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DEPARTMENT OF
WATER AFFAIRS
AND FORESTRY

Feasibility Study for the Raising of Clanwilliam Dam

Financial Viability of Irrigation Farming

Final
February 2009

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DEPARTMENT OF WATER AFFAIRS AND FORESTRY
DIRECTORATE OPTIONS ANALYSIS

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FINANCIAL VIABILITY OF IRRIGATION FARMING

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Department of Water Affairs and Forestry
Directorate Options Analysis

FEASIBILITY STUDY FOR THE RAISING OF THE CLANWILLIAM DAM

APPROVAL

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EXECUTIVE SUMMARY

This report deals with the evaluation of the financial viability of existing irrigation farming as well as the envisaged expansion of irrigation farming in relevant regions of the Olifants River system in the Western Cape Province, that may utilise additional irrigation water, following the potential raising of the Clanwilliam Dam. The envisioned expansion of irrigation farming addresses the option of the expansion of existing irrigation farms as well as the developing of new irrigation farms. The production possibilities and the accompanying irrigation water requirements that were used in the financial viability analysis are based on the findings of soil and crop-experts regarding appropriate enterprises (refer to the relevant report by Lambrechts, Schloms and Ellis). Appropriate information about the costs of the additional irrigation water originating from the envisaged enlargement of the Clanwilliam Dam, were supplied by the engineering component of the study team (refer to the relevant report by Ninham Shand, Consulting Engineers). The financial analyses were done at constant 2005/06 price levels. Typical farming situations were modelled for each of the regions of the study area, with the assistance of leading farmers and other industry experts. It is assumed that the financial results that are associated with the typical farming models of each region will also apply to the total irrigated area of that region. It is further assumed that the managerial inputs on each of the typical farms in the different regions of the study area will be optimal.

The financial viability of irrigation farming is evaluated with the aid of a computer model and by applying the following decision-making criteria, namely:

- profitability
  - internal rate of return (IRR) on capital employed in real terms
- affordability
  - expected cash-flow and break-even year at different own-to-loaned capital ratio's
- relative "efficiency" of the utilisation of irrigation water
  - annuity of the net financial benefits per m^3 irrigation water applied
  - number of jobs created per 1000 m^3 of irrigation water applied

The results of the financial viability analysis about existing irrigation farming and the envisaged irrigation developments in the different regions of the study area are presented in **Tables ES1, ES2** and **ES3**.

Table ES1 Financial viability of existing irrigation farming in the study area

Scenario/Region	Water Need	Evaluation Criteria						
		IRR *	NPV/ha **	Annuity/m^3 Water ***	Break Even Year****			Jobs/1000 m^3 Water
					Equity at:	Equity at:	Equity at:	
	(m^3/ha)	(%)	(R)	(R)	80%	60%	40%	(number)
Citrusdal Citrus farm	11,380	4.55%	(19,684)	0.05	05/06	05/06	05/06	0.05
Clanwilliam Citrus farm	9,177	7.54%	20,575	0.33	05/06	05/06	05/06	0.06
Melkboom/Trawal Mixed farm	9,495	1.99%	(54,416)	(0.20)	05/06	05/06	05/06	0.03
Melkboom/Trawal table grape farm	13,580	34.44%	607,371	3.31	05/06	05/06	05/06	0.10
Klawer/Vredendal Mixed farm	9,197	10.34%	46,490	0.51	05/06	05/06	05/06	0.03
Klawer/Vredendal table grape farm	13,580	9.57%	107,643	0.86	05/06	05/06	05/06	0.10

* Internal rate of return (in real terms) on capital investment.
** Net present value at a real discounting rate of 4% per year, (i.e. 10% nominal interest per year at a yearly inflation rate of, say, 6%).
*** Annuity of the net benefits per m3 irrigation water applied at a real discounting rate of 4% per year.
**** At a real loan interest rate of 4% per year, i.e. 10% nominal interest per year.

Table ES2 Financial viability of the proposed expansion of existing irrigation farms in the study area

Scenario/Region	Water Need	Evaluation Criteria						
		IRR *	NPV/ha **	Annuity/m^3 Water ***	Break Even Year****			Jobs/1000 m^3 Water
					Equity at:	Equity at:	Equity at:	
	(m^3/ha)	(%)	(R)	(R)	80%	60%	40%	(number)
Citrusdal citrus farm expansion	11,380	3.19%	(65,846)	(0.11)	06/07	06/07	> 40 Years	0.05
Clanwilliam citrus farm expansion	8,870	6.38%	6,118	0.28	13/14	15/16	17/18	0.06
Melkboom/Trawal mixed farm expansion	9,378	5.42%	(8,594)	0.15	12/13	19/20	22/23	0.04
Melkboom/Trawal table grape expansion	13,580	28.76%	685,269	3.79	05/06	05/06	05/06	0.09
Klawer/Vredendal mixed farm expansion	9,106	10.26%	48,479	0.53	05/06	05/06	05/06	0.03
Klawer/Vredendal table grape expansion	13,037	11.24%	189,645	1.38	11/12	12/13	12/13	0.10

* Internal rate of return (in real terms) on capital investment.
** Net present value at a real discounting rate of 4% per year, i.e. 10% nominal interest per year at a yearly inflation rate of, say, 6%.
*** Annuity of the net benefits per m^3 irrigation water applied at a real discounting rate of 4% per year.
**** At a real loan interest rate of 4% per year, i.e. 10% nominal interest per year.

Table ES3 Financial viability of the envisaged new irrigation farms in the study area

Scenario/Region	Water Need	Evaluation Criteria						
		IRR *	NPV/ha **	Annuity/m^3 Water ***	Break Even Year****			Jobs/1000 m^3 Water
					Equity at:	Equity at:	Equity at:	
	(m^3/ha)	(%)	(R)	(R)	80%	60%	40%	(number)
Citrusdal new Citrus farm	11,380	1.42%	(240,432)	(0.80)	> 40 Years	> 40 Years	> 40 Years	0.05
Clanwilliam new Citrus farm	8,870	4.19%	(58,010)	0.05	32/33	36/37	39/40	0.05
Melkboom/Trawal new mixed farm	9,378	Negative	(113,563)	(0.53)	> 40 Years	> 40 Years	> 40 Years	0.04
Melkboom/Trawal new table grape farm	13,580	11.05%	338,574	2.38	15/16	15/16	16/17	0.09
Klawer/Vredendal new mixed farm	9,106	4.93%	(22,452)	0.15	>40 years	>40 years	>40 years	0.03
Klawer/Vredendal new table grape farm	13,580	5.24%	(44,479)	0.37	19/20	21/22	23/24	0.09

* Internal rate of return (in real terms) on capital investment.
** Net present value at a real discounting rate of 4% per year, (i.e. 10% nominal interest per year at a yearly inflation rate of, say, 6%).
*** Annuity of the net benefits per m^3 irrigation water applied at a real discounting rate of 4% per year.
**** At a real loan interest rate of 4% per year, i.e. 10% nominal interest per year.

As far as the profitability criterion is concerned, an IRR of at least 4% per year in real terms (*i.e.* an IRR of 10% per year in nominal terms at an inflation rate of, say, 6% per year) can be seen as a benchmark. At a benchmark IRR of 10% per year in nominal terms (*i.e*. an IRR of 4% per year in real terms at an inflation rate of, say, 6% per year) the following irrigation farming situations that were analysed, seem to be financially viable:

Existing irrigation farming

Klawer/Vredendal region:

Mixed farming, i.e. wine grapes and tomatoes (real IRR of 10.34 % per year)

Table grape farming (real IRR of 9.57% per year)

Melkboom/Trawal region:

Table grape farming (real IRR of 34.44% per year)

Clanwilliam region:

Citrus farming with potatoes (real IRR of 7.54 % per year)

Citrusdal region:

Citrus farming (real IRR of 4.55 % per year)

Expansion of existing irrigation farming

Klawer/Vredendal region:

Mixed farming, i.e. wine grapes and tomatoes (real IRR of 10.26 % per year)

Table grape farming (real IRR of 11.24% per year).

Melkboom/Trawal region:

Mixed farming, i.e. wine grapes and tomatoes (real IRR of 5.42% per year)

Table grape farming (real IRR of 28.76% per year)

Clanwilliam region:

Citrus farming with potatoes (real IRR of 6.38% per year)

New irrigation farms

Melkboom/Trawal region:

Table grape farming (real IRR of 11.05% per year)

Clanwilliam region:

Citrus farming with potatoes (real IRR of 4.19% per year)

Klawer/Vredendal region:

New mixed farm, i.e. wine grapes and tomatoes (real IRR of 4.93% per year)

New table grape farm (real IRR of 5.24% per year)

It is clear from the financial analysis that, given the assumptions made, existing irrigation farming is quite profitable in the relevant regions of the study area. The main contributing factors in this regard are, *inter alia*:

- ❖ well developed and well managed farms
- ❖ sound supporting marketing structures for produce
- ❖ sound profitability levels for the major farming branches due to efficient farming practices and favourable price levels for produce
- ❖ the availability of affordable irrigation water (at R1 925 per listed hectare under irrigation)

Farming practices in the relevant regions of the study area are relatively capital intensive. It seems that it will be more viable to expand existing farms than to develop new irrigation farms. The typical mixed farming situation in the Melkboom/Trawal region is at present under financial stress (i.e. a real IRR of 1.99 % per year). Possible contributing factors to this finding are, *inter alia*:

- ❖ relatively small farms (i.e. 35 ha relative to 60 ha in Klawer/Vredendal) and thus the negative impact of higher unit overhead costs
- ❖ a decline in prices as far as the main enterprise, i.e. wine grapes is concerned.

The analysis shows further that an expansion of the mixed farming situation in Melkboom/Trawal to 50 ha should lead to increased profitability (i.e. a real IRR of 5.42 % per year).

The expansion of table grape farming in the Melkboom/Trawal region seems to be the most viable option from a financial point of view. It also seems to be a viable option to expand existing citrus farms in the Clanwilliam region in combination with potato production. Year cropping (i.e. potato production in this case) can have a considerable positive effect on the cash flow of farms. Farmers in the Clanwilliam area have sound experience and thus know how as far as the production and marketing strategies of the potato branch is concerned.

The expansion of citrus farming upstream of the Clanwilliam Dam (i.e. irrigation development on individual farms in Citrusdal) is not envisaged to be profitable, mainly due to the expected relatively high cost of irrigation infrastructure.

Several possibilities exist as far as the raising of the Clanwilliam Dam wall is concerned, each of which having a unique cost and yield level. This leads to different water unit cost levels. The sensitivity of farm profitability for different water unit cost levels were thus also analysed (refer to **Table ES4**).

Table ES4: Real internal rate of return (IRR) on capital investment in typical farming operations at different unit water costs levels (i.e. dam raising alternatives)

Raising Level (m)	Discounting Rate (%/a)	Water cost (c/m^3)	IRR of typical new farming developments per region (%)				
			CLANWILLIAM	MELKBOOM/TRAWAL		KLAWER/VREDENDAL	
			New mixed farm	New table grape farm	New mixed farm	New table grape farm	New mixed farm
5	4	37	4,43	11,25	0,47	5,45	5,32
	6	49	3,94	10,85	neg	5,04	4,54
	8	64	3,33	10,36	neg	4,52	3,59
10	4	43	4,19	11,05	neg	5,24	4,93
	6	58	3,57	10,56	neg	4,73	3,97
	8	75	2,88	10,01	neg	4,15	2,91
15	4	47	4,02	10,92	neg	5,11	4,67
	6	62	3,41	10,43	neg	4,59	3,72
	8	81	2,64	9,82	neg	3,95	2,53

The increment between the expected highest unit water cost (i.e. R0.81/m^3) and the lowest (i.e. R0.37/m^3) is relatively small. The sensitivity analysis thus showed that given the small variation in the unit cost of irrigation water that is associated with alternative dam raising possibilities, the water cost per se will only have a minor impact on the profitability level of individual farms. When stated in another way it means that the expected cost of the additional irrigation water is a relatively small component of the total cost structure of the mainly capital intensive farming developments that are envisaged.

Irrigation farming activities in the investigation area are relatively capital intensive and risky. Top-grade managerial and labour skills are preconditions for financial success and any degradation in this regard will have a negative impact on the financial results from farming.

The trend that the market value of land (refer to **Section 6.2.1**) exceeds the production value thereof implies that a farmer should be able to supply a considerable portion of the farm's capital need from own financial sources. New entrants from previously disadvantaged groups will therefore be faced with the mentioned realities and in order for them to be successful, special measures should be considered, *inter alia*:

- ❖ training facilities to further managerial skills
- ❖ appropriate financial support systems via government schemes
- ❖ appropriate farming ownership models and financial support systems to accommodate and further "partnerships" between existing commercial farmers and new entrants to farming

The finding that the expansion of existing farms should be more profitable than the development of new farms lead to an investigation of the financial viability of a "partnership" between the farmer and his labourers as far as the expansion of farming activities is concerned. Several possibilities exist as far as partnership agreements are concerned. A business trust, with the farmer and his labourers as beneficiaries, served as an example of a "joint venture" to counter the mentioned barriers to entry to farming. The financial analysis in this regard indicated that, given the assumptions made, the proposed "joint venture" should be viable, in general, in the different regions of the investigation area.

Particulars in this regard should, however, be investigated comprehensively for each individual case.

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APPENDICES

1 INTRODUCTION

1.1 Background

This report deals with the financial viability of the raising of the Clanwilliam Dam as an additional source of irrigation water for farming downstream towards Klawer/Vredendal. The financial viability of irrigation farming upstream (i.e. the Citrusdal area) direct from the Olifants River is also investigated. This is an expansion of the Olifants-/Doring River Basin Study (Department of Water Affairs and Forestry, 1998) and the Western Cape Olifants-/Doring River Irrigation Study (WODRIS), 2004. Relevant irrigation farming areas in the Citrusdal, Clanwilliam, Melkboom/ Trawal and Klawer/Vredendal regions are investigated as far as the viability of irrigation farming is concerned. These areas were identified by soil and crop specialists to be suitable for the production of citrus fruit, grapes (wine-, dried- and table grapes) and vegetables (refer to the *Soils, Water Requirements and Crops Report* by Lambrechts, Schloms and Ellis, 2006, DWAF Report No. P WMA 17/E10/00/1106). It is thus necessary to rate the alternative areas in terms of their potential to utilise the irrigation water profitably. All financial information applies to the 2005/06 financial year.

1.2 Aim of the study

The aim of this part of the multi-faceted study is to evaluate the financial viability of the raising of the storage capacity of the Clanwilliam Dam as far as irrigation farming in relevant areas of the basin is concerned: Specific objectives are the following:

- an evaluation of the financial viability of existing irrigation farming in the relevant farming regions,
- an evaluation of the financial viability to expand irrigation farming (i.e. the expansion of existing farms and/or the creation of new farms) in the relevant farming areas, and
- an identification of factors that may be obstructive for new entrants from previously disadvantaged communities to enter the farming industry and to evaluate the viability of certain “joint ventures” between farmers and their labourers as far as the expansion of irrigation farming is concerned.

1.3 Research method

It is accepted that irrigation farming plays an important role in the study area from a socio-economic point of view. An evaluation of the potential of the study area for irrigation farming will thus be of value to the policy maker. The emphasis of this part of the study thus falls on a financial evaluation of the irrigation potential of the relevant regions of the study area. The costly nature of the envisaged development of the storage capacity of the Clanwilliam Dam from an agricultural perspective will probably lead to the necessity to practice relatively profitable farming activities. It is thus assumed that a commercial farming culture will be maintained. Effective and efficient farming practices will thus be a prerequisite for success in the deregulated marketing

environment that face the farmers. Typical farming situations in the relevant regions of the study area will form the basis for the research. The characteristics of relevant regions of the study area, from a farming point of view, were identified by the soil, climate and crop experts that were involved in the study. The typical farms in each region were simulated with the aid of industry experts and leading farmers from the different regions. It is assumed that the results of the financial evaluation of the typical farming situations will serve as a plausible source of information for the evaluation of the viability of irrigation farming in the relevant regions of the study area. It is further assumed that the managerial inputs on the typical farms will be optimal. The financial evaluation is computer based and involves, *inter alia*, the following:

* the development of a computer based calculation program for every typical farming situation to enable a sensitivity analysis regarding the financial criteria that were employed. Both the expected profitability and liquidity of the envisaged farming operations are evaluated.

* the identification of viable farming enterprises, with the aid of enterprise budgets, that were generated with the help of industry experts and leading farmers.

* the calculation of the cost of additional irrigation water that is associated with the envisaged increase in the storage capacity of the Clanwilliam Dam.

Potential irrigation developments in the study area will be influenced by, *inter alia*, suitable soils and climatic conditions and by the expected costs of the irrigation developments. Potential areas in the relevant regions that may be suitable for irrigation farming were identified by the soil- and climate experts (*Soils, Water Requirements and Crops Report* by Lambrechts, Schloms and Ellis, 2006, DWAF Report No. P WMA 17/E10/00/1106)) in collaboration with the engineering team from Ninham Shand Consulting Engineers. The financial viability of both the expansion of existing irrigation farms and the development of new irrigation farms were investigated.

1.4 Arrangement of chapters

Section 2 involves a discussion of the methodology that was followed in the study. Typical farming models (refer to **Section 3**), income and costs budgets for selected crops (refer to **Section 4**) and the expected costs of the envisaged irrigation developments and thus by implication irrigation water (refer to **Section 5**) generates the necessary information for the analyses of the financial viability of irrigation farming in the relevant regions of the study area (refer to **Section 6**). The conclusions and limitations of this section of the study are listed in **Section 8**.

The viability of certain "joint ventures" between farmers and their labourers, as far as new irrigation developments is concerned, is discussed in **Section 7**.

2 METHODOLOGY

2.1 Study area

Figure 2.1 The relevant irrigation regions of the study area

The study focuses on the financial viability of:

- the raising of the storage capacity of the Clanwilliam Dam to enable the further development of irrigation farming in relevant downstream regions, *inter alia*, the Clanwilliam, Melkboom/Trawal and Klawer/Vredendal farming areas.

- the development of irrigation farming systems by individual farmers that are operating upstream of the Clanwilliam Dam (i.e. the Citrusdal area) and that are supplied with pumped irrigation water direct from the Olifants River flow.

The mentioned farming areas are relatively homogeneous from the viewpoint of soil and climatic characteristics, and thus, by implication, production possibilities.

2.2 Research approach

The emphasis of the study falls on the potential of the relevant regions as far as the expansion of irrigation farming is concerned. The focus is on the potential of the relevant regions regarding the expansion of irrigation farming in a financial viable way. An explorative approach was followed to gather the appropriate information. Workshops with leading farmers and other industry experts were employed to cover the multi-faceted issues that impact on the potential of the regions for irrigation farming. Determining factors in this regard are, *inter alia*, the availability of soils of an acceptable quality, climatic considerations and thus by implication crop production possibilities as well as the expected costs of the expansion of the storage capacity of the Clanwilliam Dam (refer to the *Soils, Water Requirements and Crops Report* by Lambrechts, Schloms and Ellis, 2006, DWAF Report No. P WMA 17/E10/00/1106) and the expected costs of irrigation scheme development. Typical farming situations in the relevant regions of the study area serve as a basis for the financial viability analyses.

2.2.1 Typical farming situations

It is accepted that farming practices are based on sound physical-biological and economic-financial considerations. Typical farming activities in the study area are characterised mainly by capital and labour intensive perennial cropping systems.

The focus of this study is on the potential of the study area for the expansion of irrigation farming. Information regarding the present farming situation thus only serve as a point of departure in that regard. Other important aspects to be dealt with include, *inter alia*, the model farming situations regarding the combination of enterprises and the technology to be employed in the production process. In order to evaluate the implications of the mentioned aspects on the financial viability of farming in the study area it was decided to employ typical farms as an analytical tool, as far as the analysis of both the existing- and the envisaged farming situations are concerned. Typical farms for each of the relevant regions of the study area were thus deduced with the aid of leading farmers and other industry experts during workshop sessions on 16/08/2005 at Vredendal and 17/08/2005 at Citrusdal. It is assumed that this procedure will generate plausible information as far as the existing and model farming operations are concerned.

The following industry experts and their accompanying field of interest were employed:

Expert	Field of interest
J Lambrechts	Soils, crops, irrigation
B Schloms	Soils, climate, irrigation
F Ellis	Soils, climate, irrigation
J Joubert	Crops
R Erasmus	Irrigation
P Louw	Crops
R Hugo	Irrigation
E van der Berg	Water Resources Engineering
K Hundley	Agricultural Engineering
A Roux	Engineering
M January	Environmental
V Zenani	Environmental
F van Heerden	Engineering/Irrigation
M du Randt	Crops

The following leading farmers from the different regions were involved to develop typical farming models during the workshops held on 16/8/2005 and 17/8/2005, respectively.

Clanwilliam	Dirkie Mouton Joop Basson
Melkboom/Trawal	Tinus van Staden Arend Adriaanse Jakkie Visser
Klawer/Vredendal	Francois Pienaar Gideon van Zyl Ryan Engelbrecht Kallie Stephan Nico Laubscher Izak Coetzee Dirk Brand Jannie Mosterd W.G. van der Merwe S.P. Mannel
Citrusdal	Kobus de Witt Bernie van den Heever Gert Kotze Christo Smit Johan Mouton Pieter Hofmeyr

A typical present farming situation was deduced in order to evaluate the financial viability of the present state of irrigation farming in the different regions with the emphasis on the ability of the present situation to adapt to a model situation for the same typical farm, should more irrigation water become available.

The model farming situations were also deduced with the aid of the farmers and other industry experts. The model farming situations were used to evaluate the financial viability of the envisaged expansion of the storage capacity of the Clanwilliam Dam. Aspects regarding the typical farms that were covered during the workshops are the following:

- size and enterprise composition
- capital structure
- labour and managerial requirements
- expected output and prices of products
- irrigation infrastructure
- water requirements and irrigation scheduling

The expected structure of the costs of the different farming enterprises were obtained from selected industry experts and institutions. The expected prices for products are based on relevant information that was supplied by farmers, other industry experts and marketing institutions. The relevant information regarding the typical farming situations of each region was modelled with the aid of a computer-based spreadsheet in order to enable an evaluation of the financial viability of the execution thereof. The farming models were verified continuously with the aid of farmers and industry experts who attended the workshops.

2.2.2 Typical farming models

Due to the long-term nature of farming activities in the study area, a multi-period calculation model was developed for each farming situation. The calculation model can handle planning periods of up to 40 years. It is assumed that a 40-year period will be sufficient in order to illustrate the effect, in financial terms, of possible envisaged changes in farming strategy. The calculations were done at constant 2005/06 price levels. Discounting of future expected income and costs was done at a real interest rate of 4 % per year (i.e. the difference between a nominal interest rate of 10 % per year and a yearly inflation rate of, say, 6 %). Due to the changing nature of interest rates, the sensitivity of the financial results will also be tested for a range of real discounting rates.

Evaluation criteria

The success of farming should be evaluated in terms of both the profitability and the financial viability thereof. The expected profitability of the envisaged future farming situations in the study area was evaluated by means of the internal rate of return on capital invested (IRR). The financial viability of the envisaged irrigation farming activities was evaluated with the aid of cash-flow analyses regarding the typical farming situations at different own-to-loaned capital ratios. The expected break-even year, as far as the cumulative cash flow is concerned, serves as an indicator for the financial viability of farming operations.

The relative "efficiency" of the different regions of the study area regarding the utilisation of scarce water and the creation of jobs is, however, also important for the policy maker. The relative ability of the different regions to generate jobs with the aid of irrigation farming activities is illustrated by calculating the ratio of jobs created per 1000 m^3 of irrigation water applied. The relative "efficiency" of the different regions, as far as the utilisation of irrigation water is concerned, is calculated by means of the ratio of the net financial benefit from irrigation farming per m^3 of water applied. The net financial benefit per hectare of each typical farming situation is deduced by calculating the net present value (NPV) per hectare of the envisaged farming situations. A real discounting rate of 4 % per year was used in this regard. The computerized calculation model has various characteristics as far as its abilities are concerned.

Facilities of the calculation model

The calculation models provide answers regarding the expected profitability and financial viability of the envisaged farming situations in the different regions of the study area. Other facilities of the model are the following:

- it can handle 30 different blocks/areas of land
- a transformation/development period of 3 to 5 years is assumed
- the effect of different financing strategies can be analysed
- the sensitivity of the “answers” for important parameters like the value of output and the discounting rate can be analysed
- it can evaluate the financial viability of **existing** irrigation farming, the expansion of existing irrigation farming and the development of **new** envisaged irrigation farms

The typical farming situations of the relevant regions of the study area are the theme of the following section.

3 TYPICAL FARMING SITUATIONS IN THE RELEVANT REGIONS OF THE STUDY AREA

3.1 Introduction

The relevant regions of the study area on which this study has a bearing were shown in **Section 2.1** (refer also to **Figure 2.1**). The typical farming situations in the relevant regions are next discussed with the emphasis on the present and model composition of enterprises as well as the accompanying farming infrastructure, labour and managerial requirements and the irrigation water requirements for the selected crops*. This information, together with the income and costs budgets for the selected crops (refer to **Section 4**) and the estimated costs of the additional irrigation water from the Clanwilliam Dam (refer to **Section 5**), serve as a basis for the analysis of the financial viability of the expansion of irrigation farming in the study area (refer to **Section 6**).

3.2 Typical farming models

The typical farming situations (present and prototype) of the relevant regions of the study area are illustrated in the following **Sections 3.2.1** to **3.2.4**. As was stated in **Section 1.3**, it is assumed that the financial evaluation of the envisaged typical farming situations will serve as a plausible source of information for the evaluation of the viability of irrigation farming in the different regions of the study area.

3.2.1 Land-use of the present and prototype farming situations

The present and model land-use situations on typical farms in the relevant regions of the study area are presented in **Tables 3.1** to **3.5**. Land-use possibilities range from vines (wine, table and dried grapes), citrus fruit to vegetables. The selection of crops for a specific region is determined by soil and climatic considerations as well as by the market prospects for products. The production process of the mentioned enterprises is both capital- and labour intensive. In order to cope with this reality it is usually found that a crop mix is selected to limit the realization of extreme peak periods as far as the pressure on the capital infrastructure and the permanent labour force of farms are concerned. The crop mix of typical farms in the different regions was selected during workshop sessions with leading farmers and other industry experts on 16/08/2005 and 17/08/2005 at Vredendal and Citrusdal, respectively.

Melkboom/Trawal region

The expansion of typical table grape and mixed farming situations are envisaged should more irrigation water become available for this region (refer to **Tables 3.1** and **3.2**). The development of new table grape farming units of, say, 25 ha per unit is also envisaged in this region. As far as the mixed farming situation is concerned, it is assumed that the model situation (refer to **Table 3.2**) should serve as a plausible farming composition in this regard.

*Information in this regard was obtained with the aid of workshop sessions with leading farmers and other industry experts as were discussed in Section 2.2.1 (refer to page 2-2).

Table 3.1 Assumed present and model table grape farming situation in the Melkboom/ Trawal region

Present situation	Area (ha)	Model situation	Area (ha)
Table grape cultivar mix:		Table grape cultivar mix:	
Prime seedless	3	Prime seedless	4
Flame seedless	2	Flame seedless	4
Victoria	2	Crimson seedless	6
Majestic	1.5	Sugarone	5
Sunred seedless	0.5	Red globe	6
Thomson seedless	6.5		
Waltham cross	2.0		
Crimson seedless	1.0		
Red Globe	1.5		
Total irrigation	20		
Irrigable land	5		
TOTAL	**25**	**TOTAL**	**25**

Table 3.2 Assumed present and model mixed farming situations (with wine grapes as main enterprise) in the Melkboom/Trawal region

Present situation	Area (ha)	Model situation	Area (ha)
Wine grapes:		Wine grapes:	
Chenin blanc	10	Chardonnay	5
Colombar	9	Chenin blanc	13
Hanepoot/Muskadel	3	Colombar	9
Shiraz	3	Hanepoot/Muskadel	3
Pinotage	3	Shiraz	3
Chardonnay	2	Pinotage	5
Grapes (Dried)	2	Grapes (Dried)	5
Vegetables	3	Vegetables	7
	2		
Total irrigation	35		
Irrigable land	15		
TOTAL	**50**	**TOTAL**	**50**

Klawer/Vredendal region

Both the expansion of typical table grape and mixed farming situations as well as the development of new farms is envisaged should more irrigation water become available for this region. It was concluded during the workshop sessions that the typical table grape farming situation that is envisaged for the Melkboom/Trawal region (refer to **Table 3.1**) will be relevant to evaluate the financial viability of both the expansion of existing farms and the development of new table grape farms of 25 ha in this region. The mixed farming situation in this region is envisaged to increase from 60 ha under irrigation to 75 ha (refer to **Table 3.3**). Should new mixed farms be developed in this region, it is expected to comprise of 75 ha of irrigated crops (refer to the model situation in **Table 3.3**).

Table 3.3 Assumed present and model mixed farming situations (with wine grapes as main enterprise) in the Klawer/Vredendal region

Present situation	Area (ha)	Model situation	Area (ha)
Wine grapes:		Wine grapes:	
White cultivars	30	White cultivars	25
Red cultivars	10	Red cultivars	15
Grapes (dried)	10	Grapes (dried)	20
Vegetables	10	Vegetables	15
Total irrigation	60		
Irrigable land	15		
TOTAL	**75**	**TOTAL**	**75**

Citrusdal region

The Citrusdal region is upstream of the Clanwilliam Dam and thus leads to a different strategy as far as the development of irrigation water sources is concerned. Existing farms are mainly irrigated directly from the Olifants River, while a portion of the irrigation water needs for the peak irrigation period is stored in private dams. The envisaged expansion of existing citrus farms as well as the development of new citrus farms in this region (refer to **Table 3.4**) is thus assumed to be possible only via "private" irrigation water development systems directly from the Olifants River.

Table 3.4 Assumed present and model citrus farming units in the Citrusdal region

Present situation	Area (ha)	Model situation	Area (ha)
Navels	31	Navels	41
Valencias	15	Valencias	15
Lemons	2	Lemons	-
Soft citrus	2	Soft citrus	14
Total irrigation	50		
Irrigable land	20		
TOTAL	**70**	**TOTAL**	**70**

Clanwilliam region

The expansion of typical mixed farming situations (mainly citrus fruit and potato production) as well as the development of new mixed irrigation farms (refer to model situation in **Table 3.5**) is envisaged should more irrigation water become available for this region.

Table 3.5 Assumed present and model mixed farming situations in the Clanwilliam region

Present situation	Area (ha)	Model situation	Area (ha)
Navels	20	Navels	35
Valencias	10	Valencias	15
Potatoes	25	Potatoes	50
Total irrigation	55		
Irrigable land	45		
TOTAL	**100**	**TOTAL**	**100**

3.2.2 Expected capital structure of typical farms

The expected capital structure (in detail) of typical farming situations in the different regions of the study area is presented in **Tables 3.6** to **3.14**.

Irrigation land was valued at the bare land value thereof with the aid of leading farmers from the different regions and other industry experts, *inter alia*, from leading commercial banks. The bare land value of irrigated land in the different regions was valued at R30 000/ha. Irrigable land that is expected to be developed for irrigation purposes, should more irrigation water become available, was valued at R15 000/ha.

The mentioned values are based on the present production possibilities, mainly dryland cropping or extensive livestock production. It is assumed that the accessibility thereof for irrigation purposes will impact positively on the value of the bare land that has potential for irrigation farming.

The improvements on the land like orchards, buildings, dams, boreholes and other irrigation infrastructure were valued at the replacement value thereof. As far as existing farms are concerned, it was assumed that fixed improvements like buildings should be valued at 50% of the calculated replacement value thereof, while the irrigation infrastructure were valued at 60% of the replacement value thereof. Orchards were valued at the replacement value thereof, but depreciated for the age of each specific block. Envisaged improvements that are connected to the expansion and/or replacement of items, *inter alia*, orchards and irrigation infrastructure like dams, main lines, pumps, filters and inland irrigation equipment were valued at the replacement value thereof. The appropriate improvements on “new” farms that are associated with the envisaged new irrigation developments in certain regions of the study area were valued at the replacement value thereof.

The relevant equipment (i.e. tractors, vehicles, spray pumps, cultivation equipment, etc.) of typical farms were valued at existing prices as new or at a reasonable market price depending on the availability of second hand items of an acceptable quality. Inputs from leading farmers were useful in this regard.

Table 3.6 Expected capital investment on a typical existing table grape farm
Region : Melkboom/Trawal and Klawer/Vredendal
Area: 20 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	20	30,000	600,000
Irrigable	Ha			
Dryland	Ha			
Orchards/Vines	Ha	20	50,828	1,016,565
Total				1,616,565
Buildings:				
Housing:				
Labour		12.00	75,000	900,000
Manager		1.00	225,000	225,000
Manager Assistant		1.00	100,000	100,000
Pack/Cooling Shed		1.00	1,410,000	1,410,000
Total				2,635,000
Irrigation (Exist)				338,500
Irrigation (New)				0
Total Fixed Capital				4,590,065
Moveable Capital				
Livestock				
Equipment:				
Tractors		2.00	125,000	250,000
Trailer sets		3.00	15,000	45,000
Spray pumps		2.00	70,000	140,000
Sulphur spray		1.00	12,000	12,000
"Stokkiekapper"		1.00	20,000	20,000
LDV		1.00	100,000	100,000
Truck		1.00	200,000	200,000
Loose tools		1.00	25,000	25,000
Other		1.00	20,000	20,000
Total Moveable Capital				817,000
Total Capital Investment				**5,407,065**

Table 3.7 Expected capital investment on a typical existing mixed farm
Region : Melkboom/Trawal
Area: 35 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	35	30,000	1,050,000
Irrigable	Ha			
Dryland	Ha			
Orchards/Vines	Ha	33	30,115	993,805
Total				2,043,805
Buildings:				
Housing:				
Labour		7.00	75,000	525,000
Manager		1.00	225,000	225,000
Shed		1.00	250,000	250,000
Total				1,000,000
Irrigation (Exist)				548,100
Irrigation (New)				
Total Fixed Capital				3,591,905
Moveable Capital				
Livestock				
Equipment:				
Tractors		2.00	100,000	200,000
Spray pumps		1.00	40,000	40,000
Weed spray		1.00	25,000	25,000
Tip trailer		1.00	5,000	5,000
Harvesting bins		1.00	15,000	15,000
LDV		1.00	125,000	125,000
"Bossiekapper"		1.00	5,000	5,000
Disc		1.00	8,000	8,000
Disc harrow		1.00	5,000	5,000
Scraper		1.00	10,000	10,000
Harvesting trailer		1.00	10,000	10,000
Drying equipment		1.00	60,000	60,000
Other		1.00	10,000	20,000
Total Moveable Capital				528,000
Total Capital Investment				**4,119,905**

Table 3.8 Expected capital investment on a typical model mixed farm
Region : Melkboom/Trawal
Area: 50 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	35	30,000	1,050,000
Irrigable	Ha	15	15,000	225,000
Dryland	Ha			
Orchards/Vines	Ha	33	30,115	993,805
Total				2,268,805
Buildings:				
Housing:				
Labour		7.00	75,000	525,000
Labour		3.00	75,000	225,000
Manager		1.00	225,000	225,000
Manager Assistant		1.00	100,000	100,000
Shed		1.00	250,000	250,000
Total				1,325,000
Irrigation (Exist)				548,100
Irrigation (New)				285,375
Total Fixed Capital				4,427,280
Moveable Capital				
Livestock				
Equipment:				
Tractors		2.00	100,000	200,000
Tractors		1.00	120,000	120,000
Spray pumps		1.00	40,000	40,000
Spray pumps		1.00	45,000	45,000
Weed spray		1.00	25,000	25,000
Tip trailer		1.00	5,000	5,000
Harvesting bins		2.00	15,000	30,000
Truck		1.00	250,000	250,000
LDV		1.00	125,000	125,000
"Bossieslaner"		1.00	5,000	5,000
Disc		1.00	8,000	8,000
Disc harrow		1.00	5,000	5,000
Scraper		1.00	10,000	10,000
Harvesting trailer		2.00	10,000	20,000
Shade cloth		1.50	60,000	90,000
Other		1.00	20,000	20,000
Total Moveable Capital				998,000
Total Capital Investment				**5,425,280**

Table 3.9 Expected capital investment on a typical existing mixed farm
Region : Klawer/Vredendal
Area: 60 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	60	30,000	1,800,000
Irrigable	Ha			
Dryland	Ha			
Orchards/Vines	Ha	50	32,803	1,640,142
Total				3,440,142
Buildings:				
Housing:				
Labour		10.00	75,000	750,000
Manager		1.00	225,000	225,000
Manager Assistant		1.00	100,000	100,000
Single quarters		1.00	200,000	200,000
Shed		1.00	250,000	250,000
Total				1,525,000
Irrigation (Exist)				1,202,640
Irrigation (New)				0
Total Fixed Capital				6,167,782
Moveable Capital				
Livestock				
Equipment:				
Tractors		2.00	120,000	240,000
Tractors		2.00	80,000	160,000
Spray pumps		2.00	40,000	80,000
Weed spray		1.00	30,000	30,000
Trailer		1.00	20,000	20,000
Harvesting bins		2.00	8,000	16,000
Bin Trailers		2.00	12,000	24,000
LDV		2.00	100,000	200,000
"Bossieslaner"		1.00	8,000	8,000
Drying Equipment		1.00	210,000	210,000
Bins		100.00	140	14,000
Other		1.00	30,000	30,000
Total Moveable Capital				1,032,000
Total Capital Investment				**7,199,782**

Table 3.10 Expected capital investment on a typical model mixed farm
Region : Klawer/Vredendal
Area: 75 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	60	30,000	1,800,000
Irrigable	Ha	15	15,000	225,000
Dryland	Ha			
Orchards/Vines	Ha	50	32,803	1,640,142
Total				3,665,142
Buildings:				
Housing:				
Labour		12.00	75,000	900,000
Manager		1.00	225,000	225,000
Manager Assistant		2.00	100,000	200,000
Single quarters		1.00	200,000	200,000
Shed		1.00	250,000	250,000
Total				1,775,000
Irrigation (Exist)				1,202,640
Irrigation (New)				325,935
Total Fixed Capital				6,968,717
Moveable Capital				
Livestock				
Equipment:				
Tractors		2.00	120,000	240,000
Tractors		2.00	80,000	160,000
Tractors		1.00	160,000	160,000
Spray pumps		3.00	40,000	120,000
Spray pumps		1.00	45,000	45,000
Weed spray		1.00	30,000	30,000
Trailer		1.00	20,000	20,000
Trailer		1.00	25,000	25,000
Harvesting bins		3.00	8,000	24,000
Bin trailers		3.00	12,000	36,000
LDV		2.00	100,000	200,000
"Bossieslaner"		1.00	8,000	8,000
Drying Equipment		2.00	210,000	420,000
Bins		120.00	100	12,000
Other		1.00	30,000	30,000
Total Moveable Capital				1,530,000
Total Capital Investment				**8,498,717**

Table 3.11 Expected capital investment on a typical existing citrus farm
Region : Citrusdal
Area: 50 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	50	30,000	1,500,000
Irrigable	Ha			
Dryland	Ha			
Orchards/Vines	Ha	50	30,823	1,541,126
Total				3,041,126
Buildings:				
Housing:				
Labour		9.00	75,000	675,000
Manager		1.00	225,000	225,000
Manager Assistant		1.00	100,000	100,000
Single quarters		1.00	130,000	130,000
Shed		1.00	250,000	250,000
Total				1,380,000
Irrigation (Exist)				2,778,976
Irrigation (New)				0
Total Fixed Capital				7,200,102
Moveable Capital				
Livestock				
Equipment:				
Tractors		4.00	106,250	425,000
Fertilizer caster		1.00	60,000	60,000
Spray pumps		2.00	46,000	92,000
Weed Spray		1.00	12,000	12,000
Trailer		1.00	10,000	10,000
Bin trailer set		4.00	10,000	40,000
LDV		1.00	70,000	70,000
Forklift		1.00	40,000	40,000
Truck		1.00	100,000	100,000
Weed cultivator		1.00	6,000	6,000
Motor bike		1.00	20,000	20,000
Other and ladders		1.00	62,000	62,000
Total Moveable Capital				937,000
Total Capital Investment				**8,137,102**

Table 3.12 Expected capital investment on a typical model citrus farm
Region : Citrusdal
Area: 70 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	50	30,000	1,500,000
Irrigable	Ha	2	15,000	30,000
Dryland	Ha			
Orchards/Vines	Ha	50	30,823	1,541,126
Total				3,341,126
Buildings:				
Housing:				
Labour		12.00	75,000	900,000
Manager		1.00	225,000	225,000
Manager assistant		2.00	100,000	200,000
Single quarters		1.00	130,000	130,000
Shed		1.00	250,000	250,000
Total				1,705,000
Irrigation (Exist)				2,778,976
Irrigation (New)				1,823,584
Total Fixed Capital				7,825,102
Moveable Capital				
Livestock				
Equipment:				
Tractors		6.00	125,833	755,000
Fertilizer caster		1.00	60,000	60,000
Spray pumps		3.00	60,667	182,000
Fork lift		1.00	40,000	40,000
Weed Spray		2.00	23,500	47,000
Trailer		1.00	10,000	10,000
Bin trailer set		6.00	13,333	80,000
LDV		1.00	70,000	70,000
Truck		1.00	100,000	100,000
Disc		1.00	6,000	6,000
Motor bike		1.00	20,000	20,000
Topper		1.00	30,000	30,000
Other and ladders		1.00	62,000	62,000
Total Moveable Capital				1,462,000
Total Capital Investment				**9,287,102**

Table 3.13 Expected capital investment on a typical existing mixed farm
Region : Clanwilliam
Area: 55 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	55	30,000	1,650,000
Irrigable	Ha			
Dryland	Ha			
Orchards/Vines	Ha	30	47,081	1,412,438
Total				3,062,438
Buildings:				
Housing:				
Labour		10.00	75,000	750,000
Manager		1.00	225,000	225,000
Manager assistant		2.00	100,000	200,000
Single quarters		1.00	250,000	250,000
Shed		1.00	250,000	250,000
Total				1,675,000
Irrigation (Exist)				901,273
Irrigation (New)				0
Total Fixed Capital				5,638,711
Moveable Capital				
Livestock				
Equipment:				
Tractors		2.00	100,000	200,000
Tractors		2.00	185,000	370,000
Fertilizer caster		1.00	60,000	60,000
Trailer		3.00	20,000	60,000
Bin trailer set		12.00	6,000	72,000
Spray Pumps		1.00	100,000	100,000
Weed Spray		1.00	12,000	12,000
Fork lift		1.00	160,000	160,000
Truck		1.00	1,000,000	1,000,000
LDV		1.00	100,000	100,000
Potato equipment		1.00	805,000	805,000
Centre pivot		1.00	152,750	152,750
Weed cultivator		1.00	6,000	6,000
Motorbike		2.00	20,000	40,000
Other and ladders		1.00	58,000	58,000
Total Moveable Capital				3,195,750
Total Capital Investment				**8,136,114**

Table 3.14 Expected capital investment on a typical model mixed farm
Region : Clanwilliam
Area: 100 ha

Item	Units	Number of Units	Value	
			(R/Unit)	(R)
Fixed Capital				
Land:				
Irrigated	Ha	55	30,000	1,650,000
Irrigable	Ha	45	15,000	675,000
Dryland	Ha			
Orchards/Vines	Ha	30	47,081	1,412,438
Total				3,737,438
Buildings:				
Housing:				
Labour		25.00	75,000	1,875,000
Manager		1.00	225,000	225,000
Manager Assistant		5.00	110,000	550,000
Single quarters		2.00	175,000	350,000
Shed		1.00	250,000	250,000
Total				3,250,000
Irrigation (Exist)				901,273
Irrigation (New)				953,302
Total Fixed Capital				7,888,711
Moveable Capital				
Livestock				
Equipment:				
Tractors 60 kW		1.00	250,000	250,000
Tractors 55 kW		2.00	175,000	350,000
Tractors 35 kW		3.00	116,667	350,000
Fertilizer caster		1.00	60,000	60,000
Spray Pumps		2.00	110,000	220,000
Weed Spray		1.00	12,000	12,000
Trailer		3.00	20,000	60,000
Bin Trailer set		15.00	6,000	90,000
Forklift		1.00	160,000	160,000
Truck		1.00	1,000,000	1,000,000
LDV		1.00	100,000	100,000
Motor bike		2.00	20,000	40,000
Weed cultivator		1.00	6,000	6,000
Potato equipment		1.00	805,000	805,000
Centre pivot		2.00	229,125	458,250
Other and Ladders		1.00	58,000	58,000
Total Moveable Capital				4,019,250
Total Capital Investment				**11,907,961**

3.2.3 Visualised investment in farm irrigation infrastructure

The expected investment in farm irrigation infrastructure in the different regions of the study area is presented in **Tables 3.15** to **3.26**. Information in this regard was provided by the engineering section of the research team (refer to the internal study memo on farm irrigation infrastructure by Ninham Shand, Consulting Engineers, 2007, and to the *Irrigation Development Options Report* by Hundley, 2007, DWAF Report No. P WMA 17/E10/00/1407).

Table 3.15 Expected irrigation infrastructure for a typical citrus farm of 70 ha, Citrusdal, 2005/06
Irrigated area : 70 ha

Capital cost (R)	Rand
Pump station	388 679
Pipe line	71 698
River pumps	
Pump station	173 585
Pipe line	107 547
Dam	6 339 623
TOTAL	R7 081 132
Per hectare	R 101 159
Operating costs (R/a)	
Equipment	38 849
Electricity	29 245
TOTAL (R/a)	R 68 094
Per hectare	R 973

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.16 Expected irrigation infrastructure for the expansion of a typical citrus farm from 50 ha to 70 ha, Citrusdal, 2005/06
Expanded irrigation area : 20 ha

Capital cost (R)	Rand
Pump station	116 981
Pipe line	40 566
River pumps	
Pump station	61 320
Pipe line	55 660
Dam	1 449 057
TOTAL	R1 723 584
Per hectare	R 86 179
Operating costs (R/a)	
Equipment	11 268
Electricity	10 377
TOTAL (R/a)	R 21 645
Per hectare	R 1 082

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.17 Expected irrigation infrastructure for a typical citrus farm of 100 ha, Clanwilliam, 2005/06
Irrigated area: 50 ha Citrus
50 ha Potatoes
100 ha

Capital cost (R)	Citrus (R)	Potatoes (R)
Pump station	449 057	474 528
Pipe line	107 547	107547
TOTAL	R556 604	R582 075
Per hectare	R 11 132	R 11 642
Operating costs (R/a)	**Citrus (R)**	**Potatoes (R)**
Equipment	10 377	10 755
Electricity	16 038	9 434
TOTAL (R/a)	R26 415	R20 189
Per hectare	R 528	R 404

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.18 Expected irrigation infrastructure for the expansion of a typical irrigation farm from 55 ha to 100 ha, Clanwilliam, 2005/06
Expanded irrigated area: 20 ha Citrus
25 ha Potatoes

Capital cost (R)	Citrus (R)	Potatoes (R)
Pump station	174 528	234 906
Pipe line	159 434	159 434
TOTAL	R333 962	R394 340
Per hectare	R 16 698	R 15 774
Operating costs (R/a)	**Citrus (R)**	**Potatoes (R)**
Equipment	5 755	6 698
Electricity	6 603	5 660
TOTAL (R/a)	R12 358	R12 358
Per hectare	R 618	R 494

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.19 Expected irrigation infrastructure for a typical table grape farm of 25 ha, Melkboom/Trawal, 2005/06
Irrigated area: 25 ha

Capital cost (R)	Rand
Pump station	216 981
Pipe line	81 132
TOTAL	R298 113
Per hectare	R 11 925
Operating costs (R/a)	
Equipment	6 320
Electricity	7 547
TOTAL (R/a)	R 13 867
Per hectare	R 555

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.20 Expected irrigation infrastructure for the expansion of a typical table grape farm from 20 ha to 25 ha, Melkboom/Trawal, 2005/06
Expanded Irrigated area: 5 ha

Capital cost (R)	Rand
Pump station	46 226
Pipe line	50 000
TOTAL	R96 226
Per hectare	R19 245
Operating costs (R/a)	
Equipment	2 264
Electricity	1 887
TOTAL (R/a)	R 4 151
Per hectare	R 830

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.21 Expected irrigation infrastructure for a typical mixed farm of 50 ha, Melkboom/Trawal, 2005/06
Irrigated area: 45 ha wine grapes
5 ha tomatoes

Capital cost (R)	Rand
Pump station	363 208
Pipe line	169 811
TOTAL	R533 019
Per hectare	R 10 660
Operating costs (R/a)	
Equipment	9 623
Electricity	12 264
TOTAL (R/a)	R 21 887
Per hectare	R 438

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.22 Expected irrigation infrastructure for the expansion of a typical mixed farm from 35 ha to 50 ha, Melkboom/Trawal, 2005/06
Expanded irrigated area: 15 ha

Capital cost (R)	Rand
Pump station	113 208
Pipe line	97 170
TOTAL	R210 378
Per hectare	R 14 025
Operating costs (R/a)	
Equipment	3 491
Electricity	3 774
TOTAL (R/a)	R 7 265
Per hectare	R 484

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.23 Expected irrigation infrastructure for a typical table grape farm of 25 ha, Klawer/Vredendal, 2005/06
Irrigated area : 25 ha

Capital cost (R)	Rand
Pump station	293 396
Pipe line	107 547
TOTAL	R400 943
Per hectare	R 16 038
Operating costs (R/a)	
Equipment	7 453
Electricity	10 377
TOTAL (R/a)	R 17 830
Per hectare	R 713

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.24 Expected irrigation infrastructure for the expansion of a typical table grape farm from 20 ha to 25 ha, Klawer/Vredendal, 2005/06
Expanded irrigated area : 5 ha

Capital cost (R)	Rand
Pump station	74 528
Pipe line	55 660
TOTAL	R130 188
Per hectare	R 26 038
Operating costs (R/a)	
Equipment	2 264
Electricity	1 887
TOTAL (R/a)	R 4 151
Per hectare	R 830

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.25 Expected irrigation infrastructure for a typical farm of 75 ha, Klawer/Vredendal, 2005/06
Irrigated area : 60 ha wine grapes
15 ha tomatoes

Capital cost (R)	Rand
Pump station	944 340
Pipe line	183 962
TOTAL	R1 128 302
Per hectare	R 15 044
Operating costs (R/a)	
Equipment	23 302
Electricity	23 585
TOTAL (R/a)	R 46 887
Per hectare	R 625

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

Table 3.26 Expected irrigation infrastructure for the expansion of a typical irrigation farm from 60 ha to 75 ha, Klawer/Vredendal, 2005/06
Expanded irrigated area : 10 ha wine grapes
5 ha tomatoes

Capital cost (R)	Rand
Pump station	169 811
Pipe line	81 132
TOTAL	R250 943
Per hectare	R 16 729
Operating costs (R/a)	
Equipment	4 434
Electricity	4 717
TOTAL (R/a)	R 9 151
Per hectare	R 610

Source: Irrigation cost estimates, Ninham Shand Consulting Engineers, 2007.

3.2.4 Expected labour and managerial requirements

The expected labour and managerial requirements of typical farms in the different regions of the study area are presented in **Table 3.27**. Information in this regard was generated during workshop sessions with leading farmers from the different regions of the study area and other industry experts.

Production processes in general are characterised by, *inter alia*, a relatively labour intensive nature. Irrigation farming in the study area thus plays an important role as far as employment opportunities are concerned, on the farm level as well as for the relevant supporting industries (i.e. input suppliers and processing industries).

Table 3.27 Assumed managerial and labour requirements and their remuneration for typical model farms in the different regions of the study area

Region	Farm area (ha)	Owner/managers		Managerial assistants		Labour			
						Permanent		Seasonal	
		Number	Rem.* (R)	Number	Rem.* (R)	Number	Rem.* (R)	Number	Rem.** (R)
MELKBOOM/TRAWAL									
• Table grapes	25	1	170,000	1	85,000	16	15,200	60	50
• Mixed farm***	60	1	128,000	1	36,000	10	12,500	30	45
KLAWER/VREDENDAL									
• Table grapes	25	1	170,000	1	85,000	16	15,200	60	50
• Mixed farm***	75	1	130,000	2	18,300	12	12,500	40	45
CITRUSDAL									
• Citrus farm	70	1	108,000	2	36,000	12	13,950	70	50
CLANWILLIAM									
• Mixed farm****	100	1	108,000	5	39,000	27	12,500	65	50

* Cash remuneration per unit per year
** Cash remuneration per unit per day
*** With wine grapes as main enterprise
**** With citrus fruit and potatoes as main enterprises

3.2.5 Expected irrigation water requirements for selected crops

The expected gross annual irrigation water requirements for selected crops in the different areas of the study area are presented in **Table 3.28**. Relevant information in this regard was supplied by the soil and crop experts (refer to the *Soils, Water Requirements and Crops Report* by Lambrechts, Schloms and Ellis, 2006, DWAF Report No. P WMA 17/E10/00/1106).

Table 3.28 Water requirements of crops (m^3/ha/a)

Crop	Irrigation water requirement per production area per annum (m^3/ha/a)		
	Citrusdal	Clanwilliam	Trawal/Klawer***
Citrus fruit	11,380	12,250	14,660
Table grapes	-	-	13,580
Wine grapes	8,130	8,650	9,650
Potatoes*	5,990	5,490	6,820
Tomatoes**	6,430	6,660	6,930

* Centre pivot system (water requirement per production cycle)
** Drip irrigation system (water requirement per production cycle)
*** This is a combination of the Melkboom/Trawal en Klawer/Vredendal areas

4 INCOME AND COST BUDGETS FOR SELECTED CROPS

4.1 Introduction

The profitability of irrigation farming is mainly influenced by the costs of irrigation developments relative to the profitability of farming practices. Irrigation farming practices in the study area are determined by soil and climatic considerations, as well as by market prospects for products.

Crop production possibilities range from vines (table and wine grapes), citrus fruit to vegetables (mainly tomatoes and potatoes). This section aims to present the expected income and cost structures of the selected irrigation farming practices in the different regions of the study area. Relevant information in this regard will be utilized during the analysis of the financial viability of irrigation farming (present and proposed) in the different regions of the study area (refer to **Section 6**). The 2005/06 production year serves as a base year for the financial analysis. This implies that all the financial data is presented in 2005/06 Rand values. Producer income is, however, mainly determined by marketing prospects for produce. Relevant trends in this regard will thus serve as a base for the assumptions as far as producer price expectations is concerned.

4.2 Marketing prospects for produce

The main crops of the investigation area, i.e. wine and table grapes and citrus fruit, are relatively capital- and labour intensive as far as production is concerned. Producer's risk is further enhanced via the impact of the globalisation of world trade and more specific the tough competition from Asian, African and Latin American low wage producers on traditional South African export markets. The strong Rand thus further pressures returns from the mentioned export orientated crops. Given the relatively small role of the mentioned industries of approximately 1 to 3% in a world production context, it is of paramount importance to optimize effectivity and efficiency as far as the production and marketing of produce of quality is concerned.

Given the mentioned increased pressure that is realized on export markets, it is important to investigate alternative opportunities. Local market opportunities are enhanced by a growing South African economy in which a strong trend of a more equitable distribution of wealth and income generates buying power. It may thus be worthwhile to investigate opportunities in this growing segment of the market.

4.2.1 Grapes

The marketing prospects, as far as grapes (wine and table grapes) and vegetables are concerned were discussed comprehensively in the similar WODRIS report in 2004 (Department of Agriculture, Western Cape Government, Report 259/2004/13, September 2004).

The strong trend of a weakening Rand from 1990 to 2000 served as an incentive for producers to become more export orientated. Continuous reform, as far as the cultivar mix is concerned, in order to meet global market requirements took place in the wine and table grape industries. Tougher world competition is putting greater pressure on the need for product excellence (i.e.

noble varieties). The South African wine and table grape industries took advantage of the mentioned export opportunities and wine exports quadrupled while table grape exports nearly trebled over the decade 1992 - 2002. The average export prices of table grapes trebled over the mentioned period. As far as the production of table grapes is concerned, the investigation area (i.e. Melkboom/Trawal) has the advantage of a relatively early marketing season and thus relatively higher prices on export markets regarding this perishable product (i.e. short shelf life). This advantage will serve to alleviate the income decrease of producers, should the Rand appreciate in the exchange value thereof. It is thus obvious that a strong Rand will have a negative effect on producers' earnings.

The strengthening Rand over the past 3 to 4 years, combined with the plateau in the wine market will thus lead to lower producer prices. The six-year cycle in the world wine market should further be kept in mind when evaluating the recent downward pressure as far as prices is concerned. It is thus advisable to avoid the large-scale uprooting of cultivars that are experiencing, possibly temporary, low price levels.

4.2.2 Citrus fruit

Citrusdal and Clanwilliam are two of the leading citrus producing areas of South Africa. Approximately 60% of the production volume is exported, mainly to the United Kingdom, USA, Europe and the Middle East. As in the case of export grapes, a weakening rand in the decade 1992 to 2002 served as an incentive for export marketing. Producer income increased mainly due to the continuing trend of a weakening Rand over the mentioned period. Since 2002 the export realization of producers became under pressure due to a stronger Rand. A positive development, as far as citrus marketing from the investigation area is concerned, is the granted access to the USA market. Citrusdal and Clanwilliam are the only production areas in South Africa that qualified as far as the strict phito sanitary regulations regarding fresh produce imports to the USA is concerned. This positive milestone has lead to an increase of citrus exports to the USA. Relative favourable prices in the USA, when seen together with the trend of a weakening Rand since 2006, lead to an increase in the export income of producers of approximately 24 % when compared with the situation in the 2005/06 production season. The income of producers, as was deduced during the workshop sessions in 2005 can thus be seen as relatively conservative.

4.3 Perennial crops: costs of establishment

The expected costs of the establishment of the selected perennial crops for the different regions of the study area are presented in **Table 4.1**. Information in this regard was obtained from industry institutions, the soil experts of the research team and also from leading farmers. It should be noted that the capital investment for inland irrigation facilities have been excluded from this costing, but forms a part of the investment in farm irrigation infrastructure (refer to **Section 3.2.3** and **Tables 3.15** to **3.26**).

Table 4.1 Expected costs per hectare of establishing table grapes, wine grapes and citrus fruit in selected regions of the study area

Items Costed	Table Grapes (R/ha)		Wine Grapes (R/ha)		Citrus fruit (R/ha)	
	Melkboom/ Trawal	Klawer/ Vredendal	Melkboom/ Trawal	Klawer/ Vredendal	Citrusdal	Clanwilliam
1.1 Trellising:	39,425	39,425	11,000	11,000	0	0
1.2 Fertilizer	703	703	639	639	3,500	3,500
1.3 Plant Material	16,500	16,500	18,662	18,662	16,000	16,000
1.4 Drainage	6,500	6,500	6,500	6,500	8,000	8,000
1.5 Contract Work	6,750	6,750	6,750	6,750	8,775	8,775
1.6 Tractor and Implement Costs	4,500	4,500	1,760	1,760	3,750	3,750
1.7 Labour	7,500	7,500	1,410	1,410	5,500	5,500
1.8 Permanent Irrigation Equipment	19,500	19,500	14,000	14,000	16,000	16,000
1.9 Soil Tests and other	25	25	25	25	1,250	1,250
Total Establishment Costs:	**101,403**	**101,403**	**60,746**	**60,746**	**62,775**	**62,775**

Source: Table grape study-group results, VINPRO (SA), Agriculture Western Cape and leading farmers from the study area, 2005/06.

4.4 Annual variable costs of selected crops

The expected annual variable costs per hectare for the selected cropping systems in the study area are presented in **Table 4.2**. Detailed information regarding the costs of production of crops per region is not available. The costs of production of specific crops in defined regions were obtained from study groups and industry institutions. Information in this regard was thus inspected carefully in order to consider the appropriateness thereof regarding the other regions of the study area. It was concluded that only minor differences regarding the variable costs of production (i.e. the costs of fertilizer, pest control, fuel and maintenance, etc.) might exist between the different regions. It was thus decided that the generalization of information regarding the variable costs of production per crop per region would be acceptable for the purpose of this study. It should be noted that as far as the overhead costs of production (i.e. the costs of capital, labour, management and irrigation water) is concerned, each region was dealt with separately with the aid of the region-specific typical farming models.

4.5 Expected income from selected crops per region

The visualized crop production pattern varies per region in the study area, mainly due to climatic differences. The expected output, prices and life span of perennial crops in the different regions of the study area are presented in **Tables 4.3** to **4.7**. Information about the expected output and lifespan of crops as well as the price expectations for products was obtained during workshop sessions with leading farmers from each region and other industry experts (refer to **Section 2.2.1**).

Table 4.2 Expected annual variable costs per hectare (Rand) of selected crops in the study area

Cost Items		Tomatoes	Potatoes	Table Grapes	Wine Grapes	Citrus fruit
Direct Costs:	Seed	6,450	10,991			
	Fertilizer	6,450	11,485	3,460	984	2,846
	Pesticides &	9,400	5,591	6,428	1,078	3,630
	Herbicides	15,265				
	Trellising	4,100	2,677	10,037	2,579	1,837
Mechanisation:	Transport	4,850	4,110	1,203		6,842
	Fuel and	1,175			479	307
General:	Repairs			1,500	931	1,200
	Other			3,137	636	585
	Electricity	1,500	1,761	264	248	442
	Admin					
	Other					
Total		**R49,190**	**R36,615**	**R26,029**	**R6,935**	**R17,689**

Source: Table grape study-group results, VINPRO (SA), Agriculture Western Cape and leading farmers from the study area, 2005/06.

Table 4.3 Expected output, payments* and lifetime of selected table grape cultivars in the Melkboom/Trawal and Klawer/Vredendal regions of the study area under optimal production conditions, 2005/06

Fruit Variety/Cultivar	Output per ha			Payment per 4.5 kg Carton (R)		Expected lifetime (years)	Years to full – bearing
	Ton	Grading (%)					
		Export	Local	Export*	Local**		
Prime Seedless	22,50	75	10	58,30	23,50	20	5
Flame Seedless	21,15	75	10	50,30	23,50	20	5
Victoria	19,13	75	10	33,30	23,50	20	5
Majestic	22,50	75	10	23,30	23,50	20	5
Sunred Seedless	22,50	75	10	28,30	23,50	20	5
Thompson Seedless	17,55	75	10	28,30	23,50	20	5
Waltham Cross	18,00	75	10	18,30	23,50	20	5
Crimpson Seedless	15,75	75	10	43,30	23,50	20	5
Red Globe	27,00	75	10	33,30	23,50	20	5
Sugarone	18,00	75	10	48,30	23,50	20	5

* Estimated delivery in port (DIP) payment minus the costs of packing, transport and levies for the Melkboom region. It is assumed that the payments to producers in the Klawer/Vredendal region will be 20 % lower due to a relatively later harvesting season.

** When sold as fresh fruit on the local market minus the costs of packing and transport.

Table 4.4 Expected output and producers' prices of wine grapes and other selected crops in the Melkboom/Trawal region of the study area under optimal production conditions, 2005/06

Fruit Variety/Cultivar	Output per ha (ton)	Price per ton (R)	Expected lifetime (years)	Years to full-bearing
WINE GRAPES				
Chenin Blanc	25	1000	25	5
Colombar	25	1000	25	5
Hanepoot	20	1300	25	5
Shiraz	15	2000	25	5
Pinotage	15	2000	25	5
Merlot	15	2000	25	5
Cabernet S	15	2500	25	5
Other red	15	2000	25	5
DRIED GRAPES				
Sultanas	30	1250	25	5
TOMATOES	75	2000	-	-

Table 4.5 Expected output and producers' prices of wine grapes and other selected crops in the Klawer/Vredendal region of the study area under optimal production conditions, 2005/06

Fruit Variety/Cultivar	Output per ha (ton)	Price per ton (R)	Expected lifetime (years)	Years to full-bearing
WINE GRAPES				
White cultivars	25	1000	25	5
Red cultivars	12	2000	25	5
DRIED GRAPES	30	1250	25	5
TOMATOES	75	2000	-	-

Table 4.6 Expected output and producers' prices of citrus fruit in the Citrusdal region of the study area under optimal production conditions, 2005/06

Cultivar	Output per ha (ton)	Price per ton* (R)	Expected lifetime (years)	Years to full-bearing
Navels	45	1223	40	9
Valencias	45	865	40	9
Midknight	45	1475	40	9
Soft Citrus	50	810	40	9
Lemons	50	550	40	9

* Average payment to producers after the costs of packing and export levies for the 2003, 2004 and 2005 production seasons has been taken into account.

Source: Goedehoop Citrus Company Pty (Ltd), 2005.

Table 4.7 Expected output and producers' prices of citrus fruit and other selected crops in the Clanwilliam region of the study area under optimal production conditions, 2005/06

Cultivar	Output per ha (ton)	Price per ton* (R)	Expected lifetime (years)	Years to full-bearing
Navels	40	1223	40	9
Valencias	43	865	40	9
Midknight	45	1475	40	9

* Average payment to producers after the costs of packing and export levies for the 2003, 2004 and 2005 production seasons has been taken into account.

Source: Goedehoop Citrus Company Pty (Ltd), 2005.

5 EXPECTED COSTS OF IRRIGATION WATER

Information about the costs of irrigation water forms an integral part of the database that is required to undertake the financial viability analysis of irrigation farming in the investigation area (refer to **Section 6**). Both the existing irrigation farming situations and the envisaged future irrigation farming developments thus form a part of this assignment.

5.1 Existing irrigation farming

As far as existing irrigation farming is concerned, the present water tariff of R1 925 per listed hectare serves as a cost-input in the financial viability analysis. The cost of water upstream of the Clanwilliam Dam (i.e. Citrusdal region) is taken as R80 per listed hectare at 12 200 m^3/ha. Information in this regard was obtained from the regional office of the Department of Water Affairs and Forestry at Clanwilliam.

5.2 Envisaged irrigation development

Irrigation development addresses both the expansion of existing irrigation farming and the development of new irrigation farms in the research area (refer to **Sections 2.1** and **3.2**). The envisaged irrigation development upstream of the Clanwilliam Dam will comprise mainly of the development of "private" (i.e. per individual farm) irrigation schemes where water will be pumped directly from the river. The expected cost of the infrastructure of this envisaged irrigation development was presented in **Tables 3.15** and **3.16**. The cost of the water is assumed to be at the same rate as for the existing irrigation practices of this kind, i.e. R80 per listed hectare at 12 200 m^3/ha. The expected cost of the additional irrigation water (from the Clanwilliam Dam) for downstream utilisation at different dam raising levels is presented in **Table 5.1**. The expected costs of farm irrigation infrastructure developments that are associated with the downstream expansion of irrigation farms were presented in **Tables 3.17** to **3.26**.

Table 5.1 Expected cost of irrigation water at different raising levels of the Clanwilliam Dam, 2005/06

Yield and Costs	Raising levels (m)			Discounting rate (%)
	5	10	15	
Expected yield (Mm^3/a)	38	55	70	
Expected 2005/06 costs (R mil)				
Capital costs	210,352	356,792	489,647	
Maintenance	8,987	15,245	20,920	
Total	219,339	372,037	510,567	
Capital redemption (R mil/a)*	14,04	23,81	32,68	4%
Expected water cost (R/m^3)	0,37	0,43	0,47	
Capital redemption (R mil/a)*	18,64	31,62	43,39	6%
Expected water cost(R/m^3)	0,49	0,58	0,62	
Capital redemption (R mil/a)*	24,32	41,25	56,61	8%
Expected water cost (R/m^3)	0,64	0,75	0,81	

* Expected costs based on 2006 price levels, accounting for a period, up to yield availability, of 5 years, and at a loan redemption period of 25 years.

Shortened periods, up to the availability of water, other than the five years used for the calculations, would marginally lower the expected cost of the water.

Refined, slightly altered yields have become available towards the end of the study, which are the following:

Raising levels (m)	5	10	15
Expected yield (Mm^3/a)	32	59	73

For the 5m raising this would imply that the expected water cost would increase by about 20% for a 5m raising, while the water costs for the 10m and 15m raising would reduce by about 7% and 4%, respectively. As water is only one of the input costs, the overall effect of this change will be small, and would only marginally influence the findings of this report.

6 FINANCIAL VIABILITY OF IRRIGATION FARMING

6.1 Introduction

The financial viability of both the existing and the envisaged expansion of irrigation farming in the study area were investigated. Typical regional farming models (refer to **Section 3**), the expected income and costs structures of the selected crops in the different regions (refer to **Section 4**) and the costs of irrigation water (refer to **Section 5**) serve as inputs to the financial viability analysis. The research approach that was described in **Section 2** is applied for the analysis. The results of the financial viability analysis are followed by a short discussion of the realities that may be obstructive to new entrants to farming in the study area.

6.2 Analytical framework (also refer to Section 2.2)

The multi-period financial analysis was executed at constant 2005/06 price levels. The discounting of the expected future financial results was done at a real interest rate of 4% per year (i.e. a nominal interest rate of approximately 10% per year at a yearly inflation rate of, say, 6%). Due to the difficulty to estimate an appropriate discounting rate, the sensitivity of the financial results will be tested by employing a range of real discounting rates.

6.2.1 Evaluation Criteria

The financial viability analysis focuses on the expected profitability and affordability of irrigation farming in the study area. It also aims to illustrate the relative "efficiency" of the consumption of irrigation water in the different regions of the study area.

a. Profitability

The expected profitability of the typical farming operations in the different regions of the study area is measured by means of the internal rate of return on the capital employed (IRR) and the net present value (NPV) of the expected flow of funds over the calculation period of 40 years. The NPV is calculated at a variety of real discounting rates.

b. Affordability

Farming operations in the study area is relatively capital intensive and risky due to, *inter alia*, uncertain farming output and product prices. Another reality that faces the farmer is the trend that the market value of land exceeds the productive value thereof. This implies that a farmer should be able to supply an appropriate portion of the capital needs from his own financial sources. When stated in another way, this means that, in general, farm output-value will not be able to remunerate all the farming inputs when the total capital need for the farm is financed via loaned capital. The impact of different own-to-loaned capital ratios on the break-even year of the expected cash flow from farming will illustrate this aspect.

c. "Efficiency" of irrigation water consumption

Two criteria are employed to illustrate the relative "efficiency" of the consumption of irrigation water in the different regions of the study area. The first criterion is financially-based. It measures the annual net financial benefit that is realised from irrigation farming per m^3 of water

used per year. The second criterion focuses on job creation by irrigation farming. The ratio of job creation per 1 000 m^3 of irrigation water consumed serves as a criterion of the relative "efficiency" of the different regions of the study area.

6.3 Financial viability of existing irrigation farming

The financial viability of existing irrigation farming in the different regions of the study area, when estimated with the aid of the mentioned criteria (refer to **Section 6.2**), is presented in **Exhibits 6.1** to **6.6** (see **Appendix A**), with a summary thereof in **Table 6.1**.

Given the assumptions regarding the income and costs structures of farms and the cost of irrigation water from the existing irrigation scheme that were stated in **Sections 3** to **5**, irrigation farming (i.e. mainly table grape, wine grape and citrus farming) is financially viable in all but one of the regions that were investigated, (i.e. an IRR of more than 4% per year). The typical mixed farming situation in the Melkboom/Trawal region is at present under financial stress, mainly due to the relatively low prices for the main enterprise, i.e. wine grapes.

The financial analysis indicates favourable returns on capital employed, especially for table grape farming in Melkboom/Trawal, but also as far as table grape and mixed farming in Klawer/ Vredendal and citrus farming in the Clanwilliam region is concerned. Contributing factors in this regard are*, inter alia*, the following:

- Well-established farming communities that are supported by the necessary supporting infra-structure as far as marketing services and input-supplying industries are concerned
- sound managerial skills at the farm level
- relatively affordable tariffs for irrigation water from existing water sources.

Table 6.1 Financial viability of existing irrigation farming in the study area

Scenario/Region	Water Need (m^3/ha)	Evaluation Criteria						
		IRR * (%)	NPV/ha ** (R)	Annuity/m^3 Water *** (R)	Break-even Year****			Jobs/1000 m^3 Water (number)
					Equity at: 80%	Equity at: 60%	Equity at: 40%	
Citrusdal citrus farm	11,380	4.55%	(19,684)	0.05	05/06	05/06	05/06	0.05
Clanwilliam citrus farm	9,177	7.54%	20,575	0.33	05/06	05/06	05/06	0.06
Melkboom/Trawal mixed farm	9,495	1.99%	(54,416)	(0.20)	05/06	05/06	05/06	0.03
Melkboom/Trawal table grape farm	13,580	34.44%	607,371	3.31	05/06	05/06	05/06	0.10
Klawer/Vredendal mixed farm	9,197	10.34%	46,490	0.51	05/06	05/06	05/06	0.03
Klawer/Vredendal table grape farm	13,580	9.57%	107,643	0.86	05/06	05/06	05/06	0.10

* Internal rate of return (in real terms) on capital investment.

** Net present value at a real discounting rate of 4% per year, (i.e. 10% nominal interest per year at a yearly inflation rate of, say, 6%.

*** Annuity of the net benefits per m^3 irrigation water applied at a real discounting rate of 4% per year.

**** At a real loan interest rate of 4% per year, i.e. 10% nominal interest per year.

6.4 Financial viability of envisaged irrigation developments

Irrigation development addresses the development of new water sources for both the expansion of existing irrigation farms and the development of virgin farms.

6.4.1 Expansion of existing irrigation farming

The financial viability of the expansion of existing irrigation farming, on typical farms in the different regions, of the study area is presented in **Exhibits 6.7** to **6.12** (see **Appendix B**), with a summary thereof in **Table 6.2**.

Given the assumptions about the income and cost structures of farms and the costs of the additional irrigation water from the proposed raising of the Clanwilliam Dam, the expansion of existing irrigation farms seem viable in all the regions downstream of the Clanwilliam Dam. The main contributing factors in this regard are*, inter alia:*

- the relatively cheaper additional irrigation water associated with the raising of the dam (i.e. R0,43/m^3 for a 10 metre raising, at a real discounting rate of 4% per annum)
- the possibility to realize "economy-of-scale effects" as far as the utilisation of existing infrastructure on farms is concerned.

Table 6.2 Financial viability of the proposed expansion of existing irrigation farms in the study area

Scenario/Region	Water Need (m^3/ha)	Evaluation Criteria						
		IRR * (%)	NPV/ha ** (R)	Annuity/m^3 Water *** (R)	Break-Even Year**** Equity at: 80%	Equity at: 60%	Equity at: 40%	Jobs/1000 m^3 Water (number)
Citrusdal Citrus farm expansion	11,380	3.19%	(65,846)	(0.11)	06/07	06/07	> 40 Years	0.05
Clanwilliam Citrus farm expansion	8,870	6.38%	6,118	0.28	13/14	15/16	17/18	0.06
Melkboom/Trawal mixed farm expansion	9,378	5.42%	(8,594)	0.15	12/13	19/20	22/23	0.04
Melkboom/Trawal table grape expansion	13,580	28.76%	685,269	3.79	05/06	05/06	05/06	0.09
Klawer/Vredendal mixed farm expansion	9,106	10.26%	48,479	0.53	05/06	05/06	05/06	0.03
Klawer/Vredendal table grape expansion	13,037	11.24%	189,645	1.38	11/12	12/13	12/13	0.10

* Internal rate of return (in real terms) on capital investment.

** Net present value at a real discounting rate of 4% per year, i.e. 10% nominal interest per year at a yearly inflation rate of, say, 6%.

*** Annuity of the net benefits per m^3 irrigation water applied at a real discounting rate of 4% per year.

**** At a real loan interest rate of 4% per year, i.e. 10% nominal interest per year.

6.4.2 New irrigation farms

The expected financial viability of the development of typical irrigation farms on virgin land in the relevant regions of the study area, are presented in **Exhibits 6.13** to **6.18** (see **Appendix C**), with a summary thereof in **Table 6.3**.

In general, the development of new irrigation farms seems to be problematic from a financial viability viewpoint. Given the reality of relatively profitable existing farming operations in the various regions of the study area, the major contributing factor to lower profit margins seems to be the expected relatively high capital cost of the development of new farms.

An exception in this regard is the seemingly profitable option of the development of new table grape farms in the Melkboom/Trawal region, where a real IRR of 11.05% per year can be expected (refer to **Exhibit 6.16** in **Appendix C**). A major contributing factor in this regard is the expected higher prices for produce due to a relatively favourable early harvesting season.

It is thus important to note that the expansion of existing irrigation farms (refer to **Table 6.2**) will in general be financially more viable than the development of new irrigation farms (refer to **Table 6.3**), should more irrigation water become available from the Clanwilliam Dam. The main reason for this finding is the cost effectiveness of the improved utilisation of infrastructure on existing farms relative to the costly nature of the development of new farms. This finding should be kept in mind when strategies are developed for the economic empowerment of previously disadvantaged groups (refer to **Section 7**).

Table 6.3 Financial viability of the envisaged new irrigation farms in the study area

Scenario/Region	Water Need (m^3/ha)	Evaluation Criteria						
		IRR * (%)	NPV/ha ** (R)	Annuity/m^3 Water *** (R)	Break-even Year			Jobs/1000 m^3 Water (number)
					Equity at: 80%	Equity at: 60%	Water (number)	
Citrusdal new Citrus farm	11,380	1.42%	(240,432)	(0.80)	> 40 Years	> 40 Years	> 40 Years	0.05
Clanwilliam new Citrus farm	8,870	4.19%	(58,010)	0.05	32/33	36/37	39/40	0.05
Melkboom/Trawal new mixed farm	9,378	Negative	(113,563)	(0.53)	> 40 Years	> 40 Years	> 40 Years	0.04
Melkboom/Trawal new table grape farm	13,580	11.05%	338,574	2.38	15/16	15/16	16/17	0.09
Klawer/Vredendal new mixed farm	9,106	4.93%	(22,452)	0.15	>40 years	>40 years	>40 years	0.03
Klawer/Vredendal new table grape farm	13,580	5.24%	(44,479)	0.37	19/20	21/22	23/24	0.09

* Internal rate of return (in real terms) on capital investment.

** Net present value at a real discounting rate of 4% per year, (i.e. 10% nominal interest per year at a yearly inflation rate of, say, 6%.

*** Annuity of the net benefits per m^3 irrigation water applied at a real discounting rate of 4% per year.

**** At a real loan interest rate of 4% per year, i.e. 10% nominal interest per year.

The sensitivity of the financial viability of new farming developments for the cost of additional irrigation water is presented in **Table 6.4**. Three dam raising levels (i.e. 5 metre, 10 metre and 15 metre) are considered, each with a unique expected cost structure and yield per annum (refer to **Table 5.1**). The expected cost structure of the dam developments is also influenced by the capital discounting rate as far as future capital expenditure and dam operating costs are concerned. The financial viability analysis (refer to **Tables 6.1** to **6.3** and **Exhibits 6.1** to **6.18**) of irrigation farming was done at a cost level of R0,43/m^3 as far as the additional irrigation water is concerned (i.e. a 10 metre raising and the bench mark real capital discounting rate of 4% per annum).

It is clear from **Table 6.4** that the different envisaged cost levels (i.e. water cost/m^3 at different dam raisings) only have a minor impact on the expected financial viability of irrigation farming. The main reason for this finding is the reality of relatively small incremental differences between the water unit costs at the different dam raising levels.

Given the expected yields and costs of the alternative dam raisings and the income and cost structure associated with typical farming operations in the investigation area, it can be concluded that, from a pure farm-financial perspective, the financial viability of irrigation farming is not sensitive to the potential level of dam raising.

Table 6.4 Internal rate of return (IRR) on capital investment in typical farming operations at different unit water cost levels (i.e. dam raising alternatives)

Raising Level (m)	Discounting Rate (%/a)	Water cost (c/m^3)	IRR of typical new farming developments per region				
			Clanwilliam	Melkboom//Traval		Klawer/Vredendal	
			New mixed farm	New table grape farm	New mixed farm	New table grape farm	New mixed farm
5	4	37	4,43	11,25	0,47	5,45	5,32
	6	49	3,94	10,85	negative	5,04	4,54
	8	64	3,33	10,36	negative	4,52	3,59
10	4	43	4,19	11,05	negative	5,24	4,93
	6	58	3,57	10,56	negative	4,73	3,97
	8	75	2,88	10,01	negative	4,15	2,91
15	4	47	4,02	10,92	negative	5,11	4,67
	6	62	3,41	10,43	negative	4,59	3,72
	8	81	2,64	9,82	negative	3,95	2,53

6.5 Realities that may be obstructive to new entrants to farming in the study area

The following realities should be kept in mind when one considers becoming involved in irrigation farming in the study area:

(i) Irrigation farming is in general relatively capital intensive and expensive, due to, *inter alia*, the following:

- ❖ High-potential irrigation land is relatively scarce in the RSA and is thus expensive

- ❖ the upgrading of medium-low and medium potential irrigation land is a relatively expensive activity
- ❖ the development of irrigation schemes is capital-intensive and thus costly, and
- ❖ water reticulation systems on farms are costly

(ii) High-income crops, with the accompanying high level of technological and managerial inputs, are thus produced, attempting to recover the mentioned relatively high costs.

(iii) Acceptable quality and price levels for produce are furthered by sound managerial practices at the farm level as well as by productive marketing practices.

(iv) The trend that the market value of land (refer to **Section 6.2**) exceeds the productive value thereof, implies that a farmer should be able to supply a considerable portion of the farm's capital need from own financial sources.

New entrants from previously disadvantaged groups will therefore be faced with the mentioned realities when considering becoming farmers. The development of appropriate farming ownership models and suitable financial support systems to accommodate and further "partnerships" between existing commercial farmers and the new entrants are further discussed in **Section 7**.

7 ECONOMIC EMPOWERMENT OF PREVIOUSLY DISADVANTAGED GROUPS

The economic empowerment of previously disadvantaged communities is an important objective of the political dispensation in South Africa.

As far as the agricultural sector is concerned this objective at first manifested itself mainly towards measures to further the redistribution of land (i.e. the belief existed that land ownership should lead to the mentioned groups to become successful farmers).

The following realities regarding farming in the South African milieu, however, served as barriers to the realization of success as far as this belief is concerned:

- Agriculture functions in a highly competitive environment as far as markets are concerned and thus experience variable prices. The level of price variability is enhanced via the variable exchange rate of the Rand.

- Agricultural production is of biological nature and is influenced by the nature. Economic uncertainty in agriculture is further enhanced via variable outputs due to the impact of variable weather conditions on agricultural production.

- Most agricultural industries in the investigation area are relatively capital-intensive as far as production processes is concerned.

- The gap between the production and market value of land implies that about 60% of the capital requirement should be financed by own capital sources. It is thus difficult to enter the farming industry should one experience a shortage of “own capital”.

- The risky nature of agricultural production implies the necessity of skilful managerial inputs.

Strategies to enhance economic empowerment should thus take the mentioned realities into consideration, especially as far as the lack of managerial skills and limited capital resources of envisaged new entrants to farming is concerned. Even when capital limitations were countered by government subsidisation, various examples exist where lack of managerial skills lead to failure of land reform projects.

The emphasis, as far as economic empowerment is concerned, thus shifted from the objective of land redistribution per se to the attainment of a "share" in existing successful businesses as an initial step towards economic empowerment. The generation of own capital in this way may thus lead to the attainment of the objective of land ownership at a later stage.

It is thus assumed that the yield of the Clanwilliam Dam project (i.e. additional irrigation water for farming) will only become a reality when farming schemes are developed that involve the previously disadvantaged people (for example the farm labourers) in a viable way. Possible farming schemes were discussed in full in the Olifants-/Doring River Irrigation Study reports (Department of Agriculture, Provincial Government Western Cape, Contract 259/2000/2001, Report JA0385A, September 2004, *Agricultural Development Plan and Economic Analysis* – Volume 1, p. 13-1).

As far as the investigation area is concerned, the following example can serve as an illustration of a possible partnership between a commercial farmer and his labourers. The proposed structure was applied to the main typical farming models of the investigation area, i.e. citrus, table grape and wine grape farms. It was clear from the analysis of Sections 6.4.1 and 6.4.2 (refer to p.6-10) that is should be more viable to expand existing farms than to start new farms. The proposed structure of farming partnerships will thus focus on an investigation of the viability to expand existing commercial farms in partnership with the farm labourers.

Basic structure
A business Trust, with the farmer and his existing permanent labourers as beneficiaries, serve as an example of a business entity.

Trustees are selected from the mentioned groups.

The effectivity of the Board of Trustees may be enhanced via the appointment of relevant experts as additional trustees from "outside", for example a person(s) with legal and financial/accounting skills.

Farmer contribution:
- the land for the envisaged development
- managerial inputs
- a portion of the additional capital needs (refer to the examples that follow for an outline of the "relative interest" of the farmer and his labourer partners in the envisaged farming developments).

Labour contribution:
- labour inputs
- managerial inputs (as part of the Board of Trustees)
- R20 000 per participating labourer (i.e. the “grant” from government)

The remaining capital needs for the envisaged development is to be financed with loaned capital (i.e. a 50-50 share of the loan by the farmer and the participating labourer partners, respectively). An analysis of the viability of this envisaged farming development strategy, as far as the expansion of existing typical farms in the study area is concerned, follows below.

7.1 Clanwilliam: expansion of an existing mixed farm (citrus and potatoes) from 55 ha to 100 ha

The calculations (refer to **Tables 7.1** and **7.2**) have a bearing only on the expanded portion of the existing farm (i.e. 45 ha). It is assumed that the 10 permanent labourers who are currently employed will be the farmer’s partners in the joint venture. Given the assumptions made, the proposed joint venture seems a viable proposition.

Table 7.1 Possible capital and financing structure of the envisaged farm expansion and the relative interest of the farmer and his labour partners, Clanwilliam, 2005/06

Expected capital investment*:					Financing strategy			R/ha
FIXED CAPITAL:			R/ha		OWN CAPITAL			
Bare Land			15,000		Farmer contribution:	Land		15000
Buildings			35,000			Equipment		
Irrigation (main lines,pumps,filters & dams			21,184			Buildings		35000
Establishment			27,900					
					Labour contribution**	(10 @ R20000/45 ha)		4444
MOVABLE CAPITAL:					Total			54444
Equipment			18,300					
TOTAL			117,384		BORROWED CAPITAL			62940
* for 45 ha (i.e. 20 ha of citrus fruit and 25 ha of potatoes)					Re-capitalized for 3 years			70838
					Repayment from year 4 to year 13			-8,742
Relative interest : Farmer/ Labourers								
			RAND/ha					
Labour:	Own capital**	(10 @ R20000/45 ha)	4,444					
	Dev loan	(50% of loan)	31,470					
	Total		35,914					
	Interest of labour		31%					
Farmer interest			69%	(i.e. R	81470)			
** Labour 'grant':	R 20,000	per labourer						

Table 7.2 Possible profit sharing agreement when expanding a typical citrus farm from 55 to 100 ha. Clanwilliam. 2005/06*

Year	Margin before debt payment (R/ha)	Debt Payment (R/ha)	Margin after debt payment	Comulative margin	Profit share of labourers per ha per year	Profit share of farmer per ha per year	Profit share per labourer per ha per yr	Profit share per labourer per year (45 ha)
0	-6,099		-6,099	-6,099				
1	6,581		6,581	482				
2	6,581		6,581	7,063				
3	6,581		6,581	13,643				
4	8,399	8,742	-343	13,300	4,069	9,231	407	18,312
5	10,217	8,742	1,475	14,775	451	1,024	45	2,030
6	13,853	8,742	5,111	19,886	1,564	3,547	156	7,036
7	17,488	8,742	8,747	28,632	2,676	6,070	268	12,042
8	21,124	8,742	12,382	41,015	3,788	8,594	379	17,048
9	24,760	8,742	16,018	57,033	4,901	11,117	490	22,054
10	24,760	8,742	16,018	73,051	4,901	11,117	490	22,054
11	24,760	8,742	16,018	89,070	4,901	11,117	490	22,054
12	24,760	8,742	16,018	105,088	4,901	11,117	490	22,054
13	24,760	8,742	16,018	121,106	4,901	11,117	490	22,054
14	24,760		24,760	145,867	7,576	17,185	758	34,090
15	24,760		24,760	170,627	7,576	17,185	758	34,090
16	24,760		24,760	195,387	7,576	17,185	758	34,090
17	24,760		24,760	220,147	7,576	17,185	758	34,090
18	24,760		24,760	244,907	7,576	17,185	758	34,090
19	24,760		24,760	269,668	7,576	17,185	758	34,090
20	24,760		24,760	294,428	7,576	17,185	758	34,090
21	24,760		24,760	319,188	7,576	17,185	758	34,090
22	24,760		24,760	343,948	7,576	17,185	758	34,090
23	24,760		24,760	368,708	7,576	17,185	758	34,090
24	24,760		24,760	393,469	7,576	17,185	758	34,090
25	24,760		24,760	418,229	7,576	17,185	758	34,090
26	24,760		24,760	442,989	7,576	17,185	758	34,090
27	24,760		24,760	467,749	7,576	17,185	758	34,090
28	24,760		24,760	492,509	7,576	17,185	758	34,090
29	24,760		24,760	517,270	7,576	17,185	758	34,090
30	24,760		24,760	542,030	7,576	17,185	758	34,090
31	24,760		24,760	566,790	7,576	17,185	758	34,090
32	24,760		24,760	591,550	7,576	17,185	758	34,090
33	24,760		24,760	616,310	7,576	17,185	758	34,090
34	24,760		24,760	641,071	7,576	17,185	758	34,090
35	24,760		24,760	665,831	7,576	17,185	758	34,090

* Expansion of 20 ha citrus fruit and 25 ha potatoes

7.2 Melkboom/Trawal

7.2.1 Expansion of a typical wine grape farm from 50 ha to 65 ha

Given the assumptions made, the proposed joint venture seems a viable proposition for both the farmer and his 7 permanent labour partners (refer to **Tables 7.3** and **7.4**)

Table 7.3 Possible capital and financial structure of the envisaged mixed wine grape farm expansion and the relative interest of the farmer and his labour partners, Melkboom/Trawal, 2005/06

Expected capital investment*:					Financing strategy			R/ha
FIXED CAPITAL:			R/ha		OWN CAPITAL			
Bare Land			15,000		Farmer contribution:	Land		15,000
Buildings			21,667			Equipment		37,667
Irrigation (main lines,pumps,filters			19,025					
Establishment			40,497					
					Labour contribution**	7 @ R20 000/15 ha		9,333
MOVABLE CAPITAL:					Total			62,000
Equipment			37,667					
TOTAL			133,856		BORROWED CAPITAL			71,856
* For 15 ha (i.e.10ha of wine grapes and 5ha of tomatoes)					Re-capitalized for 7 years			94,678
					Repayment from year 7 to year 16		R	-11,684
Relative interest : Farmer/ Labourers								
			RAND/ha					
Labour:	Own cap**	7 @ R20 000/15 ha	9,333					
	Dev loan	(50% of loan)	35,928					
	Total		45,261					
	Interest of labour		34%					
Farmer interest			66%	(i.e. R	88595)			
** Labour 'grant' :	R 20,000	per labourer						

Table 7.4 Possible profit sharing agreement when expanding a typical "mixed" wine grape farm from 35 to 50 ha, Melkboom/Trawal, 2005/06*

Year	Margin before debt payment (R/ha)	Debt Payment (R/ha)	Margin after debt payment	Comulative margin	Profit share of labourers per ha per year	Profit share of farmer per ha per year	Profit share per labourer per ha per year	Profit share per labourer per year (15 ha)
0	-7,580		-7,580	-7,580				
1	-5,545		-5,545	-13,653				
2	-5,545		-5,545	-19,969				
3	1,744		1,744	-18,958				
4	5,388		5,388	-13,570				
5	12,677		12,677	-893				
6	12,677		12,677	11,784	3,985	7,800	569	8,538
7	12,677	11,684	993	12,777	336	657	48	720
8	12,677	11,684	993	13,771	336	657	48	720
9	12,677	11,684	993	14,764	336	657	48	720
10	12,677	11,684	993	15,757	336	657	48	720
11	12,677	11,684	993	16,750	336	657	48	720
12	12,677	11,684	993	17,743	336	657	48	720
13	12,677	11,684	993	18,736	336	657	48	720
14	12,677	11,684	993	19,730	336	657	48	720
15	12,677	11,684	993	20,723	336	657	48	720
16	12,677	11,684	993	21,716	336	657	48	720
17	12,677		12,677	34,393	4,287	8,391	612	9,185
18	12,677		12,677	47,070	4,287	8,391	612	9,185
19	12,677		12,677	59,747	4,287	8,391	612	9,185
20	12,677		12,677	72,424	4,287	8,391	612	9,185
21	12,677		12,677	85,101	4,287	8,391	612	9,185
22	12,677		12,677	97,778	4,287	8,391	612	9,185
23	9,033		9,033	106,811	3,054	5,978	436	6,545
24	5,388		5,388	112,199	1,822	3,566	260	3,904
25	2,633		2,633	114,832	890	1,742	127	1,908

* Expansion by 15 ha (i.e. 10 ha of wine grapes and 5 ha of tomatoes)

7.2.2 Expansion of a typical table grape farm from 20 ha to 25 ha

Table grape production in the Melkboom/Trawal region seems to be the most profitable farming branch in the investigation area (refer to **Tables 6.1** and **6.2**).

Given the assumptions made (refer to **Table 7.5** and **7.6**), the proposed joint venture thus also seems to be a viable proposition for both the farmer and his labour partners (i.e. the 12 permanent labourers that are currently employed).

Table 7.5 Possible capital and financing structure and relative interest of the farmer and his labour partners when expanding a typical table grape farm, Melkboom/Trawal, 2005/06

Expected capital investment*:					Financing strategy			R/ha
FIXED CAPITAL:			R/ha		OWN CAPITAL			
Bare Land			15000		Farmer contribution:	Land		15000
Pumps and main lines			19245			Equipment		32680
Irrigation (main and branch lines inland)			5000					
Establishment			101653					
Buildings(new)			60000		Labour contribution	12 @ R20000/5 ha		48000
					Total			95680
MOVABLE CAPITAL:								
Equipment			32680					
					BORROWED CAPITAL			137898
TOTAL			233578					
					Re-capitalized for 5 years			167927
* for 5ha of table grapes								
					Repayment from year 5 to year 14			-20,723
Relative interest : Farmer/ Labourers								
			RAND/ha					
Labour:	Own capital**	12 @ R20000/5 ha	48000					
	Devlopment lo	(50% of loan)	68949					
	Total		116949					
	Interest of labour		50%					
Farmer interest			50%	(i.e. R	116629)			
** Labour 'grant':	R 20,000	per labourer						

Table 7.6 Possible profit sharing agreement when expanding a typical table grape farm from 20 to 25 ha, Melkboom/Trawal, 2005/06*

Year	Margin before debt payment (R/ha)	Debt Payment (R/ha)	Margin after debt payment	Comulative margin	Profit share of labourers per ha per year	Profit share of farmer per ha per year	Profit share per labourer per ha per yr	Profit share per labourer per year (5 ha)
0	-33,870		-33,870	-33,870				
1	-66,768		-66,768	-104,683				
2	-66,768		-66,768	-178,342				
3	25,639		25,639	-158,840				
4	71,842		71,842	-90,494				
5	164,250	20,723	143,526	55,164	27,620	27,544	2,302	11,508
6	164,250	20,723	143,526	198,690	71,861	71,665	5,988	29,942
7	164,250	20,723	143,526	342,216	71,861	71,665	5,988	29,942
8	164,250	20,723	143,526	485,742	71,861	71,665	5,988	29,942
9	164,250	20,723	143,526	629,269	71,861	71,665	5,988	29,942
10	164,250	20,723	143,526	772,795	71,861	71,665	5,988	29,942
11	164,250	20,723	143,526	916,321	71,861	71,665	5,988	29,942
12	164,250	20,723	143,526	1,059,847	71,861	71,665	5,988	29,942
13	164,250	20,723	143,526	1,203,374	71,861	71,665	5,988	29,942
14	164,250	20,723	143,526	1,346,900	71,861	71,665	5,988	29,942
15	164,250		164,250	1,511,150	82,237	82,012	6,853	34,266
16	164,250		164,250	1,675,399	82,237	82,012	6,853	34,266
17	164,250		164,250	1,839,649	82,237	82,012	6,853	34,266
18	164,250		164,250	2,003,898	82,237	82,012	6,853	34,266
19	118,046		118,046	2,121,944	59,104	58,942	4,925	24,627
20	71,842		71,842	2,193,787	35,970	35,872	2,998	14,988

* Expanded area 5 ha

7.3 Klawer/Vredendal

7.3.1 Expansion of a typical wine grape farm from 60 ha to 75 ha

Given the assumptions made, the proposed joint venture (refer to **Tables 7.7** and **7.8**) seems a viable proposition for both the farmer and his labour partners (i.e. the 10 permanent labourers that are currently employed).

Table 7.7 Possible capital and financing structure of the envisaged wine grape farm expansion and the relative interest of the farmer and his labour partners, Klawer/Vredendal, 2005/06

Expected capital investment*:					Financing strategy			R/ha
FIXED CAPITAL:			R/ha		OWN CAPITAL			
Bare Land			15000		Farmer contribution:	Land		15000
Buildings			21667			Equipment		15533
Irrigation (main lines,pumps,filters			21729					
Establishment			40497					
					Labour contribution**	10 @ R20000/15 ha		13333
MOVABLE CAPITAL:					Total			43867
Equipment			15533					
TOTAL			114426		BORROWED CAPITAL			70560
* for 15ha (i.e 10ha of wine grapes and 5ha of tomatoes)					Re-capitalized for 5 years			85925
					Repayment from year 5 to year 14			R -10,604
Relative interest : Farmer/ Labourers								
			RAND/ha					
Labour:	Own cap**	10 @ R20000/15 ha	13333					
	Dev loan	(50% of loan)	35280					
	Total		48613					
	Interest of labour		42%					
Farmer interest			58%	(i.e. R	65813)			
** Labour 'grant' :	R 20,000	per labourer						

Table 7.8 Possible profit sharing agreement when expanding a typical "mixed" wine grape farm from 60 to 75 ha, Klawer/Vredendal, 2005/06*

Year	Margin before debt payment (R/ha)	Debt Payment (R/ha)	Margin after debt payment	Comulative margin	Profit share of labourers per ha per year	Profit share of farmer per ha per year	Profit share per labourer per ha per yr	Profit share per labourer per year (15 ha)
0	-4,327		-4,327	-4,327				
1	-2,418		-2,418	-7,016				
2	-2,418		-2,418	-9,813				
3	5,138		5,138	-4,863				
4	8,916		8,916	4,053	1,722	2,331	172	2,583
5	16,471	10,604	5,867	9,920	2,493	3,375	249	3,739
6	16,471	10,604	5,867	15,788	2,493	3,375	249	3,739
7	16,471	10,604	5,867	21,655	2,493	3,375	249	3,739
8	16,471	10,604	5,867	27,522	2,493	3,375	249	3,739
9	16,471	10,604	5,867	33,390	2,493	3,375	249	3,739
10	16,471	10,604	5,867	39,257	2,493	3,375	249	3,739
11	16,471	10,604	5,867	45,124	2,493	3,375	249	3,739
12	16,471	10,604	5,867	50,992	2,493	3,375	249	3,739
13	16,471	10,604	5,867	56,859	2,493	3,375	249	3,739
14	16,471	10,604	5,867	62,726	2,493	3,375	249	3,739
15	16,471		16,471	79,197	6,998	9,473	700	10,496
16	16,471		16,471	95,668	6,998	9,473	700	10,496
17	16,471		16,471	112,139	6,998	9,473	700	10,496
18	16,471		16,471	128,610	6,998	9,473	700	10,496
19	16,471		16,471	145,082	6,998	9,473	700	10,496
20	16,471		16,471	161,553	6,998	9,473	700	10,496
21	16,471		16,471	178,024	6,998	9,473	700	10,496
22	16,471		16,471	194,495	6,998	9,473	700	10,496
23	12,693		12,693	207,188	5,393	7,301	539	8,089
24	8,916		8,916	216,103	3,788	5,128	379	5,682
25	6,093		6,093	222,197	2,589	3,505	259	3,883

* Expansion by 15 ha (i.e. 10 ha of wine grapes and 5 ha of tomatoes)

7.3.2 Expansion of a typical table grape farm from 20 ha to 25 ha

Given the assumptions made (refer to **Tables 7.9** and **7.10**), the proposed joint venture seems a viable proposition for both the farmer and his labour partners (i.e. the 12 permanent labourers that are currently employed).

Table 7.9 Possible capital and financing structure and relative interest of the farmer and his labour partners when expanding a table grape farm, Klawer/Vredendal, 2005/06

Expected capital investment*:					Financing strategy		R/ha
FIXED CAPITAL:		R/ha			OWN CAPITAL		
Bare Land		15000			Farmer contribution:	Land	15000
Pumps and main lines		26038				Equipment	32680
Irrigation (main and branch lines inland		5000					
Establishment		101653					
Buildings(new)		60000			Labour contribution	12@ R20000/5ha	48000
					Total		95680
MOVABLE CAPITAL:							
Equipment		32680					
					BORROWED CAPITAL		144691
TOTAL		240371					
					Re-capitalized for 6 years		183280
* for 5ha of table grapes							
					Repayment from year 6 to year 15		-22,618
Relative interest : Farmer/ Labourers							
		RAND/ha					
Labour:	Own capital**	12 @ R20000/5 ha	48000				
	Devlopment lo	(50% of loan)	72346				
	Total		120346				
	Interest of labour		50%				
Farmer interest			50%	(i.e. R	120026)		
** Labour 'grant': R	20000	per labourer					

Table 7.10 Possible profit sharing agreement when expanding a typical table grape farm from 20 to 25 ha, Klawer/Vredendal, 2005/06*

Year	Margin before debt payment (R/ha)	Debt Payment (R/ha)	Margin after debt payment	Comulative margin	Profit share of labourers per ha per year	Profit share of farmer per ha per year	Profit share per labourer per ha per yr	Profit share per labourer per year (5 ha)
0	-33,870		-33,870	-33,870				
1	-66,768		-66,768	-104,683				
2	-66,768		-66,768	-178,342				
3	7,157		7,157	-178,064				
4	44,120		44,120	-139,327				
5	118,046		118,046	-22,136				
6	118,046	22,618	95,428	73,292	36,695	36,597	3,058	15,289
7	118,046	22,618	95,428	168,720	47,777	47,650	3,981	19,907
8	118,046	22,618	95,428	264,147	47,777	47,650	3,981	19,907
9	118,046	22,618	95,428	359,575	47,777	47,650	3,981	19,907
10	118,046	22,618	95,428	455,003	47,777	47,650	3,981	19,907
11	118,046	22,618	95,428	550,431	47,777	47,650	3,981	19,907
12	118,046	22,618	95,428	645,859	47,777	47,650	3,981	19,907
13	118,046	22,618	95,428	741,287	47,777	47,650	3,981	19,907
14	118,046	22,618	95,428	836,715	47,777	47,650	3,981	19,907
15	118,046	22,618	95,428	932,143	47,777	47,650	3,981	19,907
16	118,046		118,046	1,050,189	59,102	58,944	4,925	24,626
17	118,046		118,046	1,168,235	59,102	58,944	4,925	24,626
18	118,046		118,046	1,286,281	59,102	58,944	4,925	24,626
19	81,083		81,083	1,367,364	40,596	40,488	3,383	16,915
20	44,120		44,120	1,411,484	22,089	22,031	1,841	9,204

* Expanded area 5 ha

7.4 Citrusdal: expansion of a typical citrus farm from 50 ha to 70 ha

At the time of the investigation (i.e. 2005/06) the citrus industry in the study area experienced a period of financial stress, mainly due to lower export prices as well as the negative effect of a relatively strong Rand (refer to **Table 6.1** and **Section 4.2**). This situation improved considerably since 2005, mainly due to successful marketing actions in the U.S.A. The analysis (refer to **Tables 7.11** and **7.12**) thus reflects a relatively conservative picture as far as the financial success of the proposed joint venture between the farmer and his labour partners is concerned. Other factors that may contribute to the finding that the proposed joint venture is not a profitable proposition are, *inter alia:*

- the relative expensive nature of the development of water sources upstream of the Clanwilliam Dam by individual farmers
- the fact that the assumed typical farm in the Citrusdal area is a specialized Citrus farm (i.e. no supporting vegetable branch as in the case of, for example, potatoes at Clanwilliam).

Table 7.11 Possible capital and financing structure of the envisaged farm expansion and the relative interest of the farmer and his labour partners, Citrusdal, 2005/06

Expected capital investment*:					Financing strategy			**R/ha**
FIXED CAPITAL:			R/ha		OWN CAPITAL			
Bare Land			15,000		Farmer contribution:	Land		15,000
Buildings			27,500			Equipment		27,250
Irrigation (main lines,pumps,filters & dams			86,179			Buildings		27,500
Establishment			62,775					
					Labour contribution**	(9 @ R20000/20 ha)		9,000
MOVABLE CAPITAL:					Total			78,750
Equipment			27,250					
TOTAL			218,704		BORROWED CAPITAL			139,954
* for 20 ha of citrus fruit					Re-capitalized for 9 years			199,524
					Repayment from year 9 to year 18			-24,623
Relative interest : Farmer/ Labourers								
			RAND/ha					
Labour:	Own cap**	(9 @ R20000/20 ha)	9,000					
	Dev loan	(50% of loan)	69,977					
	Total		78,977					
	Interest of labour		36%					
Farmer interest:			64%	(i.e. R	139727	)		
** Labour 'grant':	R 20,000	per labourer						

Table 7.12 Possible profit sharing agreement when expanding a typical citrus farm from 50 to 70 ha, Citrusdal, 2005/06*

Year	Margin before debt payment (R/ha)	Debt Payment (R/ha)	Margin after debt payment	Comulative margin	Profit share of labourers per ha per year	Profit share of farmer per ha per year	Profit share per labourer per ha per year	Profit share per labourer per year (20 ha)
0	-11,391		-11,391	-11,391				
1	-30,642		-30,642	-42,033				
2	-30,642		-30,642	-72,675				
3	-30,642		-30,642	-103,317				
4	-26,552		-26,552	-129,869				
5	-22,461		-22,461	-152,330				
6	-14,281		-14,281	-166,610				
7	-6,100		-6,100	-172,710				
8	2,081		2,081	-170,629	-109,770	-60,859	-12,197	-243,934
9	10,262	24,623	-14,361	-184,990	-5,186	-9,175	-576	-11,524
10	10,262	24,623	-14,361	-199,351	-5,186	-9,175	-576	-11,524
11	10,262	24,623	-14,361	-213,712	-5,186	-9,175	-576	-11,524
12	10,262	24,623	-14,361	-228,073	-5,186	-9,175	-576	-11,524
13	10,262	24,623	-14,361	-242,434	-5,186	-9,175	-576	-11,524
14	10,262	24,623	-14,361	-256,795	-5,186	-9,175	-576	-11,524
15	10,262	24,623	-14,361	-271,156	-5,186	-9,175	-576	-11,524
16	10,262	24,623	-14,361	-285,517	-5,186	-9,175	-576	-11,524
17	10,262	24,623	-14,361	-299,878	-5,186	-9,175	-576	-11,524
18	10,262	24,623	-14,361	-314,239	-5,186	-9,175	-576	-11,524
19	10,262		10,262	-303,977	3,706	6,556	412	8,235
20	10,262		10,262	-293,715	3,706	6,556	412	8,235
21	10,262		10,262	-283,454	3,706	6,556	412	8,235
22	10,262		10,262	-273,192	3,706	6,556	412	8,235
23	10,262		10,262	-262,930	3,706	6,556	412	8,235
24	10,262		10,262	-252,668	3,706	6,556	412	8,235
25	10,262		10,262	-242,407	3,706	6,556	412	8,235
26	10,262		10,262	-232,145	3,706	6,556	412	8,235
27	10,262		10,262	-232,145	3,706	6,556	412	8,235
28	10,262		10,262	-232,145	3,706	6,556	412	8,235
29	10,262		10,262	-232,145	3,706	6,556	412	8,235
30	10,262		10,262	-232,145	3,706	6,556	412	8,235
31	10,262		10,262	-232,145	3,706	6,556	412	8,235
32	10,262		10,262	-232,145	3,706	6,556	412	8,235
33	10,262		10,262	-232,145	3,706	6,556	412	8,235
34	10,262		10,262	-232,145	3,706	6,556	412	8,235
35	10,262		10,262	-232,145	3,706	6,556	412	8,235

* Expanded area 20 ha

It thus seems that a joint venture between a farmer and his labour partners, as described in the accompanying case studies, can generally be a viable proposition as far as the expansion of existing farming activities is concerned. Particulars in this regard should, however, be investigated in full for each individual case.

8 CONCLUDING REMARKS

The financial viability of existing irrigation farming as well as the envisioned irrigation developments in the relevant regions of the study area had been investigated. Regional typical farming models (refer to **Section 3**), the expected income and costs structures of the selected crops in the different regions (refer to **Section 4**) and the expected costs of irrigation water (refer to **Section 5**) serve as inputs for the financial viability analysis (refer to **Section 6**). The multi-period financial analysis was executed at constant 2005/06 price levels (refer to **Section 2.2**). The financial viability analysis focused on the expected profitability and affordability of irrigation farming in the study area. It also aims to illustrate the relative "efficiency" of the consumption of irrigation water in the different regions of the investigation area. The following decision-making criteria were applied:

- profitability
  - internal rate of return (IRR) on capital employed in real terms

- affordability
  - expected cash-flow and break-even year at different own-to-loaned capital ratios

- relative “efficiency” of the utilisation of irrigation water
  - annuity of the net financial benefits per 1000 m^3 irrigation water applied
  - number of jobs created per m^3 of irrigation water applied

As far as the profitability criterion is concerned, an IRR of at least 4% per year in real terms (i.e. an IRR of 10% per year in nominal terms at an inflation rate of, say, 6% per year) can be seen as a benchmark. At the benchmark IRR of 10% per year in nominal terms (i.e. an IRR of 4% per year in real terms at an inflation rate of, say, 6% per year) the following of the irrigation farming activities that were investigated seem to be financially viable (refer to **Tables 6.1**, **6.2** and **6.3**):

Existing irrigation farming

Klawer/Vredendal region:
- Mixed farming, i.e. wine grapes and tomatoes (real IRR of 10.34% per year)
- Table grape farming (real IRR of 9.57% per year)

Melkboom/Trawal region:
- Table grape farming (real IRR of 34.44% per year)

Clanwilliam region:
- Citrus farming with potatoes (real IRR of 7.54% per year)

Citrus region:
- Citrus farming (real IRR of 4.55% per year)

Expansion of existing irrigation farming

Klawer/Vredendal region:
- Mixed farming, i.e. wine grapes and tomatoes (real IRR of 10.26% per year)
- Table grape farming (real IRR of 11.24% per year).

Melkboom/Trawal region:
- Mixed farming, i.e. wine grapes and tomatoes (real IRR of 5.42% per year)
- Table grape farming (real IRR of 28.76% per year)

Clanwilliam region:
- Citrus farming with potatoes (real IRR of 6.38% per year)

New irrigation farms
Melkboom/Trawal region:
- Table grape farming (real IRR of 11.05% per year)

Clanwilliam region:
- Citrus farm with potatoes (real IRR of 4.19% per year)

Klawer/Vredendal region:
- New mixed farm, i.e. wine grapes and tomatoes (real IRR of 4.93% per year)
- New table grape farm (real IRR of 5.24% per year)

It is clear from the financial analysis that, given the assumptions made, existing irrigation farming is quite profitable in the relevant regions of the study area. The main contributing factors in this regard are, *inter alia:*

- ❖ well-developed and well-managed farms
- ❖ sound supporting marketing structures for produce
- ❖ sound profitability levels for the major farming branches due to efficient farming practices and favourable price levels for produce
- ❖ the availability of affordable irrigation water (at R1 925 per listed hectare under irrigation)

Farming practices in the relevant regions of the study area are relatively capital intensive. It seems that it will be more viable to expand existing farms than to develop new irrigation farms.

Varying water costs are associated with the alternative possibilities as far as the raising of the Clanwilliam Dam is concerned. The increment between the expected highest unit water cost (i.e. R0.81/m^3) and the lowest (i.e. R0.37/m^3) is relatively small. The cost of irrigation water from the Clanwilliam Dam is a relatively small component of the total cost structure of the mainly capital intensive farming developments that are envisaged. The sensitivity analysis (i.e. farm profits versus unit water cost) thus showed that water cost *per se* (i.e. at the envisaged cost levels that are associated with the alternative dam raisings) will only have a minor impact on the profitability of farms.

Irrigation farming activities in the investigation area are relatively capital intensive and risky. Top-grade managerial and labour skills are preconditions for financial success and any deviance in this regard will have a negative impact on the financial results from farming.

The trend that the market value of land (refer to **Section 6.2**) exceeds the production value thereof implies that a farmer should be able to supply a considerable portion of the farm's capital need from own financial sources. New entrants from previously disadvantaged groups will therefore be faced with the mentioned realities and in order for them to be successful, special measures should be considered, *inter alia*:

- ❖ training facilities to further managerial skills
- ❖ appropriate financial support systems via government schemes/subsidies
- ❖ appropriate farming ownership models and financial support systems to accommodate and further "partnerships" between existing commercial farmers and new entrants to farming.

Several possibilities exist as far as partnership agreements are concerned. It was concluded that it should be more profitable to expand existing farms than to develop new farms (refer to **Tables 6.1** to **6.3**). The focus of an analysis in thus regard is thus on a business agreement between a farmer and the new entrants (i.e. his permanent labourers) only as far as the envisaged new irrigation developments are concerned (i.e. the expanded portion of the existing farm). A business trust, with the farmer and his labourers as beneficiaries, serves as an example of a "joint venture" to counter the mentioned barriers to entry to farming. The financial analysis in this regard indicated that, given the assumptions made, the proposed "joint venture" should be viable, in general, in the different regions of the investigation area.

The perspective that was generated by this study about the financial viability of irrigation farming in the investigation area could be broadened should more typical farming situations be modelled. Budget considerations, however, limited the realization of a more extended investigation.

APPENDIX A

Exhibits 6.1 to 6.6

Exhibit 6.1: Expected flow of funds and return on investment of a typical existing irrigation farm

Region: **Citrusdal**

Farm Type: **Citrus (50 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25
Income after Packing Costs:																						
Crops:																						
Current			2,222,320	2,222,320	2,244,320	2,266,320	2,277,320	2,277,320	2,277,320	2,277,320	2,277,320	2,277,320	2,081,640	2,081,640	1,885,960	1,885,960	1,517,280	1,517,280	1,148,600	1,148,600	1,148,600	1,148,600
Proposed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	22,014	44,028	110,070	176,112	313,700	451,287
Livestock:																						
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Current																						
Proposed																						
Total Income			2,222,320	2,222,320	2,244,320	2,266,320	2,277,320	2,277,320	2,277,320	2,277,320	2,277,320	2,277,320	2,081,640	2,081,640	1,885,960	1,885,960	1,539,294	1,561,308	1,258,670	1,324,712	1,462,300	1,599,887
Production Costs:																						
Crops:																						
Current			884,450	884,450	884,450	884,450	884,450	884,450	884,450	884,450	884,450	884,450	813,694	813,694	742,938	742,938	583,737	583,737	424,536	424,536	424,536	424,536
Proposed			0	0	0	0	0	0	0	0	0	0	70,756	70,756	141,512	141,512	300,713	300,713	459,914	459,914	459,914	459,914
Livestock:																						
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Fixed Asset Repairs at:		2.00%	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970	77,970
Total Production Costs			962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420	962,420
Margin			1,259,900	1,259,900	1,281,900	1,303,900	1,314,900	1,314,900	1,314,900	1,314,900	1,314,900	1,314,900	1,119,220	1,119,220	923,540	923,540	576,874	598,888	296,250	362,292	499,879	637,467
Management, Labour and Irrigation:																						
Management			144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000	144,000
Labour	- Permanent		125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550	125,550
	- Casual		300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000	300,000
Water			4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000	4,000
Distribution			48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649	48,649
Total admin and Marketing Costs			622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199	622,199
Margin before Capital Costs			637,700	637,700	659,700	681,700	692,700	692,700	692,700	692,700	692,700	692,700	497,020	497,020	301,340	301,340	(45,326)	(23,312)	(325,950)	(259,908)	(122,320)	15,267
Capital Costs:																						
- Establishments:	Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Proposed		0	0	0	0	0	0	0	0	0	0	251,100	0	251,100	0	564,975	0	564,975	0	0	0
- Land and Orchards			3,041,126	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			690,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			937,000	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550
- Irrigation (Dams, Lines & Pumps)			1,667,385	0	0	0	0	0														
			6,335,512	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	140,550	391,650	140,550	391,650	140,550	705,525	140,550	705,525	140,550	140,550	140,550
Margin after Capital Costs at		100.00%	(5,697,811)	497,150	519,150	541,150	552,150	552,150	552,150	552,150	552,150	552,150	105,370	356,470	(90,310)	160,790	(750,851)	(163,862)	(1,031,475)	(400,458)	(262,870)	(125,283)
Margin with Income at:																						
	Income at:	130.00%	(5,031,115)	1,163,846	1,192,446	1,221,046	1,235,346	1,235,346	1,235,346	1,235,346	1,235,346	1,235,346	729,862	980,962	475,478	726,578	(289,062)	304,531	(653,874)	(3,044)	175,820	354,684
	Income at:	120.00%	(5,253,347)	941,614	968,014	994,414	1,007,614	1,007,614	1,007,614	1,007,614	1,007,614	1,007,614	521,698	772,798	286,882	537,982	(442,992)	148,400	(779,741)	(135,515)	29,590	194,695
	Income at:	90.00%	(5,920,043)	274,918	294,718	314,518	324,418	324,418	324,418	324,418	324,418	324,418	(102,794)	148,306	(278,906)	(27,806)	(904,780)	(319,992)	(1,157,342)	(532,929)	(409,100)	(285,271)
	Income at:	80.00%	(6,142,275)	52,686	70,286	87,886	96,686	96,686	96,686	96,686	96,686	96,686	(310,958)	(59,858)	(467,502)	(216,402)	(1,058,709)	(476,123)	(1,283,209)	(665,400)	(555,330)	(445,260)

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
4.55%	21.68%	15.41%	0.65%	-2.57%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	3,515,924	70,318	2,571	0.23
4.00%	522,138	10,443	528	0.05
6.00%	(984,188)	(19,684)	(1,308)	(0.11)
8.00%	(1,784,168)	(35,683)	(2,992)	(0.26)
10.00%	(2,237,690)	(44,754)	(4,576)	(0.40)
12.00%	(2,514,302)	(50,286)	(6,100)	(0.54)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			9.00
Seasonal			16.44
Management			2.00
			27.44
Jobs per	1,000	M^3 Water	0.05

Exhibit 6.2: Expected flow of funds and return on investment of a typical existing irrigation farm

Region: Clanwilliam

Farm Type: Citrus (55 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100
Proposed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100
Production Costs:																							
Crops:																							
Current			1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050
Proposed			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814	55,814
Total Production Costs			1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864	1,501,864
Margin			1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236	1,772,236
Management, Labour and Irrigation:																							
Management			186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000	186,000
Labour	- Permanent		125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
	- Casual		315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000	315,000
Water			79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643	79,643
Distribution			25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944	25,944
Total admin and Marketing Costs			731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586	731,586
Margin before Capital Costs			1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650	1,040,650
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards			3,062,438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			837,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			3,195,750	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363
- Irrigation (Dams, Lines & Pumps)			540,764	0	0	0	0	0															
			7,636,452	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363	479,363
Margin after Capital Costs at		100.00%	(6,595,802)	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287	561,287
Margin with Income at:																							
Income at:		130.00%	(5,613,572)	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517	1,543,517
Income at:		120.00%	(5,940,982)	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107	1,216,107
Income at:		90.00%	(6,923,212)	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877	233,877
Income at:		80.00%	(7,250,622)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)	(93,533)

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
7.54%	27.48%	20.39%	0.69%	-5.91%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	7,004,576	127,356	4,656	0.51
4.00%	3,336,807	60,669	3,065	0.33
6.00%	1,131,635	20,575	1,367	0.15
8.00%	(277,414)	(5,044)	(423)	(0.05)
10.00%	(1,224,424)	(22,262)	(2,277)	(0.25)
12.00%	(1,886,623)	(34,302)	(4,161)	(0.45)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			10.00
Seasonal			17.26
Management			3.00
			30.26
Jobs per	1,000	M^3 Water	0.06

Exhibit 6.3: Expected flow of funds and return on investment of a typical existing irrigation farm

Region: Melkboom/Traval

Farm Type: Mixed Farm (Wine Grapes and Tomatoes) (35 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			1,094,500	950,500	950,500	872,500	872,500	872,500	847,500	847,500	622,500	622,500	622,500	510,000	510,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000
Proposed			0	0	0	0	0	19,500	39,000	62,400	84,250	90,500	154,250	215,500	283,000	374,875	421,750	515,500	590,500	635,500	665,500	665,500	665,500
Other:																							
Current																							
Proposed																							
Total Income			1,094,500	950,500	950,500	872,500	872,500	892,000	886,500	909,900	706,750	713,000	776,750	725,500	793,000	734,875	781,750	875,500	950,500	995,500	1,025,500	1,025,500	1,025,500
Production Costs:																							
Crops:																							
Current			327,235	327,235	327,235	306,430	306,430	306,430	299,495	299,495	237,080	237,080	237,080	195,470	195,470	153,860	153,860	153,860	153,860	153,860	153,860	153,860	139,990
Proposed			0	0	0	20,805	20,805	20,805	27,740	27,740	90,155	90,155	90,155	131,765	131,765	173,375	173,375	173,375	173,375	173,375	173,375	173,375	187,245
Other:																							
Fixed Asset Repairs at:		2.00%	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453	36,453
Total Production Costs			363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688	363,688
Margin			730,812	586,812	586,812	508,812	508,812	528,312	522,812	546,212	343,062	349,312	413,062	361,812	429,312	371,187	418,062	511,812	586,812	631,812	661,812	661,812	661,812
Management, Labour and Irrigation:																							
Management			128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000	128,000
Labour	- Permanent		87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500	87,500
	- Casual		40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500	40,500
Water			52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437	52,437
Distribution			15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321	15,321
Total admin and Marketing Costs			323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757	323,757
Margin before Capital Costs			407,054	263,054	263,054	185,054	185,054	204,554	199,054	222,454	19,304	25,554	89,304	38,054	105,554	47,429	94,304	188,054	263,054	308,054	338,054	338,054	338,054
Capital Costs: Right																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	0	0	182,238	0	0	60,746	0	546,714	0	0	364,476	0	364,476	0	0	0	0	0	0	121,492
- Land and Orchards			2,043,805	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			500,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			433,000	127,450	74,325	74,325	106,825	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200	79,200
- Irrigation (Dams, Lines & Pumps)			328,860	0	0	0	0	0															
- Land Preparation																							
			3,305,665	127,450	74,325	256,563	106,825	79,200	139,946	79,200	625,914	79,200	79,200	443,676	79,200	443,676	79,200	79,200	79,200	79,200	79,200	79,200	200,692
Margin after Capital Costs at		100.00%	(2,898,610)	135,604	188,729	(71,509)	78,229	125,354	59,108	143,254	(606,610)	(53,646)	10,104	(405,622)	26,354	(396,247)	15,104	108,854	183,854	228,854	258,854	258,854	137,362
Margin with Income at:																							
	Income at:	130.00%	(2,570,260)	420,754	473,879	190,241	339,979	392,954	325,058	416,224	(394,585)	160,254	243,129	(187,972)	264,254	(175,784)	249,629	371,504	469,004	527,504	566,504	566,504	445,012
	Income at:	120.00%	(2,679,710)	325,704	378,829	102,991	252,729	303,754	236,408	325,234	(465,260)	88,954	165,454	(260,522)	184,954	(249,272)	171,454	283,954	373,954	427,954	463,954	463,954	342,462
	Income at:	90.00%	(3,008,060)	40,554	93,679	(158,759)	(9,021)	36,154	(29,542)	52,264	(677,285)	(124,946)	(67,571)	(478,172)	(52,946)	(469,734)	(63,071)	21,304	88,804	129,304	156,304	156,304	34,812
	Income at:	80.00%	(3,117,510)	(54,496)	(1,371)	(246,009)	(96,271)	(53,046)	(118,192)	(38,726)	(747,960)	(196,246)	(145,246)	(550,722)	(132,246)	(543,222)	(141,246)	(66,246)	(6,246)	29,754	53,754	53,754	(67,738)

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
1.99%	11.37%	7.88%	Negative	Negative

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	(9,731)	(278)	(10)	(0.00)
4.00%	(1,292,684)	(36,934)	(1,866)	(0.20)
6.00%	(1,904,555)	(54,416)	(3,617)	(0.38)
8.00%	(2,189,915)	(62,569)	(5,247)	(0.55)
10.00%	(2,313,143)	(66,090)	(6,758)	(0.71)
12.00%	(2,354,662)	(67,276)	(8,161)	(0.86)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			7.00
Seasonal			2.47
Management			1.00
			10.47
Jobs per	1,000	M^3 Water	0.03

Exhibit 6.4: Expected flow of funds and return on investment of a typical existing irrigation farm

Region: Melkboom/Traval

Farm Type: Table Grapes (20 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			2,622,723	2,622,723	2,622,723	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	1,640,567	1,430,580	1,430,580	1,430,580	735,911	0	0	0	0
Proposed			0	0	0	0	0	0	377,011	754,023	942,528	942,528	942,528	942,528	942,528	942,528	942,528	1,139,920	1,461,582	1,684,547	1,746,682	2,024,550	2,601,245
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			2,622,723	2,622,723	2,622,723	2,019,108	2,019,108	2,019,108	2,396,120	2,773,131	2,961,637	2,961,637	2,961,637	2,961,637	2,583,095	2,373,108	2,373,108	2,570,500	2,197,493	1,684,547	1,746,682	2,024,550	2,601,245
Production Costs:																							
Crops:																							
Current			520,580	520,580	520,580	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	260,290	208,232	208,232	208,232	130,145	0	0	0	0
Proposed			0	0	0	169,189	169,189	169,189	169,189	169,189	169,189	169,189	169,189	169,189	260,290	312,348	312,348	312,348	390,435	520,580	520,580	520,580	520,580
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	50,743	50,743	50,743	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926	63,926
Total Production Costs			571,323	571,323	571,323	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506	584,506
Margin			2,051,400	2,051,400	2,051,400	1,434,603	1,434,603	1,434,603	1,811,614	2,188,625	2,377,131	2,377,131	2,377,131	2,377,131	1,998,590	1,788,602	1,788,602	1,985,994	1,612,987	1,100,042	1,162,176	1,440,044	2,016,739
Management, Labour and Irrigation:																							
Management			255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000
Labour	- Permanent		182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400
	- Casual		240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Water			42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855
Distribution			11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094	11,094
Total admin and Marketing Costs			731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349	731,349
Margin before Capital Costs			1,320,052	1,320,052	1,320,052	703,254	703,254	703,254	1,080,265	1,457,277	1,645,782	1,645,782	1,645,782	1,645,782	1,267,241	1,057,254	1,057,254	1,254,646	881,638	368,693	430,828	708,695	1,285,390
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	0	0	659,120	0	0	0	0	0	0	0	0	354,911	202,806	0	0	304,209	507,015	0	0	0
- Land and Orchards			1,616,565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,317,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			817,000	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
- Irrigation (Dams, Lines & Pumps)			203,100	0	0	0	0	0															
			3,954,165	122,550	122,550	781,670	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	477,461	325,356	122,550	122,550	426,759	629,565	122,550	122,550	122,550
Margin after Capital Costs at		100.00%	(2,634,113)	1,197,502	1,197,502	(78,415)	580,704	580,704	957,715	1,334,727	1,523,232	1,523,232	1,523,232	1,523,232	789,781	731,898	934,704	1,132,096	454,879	(260,872)	308,278	586,145	1,162,840
Margin with Income at:																							
	Income at:	130.00%	(1,847,296)	1,984,319	1,984,319	527,317	1,186,437	1,186,437	1,676,551	2,166,666	2,411,723	2,411,723	2,411,723	2,411,723	1,564,709	1,443,830	1,646,636	1,903,245	1,114,127	244,492	832,282	1,193,510	1,943,214
	Income at:	120.00%	(2,109,569)	1,722,046	1,722,046	325,406	984,526	984,526	1,436,939	1,889,353	2,115,560	2,115,560	2,115,560	2,115,560	1,306,400	1,206,519	1,409,325	1,646,195	894,378	76,037	657,614	991,055	1,683,089
	Income at:	90.00%	(2,896,386)	935,229	935,229	(280,326)	378,793	378,793	718,103	1,057,414	1,227,069	1,227,069	1,227,069	1,227,069	531,471	494,587	697,393	875,046	235,130	(429,327)	133,610	383,690	902,716
	Income at:	80.00%	(3,158,658)	672,957	672,957	(482,237)	176,882	176,882	478,491	780,100	930,905	930,905	930,905	930,905	273,161	257,276	460,082	617,996	15,381	(597,781)	(41,059)	181,235	642,591

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
34.44%	92.79%	67.42%	23.32%	14.33%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	27,382,776	1,369,139	50,050	3.69
4.00%	17,810,432	890,522	44,992	3.31
6.00%	12,147,428	607,371	40,367	2.97
8.00%	8,623,578	431,179	36,159	2.66
10.00%	6,320,651	316,033	32,317	2.38
12.00%	4,745,352	237,268	28,781	2.12

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			12.00
Seasonal			13.15
Management			2.00
			27.15
Jobs per	1,000	M^3 Water	0.10

Exhibit 6.5: Expected flow of funds and return on investment of a typical existing irrigation farm

Region: Klawer/Vredendal

Farm Type: Mixed Farm (Wine Grapes and Tomatoes) (60 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			2,265,000	2,265,000	2,265,000	2,265,000	2,265,000	2,265,000	2,140,000	2,140,000	2,140,000	2,140,000	2,140,000	1,765,000	1,577,500	1,577,500	1,577,500	1,577,500	1,265,000	1,145,000	1,145,000	1,145,000	1,145,000
Proposed			0	0	0	0	0	0	0	0	30,000	60,000	96,000	120,000	120,000	229,375	385,625	563,750	707,500	745,000	823,125	931,250	1,055,000
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			2,265,000	2,265,000	2,265,000	2,265,000	2,265,000	2,265,000	2,140,000	2,140,000	2,170,000	2,200,000	2,236,000	1,885,000	1,697,500	1,806,875	1,963,125	2,141,250	1,972,500	1,890,000	1,968,125	2,076,250	2,200,000
Production Costs:																							
Crops:																							
Current			838,650	838,650	838,650	838,650	838,650	838,650	803,975	803,975	803,975	803,975	803,975	699,950	665,275	665,275	665,275	665,275	595,925	561,250	561,250	561,250	561,250
Proposed			0	0	0	0	0	0	34,675	34,675	34,675	34,675	34,675	138,700	173,375	173,375	173,375	173,375	242,725	277,400	277,400	277,400	277,400
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485	62,485
Total Production Costs			901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135	901,135
Margin			1,363,865	1,363,865	1,363,865	1,363,865	1,363,865	1,363,865	1,238,865	1,238,865	1,268,865	1,298,865	1,334,865	983,865	796,365	905,740	1,061,990	1,240,115	1,071,365	988,865	1,066,990	1,175,115	1,298,865
Management, Labour and Irrigation:																							
Management			148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300	148,300
Labour	- Permanent		125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
	- Casual		86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400	86,400
Water			87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070	87,070
Distribution			37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512	37,512
Total admin and Marketing Costs			484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282	484,282
Margin before Capital Costs			879,584	879,584	879,584	879,584	879,584	879,584	754,584	754,584	784,584	814,584	850,584	499,584	312,084	421,459	577,709	755,834	587,084	504,584	582,709	690,834	814,584
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	0	0	0	0	0	303,730	0	0	0	0	911,190	303,730	0	0	0	607,460	303,730	0	0	0
- Land and Orchards			3,440,142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			762,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			1,032,000	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800	154,800
- Irrigation (Dams, Lines & Pumps)			721,584	0	0	0	0	0															
- Land Preparation			0	0	0	0	0																
			5,956,226	154,800	154,800	154,800	154,800	154,800	458,530	154,800	154,800	154,800	154,800	1,065,990	458,530	154,800	154,800	154,800	762,260	458,530	154,800	154,800	154,800
Margin after Capital Costs at		100.00%	(5,076,642)	724,784	724,784	724,784	724,784	724,784	296,054	599,784	629,784	659,784	695,784	(566,406)	(146,446)	266,659	422,909	601,034	(175,176)	46,054	427,909	536,034	659,784
Margin with Income at:																							
	Income at:	130.00%	(4,397,142)	1,404,284	1,404,284	1,404,284	1,404,284	1,404,284	938,054	1,241,784	1,280,784	1,319,784	1,366,584	(906)	362,804	808,721	1,011,846	1,243,409	416,574	613,054	1,018,346	1,158,909	1,319,784
	Income at:	120.00%	(4,623,642)	1,177,784	1,177,784	1,177,784	1,177,784	1,177,784	724,054	1,027,784	1,063,784	1,099,784	1,142,984	(189,406)	193,054	628,034	815,534	1,029,284	219,324	424,054	821,534	951,284	1,099,784
	Income at:	90.00%	(5,303,142)	498,284	498,284	498,284	498,284	498,284	82,054	385,784	412,784	439,784	472,184	(754,906)	(316,196)	85,971	226,596	386,909	(372,426)	(142,946)	231,096	328,409	439,784
	Income at:	80.00%	(5,529,642)	271,784	271,784	271,784	271,784	271,784	(131,946)	171,784	195,784	219,784	248,584	(943,406)	(485,946)	(94,716)	30,284	172,784	(569,676)	(331,946)	34,284	120,784	219,784

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
10.34%	29.59%	22.56%	5.36%	1.07%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	10,362,551	172,709	6,314	0.69
4.00%	5,527,066	92,118	4,654	0.51
6.00%	2,789,402	46,490	3,090	0.34
8.00%	1,158,030	19,301	1,619	0.18
10.00%	134,501	2,242	229	0.02
12.00%	(540,332)	(9,006)	(1,092)	(0.12)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			10.00
Seasonal			5.26
Management			2.00
			17.26
Jobs per	1,000	M^3 Water	0.03

Exhibit 6.6: Expected flow of funds and return on investment of a typical existing irrigation farm

Region: **Klawer/Vredendal**

Farm Type: **Table Grapes (20 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			1,924,410	1,924,410	1,924,410	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,215,878	1,078,116	1,078,116	1,078,116	549,722	0	0	0	0
Proposed			0	0	0	0	0	0	281,632	563,263	704,079	704,079	704,079	704,079	704,079	704,079	704,079	850,327	1,087,971	1,252,490	1,298,188	1,509,546	1,945,456
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			1,924,410	1,924,410	1,924,410	1,487,724	1,487,724	1,487,724	1,769,356	2,050,988	2,191,804	2,191,804	2,191,804	2,191,804	1,919,957	1,782,195	1,782,195	1,928,443	1,637,693	1,252,490	1,298,188	1,509,546	1,945,456
Production Costs:																							
Crops:																							
Current			520,580	520,580	520,580	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	260,290	208,232	208,232	208,232	130,145	0	0	0	0
Proposed			0	0	0	169,189	169,189	169,189	169,189	169,189	169,189	169,189	169,189	169,189	260,290	312,348	312,348	312,348	390,435	520,580	520,580	520,580	520,580
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	51,730	51,730	51,730	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913	64,913
Total Production Costs			572,310	572,310	572,310	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493	585,493
Margin			1,352,099	1,352,099	1,352,099	902,231	902,231	902,231	1,183,863	1,465,495	1,606,311	1,606,311	1,606,311	1,606,311	1,334,464	1,196,702	1,196,702	1,342,950	1,052,200	666,997	712,695	924,053	1,359,963
Management, Labour and Irrigation:																							
Management			255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000
Labour	- Permanent		182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400	182,400
	- Casual		240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Water			42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855	42,855
Distribution			14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264	14,264
Total admin and Marketing Costs			734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519	734,519
Margin before Capital Costs			617,580	617,580	617,580	167,713	167,713	167,713	449,344	730,976	871,792	871,792	871,792	871,792	599,946	462,183	462,183	608,431	317,681	(67,521)	(21,824)	189,534	625,444
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	0	0	659,120	0	0	0	0	0	0	0	0	354,911	202,806	0	0	304,209	507,015	0	0	0
- Land and Orchards			1,616,565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,317,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			817,000	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
- Irrigation (Dams, Lines & Pumps)			252,456	0	0	0	0	0															
			4,003,521	122,550	122,550	781,670	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	477,461	325,356	122,550	122,550	426,759	629,565	122,550	122,550	122,550
Margin after Capital Costs at		100.00%	(3,385,941)	495,030	495,030	(613,957)	45,163	45,163	326,794	608,426	749,242	749,242	749,242	749,242	122,485	136,827	339,633	485,881	(109,078)	(697,086)	(144,374)	66,984	502,894
Margin with Income at:																							
Income at:		130.00%	(2,808,618)	1,072,353	1,072,353	(167,640)	491,480	491,480	857,601	1,223,722	1,406,783	1,406,783	1,406,783	1,406,783	698,472	671,485	874,291	1,064,414	382,230	(321,339)	245,083	519,847	1,086,531
Income at:		120.00%	(3,001,059)	879,912	879,912	(316,412)	342,707	342,707	680,665	1,018,623	1,187,602	1,187,602	1,187,602	1,187,602	506,476	493,266	696,072	871,570	218,460	(446,588)	115,264	368,893	891,985
Income at:		90.00%	(3,578,382)	302,589	302,589	(762,729)	(103,610)	(103,610)	149,859	403,327	530,061	530,061	530,061	530,061	(69,511)	(41,392)	161,414	293,037	(272,847)	(822,336)	(274,193)	(83,971)	308,349
Income at:		80.00%	(3,770,823)	110,148	110,148	(911,502)	(252,382)	(252,382)	(27,077)	198,228	310,881	310,881	310,881	310,881	(261,506)	(219,612)	(16,806)	100,192	(436,617)	(947,585)	(404,011)	(234,925)	113,803

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
9.57%	28.66%	21.31%	4.93%	0.78%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	9,014,118	450,706	16,476	1.21
4.00%	4,606,994	230,350	11,638	0.86
6.00%	2,152,868	107,643	7,154	0.53
8.00%	720,705	36,035	3,022	0.22
10.00%	(155,035)	(7,752)	(793)	(0.06)
12.00%	(714,798)	(35,740)	(4,335)	(0.32)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			12.00
Seasonal			13.15
Management			2.00
			27.15
Jobs per	1,000	M^3 Water	0.10

APPENDIX B

Exhibits 6.7 to 6.12

Exhibit 6.7: Expected flow of funds and return on investment for the proposed expansion of a typical irrigation farm

Region: Citrusdal

Farm Type: Citrus (70 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			2,222,320	2,222,320	2,244,320	2,266,320	2,277,320	2,277,320	2,277,320	2,277,320	2,277,320	2,277,320	2,081,640	2,081,640	1,885,960	1,885,960	1,517,280	1,517,280	1,148,600	1,148,600	1,148,600	1,148,600	1,148,600
Proposed			0	0	0	0	0	66,375	173,250	346,500	560,250	774,000	987,750	1,068,750	1,068,750	1,068,750	1,090,764	1,112,778	1,178,820	1,244,862	1,382,450	1,520,037	1,712,660
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			2,222,320	2,222,320	2,244,320	2,266,320	2,277,320	2,343,695	2,450,570	2,623,820	2,837,570	3,051,320	3,069,390	3,150,390	2,954,710	2,954,710	2,608,044	2,630,058	2,327,420	2,393,462	2,531,050	2,668,637	2,861,260
Production Costs:																							
Crops:																							
Current			884,450	884,450	884,450	884,450	884,450	884,450	884,450	884,450	884,450	884,450	813,694	813,694	742,938	742,938	583,737	583,737	424,536	424,536	424,536	424,536	424,536
Proposed			0	176,890	353,780	353,780	353,780	353,780	353,780	353,780	353,780	353,780	424,536	424,536	495,292	495,292	654,493	654,493	813,694	813,694	813,694	813,694	813,694
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	102,113	114,668	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223	127,223
Total Production Costs			986,563	1,176,008	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453	1,365,453
Margin			1,235,757	1,046,312	878,867	900,867	911,867	978,242	1,085,117	1,258,367	1,472,117	1,685,867	1,703,937	1,784,937	1,589,257	1,589,257	1,242,591	1,264,605	961,967	1,028,009	1,165,597	1,303,184	1,495,807
Management, Labour and Irrigation:																							
Management			180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Labour	- Permanent		167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400
	- Casual		420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000
Water			5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600
Distribution			70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297	70,297
Total admin and Marketing Costs			843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297	843,297
Margin before Capital Costs			392,460	203,015	35,570	57,570	68,570	134,945	241,820	415,070	628,820	842,570	860,640	941,640	745,960	745,960	399,294	421,308	118,670	184,712	322,299	459,887	652,509
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	627,750	627,750	0	0	0	0	0	0	0	251,100	0	251,100	0	564,975	0	564,975	0	0	0	0
- Land and Orchards			2,724,676	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			690,000	325,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			937,000	665,550	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300	219,300
- Irrigation (Dams, Lines & Pumps)			3,490,969	0	0	0	0	0															
			7,842,645	1,618,300	847,050	219,300	219,300	219,300	219,300	219,300	219,300	219,300	470,400	219,300	470,400	219,300	784,275	219,300	784,275	219,300	219,300	219,300	219,300
Margin after Capital Costs at		100.00%	(7,450,185)	(1,415,285)	(811,480)	(161,730)	(150,730)	(84,355)	22,520	195,770	409,520	623,270	390,240	722,340	275,560	526,660	(384,981)	202,008	(665,605)	(34,588)	102,999	240,587	433,209
Margin with Income at:																							
Income at:		130.00%	(6,783,489)	(748,589)	(138,184)	518,166	532,466	618,753	757,691	982,916	1,260,791	1,538,666	1,311,057	1,667,457	1,161,973	1,413,073	397,432	991,025	32,621	683,450	862,314	1,041,178	1,291,587
Income at:		120.00%	(7,005,721)	(970,821)	(362,616)	291,534	304,734	384,384	512,634	720,534	977,034	1,233,534	1,004,118	1,352,418	866,502	1,117,602	136,628	728,019	(200,121)	444,104	609,209	774,314	1,005,461
Income at:		90.00%	(7,672,417)	(1,637,517)	(1,035,912)	(388,362)	(378,462)	(318,725)	(222,537)	(66,612)	125,763	318,138	83,301	407,301	(19,911)	231,189	(645,786)	(60,998)	(898,347)	(273,934)	(150,106)	(26,277)	147,083
Income at:		80.00%	(7,894,649)	(1,859,749)	(1,260,344)	(614,994)	(606,194)	(553,094)	(467,594)	(328,994)	(157,994)	13,006	(223,638)	92,262	(315,382)	(64,282)	(906,590)	(324,004)	(1,131,089)	(513,281)	(403,211)	(293,141)	(139,043)

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
3.19%	10.84%	8.19%	0.74%	-1.78%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	3,752,891	53,613	1,960	0.17
4.00%	(1,798,154)	(25,688)	(1,298)	(0.11)
6.00%	(4,609,245)	(65,846)	(4,376)	(0.38)
8.00%	(6,057,139)	(86,531)	(7,256)	(0.64)
10.00%	(6,804,478)	(97,207)	(9,940)	(0.87)
12.00%	(7,179,723)	(102,567)	(12,442)	(1.09)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			12.00
Seasonal			23.01
Management			3.00
			38.01
Jobs per	1,000	M^3 Water	0.05

Exhibit 6.8: Expected flow of funds and return on investment for the proposed expansion of a typical irrigation farm

Region: Clanwilliam

Farm Type: Citrus (100 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100	3,274,100
Proposed			0	1,923,750	1,923,750	1,923,750	1,995,268	2,113,765	2,303,780	2,540,775	2,777,770	3,014,765	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725	3,108,725
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			3,274,100	5,197,850	5,197,850	5,197,850	5,269,368	5,387,865	5,577,880	5,814,875	6,051,870	6,288,865	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825	6,382,825
Production Costs:																							
Crops:																							
Current			1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050	1,446,050
Proposed			0	1,102,930	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820	1,279,820
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	76,630	85,130	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630	93,630
Total Production Costs			1,522,680	2,634,110	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500	2,819,500
Margin			1,751,420	2,563,740	2,378,350	2,378,350	2,449,868	2,568,365	2,758,380	2,995,375	3,232,370	3,469,365	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325	3,563,325
Management, Labour and Irrigation:																							
Management			346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000	346,000
Labour	- Permanent		312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500	312,500
	- Casual		585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000	585,000
Water			244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010	244,010
Distribution			50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660	50,660
Total admin and Marketing Costs			1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170	1,538,170
Margin before Capital Costs:			213,250	1,025,570	840,180	840,180	911,698	1,030,195	1,220,210	1,457,205	1,694,200	1,931,195	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155	2,025,155
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	425,000	425,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards			3,737,438	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			925,000	575,000	709,375	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			3,501,250	1,025,188	600,188	618,188	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888
- Irrigation (Dams, Lines & Pumps)			1,494,066	0	0	0	0	0															
- Land Preparation			202,750	202,750																			
			9,860,504	2,227,938	1,734,563	618,188	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888	602,888
Margin after Capital Costs at		100.00%	(9,647,253)	(1,202,367)	(894,382)	221,993	308,810	427,308	617,323	854,318	1,091,313	1,328,308	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268	1,422,268
Margin with Income at:																							
	Income at:	130.00%	(8,665,023)	356,988	664,973	1,781,348	1,889,621	2,043,667	2,290,687	2,598,780	2,906,874	3,214,967	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115	3,337,115
	Income at:	120.00%	(8,992,433)	(162,797)	145,188	1,261,563	1,362,684	1,504,881	1,732,899	2,017,293	2,301,687	2,586,081	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833	2,698,833
	Income at:	90.00%	(9,974,663)	(1,722,152)	(1,414,167)	(297,792)	(218,126)	(111,479)	59,535	272,830	486,126	699,421	783,985	783,985	783,985	783,985	783,985	783,985	783,985	783,985	783,985	783,985	783,985
	Income at:	80.00%	(10,302,073)	(2,241,937)	(1,933,952)	(817,577)	(745,063)	(650,265)	(498,253)	(308,657)	(119,061)	70,535	145,703	145,703	145,703	145,703	145,703	145,703	145,703	145,703	145,703	145,703	145,703

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
6.38%	21.15%	16.09%	1.29%	-3.86%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	12,175,564	121,756	4,451	0.50
4.00%	4,940,529	49,405	2,496	0.28
6.00%	611,838	6,118	407	0.05
8.00%	(2,111,061)	(21,111)	(1,770)	(0.20)
10.00%	(3,893,638)	(38,936)	(3,982)	(0.45)
12.00%	(5,095,286)	(50,953)	(6,181)	(0.70)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			22.03
Seasonal			28.25
Management			5.29
			55.57
Jobs per	1,000	M^3 Water	0.06

Exhibit 6.9: Expected flow of funds and return on investment for the proposed expansion of a typical irrigation farm

Region: Melkboom/Traval

Farm Type: Mixed Farm (Wine Grapes and Tomatoes) (50 ha unit)

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			1,094,500	950,500	950,500	872,500	872,500	872,500	847,500	847,500	622,500	622,500	622,500	510,000	510,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000	360,000
Proposed			319,200	319,200	319,200	391,150	503,975	669,440	814,300	982,900	1,073,750	1,116,000	1,179,750	1,241,000	1,308,500	1,400,375	1,447,250	1,541,000	1,616,000	1,661,000	1,691,000	1,691,000	1,691,000
Other:																							
Current																							
Proposed																							
Total Income			1,413,700	1,269,700	1,269,700	1,263,650	1,376,475	1,541,940	1,661,800	1,830,400	1,696,250	1,738,500	1,802,250	1,751,000	1,818,500	1,760,375	1,807,250	1,901,000	1,976,000	2,021,000	2,051,000	2,051,000	2,051,000
Production Costs:																							
Crops:																							
Current			327,235	327,235	327,235	306,430	306,430	306,430	299,495	299,495	237,080	237,080	237,080	195,470	195,470	153,860	153,860	153,860	153,860	153,860	153,860	153,860	139,990
Proposed			245,950	266,755	301,430	336,105	336,105	434,485	441,420	441,420	503,835	503,835	503,835	545,445	545,445	587,055	587,055	587,055	587,055	587,055	587,055	587,055	600,925
Other:																							
Fixed Asset Repairs at:		2.00%	42,161	42,161	42,161	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661	48,661
Total Production Costs			615,346	636,151	670,826	691,196	691,196	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576	789,576
Margin			798,354	633,549	598,874	572,454	685,279	752,364	872,224	1,040,824	906,674	948,924	1,012,674	961,424	1,028,924	970,799	1,017,674	1,111,424	1,186,424	1,231,424	1,261,424	1,261,424	1,261,424
Management, Labour and Irrigation:																							
Management			128,000	128,000	128,000	164,000	164,000	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560	170,560
Labour	- Permanent		87,500	87,500	87,500	125,000	125,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000	130,000
	- Casual		40,500	40,500	40,500	81,000	81,000	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240	84,240
Water			111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170	111,170
Distribution			22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586	22,586
Total admin and Marketing Costs			389,756	389,756	389,756	503,756	503,756	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556	518,556
Margin before Capital Costs			408,598	243,793	209,118	68,698	181,523	233,808	353,668	522,268	388,118	430,368	494,118	442,868	510,368	452,243	499,118	592,868	667,868	712,868	742,868	742,868	742,868
Capital Costs: Right																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	182,238	303,730	303,730	0	0	60,746	0	546,714	0	0	182,238	0	364,476	0	0	0	0	0	0	121,492
- Land and Orchards			2,268,805	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			500,000	0	0	325,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			528,000	79,200	79,200	79,200	79,200	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700
- Irrigation (Dams, Lines & Pumps)			614,235	0	0	0	0	0															
- Land Preparation																							
			3,911,040	261,438	382,930	707,930	79,200	149,700	210,446	149,700	696,414	149,700	149,700	331,938	149,700	514,176	149,700	149,700	149,700	149,700	149,700	149,700	271,192
Margin after Capital Costs at		100.00%	(3,502,441)	(17,645)	(173,812)	(639,232)	102,323	84,108	143,222	372,568	(308,296)	280,668	344,418	110,930	360,668	(61,933)	349,418	443,168	518,168	563,168	593,168	593,168	471,676
Margin with Income at:																							
Income at:		130.00%	(3,078,331)	363,265	207,098	(260,137)	515,266	546,690	641,762	921,688	200,579	802,218	885,093	636,230	906,218	466,180	891,593	1,013,468	1,110,968	1,169,468	1,208,468	1,208,468	1,086,976
Income at:		120.00%	(3,219,701)	236,295	80,128	(386,502)	377,618	392,496	475,582	738,648	30,954	628,368	704,868	461,130	724,368	290,142	710,868	823,368	913,368	967,368	1,003,368	1,003,368	881,876
Income at:		90.00%	(3,643,811)	(144,615)	(300,782)	(765,597)	(35,324)	(70,086)	(22,958)	189,528	(477,921)	106,818	164,193	(64,170)	178,818	(237,970)	168,693	253,068	320,568	361,068	388,068	388,068	266,576
Income at:		80.00%	(3,785,181)	(271,585)	(427,752)	(891,962)	(172,972)	(224,280)	(189,138)	6,488	(647,546)	(67,032)	(16,032)	(239,270)	(3,032)	(414,008)	(12,032)	62,968	122,968	158,968	182,968	182,968	61,476

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
5.42%	16.32%	12.47%	1.97%	Negative

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	4,790,101	95,802	3,502	0.37
4.00%	1,416,350	28,327	1,431	0.15
6.00%	(429,676)	(8,594)	(571)	(0.06)
8.00%	(1,476,138)	(29,523)	(2,476)	(0.26)
10.00%	(2,086,523)	(41,730)	(4,267)	(0.46)
12.00%	(2,449,212)	(48,984)	(5,942)	(0.63)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			10.13
Seasonal			4.92
Management			2.00
			17.04
Jobs per	1,000	M^3 Water	0.04

Exhibit 6.10: Expected flow of funds and return on investment for the proposed expansion of a typical irrigation farm

Region: **MelkhoomTraval**

Farm Type: **Table Grapes (25 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			2,622,723	2,622,723	2,622,723	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	2,019,108	1,640,567	1,430,580	1,430,580	1,430,580	735,911	0	0	0	0
Proposed			0	0	0	0	224,917	591,765	1,223,167	1,671,144	1,859,650	1,859,650	1,859,650	1,859,650	1,859,650	1,859,650	1,859,650	2,057,042	2,378,703	2,601,669	2,663,804	2,941,671	3,518,366
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			2,622,723	2,622,723	2,622,723	2,019,108	2,244,025	2,610,873	3,242,275	3,690,252	3,878,758	3,878,758	3,878,758	3,878,758	3,500,217	3,290,229	3,290,229	3,487,621	3,114,614	2,601,669	2,663,804	2,941,671	3,518,366
Production Costs:																							
Crops:																							
Current			520,580	520,580	520,580	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	260,290	208,232	208,232	208,232	130,145	0	0	0	0
Proposed			0	78,087	130,145	299,334	299,334	299,334	299,334	299,334	299,334	299,334	299,334	299,334	390,435	442,493	442,493	442,493	520,580	650,725	650,725	650,725	650,725
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	53,168	59,252	63,308	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490	76,490
Total Production Costs			573,748	657,919	714,033	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215	727,215
Margin			2,048,976	1,964,804	1,908,690	1,291,893	1,516,809	1,883,658	2,515,060	2,963,037	3,151,543	3,151,543	3,151,543	3,151,543	2,773,001	2,563,014	2,563,014	2,760,406	2,387,399	1,874,453	1,936,588	2,214,456	2,791,151
Management, Labour and Irrigation:																							
Management			255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000
Labour	- Permanent		243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200
	- Casual		240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Water			72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052
Distribution			15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245	15,245
Total admin and Marketing Costs			825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497	825,497
Margin before Capital Costs			1,223,479	1,139,308	1,083,194	466,396	691,313	1,058,161	1,689,563	2,137,540	2,326,046	2,326,046	2,326,046	2,326,046	1,947,505	1,737,517	1,737,517	1,934,909	1,561,902	1,048,957	1,111,092	1,388,959	1,965,654
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	304,209	202,806	659,120	0	0	0	0	0	0	0	0	354,911	202,806	0	0	304,209	507,015	0	0	0
- Land and Orchards			1,691,565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,317,500	300,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			817,000	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
- Irrigation (Dams, Lines & Pumps)			324,325	0	0	0	0	0															
			4,150,390	726,759	325,356	781,670	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	477,461	325,356	122,550	122,550	426,759	629,565	122,550	122,550	122,550
Margin after Capital Costs at		100.00%	(2,926,911)	412,549	757,838	(315,273)	568,763	935,611	1,567,013	2,014,990	2,203,496	2,203,496	2,203,496	2,203,496	1,470,044	1,412,161	1,614,967	1,812,359	1,135,143	419,392	988,542	1,266,409	1,843,104
Margin with Income at:																							
Income at:		130.00%	(2,140,094)	1,199,366	1,544,655	290,459	1,241,970	1,718,873	2,539,696	3,122,066	3,367,124	3,367,124	3,367,124	3,367,124	2,520,109	2,399,230	2,602,036	2,858,646	2,069,527	1,199,893	1,787,683	2,148,910	2,898,614
Income at:		120.00%	(2,402,366)	937,094	1,282,383	88,548	1,017,568	1,457,786	2,215,468	2,753,041	2,979,248	2,979,248	2,979,248	2,979,248	2,170,088	2,070,207	2,273,013	2,509,884	1,758,066	939,726	1,521,302	1,854,743	2,546,777
Income at:		90.00%	(3,189,183)	150,277	495,565	(517,184)	344,360	674,524	1,242,786	1,645,965	1,815,620	1,815,620	1,815,620	1,815,620	1,120,023	1,083,138	1,285,944	1,463,597	823,682	159,225	722,161	972,242	1,491,268
Income at:		80.00%	(3,451,456)	(111,996)	233,293	(719,095)	119,958	413,437	918,558	1,276,940	1,427,744	1,427,744	1,427,744	1,427,744	770,001	754,115	956,921	1,114,835	512,220	(100,942)	455,781	678,075	1,139,431

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
28.76%	62.40%	48.35%	21.40%	14.98%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	39,486,214	1,579,449	57,738	4.25
4.00%	25,467,666	1,018,707	51,469	3.79
6.00%	17,131,727	685,269	45,544	3.35
8.00%	11,924,739	476,990	40,000	2.95
10.00%	8,516,388	340,656	34,835	2.57
12.00%	6,187,995	247,520	30,025	2.21

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			16.00
Seasonal			13.15
Management			2.00
			31.15
Jobs per	1,000	M^3 Water	0.09

Exhibit 6.11: Expected flow of funds and return on investment for the proposed expansion of a typical irrigation farm

Region: Klawer/Vredendal

Farm Type: Mixed Farm (Wine Grapes and Tomatoes) (75 ha unit)

		05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																						
Crops:																						
Current		2,265,000	2,265,000	2,265,000	2,265,000	2,265,000	2,265,000	2,140,000	2,140,000	2,140,000	2,140,000	2,140,000	1,765,000	1,577,500	1,577,500	1,577,500	1,577,500	1,265,000	1,145,000	1,145,000	1,145,000	1,145,000
Proposed		450,000	450,000	450,000	480,000	556,875	663,750	757,500	757,500	788,750	820,000	882,500	882,500	882,500	982,500	1,129,375	1,376,250	1,470,000	1,470,000	1,548,125	1,656,250	1,817,500
Livestock:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Current																						
Proposed																						
Total Income		2,715,000	2,715,000	2,715,000	2,745,000	2,821,875	2,928,750	2,897,500	2,897,500	2,928,750	2,960,000	3,022,500	2,647,500	2,460,000	2,560,000	2,706,875	2,953,750	2,735,000	2,615,000	2,693,125	2,801,250	2,962,500
Production Costs:																						
Crops:																						
Current		838,650	838,650	838,650	838,650	838,650	838,650	803,975	803,975	803,975	803,975	803,975	699,950	665,275	665,275	665,275	665,275	595,925	561,250	561,250	561,250	561,250
Proposed		245,950	280,625	315,300	315,300	315,300	315,300	349,975	349,975	349,975	349,975	349,975	441,930	476,605	476,605	476,605	476,605	545,955	580,630	580,630	580,630	580,630
Livestock:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Fixed Asset Repairs at:	2.00%	71,503	77,578	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652	83,652
Total Production Costs		1,156,103	1,196,853	1,237,602	1,237,602	1,237,602	1,237,602	1,237,602	1,237,602	1,237,602	1,237,602	1,237,602	1,225,532	1,225,532	1,225,532	1,225,532	1,225,532	1,225,532	1,225,532	1,225,532	1,225,532	1,225,532
Margin		1,558,897	1,518,147	1,477,398	1,507,398	1,584,273	1,691,148	1,659,898	1,659,898	1,691,148	1,722,398	1,784,898	1,421,968	1,234,468	1,334,468	1,481,343	1,728,218	1,509,468	1,389,468	1,467,593	1,575,718	1,736,968
Management, Labour and Irrigation:																						
Management		166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600
Labour - Permanent		150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
- Casual		108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000
Water		143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464	143,464
Distribution		46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663	46,663
Total admin and Marketing Costs		614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727	614,727
Margin before Capital Costs:		944,169	903,420	862,670	892,670	969,545	1,076,420	1,045,170	1,045,170	1,076,420	1,107,670	1,170,170	807,240	619,740	719,740	866,615	1,113,490	894,740	774,740	852,865	960,990	1,122,240
Capital Costs: Right																						
- Establishments:	Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Proposed	0	303,730	303,730	0	0	0	303,730	0	0	0	0	911,190	303,730	0	0	0	607,460	303,730	0	0	0
- Land and Orchards		3,665,142	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings		887,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement		1,028,000	154,200	216,200	208,500	380,250	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500	229,500
- Irrigation (Dams, Lines & Pumps)		1,047,519	0	0	0	0	0															
		6,628,161	457,930	519,930	208,500	380,250	229,500	533,230	229,500	229,500	229,500	229,500	1,140,690	533,230	229,500	229,500	229,500	836,960	533,230	229,500	229,500	229,500
Margin after Capital Costs at	100.00%	(5,683,992)	445,490	342,740	684,170	589,295	846,920	511,940	815,670	846,920	878,170	940,670	(333,450)	86,510	490,240	637,115	883,990	57,780	241,510	623,365	731,490	892,740
Margin with Income at:		(4,142,412)	966,038	966,038	966,038	966,038	966,038	636,888	872,288	872,288	947,288	992,288	34,838	355,638	591,038	759,788	936,038	333,988	449,388	684,788	806,663	954,788
Income at:	130.00%	(4,869,492)	1,259,990	1,157,240	1,507,670	1,435,858	1,725,545	1,381,190	1,684,920	1,725,545	1,766,170	1,847,420	460,800	824,510	1,258,240	1,449,178	1,770,115	878,280	1,026,010	1,431,303	1,571,865	1,781,490
Income at:	120.00%	(5,140,992)	988,490	885,740	1,233,170	1,153,670	1,432,670	1,091,440	1,395,170	1,432,670	1,470,170	1,545,170	196,050	578,510	1,002,240	1,178,490	1,474,740	604,780	764,510	1,161,990	1,291,740	1,485,240
Income at:	90.00%	(5,955,492)	173,990	71,240	409,670	307,108	554,045	222,190	525,920	554,045	582,170	638,420	(598,200)	(159,490)	234,240	366,428	588,615	(215,720)	(19,990)	354,053	451,365	596,490
Income at:	80.00%	(6,226,992)	(97,510)	(200,260)	135,170	24,920	261,170	(67,560)	236,170	261,170	286,170	336,170	(862,950)	(405,490)	(21,760)	95,740	293,240	(489,220)	(281,490)	84,740	171,240	300,240

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
10.26%	28.60%	21.87%	5.35%	0.95%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	13,478,865	179,718	6,570	0.72
4.00%	7,208,866	96,118	4,856	0.53
6.00%	3,635,932	48,479	3,222	0.35
8.00%	1,492,076	19,894	1,668	0.18
10.00%	139,627	1,862	190	0.02
12.00%	(754,039)	(10,054)	(1,220)	(0.13)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			12.00
Seasonal			6.58
Management			3.00
			21.58
Jobs per	1,000	M^3 Water	0.03

Exhibit 6.12: Expected flow of funds and return on investment for the proposed expansion of a typical irrigation farm

Region: **Klawer/Vredendal**

Farm Type: **Table Grapes (25 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			1,924,410	1,924,410	1,924,410	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,487,724	1,215,878	1,078,116	1,078,116	1,078,116	549,722	0	0	0	0
Proposed			0	0	0	0	167,539	440,821	911,967	1,246,471	1,387,286	1,387,286	1,387,286	1,387,286	1,387,286	1,387,286	1,387,286	1,533,534	1,771,178	1,935,697	1,981,395	2,192,753	2,628,663
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			1,924,410	1,924,410	1,924,410	1,487,724	1,655,263	1,928,546	2,399,691	2,734,195	2,875,011	2,875,011	2,875,011	2,875,011	2,603,164	2,465,402	2,465,402	2,611,650	2,320,900	1,935,697	1,981,395	2,192,753	2,628,663
Production Costs:																							
Crops:																							
Current			520,580	520,580	520,580	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	351,392	260,290	208,232	208,232	208,232	130,145	0	0	0	0
Proposed			0	78,087	130,145	299,334	299,334	299,334	299,334	299,334	299,334	299,334	299,334	299,334	390,435	442,493	442,493	442,493	520,580	650,725	650,725	650,725	650,725
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	54,834	60,918	64,975	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157	78,157
Total Production Costs			575,414	659,585	715,700	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882	728,882
Margin			1,348,995	1,264,824	1,208,710	758,842	926,381	1,199,664	1,670,809	2,005,313	2,146,129	2,146,129	2,146,129	2,146,129	1,874,282	1,736,520	1,736,520	1,882,768	1,592,018	1,206,815	1,252,513	1,463,871	1,899,781
Management, Labour and Irrigation:																							
Management			255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000
Labour	- Permanent		243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200
	- Casual		240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Water			72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052	72,052
Distribution			18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415	18,415
Total admin and Marketing Costs			828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667	828,667
Margin before Capital Costs			520,329	436,157	380,043	(69,825)	97,714	370,997	842,142	1,176,646	1,317,462	1,317,462	1,317,462	1,317,462	1,045,616	907,853	907,853	1,054,101	763,351	378,149	423,846	635,204	1,071,114
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	304,209	202,806	659,120	0	0	0	0	0	0	0	0	354,911	202,806	0	0	304,209	507,015	0	0	0
- Land and Orchards			1,691,565	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,317,500	300,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			817,000	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
- Irrigation (Dams, Lines & Pumps)			407,646	0	0	0	0	0															
			4,233,711	726,759	325,356	781,670	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	477,461	325,356	122,550	122,550	426,759	629,565	122,550	122,550	122,550
Margin after Capital Costs at		100.00%	(3,713,383)	(290,602)	54,687	(851,494)	(24,836)	248,447	719,592	1,054,096	1,194,912	1,194,912	1,194,912	1,194,912	568,155	582,497	785,303	931,551	336,592	(251,416)	301,296	512,654	948,564
Margin with Income at:																							
Income at:		130.00%	(3,136,060)	286,721	632,010	(405,177)	471,743	827,010	1,439,499	1,874,354	2,057,415	2,057,415	2,057,415	2,057,415	1,349,104	1,322,118	1,524,924	1,715,046	1,032,862	329,293	895,715	1,170,480	1,737,163
Income at:		120.00%	(3,328,501)	94,280	439,569	(553,949)	306,216	634,156	1,199,530	1,600,935	1,769,914	1,769,914	1,769,914	1,769,914	1,088,788	1,075,577	1,278,383	1,453,881	800,772	135,723	697,575	951,204	1,474,297
Income at:		90.00%	(3,905,823)	(483,043)	(137,754)	(1,000,267)	(190,362)	55,592	479,623	780,676	907,411	907,411	907,411	907,411	307,839	335,957	538,763	670,386	104,502	(444,986)	103,157	293,379	685,698
Income at:		80.00%	(4,098,264)	(675,484)	(330,195)	(1,149,039)	(355,889)	(137,262)	239,654	507,257	619,910	619,910	619,910	619,910	47,522	89,417	292,223	409,221	(127,588)	(638,556)	(94,983)	74,103	422,832

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
11.24%	25.01%	20.01%	7.30%	3.53%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	16,218,476	648,739	23,715	1.82
4.00%	8,911,080	356,443	18,009	1.38
6.00%	4,741,119	189,645	12,604	0.97
8.00%	2,245,416	89,817	7,532	0.58
10.00%	682,231	27,289	2,791	0.21
12.00%	(338,053)	(13,522)	(1,640)	(0.13)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			16.00
Seasonal			13.15
Management			2.00
			31.15
Jobs per	1,000	M^3 Water	0.10

APPENDIX C

Exhibits 6.13 to 6.18

Exhibit 6.13: Expected flow of funds and return on investment of an envisaged new irrigation farm

Region: **Citrusdal**

Farm Type: **Citrus (70 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed			0	0	0	0	0	76,905	236,529	555,777	1,025,501	1,649,750	2,341,755	2,951,757	3,396,321	3,675,447	3,819,060	3,819,060	3,819,060	3,819,060	3,819,060	3,819,060	3,819,060
Tomatoes			275,175	275,175	275,175	275,175	275,175	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			275,175	275,175	275,175	275,175	275,175	76,905	236,529	555,777	1,025,501	1,649,750	2,341,755	2,951,757	3,396,321	3,675,447	3,819,060	3,819,060	3,819,060	3,819,060	3,819,060	3,819,060	3,819,060
Production Costs:																							
Crops:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed			0	247,646	495,292	742,938	990,584	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230	1,238,230
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	171,723	189,300	206,877	224,454	242,031	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608	259,608
Total Production Costs			171,723	436,946	702,169	967,392	1,232,615	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838	1,497,838
Margin			103,452	(161,771)	(426,994)	(692,217)	(957,440)	(1,420,933)	(1,261,309)	(942,061)	(472,337)	151,912	843,917	1,453,919	1,898,483	2,177,609	2,321,222	2,321,222	2,321,222	2,321,222	2,321,222	2,321,222	2,321,222
Management, Labour and Irrigation:																							
Management			180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000	180,000
Labour	- Permanent		167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400	167,400
	- Casual		420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000	420,000
Water			5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600	5,600
Distribution			68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109	68,109
Total admin and Marketing Costs			841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109	841,109
Margin before Capital Costs			(737,657)	(1,002,880)	(1,268,103)	(1,533,326)	(1,798,549)	(2,262,042)	(2,102,418)	(1,783,170)	(1,313,446)	(689,197)	2,808	612,810	1,057,374	1,336,500	1,480,113	1,480,113	1,480,113	1,480,113	1,480,113	1,480,113	1,480,113
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	878,850	878,850	878,850	878,850	878,850	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards			1,050,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,155,000	550,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			752,000	502,800	361,300	349,800	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300
- Irrigation (Dams, Lines & Pumps)			7,431,132	0	0	0	0	0															
			10,388,132	1,931,650	1,240,150	1,228,650	1,101,150	1,101,150	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300	222,300
Margin after Capital Costs at		100.00%	(11,125,789)	(2,934,530)	(2,508,253)	(2,761,976)	(2,899,699)	(3,363,192)	(2,324,718)	(2,005,470)	(1,535,746)	(911,497)	(219,492)	390,510	835,074	1,114,200	1,257,813	1,257,813	1,257,813	1,257,813	1,257,813	1,257,813	1,257,813
Margin with Income at:																							
Income at:		130.00%	(11,043,236)	(2,851,977)	(2,425,700)	(2,679,423)	(2,817,146)	(3,340,120)	(2,253,759)	(1,838,737)	(1,228,096)	(416,572)	483,035	1,276,037	1,853,971	2,216,834	2,403,531	2,403,531	2,403,531	2,403,531	2,403,531	2,403,531	2,403,531
Income at:		120.00%	(11,070,754)	(2,879,495)	(2,453,218)	(2,706,941)	(2,844,664)	(3,347,811)	(2,277,412)	(1,894,314)	(1,330,646)	(581,547)	248,859	980,862	1,514,339	1,849,290	2,021,625	2,021,625	2,021,625	2,021,625	2,021,625	2,021,625	2,021,625
Income at:		90.00%	(11,153,306)	(2,962,047)	(2,535,770)	(2,789,493)	(2,927,216)	(3,370,882)	(2,348,371)	(2,061,047)	(1,638,296)	(1,076,472)	(453,667)	95,335	495,442	746,656	875,907	875,907	875,907	875,907	875,907	875,907	875,907
Income at:		80.00%	(11,180,824)	(2,989,565)	(2,563,288)	(2,817,011)	(2,954,734)	(3,378,573)	(2,372,023)	(2,116,625)	(1,740,846)	(1,241,447)	(687,843)	(199,841)	155,810	379,111	494,001	494,001	494,001	494,001	494,001	494,001	494,001

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
1.42%	4.22%	3.38%	0.27%	-1.07%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	(3,938,023)	(56,257)	(2,057)	(0.18)
4.00%	(12,684,045)	(181,201)	(9,155)	(0.80)
6.00%	(16,830,264)	(240,432)	(15,980)	(1.40)
8.00%	(18,648,415)	(266,406)	(22,341)	(1.96)
10.00%	(19,265,796)	(275,226)	(28,144)	(2.47)
12.00%	(19,257,817)	(275,112)	(33,372)	(2.93)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			12.00
Seasonal			23.01
Management			3.00
			38.01
Jobs per	1,000	M^3 Water	0.05

Exhibit 6.14: Expected flow of funds and return on investment of an envisaged new irrigation farm

Region: **Clanwilliam**

Farm Type: **Citrus (100 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed			0	1,923,750	3,847,500	3,847,500	3,894,480	3,988,440	4,184,415	4,482,405	4,882,410	5,337,450	5,745,510	6,059,610	6,263,640	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600
Tomatoes			384,750	384,750	384,750	384,750	384,750	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Current																							
Proposed																							
Total Income			384,750	2,308,500	4,232,250	4,232,250	4,279,230	3,988,440	4,184,415	4,482,405	4,882,410	5,337,450	5,745,510	6,059,610	6,263,640	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600	6,357,600
Production Costs:																							
Crops:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed			0	1,092,270	2,184,540	2,361,430	2,538,320	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210	2,715,210
Livestock:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																							
Fixed Asset Repairs at:		2.00%	58,024	66,524	75,024	83,524	92,024	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524	100,524
Total Production Costs			58,024	1,158,793	2,259,563	2,444,953	2,630,343	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733	2,815,733
Margin			326,726	1,149,707	1,972,687	1,787,297	1,648,887	1,172,707	1,368,682	1,666,672	2,066,677	2,521,717	2,929,777	3,243,877	3,447,907	3,541,867	3,541,867	3,541,867	3,541,867	3,541,867	3,541,867	3,541,867	3,541,867
Management, Labour and Irrigation:																							
Management			1,666,000	1,666,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000	307,000
Labour	- Permanent		312,500	312,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500	187,500
	- Casual		585,000	585,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000	450,000
Water			381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410	381,410
Distribution			46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604	46,604
Total admin and Marketing Costs			2,991,514	2,991,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514	1,372,514
Margin before Capital Costs			(2,664,788)	(1,841,807)	600,173	414,783	276,373	(199,807)	(3,832)	294,158	694,163	1,149,203	1,557,263	1,871,363	2,075,393	2,169,353	2,169,353	2,169,353	2,169,353	2,169,353	2,169,353	2,169,353	2,169,353
Capital Costs:																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	425,000	425,000	425,000	425,000	425,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards			1,500,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,262,500	575,000	1,412,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			1,343,500	2,492,025	915,100	630,600	635,100	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800
- Irrigation (Dams, Lines & Pumps)			1,638,679	0	0	0	0	0															
- Land Preparation			515,250	515,250	202,750	202,750	202,750																
			6,259,929	4,007,275	2,955,350	1,258,350	1,262,850	1,065,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800	640,800
Margin after Capital Costs at		100.00%	(8,924,717)	(5,849,082)	(2,355,177)	(843,567)	(986,477)	(1,265,607)	(644,632)	(346,642)	53,363	508,403	916,463	1,230,563	1,434,593	1,528,553	1,528,553	1,528,553	1,528,553	1,528,553	1,528,553	1,528,553	1,528,553
Margin with Income at:																							
	Income at:	130.00%	(8,809,292)	(5,156,532)	(1,085,502)	426,108	297,292	(69,075)	610,692	998,079	1,518,086	2,109,638	2,640,116	3,048,446	3,313,685	3,435,833	3,435,833	3,435,833	3,435,833	3,435,833	3,435,833	3,435,833	3,435,833
	Income at:	120.00%	(8,847,767)	(5,387,382)	(1,508,727)	2,883	(130,631)	(467,919)	192,251	549,839	1,029,845	1,575,893	2,065,565	2,442,485	2,687,321	2,800,073	2,800,073	2,800,073	2,800,073	2,800,073	2,800,073	2,800,073	2,800,073
	Income at:	90.00%	(8,963,192)	(6,079,932)	(2,778,402)	(1,266,792)	(1,414,400)	(1,664,451)	(1,063,074)	(794,883)	(434,878)	(25,342)	341,912	624,602	808,229	892,793	892,793	892,793	892,793	892,793	892,793	892,793	892,793
	Income at:	80.00%	(9,001,667)	(6,310,782)	(3,201,627)	(1,690,017)	(1,842,323)	(2,063,295)	(1,481,515)	(1,243,123)	(923,119)	(559,087)	(232,639)	18,641	181,865	257,033	257,033	257,033	257,033	257,033	257,033	257,033	257,033

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
4.19%	10.94%	8.75%	1.66%	-1.19%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	13,071,378	130,714	4,778	0.54
4.00%	800,709	8,007	405	0.05
6.00%	(5,800,961)	(58,010)	(3,855)	(0.43)
8.00%	(9,416,654)	(94,167)	(7,897)	(0.89)
10.00%	(11,403,218)	(114,032)	(11,661)	(1.31)
12.00%	(12,470,855)	(124,709)	(15,128)	(1.71)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			15.50
Seasonal			25.03
Management			5.05
			45.58
Jobs per	1,000	M^3 Water	0.05

Exhibit 6.15: Expected flow of funds and return on investment of an envisaged new irrigation farm

Region: **Melkboom/Traval**

Farm Type: **Mixed Farm (Wine Grapes and Tomatoes) (35 ha unit)**

			05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																							
Crops:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed			270,000	270,000	270,000	339,375	469,500	856,875	1,109,650	1,362,800	1,554,200	1,684,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000
Other:																							
Current																							
Proposed																							
Total Income			270,000	270,000	270,000	339,375	469,500	856,875	1,109,650	1,362,800	1,554,200	1,684,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000	1,738,000
Production Costs:																							
Crops:																							
Current			0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed			147,570	209,985	272,400	334,815	397,230	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025	558,025
Other:																							
Fixed Asset Repairs at:		2.00%	35,660	35,660	35,660	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160	42,160
Total Production Costs			183,230	245,645	308,060	376,975	439,390	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185	600,185
Margin			86,770	24,355	(38,060)	(37,600)	30,110	256,690	509,465	762,615	954,015	1,083,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815	1,137,815
Management, Labour and Irrigation:																							
Management			128,000	128,000	128,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000	164,000
Labour	- Permanent		87,500	87,500	87,500	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000	125,000
	- Casual		40,500	40,500	40,500	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000	81,000
Water			201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627	201,627
Distribution			21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887	21,887
Total admin and Marketing Costs			479,514	479,514	479,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514	593,514
Margin before Capital Costs			(392,744)	(455,159)	(517,574)	(631,114)	(563,404)	(336,824)	(84,049)	169,101	360,501	490,301	544,301	544,301	544,301	544,301	544,301	544,301	544,301	544,301	544,301	544,301	544,301
Capital Costs: Right																							
- Establishments:		Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		Proposed	0	421,488	421,488	421,488	421,488	421,488	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards			750,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings			1,000,000	0	0	325,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement			528,000	79,200	79,200	79,200	79,200	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700
- Irrigation (Dams, Lines & Pumps)			783,000	0	0	0	0	0															
- Land Preparation			125,226	125,226	125,226	125,226	125,226	69,570															
			3,186,226	625,914	625,914	950,914	625,914	640,758	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700	149,700
Margin after Capital Costs at		100.00%	(3,578,970)	(1,081,073)	(1,143,488)	(1,582,028)	(1,189,318)	(977,582)	(233,749)	19,401	210,801	340,601	394,601	394,601	394,601	394,601	394,601	394,601	394,601	394,601	394,601	394,601	394,601
Margin with Income at:																							
	Income at:	130.00%	(3,497,970)	(1,000,073)	(1,062,488)	(1,480,216)	(1,048,468)	(720,520)	99,146	428,241	677,061	845,801	916,001	916,001	916,001	916,001	916,001	916,001	916,001	916,001	916,001	916,001	916,001
	Income at:	120.00%	(3,524,970)	(1,027,073)	(1,089,488)	(1,514,153)	(1,095,418)	(806,207)	(11,819)	291,961	521,641	677,401	742,201	742,201	742,201	742,201	742,201	742,201	742,201	742,201	742,201	742,201	742,201
	Income at:	90.00%	(3,605,970)	(1,108,073)	(1,170,488)	(1,615,966)	(1,236,268)	(1,063,270)	(344,714)	(116,879)	55,381	172,201	220,801	220,801	220,801	220,801	220,801	220,801	220,801	220,801	220,801	220,801	220,801
	Income at:	80.00%	(3,632,970)	(1,135,073)	(1,197,488)	(1,649,903)	(1,283,218)	(1,148,957)	(455,679)	(253,159)	(100,039)	3,801	47,001	47,001	47,001	47,001	47,001	47,001	47,001	47,001	47,001	47,001	47,001

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
Negative	5.76%	4.07%	Negative	Negative

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	(3,350,386)	(67,008)	(2,450)	(0.26)
4.00%	(4,932,809)	(98,656)	(4,984)	(0.53)
6.00%	(5,678,153)	(113,563)	(7,548)	(0.80)
8.00%	(6,006,764)	(120,135)	(10,075)	(1.07)
10.00%	(6,117,381)	(122,348)	(12,511)	(1.33)
12.00%	(6,108,794)	(122,176)	(14,820)	(1.58)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			9.78
Seasonal			4.75
Management			1.93
			16.45
Jobs per	1,000	M^3 Water	0.04

Exhibit 6.16: Expected flow of funds and return on investment of an envisaged new irrigation farm

Region: **Melkboom/Traval**

Farm Type: **Table Grapes (25 ha unit)**

		05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																						
Crops:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed		0	0	0	0	429,438	1,208,887	2,114,779	2,878,399	3,543,886	3,915,066	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793
Tomatoes		310,879	310,879	310,879	310,879	310,879	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Current																						
Proposed																						
Total Income		310,879	310,879	310,879	310,879	740,317	1,208,887	2,114,779	2,878,399	3,543,886	3,915,066	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793	4,038,793
Production Costs:																						
Crops:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed		0	65,073	260,290	390,435	520,580	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725
Tomatoes		52,058	52,058	52,058	52,058	52,058	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Fixed Asset Repairs at:	2.00%	20,731	29,474	38,216	46,959	55,701	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444	64,444
Total Production Costs		72,789	146,604	350,564	489,452	628,339	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169	715,169
Margin		238,090	164,275	(39,686)	(178,573)	111,977	493,718	1,399,610	2,163,230	2,828,718	3,199,897	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624	3,323,624
Management, Labour and Irrigation:																						
Management		127,500	127,500	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000
Labour - Permanent		91,200	91,200	167,200	167,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200
- Casual		80,000	80,000	160,000	160,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Water		145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985
Distribution		13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867	13,867
Total admin and Marketing Costs		458,552	458,552	742,052	742,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052	898,052
Margin before Capital Costs		(220,463)	(294,278)	(781,738)	(920,625)	(786,075)	(404,334)	501,558	1,265,178	1,930,666	2,301,845	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572	2,425,572
Capital Costs:																						
- Establishments:	Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Proposed	0	437,125	437,125	437,125	437,125	437,125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards		375,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings		825,000	600,000	1,510,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement		592,000	88,800	228,800	109,800	194,800	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
- Irrigation (Dams, Lines & Pumps)		211,563	211,563	0	0	0	0															
- Land Preparation		69,890	69,890	69,890	69,890	69,890																
		2,073,453	1,407,378	2,245,815	616,815	701,815	559,675	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
Margin after Capital Costs at	100.00%	(2,293,915)	(1,701,655)	(3,027,553)	(1,537,440)	(1,487,890)	(964,009)	379,008	1,142,628	1,808,116	2,179,295	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022	2,303,022
Margin with Income at:																						
Income at:	130.00%	(2,200,651)	(1,608,391)	(2,934,289)	(1,444,176)	(1,265,795)	(601,343)	1,013,441	2,006,148	2,871,281	3,353,815	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660	3,514,660
Income at:	120.00%	(2,231,739)	(1,639,479)	(2,965,377)	(1,475,264)	(1,339,826)	(722,231)	801,964	1,718,308	2,516,893	2,962,309	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781	3,110,781
Income at:	90.00%	(2,325,003)	(1,732,743)	(3,058,640)	(1,568,528)	(1,561,921)	(1,084,898)	167,530	854,788	1,453,727	1,787,789	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143	1,899,143
Income at:	80.00%	(2,356,091)	(1,763,831)	(3,089,728)	(1,599,616)	(1,635,953)	(1,205,786)	(43,948)	566,948	1,099,338	1,396,282	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263	1,495,263

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
11.05%	16.52%	14.81%	8.94%	6.62%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	28,893,994	1,155,760	42,250	3.11
4.00%	15,962,409	638,496	32,259	2.38
6.00%	8,464,361	338,574	22,502	1.66
8.00%	3,924,050	156,962	13,163	0.97
10.00%	1,069,594	42,784	4,375	0.32
12.00%	(779,523)	(31,181)	(3,782)	(0.28)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			15.25
Seasonal			12.49
Management			1.95
			29.69
Jobs per	1,000	M^3 Water	0.09

Exhibit 6.17: Expected flow of funds and return on investment of an envisaged new irrigation farm

Region: Klawer/Vredendal

Farm Type: Mixed Farm (Wine Grapes and Tomatoes) (75 ha unit)

		05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																						
Crops:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed		900,000	900,000	900,000	960,000	1,080,000	1,290,125	1,550,750	2,283,125	2,592,500	2,830,000	3,005,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000
Other:																						
Current																						
Proposed																						
Total Income		900,000	900,000	900,000	960,000	1,080,000	1,290,125	1,550,750	2,283,125	2,592,500	2,830,000	3,005,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000	3,080,000
Production Costs:																						
Crops:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed		163,967	280,625	630,600	699,950	769,300	838,650	908,000	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950	1,153,950
Other:																						
Fixed Asset Repairs at:	2.00%	38,522	47,888	57,255	66,621	75,988	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354	85,354
Total Production Costs		202,489	328,513	687,855	766,571	845,288	924,004	993,354	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304	1,239,304
Margin		697,511	571,487	212,145	193,429	234,712	366,121	557,396	1,043,821	1,353,196	1,590,696	1,765,696	1,840,696	1,840,696	1,840,696	1,840,696	1,840,696	1,840,696	1,840,696	1,840,696	1,840,696	1,840,696
Management, Labour and Irrigation:																						
Management		111,067	111,067	111,067	111,067	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600	166,600
Labour - Permanent		50,000	50,000	100,000	100,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000	150,000
- Casual		54,000	54,000	54,000	54,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000	108,000
Water		293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669	293,669
Distribution		46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887	46,887
Total admin and Marketing Costs		555,622	555,622	605,622	605,622	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156	765,156
Margin before Capital Costs		141,889	15,864	(393,477)	(412,193)	(530,443)	(399,035)	(207,760)	278,666	588,041	825,541	1,000,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541
Capital Costs: Right																						
- Establishments:	Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Proposed	0	468,320	468,320	468,320	468,320	468,320	468,320	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards		1,125,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings		1,425,000	0	275,000	0	75,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement		414,667	108,867	537,867	159,500	722,500	229,500	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Irrigation (Dams, Lines & Pumps)		501,100	501,100	501,100	0	0	0															
- Land Preparation		208,710	139,140	139,140	139,140	139,140	139,140	139,140														
		3,674,477	1,217,427	1,921,427	766,960	1,404,960	836,960	607,460	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Margin after Capital Costs at	100.00%	(3,532,588)	(1,201,562)	(2,314,904)	(1,179,153)	(1,935,403)	(1,235,995)	(815,220)	278,666	588,041	825,541	1,000,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541	1,075,541
Margin with Income at:																						
Income at:	130.00%	(3,262,588)	(931,562)	(2,044,904)	(891,153)	(1,611,403)	(848,957)	(349,995)	963,603	1,365,791	1,674,541	1,902,041	1,999,541	1,999,541	1,999,541	1,999,541	1,999,541	1,999,541	1,999,541	1,999,541	1,999,541	1,999,541
Income at:	120.00%	(3,352,588)	(1,021,562)	(2,134,904)	(987,153)	(1,719,403)	(977,970)	(505,070)	735,291	1,106,541	1,391,541	1,601,541	1,691,541	1,691,541	1,691,541	1,691,541	1,691,541	1,691,541	1,691,541	1,691,541	1,691,541	1,691,541
Income at:	90.00%	(3,622,588)	(1,291,562)	(2,404,904)	(1,275,153)	(2,043,403)	(1,365,007)	(970,295)	50,353	328,791	542,541	700,041	767,541	767,541	767,541	767,541	767,541	767,541	767,541	767,541	767,541	767,541
Income at:	80.00%	(3,712,588)	(1,381,562)	(2,494,904)	(1,371,153)	(2,151,403)	(1,494,020)	(1,125,370)	(177,960)	69,541	259,541	399,541	459,541	459,541	459,541	459,541	459,541	459,541	459,541	459,541	459,541	459,541

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
4.93%	10.90%	8.99%	2.71%	0.30%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	8,710,301	116,137	4,245	0.47
4.00%	1,965,429	26,206	1,324	0.15
6.00%	(1,683,877)	(22,452)	(1,492)	(0.16)
8.00%	(3,711,023)	(49,480)	(4,149)	(0.46)
10.00%	(4,851,002)	(64,680)	(6,614)	(0.73)
12.00%	(5,485,505)	(73,140)	(8,872)	(0.97)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			11.40
Seasonal			6.25
Management			2.90
			20.55
Jobs per	1,000	M^3 Water	0.03

Exhibit 6.18: Expected flow of funds and return on investment of an envisaged new irrigation farm

Region: Klawer/Vredendal

Farm Type: Table Grapes (25 ha unit)

		05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15	15/16	16/17	17/18	18/19	19/20	20/21	21/22	22/23	23/24	24/25	25/26
Income after Packing Costs:																						
Crops:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed		0	0	0	0	325,760	911,552	1,587,707	2,155,441	2,651,011	2,927,723	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960
Tomatoes		249,034	249,034	249,034	249,034	249,034	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Current																						
Proposed																						
Total Income		249,034	249,034	249,034	249,034	574,794	911,552	1,587,707	2,155,441	2,651,011	2,927,723	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960	3,019,960
Production Costs:																						
Crops:																						
Current		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Proposed		0	65,073	260,290	390,435	520,580	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725	650,725
Tomatoes		52,058	52,058	52,058	52,058	52,058	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other:																						
Fixed Asset Repairs at:	2.00%	21,760	30,502	39,245	47,987	56,730	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472	65,472
Total Production Costs		73,818	147,633	351,593	490,480	629,368	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197	716,197
Margin		175,216	101,401	(102,559)	(241,446)	(54,574)	195,355	871,510	1,439,244	1,934,814	2,211,526	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763	2,303,763
Management, Labour and Irrigation:																						
Management		127,500	127,500	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000	255,000
Labour - Permanent		91,200	91,200	167,200	167,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200	243,200
- Casual		80,000	80,000	160,000	160,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000	240,000
Water		145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985	145,985
Distribution		17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830	17,830
Total admin and Marketing Costs		462,515	462,515	746,015	746,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015	902,015
Margin before Capital Costs		(287,299)	(361,114)	(848,574)	(987,461)	(956,589)	(706,660)	(30,505)	537,229	1,032,799	1,309,511	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748	1,401,748
Capital Costs:																						
- Establishments:	Current	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Proposed	0	437,125	437,125	437,125	437,125	437,125	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Land and Orchards		375,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Buildings		825,000	600,000	1,510,000	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
- Equipment and Replacement		592,000	88,800	228,800	109,800	194,800	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
- Irrigation (Dams, Lines & Pumps)		262,975	262,975	0	0	0	0															
- Land Preparation		69,890	69,890	69,890	69,890	69,890																
		2,124,865	1,458,790	2,245,815	616,815	701,815	559,675	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550	122,550
Margin after Capital Costs at	100.00%	(2,412,164)	(1,819,904)	(3,094,389)	(1,604,276)	(1,658,404)	(1,266,335)	(153,055)	414,679	910,249	1,186,961	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198	1,279,198
Margin with Income at:																						
Income at:	130.00%	(2,337,454)	(1,745,194)	(3,019,679)	(1,529,566)	(1,485,965)	(992,869)	323,258	1,061,311	1,705,553	2,065,277	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186	2,185,186
Income at:	120.00%	(2,362,357)	(1,770,097)	(3,044,582)	(1,554,470)	(1,543,445)	(1,084,024)	164,487	845,767	1,440,452	1,772,505	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190	1,883,190
Income at:	90.00%	(2,437,067)	(1,844,807)	(3,119,292)	(1,629,180)	(1,715,883)	(1,357,490)	(311,825)	199,135	645,148	894,188	977,202	977,202	977,202	977,202	977,202	977,202	977,202	977,202	977,202	977,202	977,202
Income at:	80.00%	(2,461,971)	(1,869,711)	(3,144,196)	(1,654,083)	(1,773,362)	(1,448,645)	(470,596)	(16,409)	380,047	601,416	675,206	675,206	675,206	675,206	675,206	675,206	675,206	675,206	675,206	675,206	675,206

Return on Investment:

Internal Rate of Return at % of Income:				
100%	130%	120%	90%	80%
(%)	(%)	(%)	(%)	(%)
5.24%	10.44%	8.84%	3.19%	0.90%

NPV at:

Cap. Rate	Net Present Value		Annuity *	
			Period (Yrs):	40
(%)	(R)	(R/Ha)	(R/Ha)	(R/M^3)
2.00%	9,008,472	360,339	13,172	0.97
4.00%	2,456,187	98,247	4,964	0.37
6.00%	(1,111,982)	(44,479)	(2,956)	(0.22)
8.00%	(3,121,921)	(124,877)	(10,472)	(0.77)
10.00%	(4,279,533)	(171,181)	(17,505)	(1.29)
12.00%	(4,948,695)	(197,948)	(24,012)	(1.77)

* Annuity of Net Benefits over 40 years.

Job Creation per 1000 Cubic metre Water.

			Number
Regular			15.25
Seasonal			12.49
Management			1.95
			29.69
Jobs per	1,000	M^3 Water	0.09

FEASIBILITY STUDY FOR THE RAISING OF CLANWILLIAM DAM

Study Reports

No	Report name	8.1.1 DWAF Report numbers	8.1.2 NS Report numbers
1	Inception	No report number	4414
2	Screening of Options	P WMA 17/E10/00/0405	4415
3	Water Quality	P WMA 17/E10/00/0506	4416
4	System Analysis	P WMA 17/E10/00/0607	4417
5	Groundwater Resources	P WMA 17/E10/00/0707	4418
6	Environmental Scoping	P WMA 17/E10/00/0805	4419
7	Environmental Impact	P WMA 17/E10/00/0907	4420
8	Soils, Water Requirements and Crops	P WMA 17/E10/00/1106	4422
9	Water Management Plan for the Olifants-Doorn Catchment Management Area	P WMA 17/E10/00/1207	4423
10	Opportunities for the Supply of Water to Resource-poor Farmers	P WMA 17/E10/00/1307	4424
11	Irrigation Development and Water Distribution Options	P WMA 17/E10/00/1407	4425
12	Impacts on Roads and other Infrastructure	P WMA 17/E10/00/1507	4426
13	Financial Viability of Irrigation Farming	P WMA 17/E10/00/1607	4427
14	Socio-economic Impact Assessment	P WMA 17/E10/00/1707	4428
15	Financial Evaluation	P WMA 17/E10/00/1807	4455
16	Main	P WMA 17/E10/00/1907	4429

8.1.3 No	8.1.4 Reports by DWAF	DWAF Report numbers	NS Report numbers
17	Feasibility Design of Raising (Engineering Design) and Design Report Addendum	-	4430
18	First Engineering Geological Materials Report (Course Aggregate) For Proposed Raising (Council for Geoscience)	-	4431
19	Farm Dams (Options Analysis): include under Report 4 as Appendix	-	4432