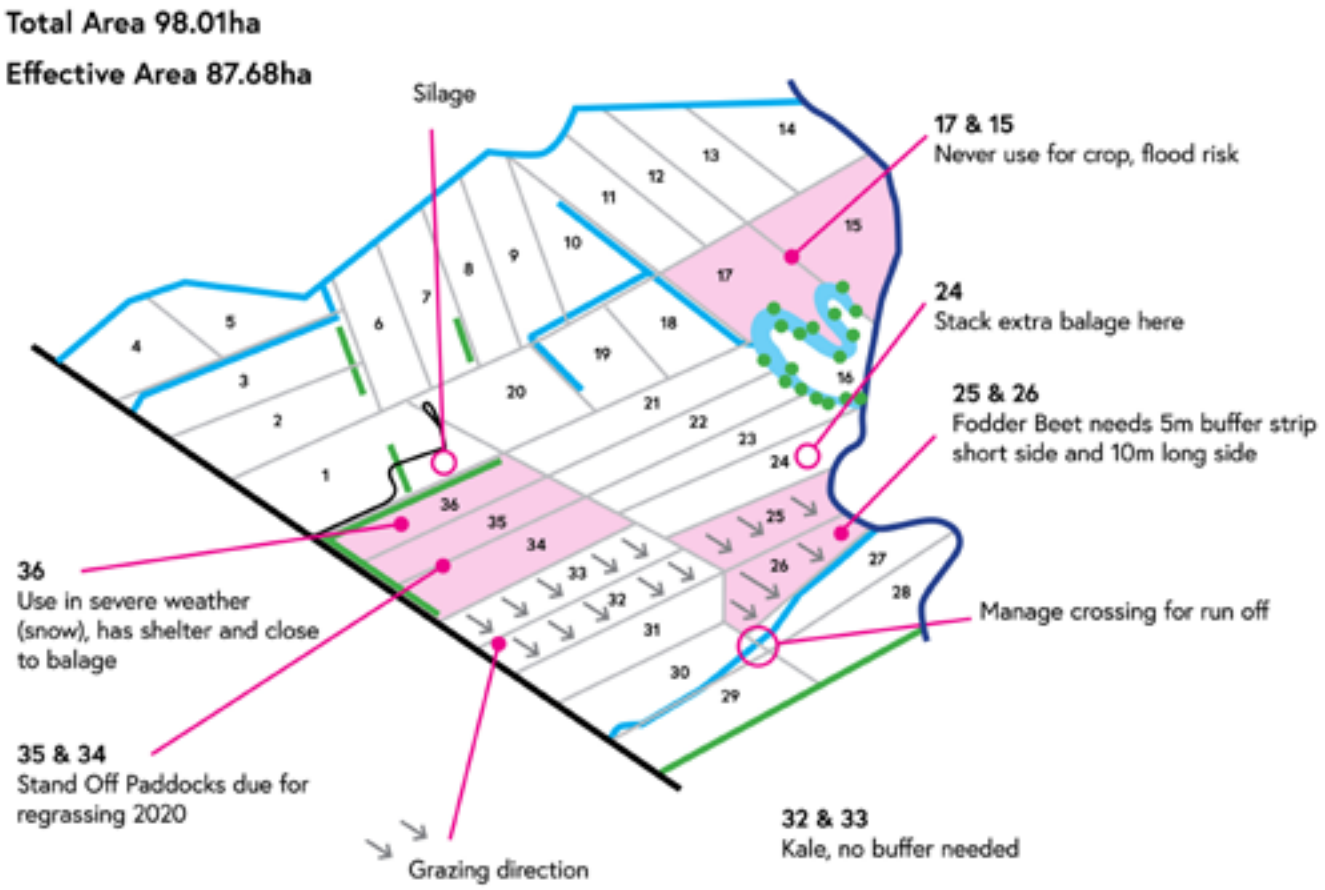


FIGURE 1

The plan should identify any 'Red zone' areas where the risks are so high that they should never be used for stock wintering, particularly cropping. A written plan is also evidence for FEP Auditors that the risks of winter management have been considered and appropriate mitigation measures have been identified and adopted.

The ideal time to start preparing a winter management plan is when crops are being planned for the coming season. Thinking about risks and what mitigations may be needed will add very little work to the normal crop planning process.

Your winter management plan should also consider what options or alternatives are available to you in extreme weather events. It is not acceptable to just hope for the best.

Difficult scenarios should be expected and planned for. Extreme weather events should be treated as a 'when' rather than an 'if'.

4. RISK EVALUATION

Evaluating risks is essential when developing a winter management plan and deciding on appropriate mitigation actions.

There are six critical environmental and management risk factors that must be considered when deciding on the overall level of risk for a particular winter management plan and the appropriate level of mitigation for that plan.

Risk 1: **Soil type**

Generally soils present two types of risk:

Heavy Soil: (poor draining, deep silty (palic) or clay soils) present significant risks in very wet weather. Waterlogging, pugging deep mud and surface run-off exacerbate sediment, P loss and faecal contamination are all risks associated with heavy soils in wet conditions.

Lighter soils: (freely drained, stony, shallow, silty or sandy) present lower risks from pugging and run-off, but present risks of high nitrate leaching. Lighter soils tend to offer the best choice in wet conditions for both environmental and welfare considerations. A plan should consider the range of soil types on the farm and the pros and cons of each.

Risk 2: Waterways

Stock wintered in close proximity to waterways and drains present a significant environmental risk of direct contamination to waterways with run-off from sediment, P and faecal material in run-off. Waterways must be protected from these risks.

Risk 3: Groundwater

Further consideration must be given to groundwater contamination especially by nitrate leaching on lighter soils with a high water table or paddocks with extensive artificial drainage. Particular care needs to be taken in sensitive areas, such as community water protection zones or the location of drinking water bores.

Risk 4: Slope

The increased angle and length of slope increases the velocity of water flow which exacerbates run-off and associated environmental risks. Complex slopes (rolling country) can concentrate sheet flows into channels. High velocity flows concentrated into channels creates the greatest run-off risk as flow velocity and volume of water increase the amount of suspended soil material and the erosive nature of the runoff. Any mitigation measure must consider slope. Wintering on sloping ground will always increase risks.

Risk 5: Stock class

Generally heavier stock presents the greater risk. Bovines have a high N loss risk whereas other stock such as deer present their own unique risks.

Risk 6: Fodder crops

Crops, by design, support a high density of stock which offers many advantages to the farmer. However, grazing fodder crops is likely to lead to damaged soil structure and very high deposits of faecal material and urine which is very high in soluble nitrogen, phosphorous and pathogens. The use of fodder crops greatly increases the environmental and welfare risks of winter stock management. Crops create bare ground, which in wet weather inevitably leads to muddy conditions.

In addition, fodder beet can compromise management options because of the need to transition animals on and off it. 100% crop-based wintering which avoids the need to transition and reduced stock movement is a more attractive option for farmers. Wintering on fodder crops will significantly increase environmental, welfare and management risks.

It is very important to understand that risk factors are cumulative and will influences the scale of the necessary mitigations required to minimise environmental risks.

In each situation, six risk-factors needs to be considered to develop an effective package of risk mitigations.

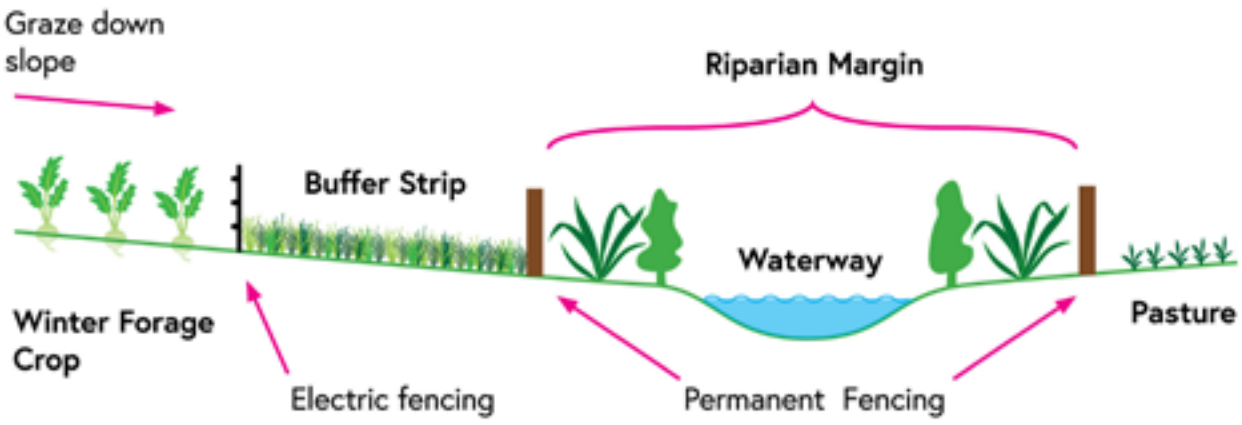


FIGURE 2

A riparian margin is not the same as a buffer strip. A riparian margin is a strip of land adjacent to a waterway and protected by permanent fencing. The ideal width of a riparian margin depends on a number of factors, including the significance of the waterway, flood or erosion risk or the landowners plans for any riparian planting or habitat creation. In a pasture situation, fencing and the riparian margin should provide adequate protection of the waterway from stock damage and runoff. Where forage crops are located adjacent to a waterway, then a buffer strip will likely be needed to provide additional protection to the waterway from higher risk of run off. The ideal width of a buffer strip depends on various risk factors which should be assessed when planning forage crops.

4. RISK EVALUATION cont...

FIGURE 3

Buffer strips work by slowing surface flows allowing water to infiltrate into the soil, trapping and depositing sediment in strip vegetation before reaching a waterway. Thick tussocky vegetation, such as cocksfoot make ideal buffer strips.

FIGURE 4

Buffer strips fail to be effective once flows exceed the buffer strip's capacity and run off flows through or over the vegetation and directly into watercourses. This can happen when flows are moving rapidly off a slope, volumes of water are too great for the size of the strip, where vegetation is too short or damaged or where flows are concentrated into channels. In such high risk situations buffer strips may need to be considerably wider than in low risk situations.

All diagrams (figures) acknowledgement: Amy Anderson

The two scenarios below illustrate two situations with very different risk profiles and accordingly a different range of mitigation measures.

SCENARIO 1: Heifers wintered on flat paddocks on light soils with no waterways present. Stock grazed on and off kale with a sacrifice paddock where they are fed silage.

Risk Assessment: Low risk situation: Likely to present few environmental risks other than high N leaching from fodder crop.

Likely mitigations:

- Use of portable water troughs to reduce stock movements (optional).
- Early establishment of a cereal catch crop following kale to mop up surplus N.
- Various contingency options likely to be available for severe events, such as keeping stock off kale crop and feeding additional silage on sacrifice paddock while snow on ground or soils saturated
- Very low-cost mitigations – cereal catch crop provides silage crop before regrassing or establishment of next fodder crop and sacrifice paddocks likely to need to be re-established.

SCENARIO 2: Friesian cows wintered on rolling country with deep palic soils prone to pugging with numerous waterways and gullies on 100% fodder beet with silage fed in-situ.

Risk Assessment: A multiple high risk situation presenting significant environmental risks which will require significant temporary and permanent mitigations. There are likely to be few contingency options available in severe weather, which will increase environmental and animal welfare risks.

Likely mitigations:

- Use of temporary water troughs to reduce need for stock to walk long distances on slopes in mud to find adequate water.
- Access by machinery to feed roughage will be difficult in very wet or snow conditions and likely exacerbate soil damage and pugging. Baleage may need to be stockpiled in paddock for extreme events.
- Permanent fencing at break of slope in any gullies with rough vegetation established throughout sides and length of gullies.
- Establish temporary buffer strips of rough grass (such as cocksfoot) adjacent to any waterways when crops are sown. These should be fenced off temporarily while crops are being grazed. They should not be grazed until the end of winter. The width of buffer strips may need to be significant and will need to consider slope angle and length. More than 10m is likely to be required to be effective in slowing flows to drop sediment.
- Where water is concentrated into channels along tracks, use permanent culverts to intercept flows and direct water onto grass paddocks to disperse flow and drop sediment.
- Construct permanent sediment traps along drains and/or waterways at strategic points to slow flows and enable sediment to drop out of suspension.
- Areas in-field that are identified as natural critical source areas which concentrate flows may need to be excluded from crops and left in pasture and/or fenced off temporarily in severe weather.
- Stock should be grazed from top of slope to bottom to ensure most risky areas are grazed last allowing un-grazed crop to act as a buffer strip. If this can't be done, then grass buffer strips will need to be proportionately wider (20m+)
- In severe events, animal welfare is likely to be a significant risk as it may be difficult to provide adequate shelter, lying areas and sufficient volume of feed.
- In areas which present insurmountable problems and high risks, it is best that they be excluded from use for fodder crops. (i.e. Sloping areas with waterways, access or risk of flooding).

This situation is likely to require multiple and high cost mitigation measures and present challenges for meeting good animal welfare considerations: These cumulative risks are likely to be high enough to question the use of the area for winter crop grazing.

5. RISK MITIGATION TOOLS AND DESIGN CONSIDERATIONS

Once the risks involved with a particular winter management plan have been identified, the most appropriate mitigation must be selected to eliminate or minimise these risks.

There are a wide range of mitigations available ranging from temporary buffer strips to permanent built structures (sediment trap), each may be necessary depending on the circumstances and the level of risk. The size or design of a mitigation measure will be influenced by the individual circumstances. For example, on flat ground a buffer strip near a waterway can be narrower than one sloping ground as the run-off risk is less.

Mitigation Measures must be up to the Job

Any mitigation measure adopted must be appropriate for the situation.

Similar risks may require very different risks in different situations (e.g. run-off to waterways)

Table 1 gives examples of a wide range of mitigation measures and design considerations. Use this table to help plan and implement your effective mitigation measures.

FIGURE 5

This sediment trap and new wetland feature has been created from a wet and difficult to manage area of a farm.

6. CONCLUSIONS AND SUMMARY

- ✓ Winter management needs careful management to minimise a range of environmental and other risks.
- ✓ Effective winter management is not about ticking boxes:

  It demands:

  - Early planning,
  - Careful risk evaluation; and
  - Appropriate mitigation selection.
- ✓ It is not acceptable to just hope for the best – difficult scenarios should be expected and planned for. Extreme weather events are not an 'if' but a 'when'.
- ✓ Good winter grazing management is a year-round process and requires careful planning and management throughout.
- ✓ There are six critical environmental and management risk factors that must be considered in order to decide on the overall level of risk for a particular winter management plan and the appropriate level of mitigation required.
- ✓ In each situation, consider the six risk-factors when developing an effective package of mitigations.
- ✓ There are a wide range of potential risk mitigation measures available from simple low-cost actions to more demanding actions required in higher risk situations.
- ✓ In some high-risk situations, the scale and cost of risk mitigation may outweigh the value of the planned approach to wintering and require a review of the farm's winter management systems.
- ✓ A situation with a combination of a number of risk factors may mean there is simply no effective way of coming up with an effective winter management plan. Such areas should never be used for stock wintering.

TABLE 1

List of Mitigation Tools and Design Considerations

Mitigation	Definition	Purpose	Scale and Management	Cost	Comments
Permanent Fencing and Riparian Margin	All waterways must be fenced off from intensively farmed stock, including cattle, deer and pigs. This includes any situation where stock are held for wintering and being fed crop or feed brought into the paddock.	Exclusion of stock from waterways	Appropriate to the size and flow of the waterway and nature of the channel. Should include some riparian margin that can accommodate the waterway during high flows. For waterways more than 1m across during median flows, a riparian margin (the distance between the edge of the waterway and the permanent fence) should be not less than 3m). The line of the fencing should consider any critical source areas (swales or hollows) and winter flooding that may need a wider riparian margin.	High initial cost with some areas likely to be sacrificed from productive area. Fencing very close to and following the edge of the waterway likely to result in problems with erosion and run-off -unlikely to be cost effective in the long term.	All farmers must meet Regional Rules regarding stock exclusion from waterways. Future National Environmental Standards are likely to require a riparian margin of between 3–5m
Temporary Fencing	Temporary electric fencing	Fencing off grass buffer strips, seasonal waterways, seasonal wet areas and/or critical source areas (CSA)	Appropriate to the individual situation. Consider the size and flow of the waterway the likelihood of pugging and risk of run-off.	Low cost	

Mitigation	Definition	Purpose	Scale and Management	Cost	Comments
Grass buffer strips. See fig. 3 and 4 above.	A rough grass strip designed to intercept and trap sediment from high run-off risk areas, such as winter fodder crops or tracks and laneways. The thicker the sward the better. Clumpy cocksfoot or similar rough grass ideal buffer strip. Should be established at the time of crop planting and adjacent to any waterway that may be flowing during the winter months.	To intercept and slow run-off water so suspended sediment is trapped or filtered before run-off water enters any waterway or ideally, has time to infiltrate into the soil.	To be effective the width of strip needs to be proportional to the flow and volume of run-off it intercepts. Once flows are concentrated into channels and run off flows over the top of the strip vegetation their effectiveness reduces dramatically. Strips need to be maintained in good condition throughout the winter i.e. fenced off and left ungrazed and not used as laneways as this will create channels that can concentrate flows. As a rule of thumb buffer strips should have sufficient vegetation and be wide enough to ensure flows do not become concentrated into channels. Buffer strips are unlikely to be effective on long steep or rolling slopes where flows will become concentrated into channels.	Relatively low cost: Buffer strips can be grazed out at end of winter and returned to production if not required the following winter.	Plan buffer strips early and establish when crops are sown. Grass buffer strips are not riparian margins. A buffer strip is in addition to any riparian margin and is located paddock side of any waterway fencing.
Grazing Top to Bottom of Slope	Grazing a sloping fodder crop paddock from top of slope to bottom using break fencing.	Graze highest risk areas last and use fodder crop in front of break as an additional buffer strip.	Access and location of water troughs should be considered when crop is being planned and whether they present problems. Also consider location of paddock access points – additional gateways may be needed before the start of winter.	Low cost	Is not a substitute for adequate buffer strip.
Portable Water Troughs	Plastic water troughs that can be relocated in a paddock used for winter grazing.	Reduces distance walked by stock to drink reducing pugging damage and stress on stock.	Plan use of portable water troughs when planning fodder crop. May need additional reticulation and troughs installed before conditions make job difficult.	Low cost	Reducing the distance stock need to walk for water can significantly reduce energy requirements particularly on muddy sloping paddocks.

Mitigation	Definition	Purpose	Scale and Management	Cost	Comments
Laneway Management	Any laneway that could result in accumulated run-off, from either the laneway or adjacent paddocks, being channelled into a waterway must be managed to intercept and divert run-off and suspended sediment onto paddocks or sediment traps.	Prevent sediment and manure from laneways being directed into waterways.	Mitigations need to be proportional to the length and slope and design of laneway. A laneway should be profiled so any run-off is directed into paddock, along its length is ideal. Laneways that are lower than the surrounding paddock will accumulate and concentrate water and this risk is made worse by long sloping laneways frequently found on irrigated properties. Where laneways can't be profiled to shed water – cut-outs or culverts will be required along the length of the laneway to intercept channelled water and divert it onto paddocks.	From low to high cost. However, well managed laneways that don't hold and channel water are likely to suffer less damage during the winter and have lower maintenance costs.	Every 100m of laneway 5m wide receives $5m^3$ of water in a modest 10mm rain or irrigation event. 1km of a 5m wide laneway in a 40mm rain event receives $200m^3$ water.
Crossing Management	All waterway crossings must be managed to control accumulated run-off and sediment entering waterways.	Exclusion of stock from waterways.	Any frequently used waterway crossing, or a crossing used for intensively farmed stock, which includes any stock being break fed, must be bridged or culverted. Careful consideration should be given to the approach to any crossing and the risk of concentrated run-off from laneways entering waterways at the crossing point (see Laneway Management above).	From low to moderate cost. However well managed crossings are usually damaged less during from flooding and erosion.	Waterway crossing points present high risks of run-off and accumulated sediment and manure entering waterways.

Mitigation	Definition	Purpose	Scale and Management	Cost	Comments
Sediment Traps	An area in or adjacent to a waterway that slows flow and allows sediment to drop out of suspension. Structures such as old stock water dams, old irrigation channels or ponds can form effective sediment traps. New structures can be created for the purpose of trapping sediment.	To intercept and slow run-off water so suspended sediment is trapped before run-off water enters any waterway.	On sloping ground the accumulation of water and sediment into channels, that can't be diverted into grass paddocks, presents considerable risk of loss of sediment to waterways. In such situations the only possible mitigation is the use of constructed sediment traps of sufficient size to slow flows and allow sediment to drop out of suspension. Sediment traps can be effective in removing larger particles such as sand or silt, but are ineffective in removing very fine particles, such as clay and adsorbed phosphorous.	Existing structures: moderate cost but purpose-built sediment traps could have high initial construction cost. Sediment will need to be removed at appropriate times and returned to paddocks. Any cleaning or maintenance of sediment traps also presents risks to contamination of waterways and must be carefully planned. Sediment traps are not a low-cost option but may be an essential mitigation option available is certain high-risk situations.	Construction of new sediment traps and removal of sediment is likely to require a consent from ECan. Sediment traps are the ambulance at the bottom of the cliff. Preventative mitigations that prevent run-off in the first place or intercept run-off and direct flows onto paddocks are likely to be more effective and cheaper than constructed sediment traps.
Critical Source Areas (CSA) Exclusion Areas	A CSA is any sloping feature that accumulates surface water and run-off and channels it into a waterway.	Temporary or seasonal removal of stock from areas at risk of accumulating surface water and run-off and channelling sediment and faeces into waterways.	CSAs can be small areas within paddocks such as a swale or depression that can be temporary fenced off during wet periods through to large features such as gullies or the head of a waterway which are unsuitable for wintering stock.	Low cost, temporary electric fencing. May result in additional areas being excluded from winter grazing.	A versatile low cost means of excluding stock from high risk areas but not a substitute for adequate buffer strips, see above.

Mitigation	Definition	Purpose	Scale and Management	Cost	Comments
Cropping Red Zones	Areas that should never be used for an annual fodder crop. These are areas prone to flooding, very wet/boggy areas or paddocks with extensive wetlands or springs. These should never be used for fodder crops and should be avoided when ground conditions would lead to severe pugging or damage by machinery. In addition, areas such as the head of a waterway with complex slopes that concentrate flows into channels should not be used for winter cropping.	Avoids high risk management options and very damaging situations.	Could be single paddocks or parts of paddocks to substantial areas of a farm with soils, location or slope, or combination of these factors, which makes them unsuitable for winter fodder cropping.	Constrains use of areas used for winter management, but likely to be cost effective in long term by avoiding severe paddock damage and loss of crop, animal welfare issues.	
Harvested Fodder Beet	Fodder beet can be harvested when ground conditions are suitable and stored or clamped in an appropriate area to be used as fodder during severe weather when access to in situ fodder beet would cause severe pugging or compromise animal welfare.	Provides the ability to continue feeding fodder beet to manage transition issues in situations where stock need to be moved off fodder beet paddocks due to environmental, welfare or other management risks.	The amount of stored beet should be proportional to the likely risk of needing to move stock off fodder beet blocks.	Some costs associated with lifting and storage. Provides insurance against either having to manage high welfare or environmental risks in extreme weather situations.	Fodder beet has a long shelf life once lifted and stored in a clamp, so can be harvested early in the season when ground conditions don't present access issues.

Mitigation	Definition	Purpose	Scale and Management	Cost	Comments
Catch Crops	A crop (such as oats, barley or triticale) established as soon as possible following a fodder crop.	Mop up surplus nitrogen on paddocks used for grazing stock on fodder crops.	Very effective in reducing N losses from fodder crop blocks if sown early. Establishment is dependent on soil type and season.	Low cost if crop can be successfully established and provides useful early grazing or silage crop.	Trials have shown catch crops can significantly reduce N losses.
Sacrifice Paddocks	A paddock, ideally with free draining soils well away from waterways, used to temporally hold stock and managed in a way that the sward will be severely damaged and require pasture renewal.	Provides stock with a refuge from fodder crop paddocks should these become unsuitable for continuous use due to welfare, environmental or management reasons.	Paddocks scheduled for re-grassing can make convenient sacrifice paddocks. However just because a paddock is due for re-grassing does not necessarily make it a sensible sacrifice paddock.	Variable costs depending on what paddocks destined for re-grassing. Could significantly increase the area required for winter stock management and create additional stock movements and damage to soil and laneways.	
Stand Off Areas	A relatively dry or sheltered area that can be used to hold stock during periods of extreme weather. A wide range of features can be used as stand off areas such as laneways, old railway lines, marginal land or small farm forestry blocks.	Provides stock with a temporary refuge during extreme weather events such as snow or heavy prolonged rain.	Selection and use of standoff areas must include an assessment of environmental risks. For example, an area in a riverbed may be free draining but may present significant environmental risks. Use of laneways should consider risks of channelling of sediment and water into waterways, see laneway management above. Stand off areas are likely to lead to high stock concentrations in small areas, this may be manageable for a short duration but may cause additional problems if used for extended periods.	Likely to be relatively low cost if low productivity marginal areas used, but may create feed issues, particularly ensuring supply of fodder beet, see harvested fodder beet above.	

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