

Blaxland Vineyards Limited
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St. Magnus Vineyard

Assessment of Frost Protection

25 May 2006.



Autumn Frost at St. Magnus, pictures taken 18 April 2006.

Key Findings:

- St. Magnus Vineyard is frequently frosted which is having a dramatic impact on the profitability of the vineyard project. The frost incidence has worsened in the last two years.
- The young vines, as a result of redevelopment work in replacing the Cabernet sauvignon, on the vineyard are not producing fruit but also demanding capital for re-training and re-grafting the vines following frost events; leading to high costs of vineyard management.
- Installation of a complete frost protection system that covers the entire 90+Ha vineyard area is profitable over the short, medium and longer terms.
- When income drops below \$6,500 per hectare or the frost system costs more than \$850,000 it becomes a poor economic choice.
- Net cost of the upgrade to the frost protection system is approximately \$525,000-\$600,000
- Financing the project over 8 years, the annual repayment for principal and interest is \$91,000 at 8.5% interest.
- Urgency is required to implement the system if it is to be operational for the 2007 vintage & growing season.

Introduction:

St. Magnus Vineyard is located in the Adelaide Hills wine region. This region is cool climate and produces high quality and high value wine grapes. Consequently due to the

climate of the region there is an increased susceptibility to frost incidence. Many other vineyards in the Adelaide Hills have no frost protection and pay very high insurance premiums, use frost fans or burn hay bales with varying degrees of success.

Wine companies like to have secure parcels of their 'icon' brands and high quality fruit, this includes production of these products in years where many other vineyards are affected by frost. With the installation of more frost protection at St. Magnus the vineyard will have the capacity to reliably produce high quality fruit and be more attractive to wine companies looking to secure premium fruit.

St. Magnus Vineyard (SMV) annually experiences frost events which affect the majority of the vineyard area. This report assesses the implementation of a full cover frost sprinkler system and upgrades to the entire water system which is currently inadequate for the production of premium quality fruit off the entire vineyard area.

Background:

As far as can be determined the vineyard site has experienced frost events since its inception although the site has experienced more severe frosts in the last two years. The frost events occur in spring and autumn and do not appear to be limited to specific regions of the vineyard. Typically the temperature of a frost is down to -2.5°C with one of the worst recorded at -4.5°C in one section of the vineyard. One of the major problems encountered is that the areas of vineyard not frost protected are immature plantings or grafted areas so that when frost occur they require large amounts of capital to re-train or re-graft the losses. The net result is that full production has never been achieved in some regions and there is a considerable increase in vineyard running costs as these vines need increased care and training.

The proposed system will incorporate:

1. Full frost protection system with Flippers & Strip-Net emitters for the entire vineyard, an additional 48Ha.
2. Automation of the irrigation and frost protection system.
3. Adjustment to the suction lines on the frost pumps.
4. Additional frost pumps.
5. Additional irrigation pump, capable of increased capacity.
6. Filtration upgrades for the frost and irrigation systems.

This upgrade has been estimated at \$525,000 - \$600,000.

The proposed frost system will provide protection in frost against - 3.4°C in the less susceptible areas with Flippers and - 4.4°C frosts in the more susceptible areas with Strip-Net sprinklers.

Assumptions for financial Modeling:

The most accurate numbers will give the most accurate analysis but where accurate numbers are NOT available an estimated price has been used rather than no cost or benefit being allocated to an item.

A number of assumptions have been made in the calculations to evaluate the costs and benefits associated with the upgrades to the frost protection system.

- Water will continue to be available from the Torrens River and will not limit the ability to frost protect the vineyard.
- Upgrades to the frost and irrigation system will allow a higher water use efficiency with more accurate application of water in frost and irrigation events; hence adding value to the crop. Valued at \$50,000 annually. This will be realised as vines receive more appropriate irrigation i.e. the ability to ‘pulse’ irrigate and use water accurately to increase yields and decrease tight bunches & botrytis susceptibility.
- Existing Frost System will continue to operate and protect 40Ha with minimal maintenance.
- Extremely severe frosts of greater than - 4.5°C will not be experienced.
- By frost protecting the vineyard will achieve on average \$20,000 increased value through reliable and consistent production making the fruit and long term contracts more attractive to wineries. This figure can be realised as additional fruit sales (15T at \$1,500/T) and long term secure grape contracts as wineries look for high quality reliable parcels of fruit.
- Gross Revenues used in modeling – good year \$17,000 / Ha; average year \$13,500 / Ha and \$9,000 in a poor year.
- The inefficiencies of the current frost protection system wastes \$15,000 of water annually by applying high rates of water to vineyard area that do not require it.
- The new frost system would consume an additional \$150,000 worth of water annually, based on the fact that it will draw down the dam and may prematurely exhaust the water supply on the vineyard causing a reduction in crop in some years. In the history of the vineyard this is not likely to happen but the \$150,000 may be used say one year in five.
- The premium for frost insurance to be maintained at \$33,000 for the 48Ha of vineyard without frost protection. It is more likely that this figure will increase.
- The frost fans currently used on the vineyard would continue to be used under the current financial arrangements for the life of the project.
- The increased maintenance cost of the new frost system would cost \$20,000 annually for fuel and general system maintenance.
- Wind fans cannot be used on this property due to the close proximity to residential property.

Typical frosts are around -1 through to -2.5°C; the lowest temperature recorded was – 4.5°C in one section of the vineyard in Autumn.

It should also be noted that for the sustainable future of SMV, consistent and reliable wine grapes need to be produced which means that our crop is protected against frost. Yalumba have already voiced their concern that SMV will not be able to produce consistent fruit because of its current susceptibility to frost.

St Magnus 2006 Vintage V's Returns at Same Grape Prices with Frost Protection

Block ID	VARIETY	Area Ha	2006 Yield T / Ha	Frost Protected Yield T / Ha	2006 Price \$ / Tonne	2006 Return \$ / Ha	Frost Protected Return \$ / Ha @ 2006 Prices
Mature Vineyard Area with No Frost Protection							
1	Sauvignon Blanc	2.28	11.3	12	1,600	18,105	19,200
3	Sauvignon Blanc	2.02	10.4	12	1,600	16,713	19,200
5	Cabernet Franc	1.9	5.8	8	500	2,887	4,000
11	Sangiovese	1.69	15.2	8	700	10,670	5,600
12	Pinot Gris	1.91	10.1	10	1,800	18,170	18,000
13	Sauvignon Blanc	5.39	7	12	1,500	10,519	18,000
16	Merlot	12.42	7	9	900	6,334	8,100
		27.61				9,729	12,011
Immature Vineyard Area with No Frost Protection							
4	Sauvignon Blanc	2.09	0	12	1,600	0	19,200
14	Chardonnay	7.73	0.6	10	500	291	5,000
15	Sauvignon Blanc	3.19	0.7	12	1,600	1,154	19,200
17	Sauvignon Blanc	4.27	0	12	1,600	0	19,200
18	Pinot Gris	4.06	0	10	1,800	0	18,000
		21.34				278	13,828
Mature Vineyard Area with Frost Protection							
2	Chardonnay	5.6	11	10	700	7,705	7,000
6	Riesling	1.81	Unsold	9		-	12,600
7	Semillon	1.65	Unsold	9		-	12,600
8	Sauvignon Blanc	7.09	9.4	12	1,700	15,907	20,400
9	Sauvignon Blanc	11.61	11.2	12	1,569	17,538	18,828
10	Chardonnay	10.75	13.2	10	810	10,731	8,100
19	Sauvignon Blanc	0.8	13.1	12	1,630	21,394	19,560
		39.31				12,516	13,960
		88.26	\$/Ha income			\$ 8,685	\$ 13,318

This table, highlights the effects of frost on the young vines; the Gross Revenue figures for the Frost Protected Blocks are also diminished with the Chardonnay, Riesling and Semillon currently being unpopular in the marketplace.

This table summarises the benefits of installing a full frost protection system and upgrading the irrigation system V's operating the vineyard with the current 40Ha frost protection system and using frost insurance on the remaining vineyard area.

- Looking at the analysis the best way forward would seem to be to implement the frost control system immediately and pay off the principal and interest over an 8 year period as follows:

Benefit Cost Analysis of Frost Protection at SMV

Scenario 10

8 Year payment of Principal and Interest on the Frost System Loan.

Full Crop GR \$/Ha	13,500	Mature Vines Unprotected	20	Mature Vines Frost Protected	40
Frost Severity	2%	Young Vines Unprotected	28	Frost System Cost	550,000
Interest Rate	8.50%	Young Vines Delay	0	# Years for repayment	10

Upgrade Frost & Irrigation System

Young Vines Crop Factor	0.4	0.85	0.95	1	1	1	1	1	1	1	1	1	1	1
Year:	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020
Benefit:														
Mature Vines Crop	264600	264600	264600	264600	264600	264600	264600	264600	264600	264600	264600	264600	264600	264600
Young Vines Crop	148176	314874	351918	370440	370440	370440	370440	370440	370440	370440	370440	370440	370440	370440
Consistent Supply			20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Appropriate Irrigation			50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000	50000
Insurance Return														
Total Benefit:	412,776	579,474	686,518	705,040	705,040	705,040	705,040	705,040	705,040	705,040	705,040	705,040	705,040	705,040
Cost:														
Frost System Payment	95000	95000	95000	95000	95000	95000	95000	95000						
Increased Maintenance	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000	20000
Increased Water Use	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000	150000
Insurance Premium														
Vine grafting/Training	42000	10500	3500	0	0	0	0	0	0	0	0	0	0	0
Frost Fan Rental														
Total Cost:	307,000	275,500	268,500	265,000	265,000	265,000	265,000	265,000	170,000	170,000	170,000	170,000	170,000	170,000
Net Benefit:	105,776	303,974	418,018	440,040	440,040	440,040	440,040	440,040	535,040	535,040	535,040	535,040	535,040	535,040
Present Value:	105,776	280,160	355,088	344,511	317,522	292,647	269,720	248,590	278,579	256,755	236,640	218,102	201,015	185,260
Net Present Value:	105,776	385,936	741,024	1,085,535	1,403,056	1,695,703	1,965,423	2,214,014	2,492,593	2,749,347	2,985,988	3,204,089	3,405,105	3,590,373

Summary:

The installation of a frost system that protects the entire vineyard is a feasible and profitable option for the following reasons:

1. Consistent & Reliable fruit supply for wine companies
2. Increased annual Gross Revenue in comparison to insurance
3. The project will essentially fund itself by the increase in revenue
4. Upgrading the irrigation system simultaneously.
5. Increased Water Use Efficiency by the use of automation.
6. At very low fruit prices, the frost system is still cash flow positive.
7. At very high frost incidences (where crop insurance works well) the frost system is still financially better.

It is recommended that the frost system be financed over 8-10 years to allow a good initial cash return to investors in SMV and yet provide a debt free asset for disposal at the completion of the project.

The installation of the new frost protection system will be subject to the following risks:

1. Extreme frosts that damage the vineyard despite the frost protection system
2. Availability of Water. When the SMV dam is empty then the frost protection system is in-operational.
3. Increased water use in the frost system may result in less water being available for irrigation later in the season.

It is recommended that the frost system be installed immediately ready for the 2007 vintage.