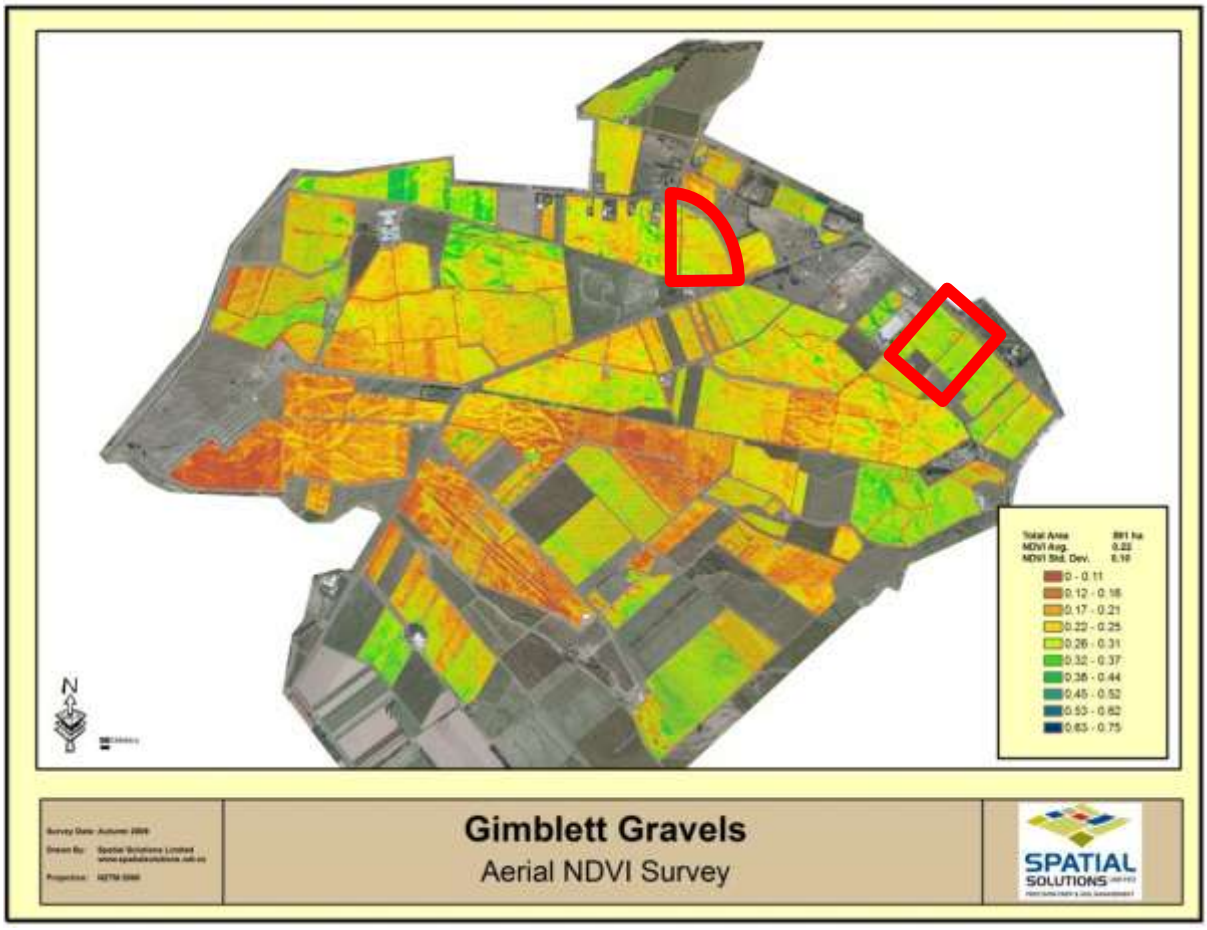
Precision Vineyard Management

Mere Road and Omahu Road



Precision Viticulture:

- Assumes uniform management is not an optimal strategy.
- Seeks to gain control over the production system
- Aims to increase the likelihood that outputs are desirable ones

- Rob Bramley CSIRO

Introduction

Welcome to "*Site Specific Vineyard Management*", a MAF Sustainable Farming Fund project focused on enhancing the financial sustainability of grape growing.

Winegrowers and viticulturists in Hawke's Bay have teamed up with LandWISE to look at benefits of managing different vineyard zones differently; planning and implementing practical site specific management strategies and assessing financial costs and benefits.

Different parts of vineyards have different inherent production characteristics. Variability causes non-uniform development, implying benefit from different management strategies. Uniform management means some areas under-perform while others have excessive inputs for the value achievable. Targeting appropriate inputs to defined zones can save money and improve quality.

Within Mission's Mere Rd Vineyard and Villa Maria's Omahu vineyard, management changes have been applied. The goal in each case was to effectively manage variability.

Key controllables include winter pruning, leaf plucking and thinning, crop load and irrigation (difficult this wet season). This field walk focuses on the pre-harvest status of vines, and compares previous crop vigour to that of the current season.

If you want to be involved in the project, register your interest with:

Dan Bloomer, 021 356 801, info@landwise.org.nz

Getting Maps Right

Difficulties sharing electronic maps caused problems this season. Get it wrong and your soil (map) can end up hundreds of metres from your farm boundary (map). Or your crop canopy (map) can be twisted relative to your trellis (map). It enhances alopecia!

Avoid problems

Two critical factors must be correct: the *datum* and the *projection*. Use the official LINZ standards to avoid errors and frustration.

A *datum* is a model that defines the Earth's shape and size. The latitude and longitude of your current position are different for different datums. The New Zealand Geodetic Datum 2000 (NZGD2000) is the official geodetic datum for New Zealand. It replaced NZGD1949 in 1998.

NZGD2000 is essentially coincident with the World Geodetic System 1984 (WGS84). This is the reference system that is used by GPS receivers. It means that for most practical purposes WGS84 coordinates can be assumed to be the same as NZGD2000 coordinates. The errors can impact precise farming so take care.

A *projection* is the mathematical process of flattening out the Earth onto a flat piece of paper or computer screen. An additional benefit of projections is that they have units of metres, which lets users measure meaningful distances directly from a map.

The official projection for New Zealand topographic mapping is called the New Zealand Transverse Mercator 2000 or NZTM2000.

The process of converting coordinates between datums and projections is called coordinate transformation.

When using coordinates from different sources, ensure they are in terms of the same datum and/or projection. If coordinates or heights are mixed, errors of hundreds of metres may result.

For more information, see:
http://www.linz.govt.nz/geodetic/find-out/understanding-datums

Mere Road Vineyard Precision History

The vineyard at Mere Road is on the edge of the Gimblett gravels, where the effect of varying soils is noticeable. Deposited by the Ngaruroro River when it flowed along what is now Omahu Road, the soils have the typical braided-river effect with varying textures and stone content. This shows in the vigour of the planted vines.

In March 2007, Spatial Solutions measured the vigour of the canopy in a trial area using a GPS-connected Crop Circle sensor. An NDVI biomass/vigour map was created. The vineyard was divided into management zones, with varying management applied.

In October 2010, the site's soils were mapped using an EM38 sensor. This identifies soil variability based on electrical conductivity.

The canopy was re-mapped in January 2010 and a second NDVI map prepared. After several years of site specific management targeted at canopy vigour, the differences within the block appear to be reducing. This impacts current management.

Setting up for the season, how did the manager:

- determine appropriate pruning strategies
- calculate a suitable contract rate
- ensure pruners knew what was expected?

Through the rest of the season, how did the manager:

- determine canopy management strategies
- manage irrigation
- ensure the right thing was done in the right place?

Current Season 2011-2012

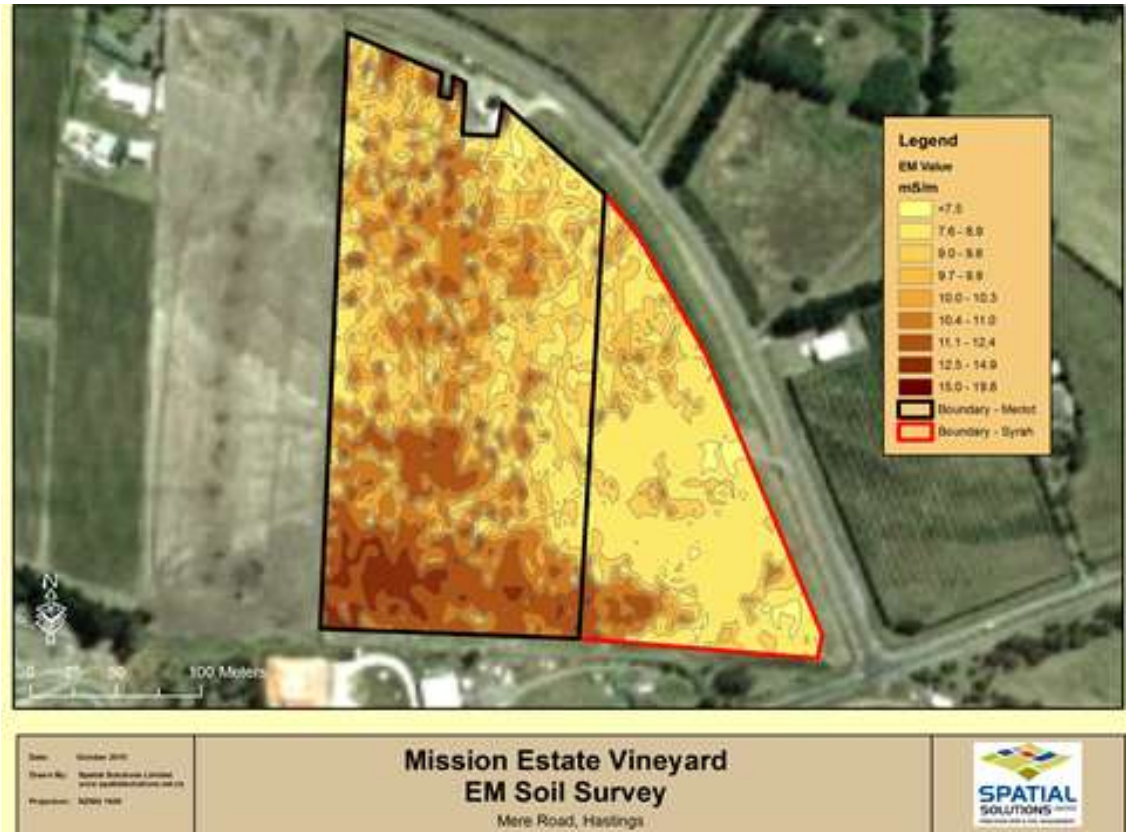
What is different?

- Block cane pruned
- Shoot thinning change within zones
- Low and med vigour: 1 bunch/shoot, High vigour: 2 /shoot
- 100% leaf removal from bunch zone
- Varying crop loads across zones
- Fruit quality, quantity monitored across zones
- Financial performance assessed

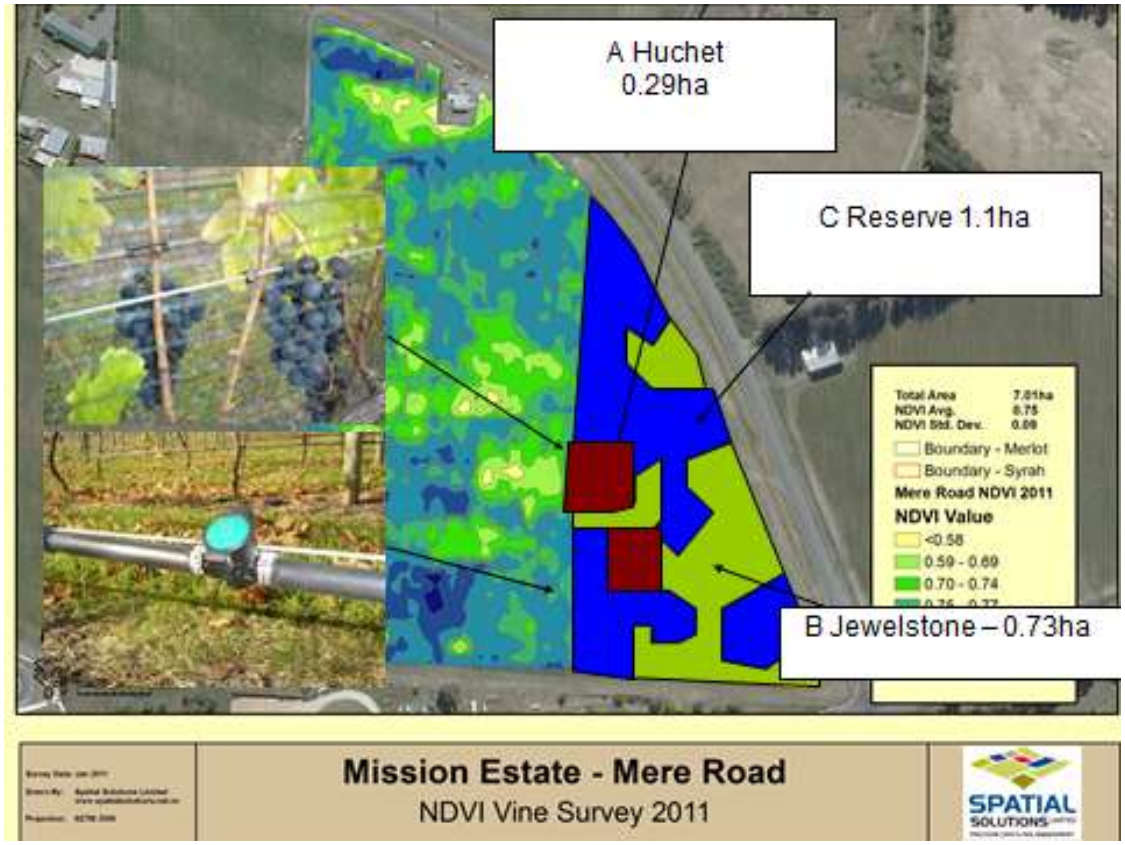
Results

Block/**Tape Colour**	Blue	Green	Red	
Vigour	High	Moderate	Low	
Wine Label	Reserve	Jewelstone	Huchet	
Area ha	0.7	1.2	0.33	
Irrigation applied	As Req	As Req	As req	
Prun**ing cost**	60 c/v	50 c/v	50 c/v	
Pru**ned**	Cane	Cane	Cane	
Shoot thin c/vine	20 c/v	20 c/v	20 c/v	Mid Nov
Shoot No. Target	25	20	15	
Leaf pluck (Hand)	40 c/v	25 c/v	15 c/v	Mid Jan
Machine Leaf pluck	12 c/v	12 c/v	12 c/v	Mid Dec
Bunch thinning	30 c/v	50 c/v	60 c/v	3rd Feb
Bunches **pre thin**	30	27	20	
Bunches **post thin**	20	15	13	
Pre Harvest Brix				

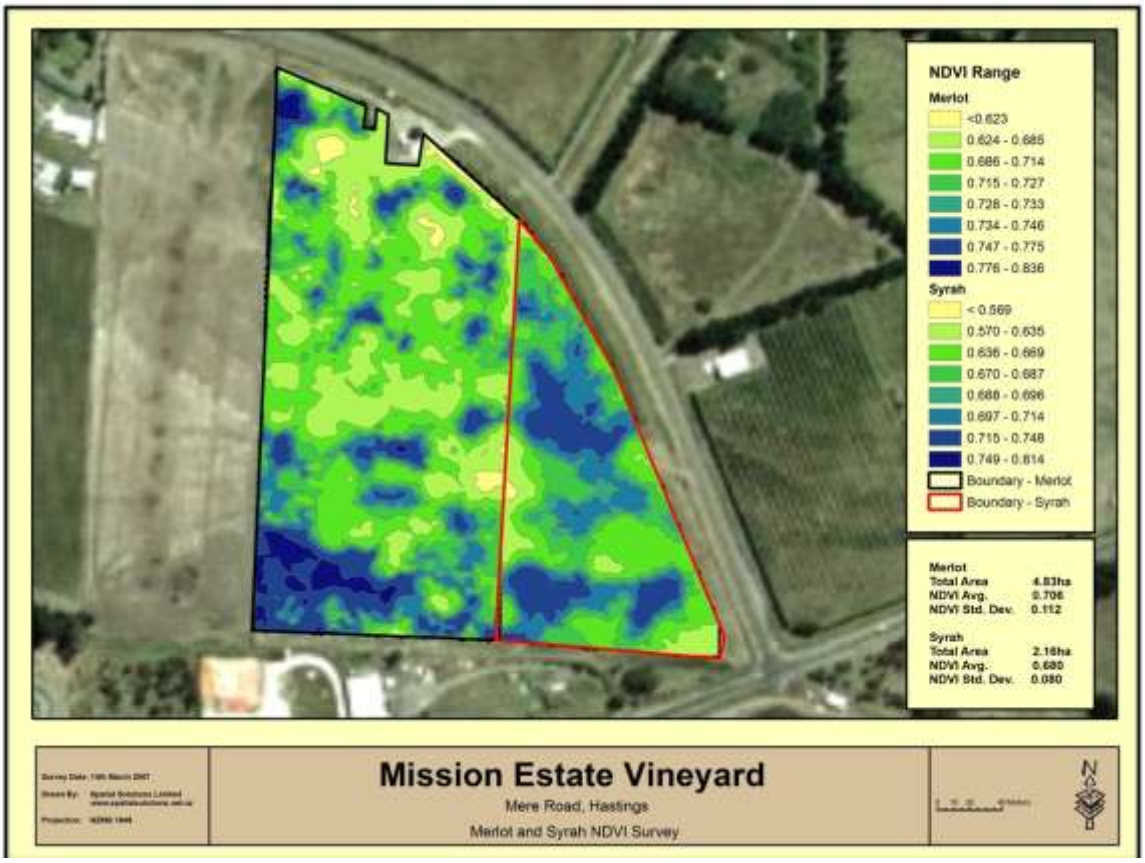
Is management based on vigour potential a winning strategy?



Mere Rd, 2010 EM Soil Survey



Mere Rd, 2011 Management Zones



Mere Rd, 2007 NDVI Canopy Vigour Survey

Mere Rd, 2011 NDVI Canopy Vigour Survey

The Villa Maria Omahu Road Vineyard

The vineyard at Omahu Road is on the edge of the Gimblett gravels, where the effect of varying soils is noticeable. Deposited by the Ngaruroro River when it flowed along what is now Omahu Road, the soils have the typical braided-river effect with varying textures and stone content. This shows in the vigour of the planted vines.

In 2010, Spatial Solutions measured the vigour of the canopy in a trial area using a GPS-connected Crop Circle sensor. A biomass / vigour map was created. The vineyard trial area was divided into two management zones, and harvested as two separate batches.

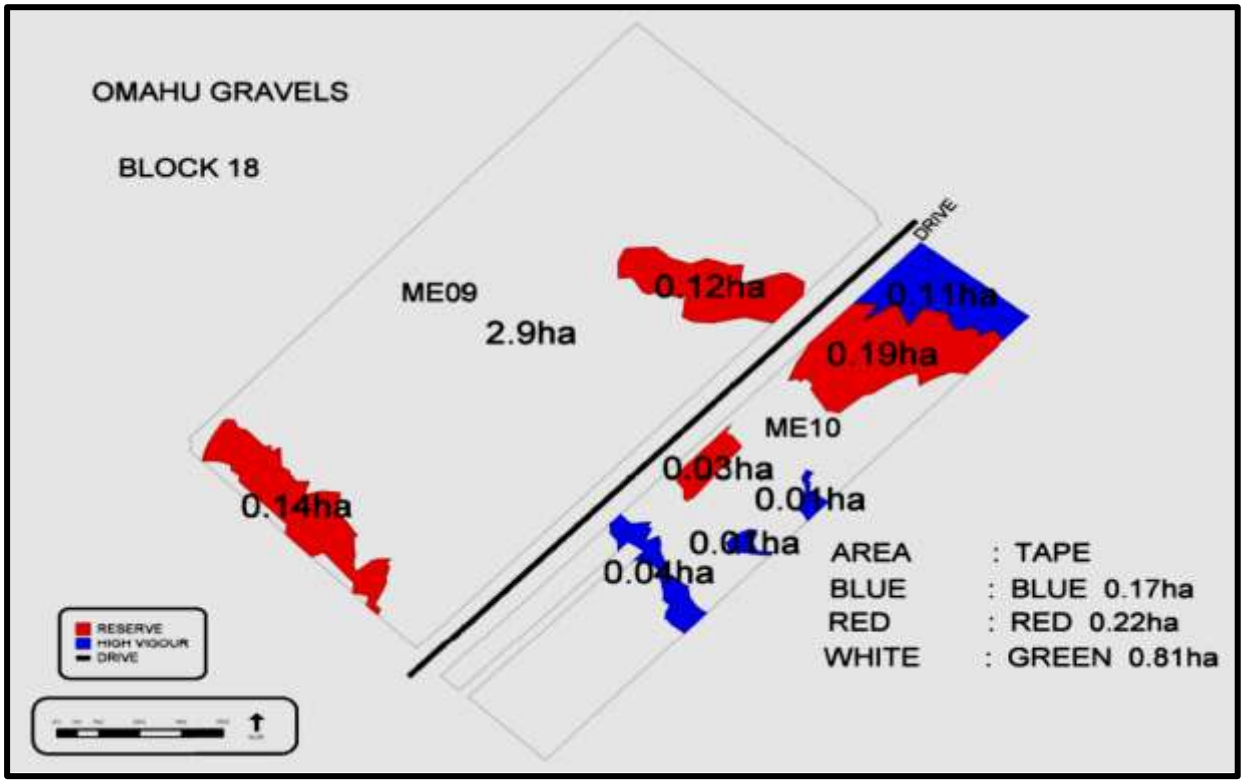
In August 2011, the site was mapped using an EM 38 sensor. This identifies soil variability based on electrical conductivity. The soil data was not available for planning the 2011-12 season, but will be combined with biomass data to refine management zones.

Winter pruning at Omahu Vineyard adopted different strategies for three zones, high, medium and low vigour. To control the high vigour zone, irrigation will be carefully controlled. In the low vigour zone, spurs were pruned to single buds, aiming for a low yield of reserve quality juice.

How did the manager:

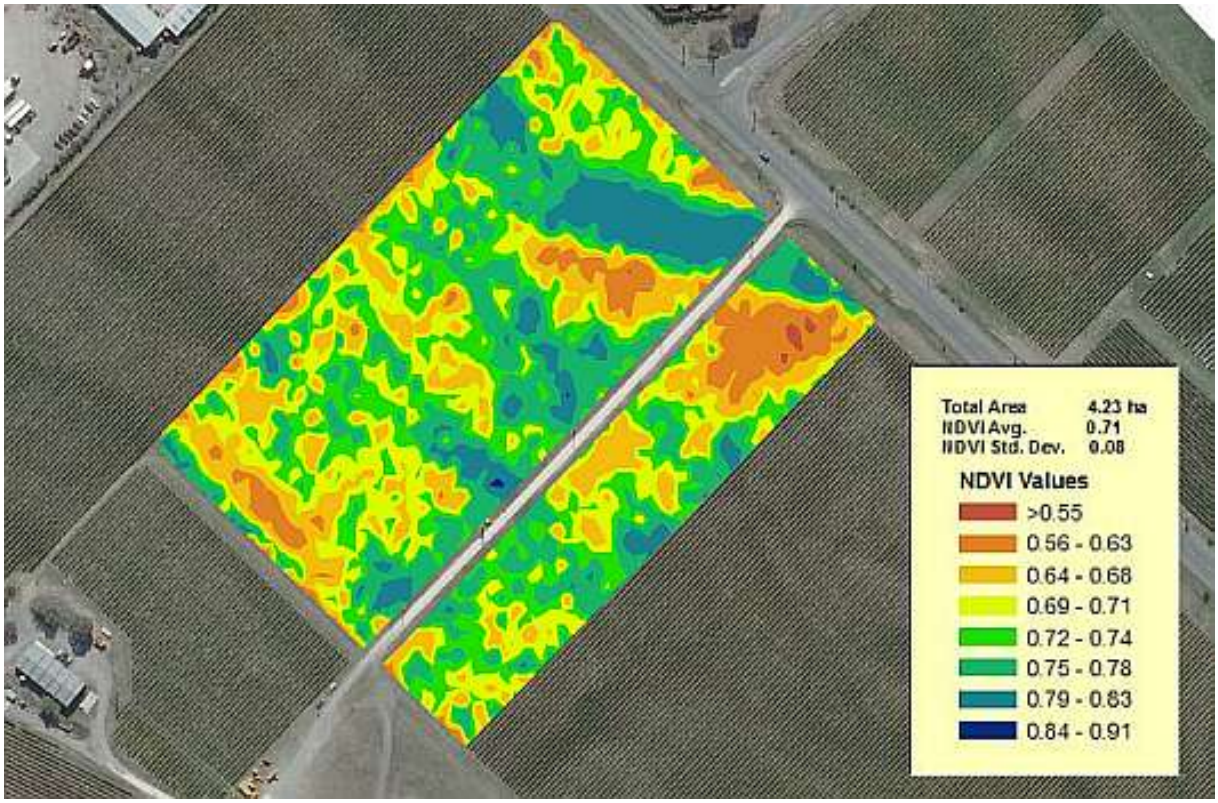
- determine appropriate pruning strategies?
- calculate a suitable contract rate?
- ensure pruners knew what was expected?
- ensure the right thing was done in the right place?

Does different management based on vigour potential appear to be a winning strategy at this stage?



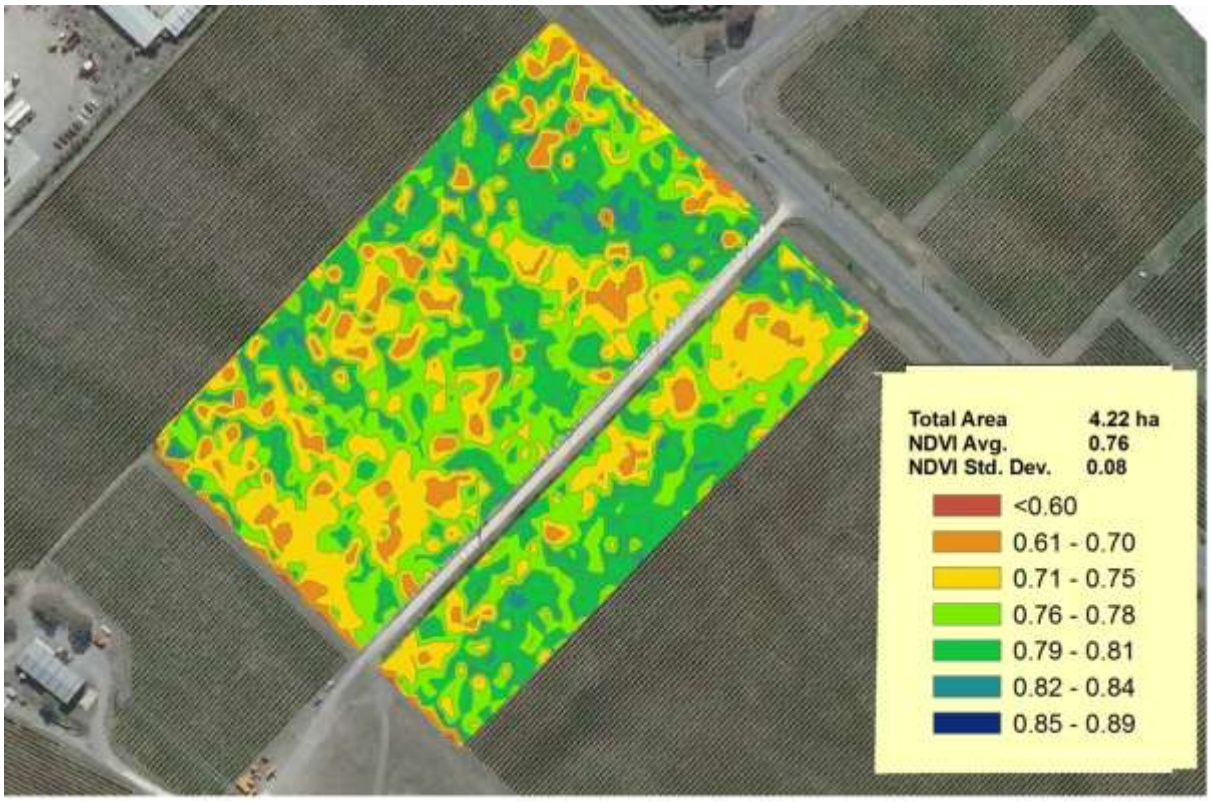
Results

Map Colour	Blue	White	Red	
Block/**Tape Colour**	Blue	Green	Red	
Vigour	High	Low	Moderate	
Area ha	0.17	0.23	0.84	
Irrigation applied	None	As req	As req	
Pruning **cost**	35 c/v	35 c/v	35 c/v	Walking to each zone
Pruned	2 bud spur	1 bud spur	2 bud spur	
Shoots at bud burst		39.6	38.8	
Shoot thin	13 c/v	13 c/v	13 c/v	6 Nov
Shoot No. Target	25	20	20	
Leaf strip	110 c/v	0 c/v	0 c/v	11 Dec
Leaf pluck (Hand)	20 c/v	58 c/v *	58 c/v *	1xB, 3xG+R
Machine Leaf pluck	7 c/v	7 c/v	7 c/v	Mid Jan
Bunch thinning	60 cents	50 cents	50 cents	23 Feb
Bunches pre thin	36	23.5	37.5	/40 vines
Bunches post thin	22	14.5	18	/40 vines
Pre Harvest Brix				



/40 vines

Omahu Rd, 2010 NDVI Canopy Vigour Survey



Omahu Rd, 2012 NDVI Canopy Vigour Survey

Higher Vigour Vines February 2012

Lower Vigour Vines February 2102

About LandWISE

- A sustainable farming group established in 1999
- Strategic relationships: farmers and growers, regional councils, sector groups, science and industry
- An incorporated society of voluntary members
- Resources freely available at www.landwise.org.nz
- Regional and topical discussion groups
- Annual Conference in May

Project Event Plan

Pruning and Thinning – 17 August 2011

- Villa Maria, Omahu Vineyard

Setting up the Season – 26 October 2011

- Mission Estate – Mere Rd Vineyard

Pre-Harvest – 29 February 2012

- **Zone sampling analysis, Review of yield data**

Post-Harvest Wrap up – 22 May 2012

- Zone yield information, juice analysis, winemaker feedback

Contacts for more information

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LandWISE Incorporated | Sustainable Farming Fund | Villa Maria Estate | Spatial Solutions Limited