Manuherikia Catchment Water Strategy Group (MCWSG)

Feasibility Study

Water Quality and Nutrients

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Te Ahuwhenua, Te Kai me te Whai Ora. Tuatahi

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Feasibility Study Overview

- MCWSG is currently undertaking a feasibility level study of the Manuherikia River catchment to provide water storage and distribution for irrigation.
- October 2013 a group led by Golder commissioned to undertake four components of the feasibility study:
  1. Geotechnical and engineering;
  2. Environmental;
  3. Water allocation, planning and RMA;
  4. Economic and commercial (Compass Agribusiness/Rational).
- Aqualinc - hydrological component.
- Feasibility study is to be completed later this year.

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Feasibility Study Overview

- Feasibility study considering 5 Options:

  Options 1-3 Small, medium and large increases in the storage capacity of Falls Dam. Upper - mid catchment focus

  Small - improved reliability to Blackstone and Omakau Main Race (6,500 ha)

  Medium + Dunstan Creek improved reliability (≈ 9,000 – 13,000 ha irrigation)

  High + Lauder and Thomson creek improved reliability (≈ 21,000 ha irrigation)

  Option 4 Efficient water distribution systems to deliver irrigation water from the Falls Dam, status quo – lower catchment focus increased irrigation in Galloway and MIS.

  Option 5 The proposed Mt Ida Dam and associated distribution system, (≈ 2,000 ha new irrigation)

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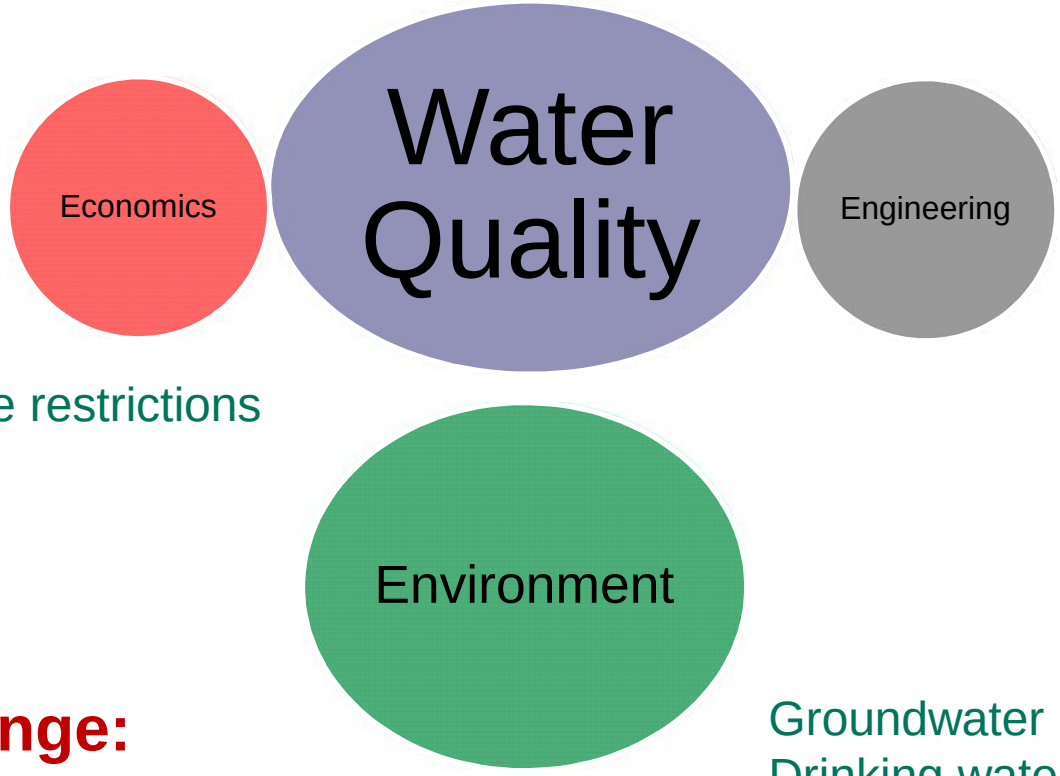
Water Quality - Key Issue



Cost of mitigation

Potential land-use restrictions

Size of structures,

Design criteria,

Treatment needs

Key challenge:
Land use change increases nutrients which leads to effects on water quality.

Groundwater and surface water
Drinking water
Ecological – Aquatic
Amenity and recreation

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Water Quality - Key Issue

Land use change → Increased nutrients → Water quality effects

- Irrigation increases production
- More stock
- Increased intensity

- More stock/higher intensity – increased nutrients – increased risk of leaching

- High soil moisture increases drainage and runoff.
- Water in the soil ends up in the groundwater and surface water systems

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Assessing water quality effect

- Use Overseer – to assess what happens at the soil level.
- Use hydrological models to assess transport through the groundwater and surface water system systems.
- Current water quality generally pretty high.

- **Challenge for feasibility study is to develop a landuse scenario that is both viable (economically) and ensures water quality meets the plan.**

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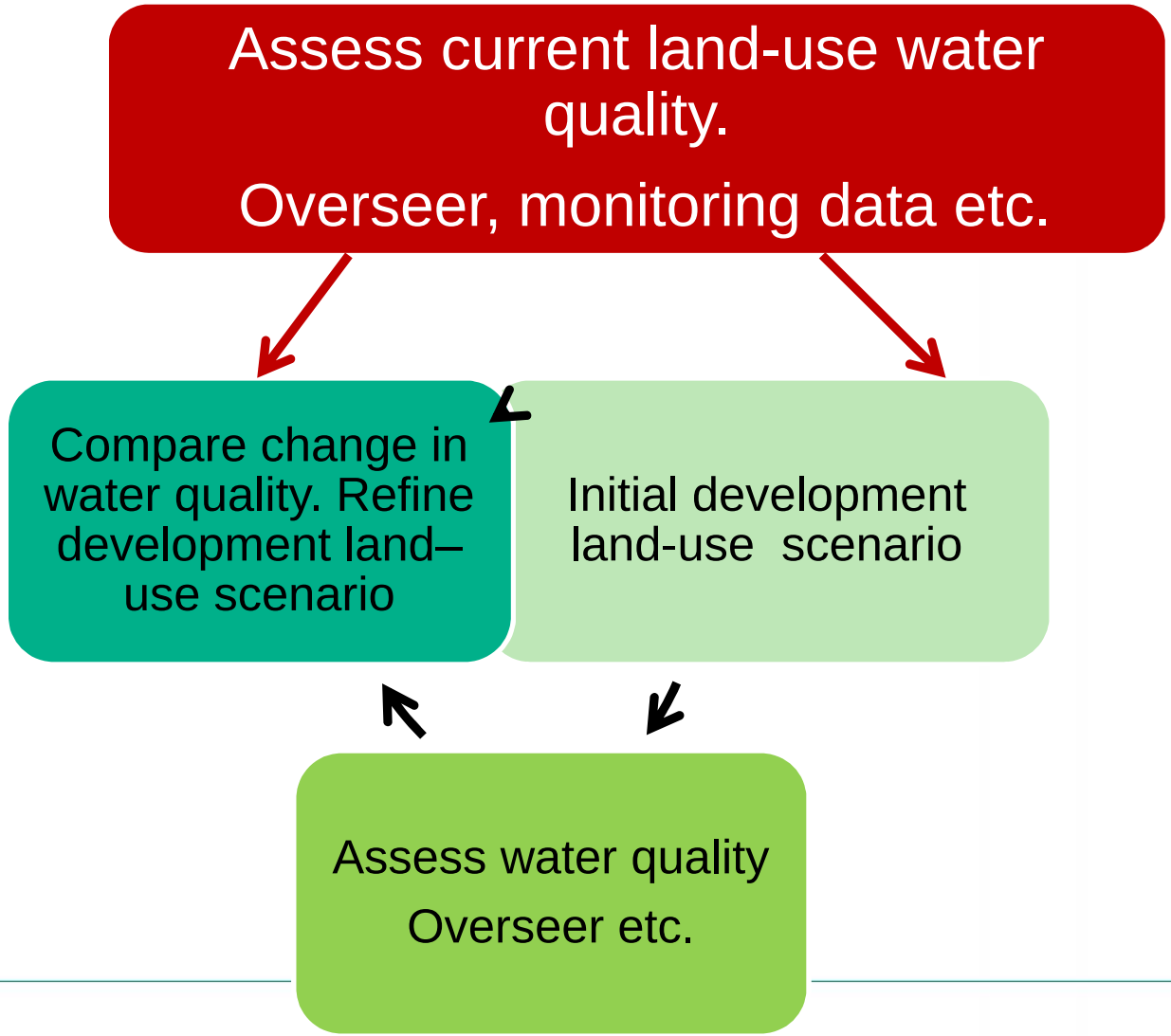
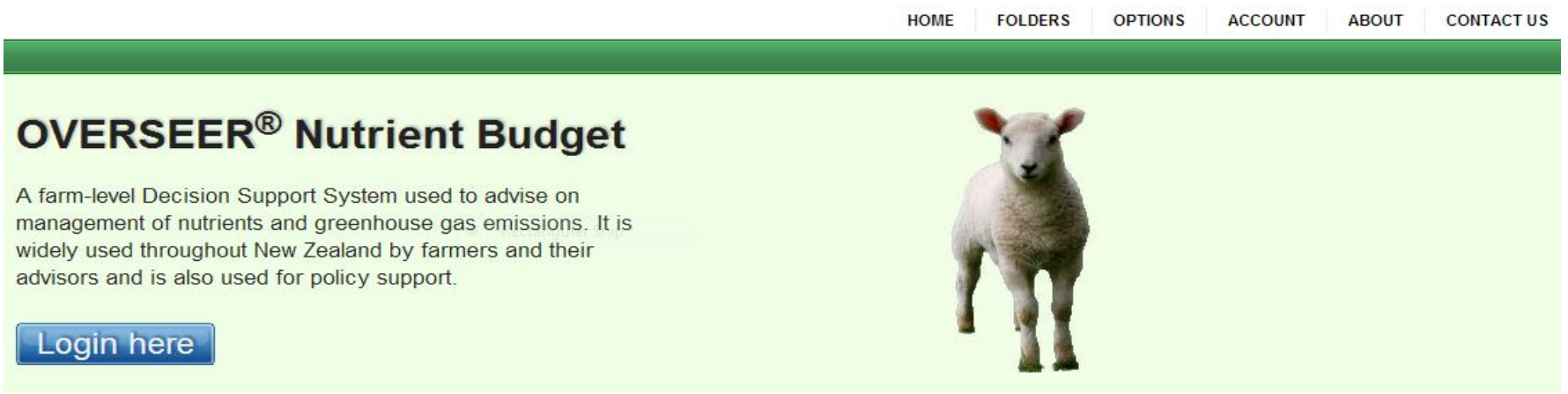
Assessing water quality effect



OVERSEER® Nutrient Budgets Model



OVERSEER®

What is *Overseer?*

- Agricultural management tool to assist farmers and their advisors to examine nutrient use and movements within a farm to optimise production and environmental outcomes

- Computer model calculates and estimate nutrient flows and creates a nutrient budget

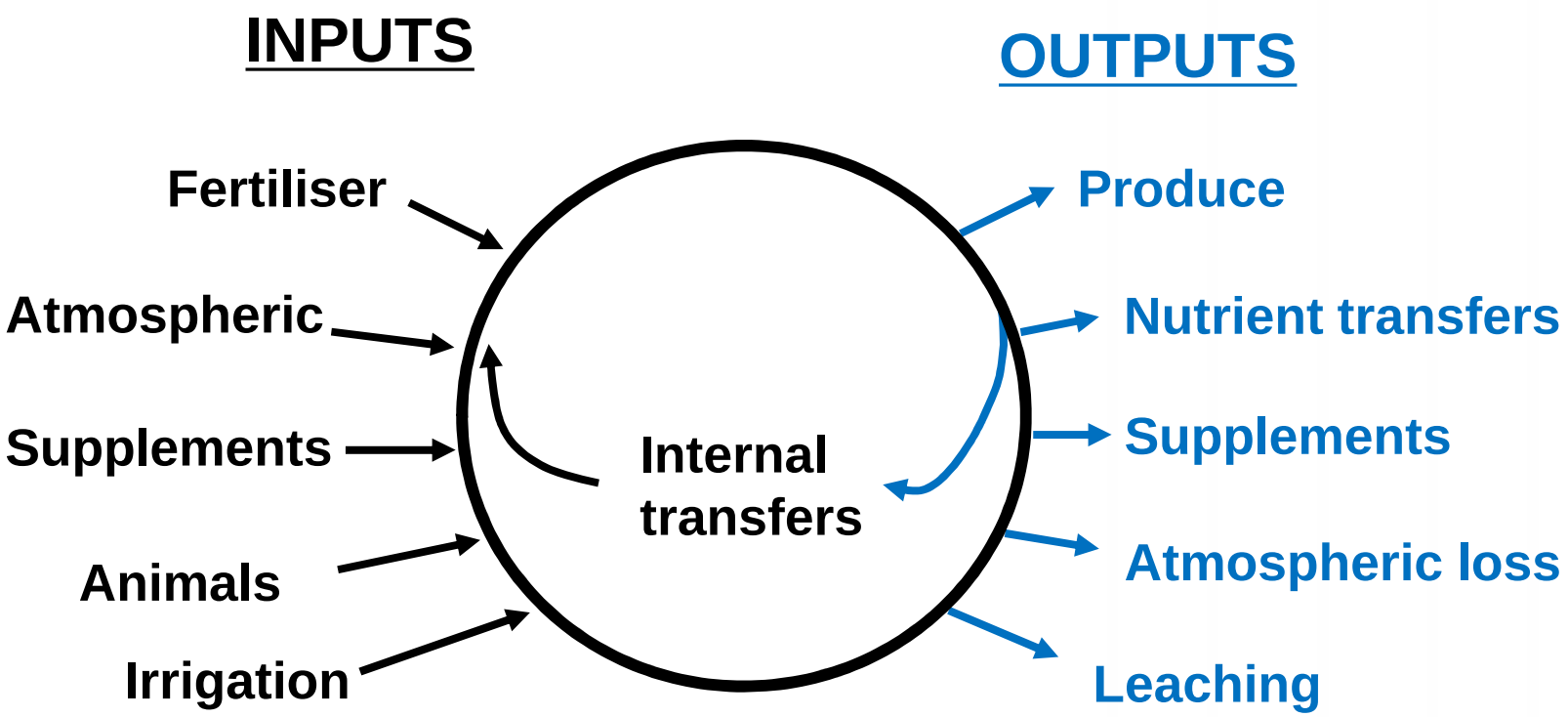
- Estimates off-farm nutrient losses:
  - N leaching / run-off
  - P run-off
  - Greenhouse gas emissions: CH_4, N_2O, CO_2

OVERSEER®

What is *Overseer?*

- Widely-used nutrient management tool
- Available free to use online
- The core of *Overseer* is a nutrient budget
- AgResearch, NZ and international research used to develop *Overseer*
- Calibrated to New Zealand farming and climatic conditions
- Uses include fertiliser recommendations, scenario testing, limit setting, and as a research and educational tool
- Continual development and wide contribution from stakeholders

Core = Nutrient Budgets



A nutrient budget is a tool to help achieve your nutrient management objectives

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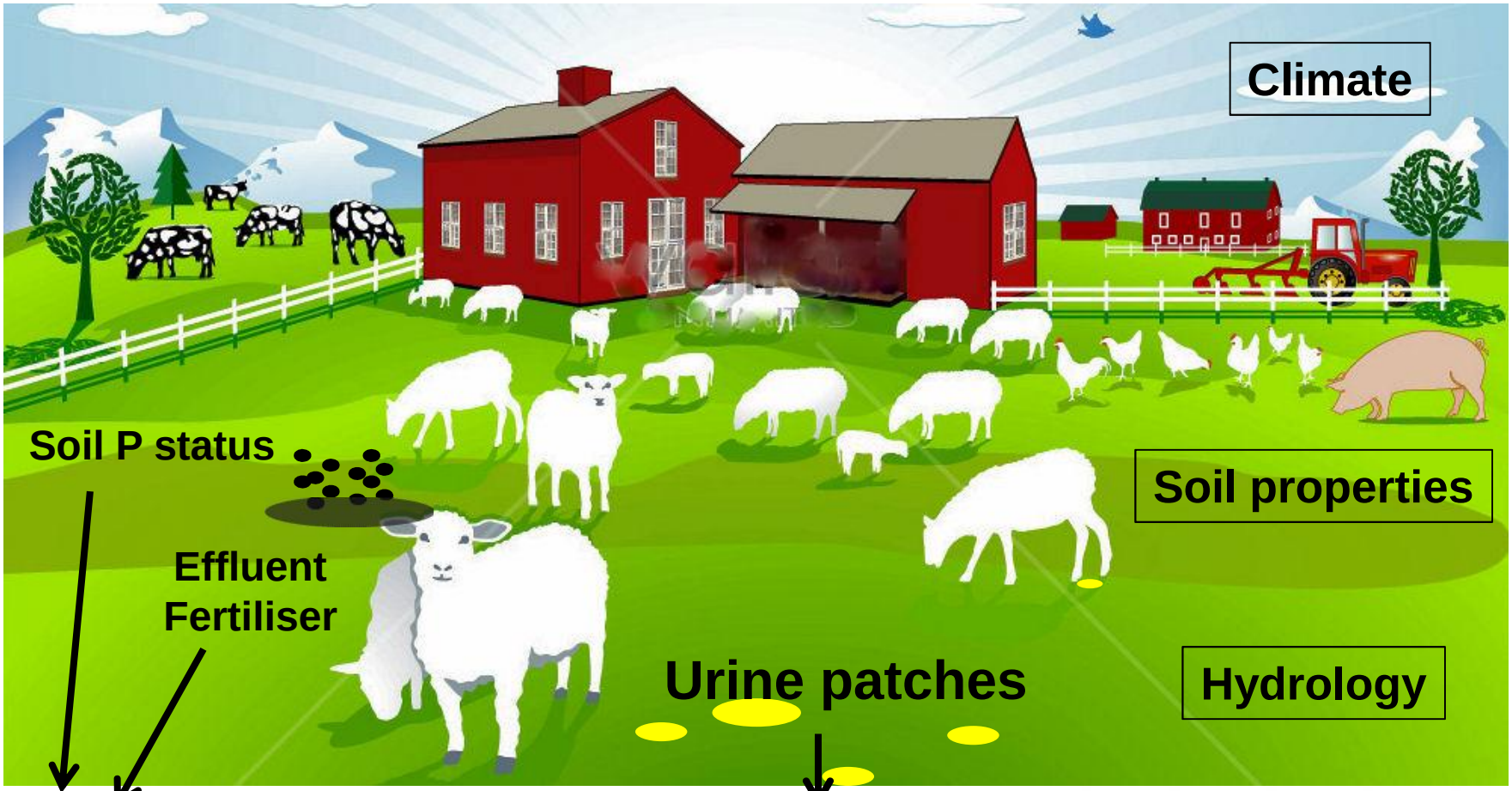
How does it work?



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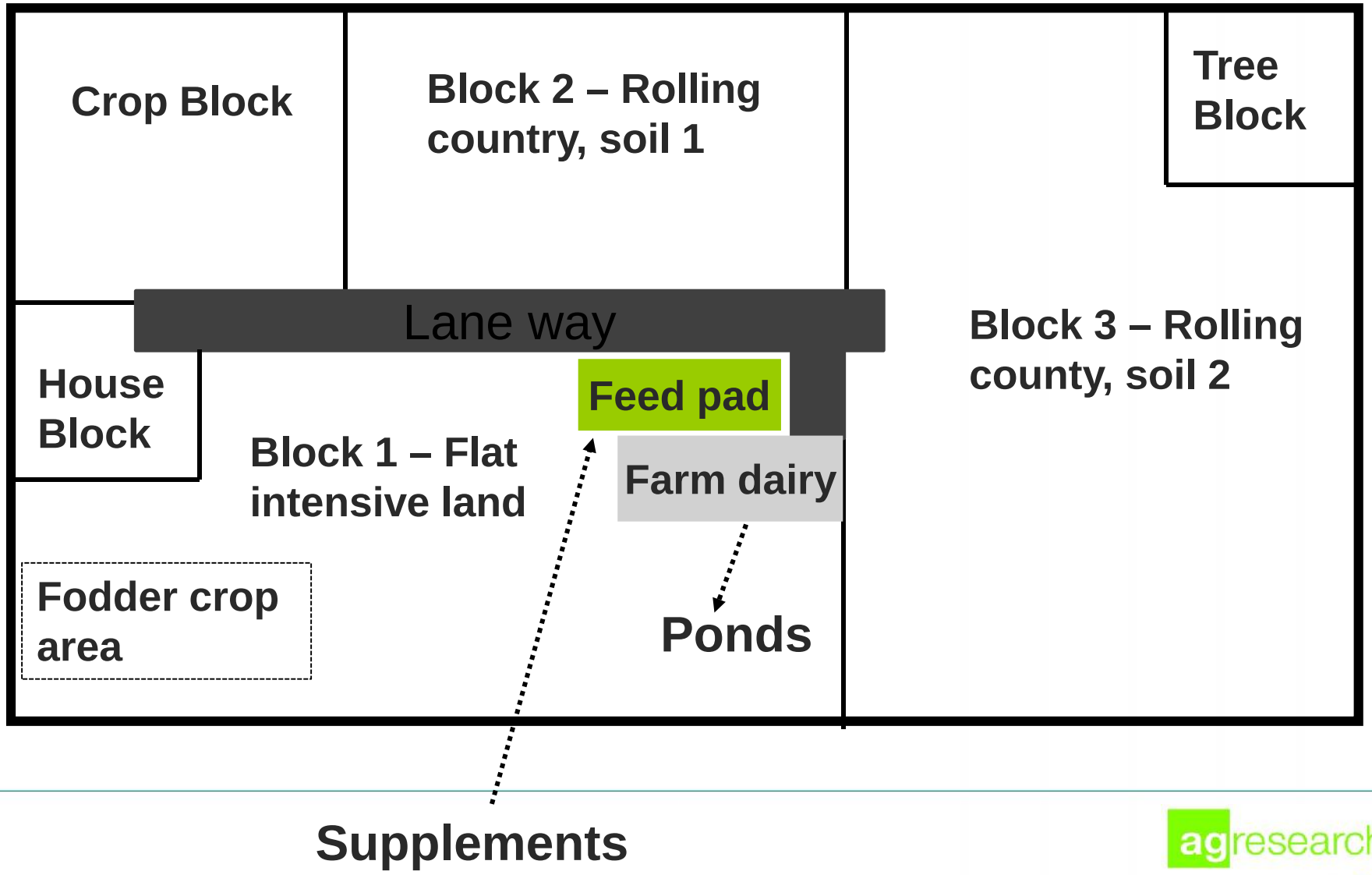
Data Entry: Think farm & block scales



Input Data

Farm scale:

- Location, block set up
- Animal stock numbers and production
- Supplements imported onto farm
- Structures present i.e. feed pads, standoffs and housing
- Effluent management system
- Use of nitrification inhibitors, areas of wetlands

Block scale:

- Topography, climate, soil information, drainage
- Pasture type
- Supplements made
- Fertiliser inputs and irrigation
- Effluent application management

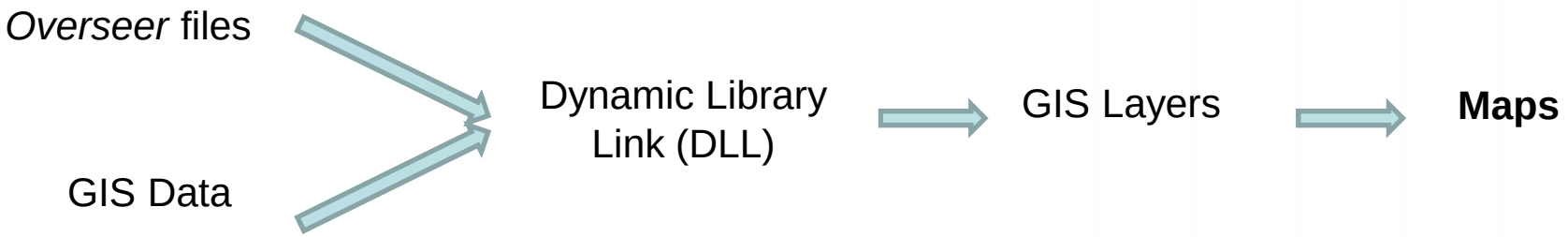
Most sensitive inputs

- Varies between nutrients and systems and the output being considered.

- In general:
  a. Inputs that influence the size of **source** of a nutrient e.g. stocking rate, fertiliser inputs
  b. Inputs that influence the **transport** of a nutrient e.g. soil, drainage, slope, climate

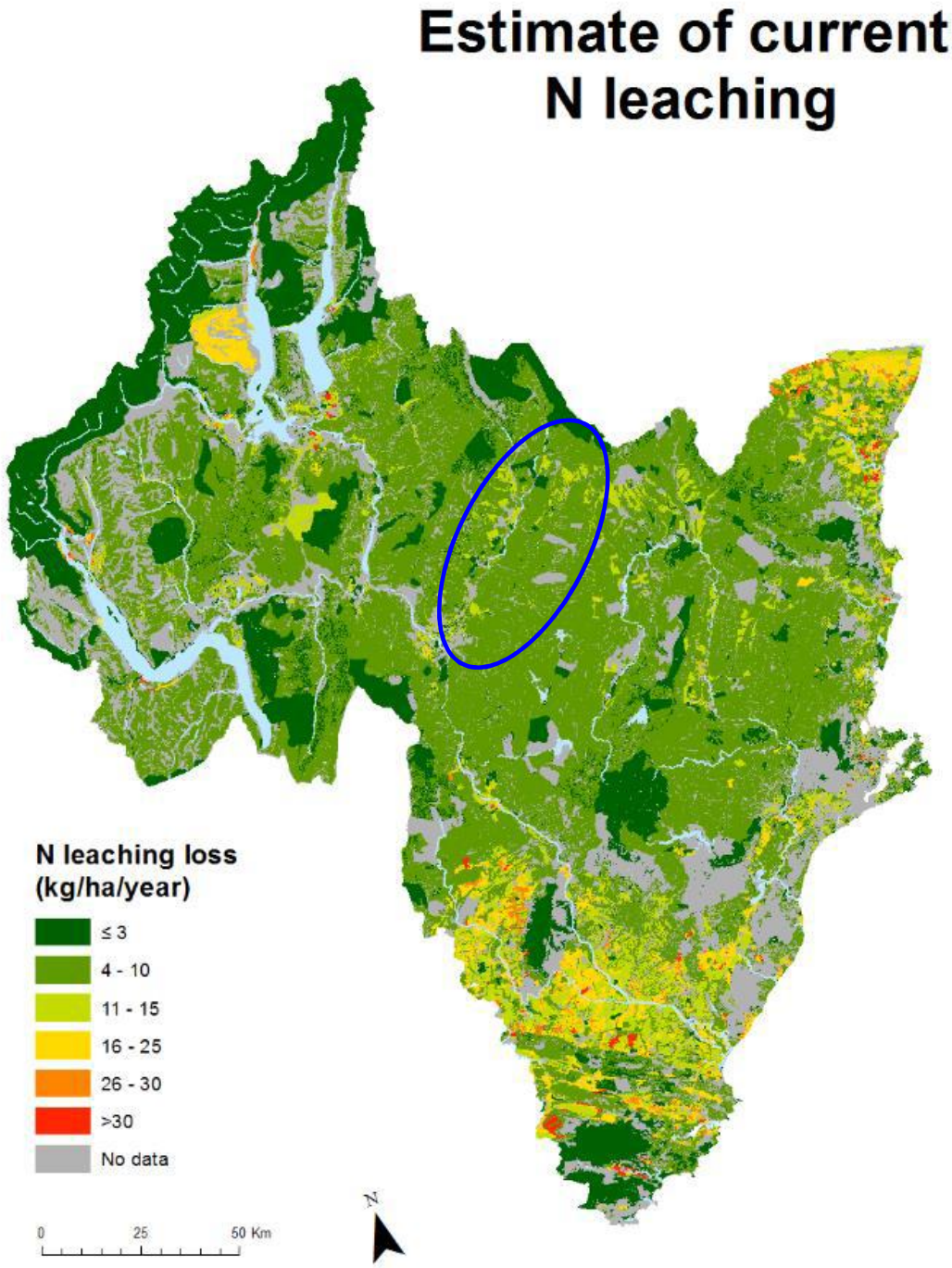
Overseer modelling work in Otago

- AgResearch worked with ORC to develop two maps for the Otago Region.
  - Inherent N leaching susceptibility from urine N input
  - Estimates of N leaching under hypothetical scenario of current average land use



- As part of the MCSWG feasibility study the process will be refined for Manuherikia catchment.

ORC Maps



The blue circle approximately highlights the Manuherikia Catchment.

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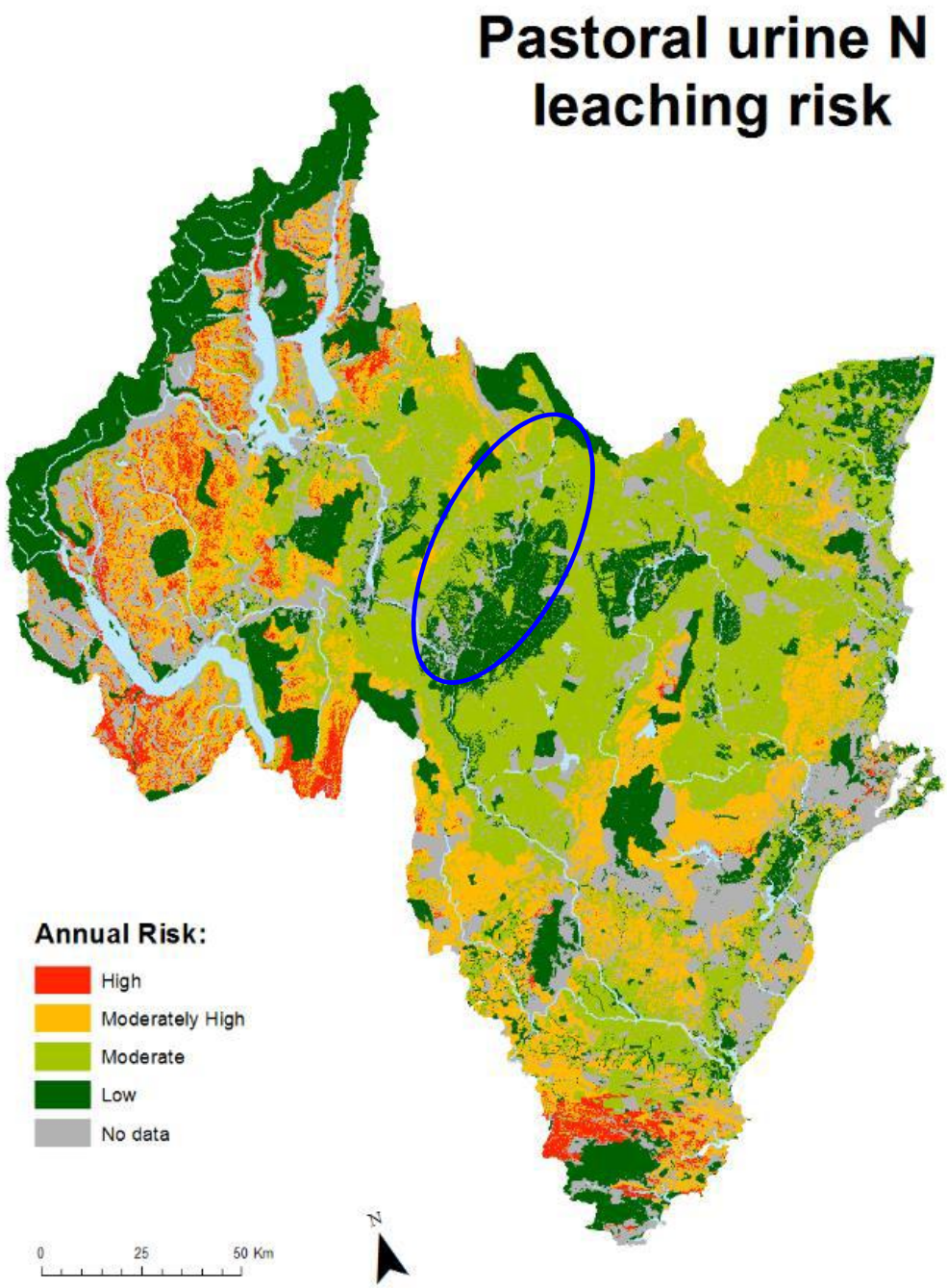
ORC Maps



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