

Waihao Downs Irrigation

**DRAFT
TEMPLATE**

Farm Management Plan

**for
Irrigated land Use
Prepared
for**

(Name of Shareholder)

Version 1 : Jan 2008

Attewell Irrigation Consultants Limited

for Waihao Downs Limited

Name:

Property details

Property name:

Owner:

Postal address:

Phone No.

Mobile No.

Fax No.

Email address:

Contact Person:

Postal address:

Phone No. Mobile No.

Fax No.

Email address:

Property area (ha):

Effective area (ha):

Area under irrigation (ha): water

effluent

Irrigation type: water

effluent

Enterprise type:

Dairy

Dairy grazing

Sheep & beef

Deer

Cropping

Other*

* Please describe

Purpose of plan

Each water user in the Waihao Downs Irrigation Scheme will prepare and implement a Farm Management Plan for Irrigated Land Use to demonstrate how they are actively managing their use of natural resources in order to achieve high standards of environmental management and optimise production from irrigation.

The plan provides a risk management approach to environmental protection and enhancement on irrigated farms. The plan is designed so that it can be adapted for each farm business. Many of the requirements will have both economic and environmental benefits.

The plan is specific to irrigated agriculture and addresses related management issues. The areas of farm activity that need to be considered are:

- Irrigation management
- Soils management
- Nutrient management
- Collected animal effluent management
- Biodiversity & ecosystem management
- Waterway and riparian management

Other Obligations

Preparation of and compliance with a Waihao Downs Irrigation Ltd Farm Management Plan will not exempt farmers from:

- their own industry quality assurance programmes, codes of practice etc.
- meeting specific regulatory/legal requirements (e.g. consent conditions for discharge of waste)

Industry Codes of Practice and Guidelines

Where industry standards and codes have been developed water users are expected to adopt these. Where applicable, a WDIL water user will meet the requirements of:

- “Code of Practice for Nutrient Management (With Emphasis on Fertiliser Use)” (NZFMRA, 2007) (Provides practical and specific guidance for safe, responsible and effective nutrient management)
- Standards New Zealand: NZS8409:2004 “Management of Agrichemicals”, which underpins the GROWSAFE ® Training Programme for agrichemical users and suppliers.
- The Spreadmark Code of Practice for the Placement of Fertiliser in New Zealand Spreadmark is a fertiliser spreading accreditation scheme that registers fertiliser-spreading companies with certified spreading machinery, trained operators and audited quality management systems.
- Environment Canterbury: “A guide to managing waterways on Canterbury farms”
- Irrigation NZ – Irrigation Code of Practice and Design Standards
- Irrigation NZ – Irrigation Evaluation Code of Practice
- “Dairying and Clean Streams Accord” (2003)

Monitor/Review/Revise

The Farm Management Plan requirements are based on best available information to achieve sustainable irrigated agriculture in the scheme area. As information, technology and best practice improve these farm plans will be reviewed and updated to incorporate the best available information.

Audit and Compliance

Appropriate records must be kept and produced on request. See Appendix 9: Waihao Downs Irrigation Limited Scheme Management Plan

Audit and Compliance requirements.

Waihao Downs Irrigation: Sustainable Development Responsibility

WDIL takes a pro-active approach to its responsibility for sustainable development of this scheme. It has developed and adopted a Scheme Management Plan that covers the Farm Plan development and implementation process and other sustainability initiatives.

References and Resources

The appendices to the Farm Plan provide key information relevant to WDIL, and references to other relevant material. Two resources available through Irrigation New Zealand (www.irrigationnz.co.nz) that provide detailed information for farmers who are developing and managing irrigation systems are:

- The Irrigation Guide and Environmental Checklist for Irrigated Farmers – A guide to decision making when going irrigating (developed by Farmers Irrigation Management Group)
- The New Zealand IRRIGATION MANUAL (developed by the Malvern Landcare Group) – A practical guide to profitable and sustainable irrigation

Summary of Key Environmental Concerns re Irrigated Agriculture and Best Management Practices to avoid or mitigate problems

Activity	Key environmental concerns/ Potential impacts	Examples of Best Management Practices
Irrigation management	Wasteful use of water e.g. <ul style="list-style-type: none"> • irrigation during/after rainfall • ponding of irrigation water • inefficient application • drainage to other properties 	Use INZ code of practice for design Use INZ evaluation code Schedule & apply water taking into account: crop type, soil type, rainfall etc Soil moisture monitoring
Soil management	<ul style="list-style-type: none"> • Soil compaction / pugging • Soil erosion • Soil health problems • Soil contamination 	Avoid stock pugging – use stand off pads or 'sacrifice' paddock Use shelter planting & reduced tillage to avoid wind erosion Avoid irrigation during or after heavy rainfall to minimise runoff to avoid erosion & contamination of water Use only FertMark certified fertilisers to avoid soil contamination
Nutrient management	<ul style="list-style-type: none"> • Fertiliser getting into ground & surface waterways • Runoff and leaching of stock effluent from paddocks into water ways (including through tile & mole drains) 	Follow the NZ code of Practice for Fertiliser Use Use soil test results to plan fertiliser needs Use Nutrient budgeting & nutrient management Manage fertiliser applications e.g. to avoid waterways, timing re crop needs, rainfall etc.
Collected animal effluent management	Contamination of ground & surface water during disposal of collected animal effluent (e.g. dairy shed or piggery waste)	Preparing an effluent disposal plan, including spillage management Including nutrients from effluent in nutrient budget and management
Riparian management	<ul style="list-style-type: none"> • Damage to stream banks. • Nutrient and faecal contamination of waterways • Sediment 	Stock management, including fencing to keep stock from waterways Crop management, including buffer zone around waterway. Stream bank planting
Biodiversity & Ecosystem management	<ul style="list-style-type: none"> • Loss of native plants and animals and their habitats; • Loss of ecosystem diversity • Soil health problems 	Protect existing habitats (e.g. wetlands) as an integral part of farm management Plantings (native & exotic) to support ecosystem diversity

Irrigation Management

Our objective for best practice irrigation management is to use water efficiently, minimising runoff and drainage.

The problems that we will avoid, remedy or mitigate include:

Wasteful use of water

- irrigation during/after rainfall, or when significant rain is forecast
- ponding of irrigation water
- inefficient application
- drainage to other properties

We undertake to comply with WDIL's specific requirements relating to irrigation management which include:

WDIL requirements	Checklist	
	Yes	No
Compliance with Regional Council conditions relating to the supply of water to WDIL		
All new on-farm irrigation infrastructure to be designed by a suitably qualified irrigation designer to meet INZ design standards and any WDIL design requirements (Appendix 2)		
All Irrigators to provide WDIL with an evaluation report prepared by an Irrigation NZ accredited evaluator according to the INZ Irrigation Evaluation Code of Practice when requested by WDIL. The report must set out the system performance, and the timelines for upgrades, if required. All upgrades to be completed within 36 months of receiving the report.		

In addition we will implement our own policies and procedures for best practice irrigation including:

To achieve best practice irrigation we will	Checklist	
	Yes	No
Apply irrigation water at rates equal to or lower than 50% of soil moisture holding capacity of the soil.		
Plan & schedule irrigation so that it is applied according to evapotranspiration, rainfall and soil moisture status		
Match application rate to crop or pasture being grown as far as possible, according to the capability of our system		
Avoid ponding of irrigation water, as far as possible		
Avoid drainage of irrigation water to adjacent properties or to surface or groundwater		

Self Assessment

- Recent technical reports (refs) have identified that well-designed on-farm irrigation infrastructure is the key to achieving application efficiency of 80% or greater and minimising adverse effects such as runoff & ponding
- INZ Design standards describe the minimum acceptable design practices
- WDIL will inspect existing irrigation systems and may require a completed evaluation report. A period is allowed to implement any required changes.
- This requires a knowledge of actual soil moisture prior to irrigation. Table 19 INZ CoP gives summary of soil moisture measurement methods. NZ Irrigation Manual provides details.
- System must be designed to match appropriate soil-crop conditions. Application depths managed through soil moisture and crop monitoring
- Design criteria should ensure that application rate does not generally exceed infiltration rate. (Design standard) Note that soil infiltration rates can vary with wetness of soil and can change after irrigation development.
- Irrigation during or after significant rain can be avoided if users know that water can be ordered/delivered when they require. Good application uniformity (to design standards) reduces problems.

Name:

Does my management achieve the objectives above?

Yes Objectives achieved

No Please fill out table below

List actions required	Person responsible	Timeframe for completion	Completion date

Verification

The information provided is verified as correct.

Property owner / manager

Signature Date

Soils management

Our objective for best practice soils management is to maintain or improve (if necessary) the physical condition of our soil

The problems that we will avoid, remedy or mitigate include:

- loss of topsoil by wind or water erosion
- movement of soil & contaminants into waterways
- damage to soil structure and health
- ! contamination of soil

We undertake to comply with WDIL's specific requirements relating to soils management which include:

WDIL requirements	Checklist	
	Yes	No
Minimise soil loss to waterways through compliance with WDIL standards (Appendix 4)		

In addition we will implement our own policies and procedures for best practice soil management including:

To achieve best practice soil management we will	
Reduce the risk of wind erosion by <ul style="list-style-type: none"> • using appropriate seedbed preparation • avoiding creation of small aggregates and minimising the length of time that soils are exposed during soil cultivation 	
Implement practices that optimise soil structure and soil biological activity	
Maintain well-aerated soils and conserve soil organic matter	
Carry out on-farm monitoring of soil quality indicators	
Avoid risk of soil contamination by using fertilisers that are 'Fertmark' compliant.	
Use stand off pads and other methods to minimise soil pugging in wet conditions	

Note: effects of land use activities on stream bank erosion are covered in Riparian Management Policy.

Self Assessment

- Note that this section refers only to water bodies on or directly affected by the property that the plan applies to.
- Minimising soil loss to waterways reduces sediment, nutrient and microbiological contamination of the water body.
- Good design and management of irrigation are key to avoiding runoff. Irrigation NZ design code of practice identifies standards that reduce risks of run off from irrigation water. Water budgeting and regularly available water reduce the need to apply water when soil moisture levels are close to field capacity.
- Well-managed irrigated crops and pastures have a low wind erosion risk c.f. dryland. Irrigated land uses have reduced risk of topsoil loss by wind (c.f. dryland) because irrigated soil is moist and ground cover by plants is maintained at higher levels.
- Fertmark is an independently assessed fertiliser quality assurance programme. 'Fertmark' fertilisers have ongoing, independent and vigorous auditing.

Name:

Does my management achieve the objectives above?

Yes Objectives achieved

No Please fill out table below

List actions required	Person responsible	Timeframe for completion	Completion date

Verification

The information provided is verified as correct.

Property owner / manager

Signature Date

Nutrient management

Our objective for nutrient management is to minimise nutrient losses to water while managing soil fertility to optimise pasture and crop productivity.

The problems that we will avoid, remedy or mitigate include:

- N & P losses from fertiliser & stock into groundwater and surface water
- Runoff, leaching

We undertake to comply with WDIL’s specific requirements relating to nutrient management which include:

WDIL requirements	Checklist	
	Yes	No
Compliance with Regional Council's requirements for nutrient management (Appendix 5)		
Annual nutrient budget & management plan to be prepared & implemented for the property ¹⁵ (Appendix 6) and regularly reviewed		
Minimise nutrient losses to water bodies in accordance with WDIL requirements(Appendix 7)		

In addition we will implement our own policies and procedures for best practice nutrient management including:

To achieve best practice nutrient management we will	Checklist	
	Yes	No
Implement the best management practices in the ‘Code of Practice for Nutrient Management’ (NZFMRA 2007).		
Ensure that nutrient budgets etc account for all inputs, including brought in feed		
Use ‘Spreadmark’ accredited contractors or apply fertiliser to ‘Spreadmark’ standards		
Use data from soil tests (taken regularly, as appropriate to farming activity) to manage fertiliser inputs		
Apply nutrients where and when needed in accordance with soil monitoring and nutrient budgeting.		
Time fertiliser applications carefully to avoid saturated soil and heavy rainfall to minimise nutrient losses to ground water and waterways		
Use several smaller applications of fertiliser (especially N) during the growing season		
Minimise N losses to water by understanding and applying best management practices including use of		

new technologies that optimise N uptake for production & reduce leaching to water	
Manage soil, organic manures, etc. to avoid to avoid nutrient losses to water	
Avoid autumn cultivation until soil temperature is below 10 degrees C, if practical	
Note paddocks where there are tile or mole drains and manage these carefully	

Note: Disposal of stock effluent is covered in Collected Animal Effluent Management Policy.

Self Assessment

- Nutrient leaching is not easily measured by users, so emphasis is on best management practices for fertiliser application, grazing etc, to avoid problems, rather than require remedial actions.
- Fonterra require a review of plan/budget every 3 years (June 2007).
- Meeting regulations for effluent disposal are the responsibility of the landholder. However, where disposal is to land on an irrigated farm, the effects of the effluent disposal must be taken into account in managing irrigation applications.

Name:

Does my management achieve the objectives above?

Yes Objectives achieved

No Please fill out table below

List actions required	Person responsible	Timeframe for completion	Completion date

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Verification

The information provided is verified as correct.

Property owner / manager

Signature Date

DRAFT

Collected animal effluent management

Our objective for effluent management is to manage the effluent system to optimise the productive benefits of animal effluent while taking all practical steps to avoid contamination of ground and surface water.

The problems that we will avoid, remedy or mitigate include:

- Contamination of groundwater and surface water, especially faecal, N, P

We undertake to comply with WDIL's specific requirements relating to effluent management which include:

WDIL requirements	Checklist	
	Yes	No
Compliance with ECAN requirements relating to effluent management & disposal		
Preparation of an Effluent Management Plan		
Effluent application to land to be included in farm nutrient budget		

In addition we will implement our own policies and procedures for best practice effluent management including:

We will incorporate the following in our effluent management plan & practices:	Checklist	
	Yes	No
Maintenance of the effluent irrigator and all associated equipment in good functioning order		
Ensuring that ponding of irrigated effluent does not occur		
Using only designated disposal area for effluent irrigation		
Ensuring that effluent disposal does not occur: <ul style="list-style-type: none"> • Within 20m of any surface waterbody • Within 30 m of any bore or spring • On any land that has been irrigated within the previous 24 hours or will be in next 24 hours 		
Specific procedures for dealing with spillage from any part of the disposal system		
Ensure that runoff from stock races does not flow directly into waterways		
Use effluent holding pond (5 days volume) for extra wet periods		

Self Assessment

Name:

Does my management achieve the objectives above?

Yes Objectives achieved

No Please fill out table below

List actions required	Person responsible	Timeframe for completion	Completion date

Verification

The information provided is verified as correct.

Property owner / manager

Signature Date

Waterway & Riparian management

Our objective is to protect the waterways on our farm by maintaining healthy riparian margins.

The problems that we will avoid, remedy or mitigate include:

- Stock damage to banks, causing sedimentation
- Contamination of water by stock or agrichemicals
- ! Soil loss causing sedimentation of waterways
- Poor water quality and stream life

We will comply with WDIL's specific requirements relating to waterway and riparian management which include:

WDIL requirements	Checklist	
	Yes	No
Riparian management plan to meet WDIL guidelines for all permanent streams		

In addition we will implement our own management policies to achieve the above objectives including:

We will incorporate the following in our waterway & riparian management & practices	Checklist	
	Yes	No
Exclude cattle, pigs and deer from waterways. Exclude other stock from waterways, if necessary.		
Leave a buffer of uncultivated vegetation beside streams to filter any runoff. This will be and appropriate distance from the stream bank depending on soil type etc. [ECAN has guidelines]		
Allow a wider buffer at low points which are more prone to potential runoff from paddocks to provide filter.		
Have field drains discharge into a riparian strip, rather than a waterway where practical		
When applying fertiliser or other chemicals spread at a distance where it won't get into the waterway		
Manage farm drains and races according to guidelines (Appendix 10)		
Help manage waterways with plantings of suitable trees and shrubs on waterway		

margins, choosing species according to guidelines (e.g. regional council) (Appendix 10)	
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y.

Self Assessment

- Note that this section refers only to waterways on or directly affected by the property that the plan applies to.

Name:

Does my management achieve the objectives above?

Yes Objectives achieved

No Please fill out table below

List actions required	Person responsible	Timeframe for completion	Completion date

Verification

The information provided is verified as correct.

Property owner / manager

Signature Date

Biodiversity and ecosystem management

Our objective is to include biodiversity and ecosystem management as an integral part of our farm management

The problems that we will avoid, remedy or mitigate include:

- Loss of native plants and native animals and their habitats;
- Loss of ecosystem diversity
- Soil health problems
- Loss of habitat for pollinators, beneficial birds, insects etc
- Loss of shelter for stock and crops

We will comply with WDIL's specific requirements relating to biodiversity & ecosystem management which include:

WDIL requirements	Checklist Yes No
Adopting WDIL requirements for biodiversity enhancement (Appendix 11)	

In addition we will implement our own management policies to achieve the above objectives including:

We will incorporate the following in our farm management & practices	Checklist Yes No
Protect important habitats for native biodiversity through sympathetic farm management	
Where shelter belts, hedges, trees etc are removed as part of irrigation development replant suitable perennial plants to provide shelter and habitat for pollinators, beneficial birds, insects etc.	
Manage physical, biological and nutrient properties of soils to ensure soils are healthy	

Note: Having healthy waterways is covered in Waterway and Riparian Management

Self Assessment

- Good irrigation design for efficient water use may require existing shelter etc. to be removed. With water, new plantings will grow more readily, and a greater range of species will thrive.

Name:

Does my management achieve the objectives above?

Yes Objectives achieved

No Please fill out table below

List actions required	Person responsible	Timeframe for completion	Completion date

Verification

The information provided is verified as correct.

Property owner / manager

Signature Date

APPENDICES

1. Summary of RMA consent conditions for the Scheme that affect on-farm activities
2. Requirements for on-farm irrigation system design
3. Requirements for evaluation of existing irrigation systems
4. Requirements to minimise soil loss
5. Summary of Canterbury Regional Council requirements for nutrient management
6. Requirements to minimise nutrient losses to water bodies (includes requirements for nutrient budgets and management plans)
7. Draft effluent management plan
8. Requirements for waterway, riparian and biodiversity management
9. WDIL audit and compliance requirements
10. References

Note: the content of these appendices needs to be consistent with the Scheme Management Plan, especially the section on WDIL requirements for water users

Appendix 1

Summary of RMA consent conditions that affect on farm activities

Appendix 2

Design of on-farm irrigation systems

New on-farm infrastructure must be designed by a suitably qualified designer to meet INZ design standards and any WDIL design requirements.

The designer must comply with the Irrigation New Zealand Code of Practice for

- Planning
- Design
- Quoting and Supply
- Installation & Commissioning
- Operations

The designer must:

- State what KPI values will be achieved by the design, if correctly installed
- Give sufficient details on what to measure and where, throughout the irrigation system, for the purchaser or a third party to verify that the system is achieving the KPI values.
- Provide a design summary report with KPIs (e.g. Table 21 INZ CoP)
- On commissioning, provide an operating manual that specifies:
 - The correct way to operate all equipment and installations;
 - Scheduling methods and crop water requirements;
 - How the system should work and its optimal operating range;
 - Protocols for operating the system safely;
 - How the system handles natural extreme events such as floods and storms;
 - How the system's operation will be monitored;
 - How environmental impacts, such as drainage, will be monitored; and
 - Emergency procedures.

The incorporation of both water use measurement and soil moisture measurement should be planned for and included in the design.

References:

The Irrigation Guide – in particular Section 8: “How much water to apply and how often”

Appendix 3

Requirements for evaluation of on-farm irrigation systems

Measuring water use and soil moisture can make significant savings in both water use and energy use, particularly on systems with more than adequate capacity, as it is very easy to overwater under most conditions.

Existing on-farm irrigation systems must be evaluated by an Irrigation New Zealand (INZ) accredited evaluator according to the INZ “Irrigation Evaluation Code of Practice” The Code of Practice. WDIL will require systems to meet water use efficiency and environmental performance standards.

An ‘Irrigation Evaluation’ carried out under the Irrigation New Zealand Code of Practice assesses and reports on the existing system and current management practices. It should consist of: A visual inspection plus a uniformity test on the system to determine the water application efficiency over the site

- A seasonal irrigation efficiency estimation
- Assessment of pump, pipe and filter performance including energy use
- Analysis and reporting of the results, with comparison to INZ design standards
- Recommendations for improvement, if necessary

The report should provide the information required by WDIL on key performance indicators of water use efficiency and established performance benchmarks, as well as recommendations for improvements to the system, if the system does not meet required performance.

WDIL does not require reporting of indicators relating to the business performance e.g. labour, capital, productivity, returns etc. Indicators selected for this Code relate to estimates of efficiency across an irrigated growing season or year. They provide information relating to economic or environmental implications of inefficient irrigation systems or management.

Key performance indicators

Key performance indicators used in the Irrigation Evaluation are presented in the Code of Practice for Irrigation Design (2007). They include:

Water Use Efficiency
Crop irrigation demand
Management allowable deficit
Return interval
Application uniformity
Application rate
Application depth
Adequacy of irrigation
Application efficiency
Distribution efficiency
Headwork efficiency
Supply reliability
System capacity

Other Efficiency Indicators

Energy
Labour
Capital
Capital cost
Operating cost
Productivity
Returns
Environment
Average system efficiency
Drainage
Runoff

The evaluation is only the start of the process towards irrigation “best practice”. It is important that managers use the generated information to continuously improve the irrigation system and practice.

Appendix 4

Soils Management - avoiding soil and contaminant loss to waterways

Design requirements

High-volume sprinkler irrigation impacting on the soil particles can cause either movement of the particles or the breakdown of the soil into smaller particles. Designers must ensure that the design minimises problems with soil breakdown and movement by:

- Identifying potential problems with stream impact energy;
- Selecting an irrigation system type to minimise or eliminate problems with stream impact; and
- If there is a potential problem, make it known to the purchaser of the irrigation system. Spray irrigation system should apply water at a rate that does not cause excessive surface runoff or ponding on the soil surface during irrigation or after irrigation has ceased.

Management Requirements

Spray irrigation system must be operated so that they apply water at rates that do not cause surface runoff or excessive ponding on the soil surface during irrigation or after irrigation has ceased.

Riparian buffers

To minimise soil (and contaminant) loss in the event of heavy rainfall on land with high soil moisture levels suitable riparian buffers must be provided adjacent to rivers and streams. See Appendices 9 & 10 for guidelines on riparian buffers.

Appendix 5

Summary of Canterbury Regional Council requirements for nutrient management

Appendix 6

Requirements for minimising nutrient losses to water bodies

(includes requirements for nutrient budgets and nutrient management plans)

Potential risks

- Contamination of ground water
- Contamination of surface water

Minimising Nitrate Leaching

- Apply irrigation at optimum rates & times
 - Soil moisture measurement, scheduling
- Match N fertiliser application to meet plant demand
 - Amount, rate and timing
- Use nutrient budgets and models to guide N inputs
 - (e.g. OVERSEER ® and NLE model)
- Use new nitrification inhibitor technology to improve the soil N cycle efficiency and reduce nitrate leaching losses

Nutrient Budgets and Management Plans

[More work to do here. The recently released “Code of Practice for Nutrient Management (With Emphasis on Fertiliser Use)” (NZFMRA, 2007) will provide the guidelines. It has a template for preparing a nutrient management plan etc.

A nutrient budget and management plan that is appropriate to the land uses must be prepared. The budget, plan and records of fertiliser and effluent application must be made available to WDIL, on request. A nutrient budget must compare inputs and outputs to establish changes in soil nutrient levels.

Inputs to be considered include nutrients:

- in mineral fertilisers
- in organic fertiliser, soil amendments, feedlot waste, other imported manures or by-products
- in dairy and pig effluent
- in purchased feed (such as grain, hay, silage, brewer’s grain, palm kernel extract, other feeds)
- contained in stock returns from stock grazing regularly on the land
- released from soil fixation sites or mineralised from organic matter
- in irrigation water and rainfall
- in clover/lucerne nitrogen fixation
- Nutrient outputs and losses that should be included occur in:
 - produce leaving the block (such as fruit, vegetables, grain, hay, silage, milk, meat, wool, timber)
 - nutrient leaching below the root zone
 - losses in run-off, including nutrients associated with eroded soil particles
 - loss through soil fixation (P, K) or immobilisation (N, S)
 - loss to the atmosphere from volatilisation and denitrification
 - transfer in dung or urine to stock camps, yards or laneways.
- (based on CoP for Nutrient Management (2007))

Appendix 7

Example of an Effluent Management Plan

Also ECan effluent standards.

Appendix 8

Waterway, Riparian & Biodiversity Management

This appendix to include Environment Canterbury ‘Guide to managing waterways on Canterbury farms’

(2005) & companion guides “Lowland Plains, Streams and Drains” & “Hill Country Streams”

WDIL requires that: Cattle, pigs and deer are excluded from waterways. Other stock to be excluded from waterways, if necessary.

- A buffer of uncultivated vegetation must be left beside streams to filter any runoff. This will be an appropriate distance from the stream bank depending on soil type, slope etc., according to the ECan guidelines.
- A wider buffer is provided at low points which are more prone to potential runoff from paddocks to provide filter.
- Farm drains and races are managed according to Environment Canterbury guidelines
- Vegetation on waterway margins take into account the need for suitable species to achieve desired benefits, as described in Environment Canterbury guidelines²³.
- Where shelter and other plantings are removed for irrigation development, consideration be given to replacing these with native species in suitable locations.

Appendix 9