Feasibility Study for Foxwood Dam (WP10580)

Economic Impact Assessment

Final

DWS Report Number: **P WMA 15/Q92/00/2113/14**

water & sanitation
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

SIGNATURE PAGE

Project name:	***Feasibility Study for Foxwood Dam***
Report Title:	***Economic Impact Assessment***
Author:	***Arup (Pty) Limited***
Arup project reference no.:	***225739-00***
DWS Report no.:	***P WMA 15/Q92/00/2113/14***
Status of report:	***Final***
First issue:	***December 2014***
Final issue:	***February 2015***

CONSULTANTS: Arup (Pty) Limited in association with Rand International Capital

*Approved for **Consultants**:*

James Bristow
Project Manager

James Hampton
Project Director

DEPARTMENT OF WATER AND SANITATION (DWS): Directorate: Options Analysis

*Approved for **DWS**:*

S. van Jaarsveld
Project Engineer: Options Analysis (South)

L. S. Mabuda
Chief Director: Integrated Water Resource Planning

RAND INTERNATIONAL CAPITAL
Development Finance and Economics

ARUP

STUDY REPORTS

The Economic Impact Assessment report forms one of the suite of reports that make-up the Feasibility Study for Foxwood Dam. The full list of reports is provided below:

Feasibility Study for Foxwood Dam: Inception Report	**P WMA 15/Q92/00/2113/1**
Feasibility Study for Foxwood Dam: Preliminary Study Report	**P WMA 15/Q92/00/2113/2**
Feasibility Study for Foxwood Dam: Environmental Screening	P WMA 15/Q92/00/2113/3
Feasibility Study for Foxwood Dam: Geotechnical Reconnaissance	P WMA 15/Q92/00/2113/4
Feasibility Study for Foxwood Dam: Alternative Water Supply Options	P WMA 15/Q92/00/2113/5
Feasibility Study for Foxwood Dam: Feasibility Study Main Report	**P WMA 15/Q92/00/2113/6**
Feasibility Study for Foxwood Dam: Koonap River Hydrology	P WMA 15/Q92/00/2113/7
Feasibility Study for Foxwood Dam: Water Requirements	P WMA 15/Q92/00/2113/8
Feasibility Study for Foxwood Dam: Agro-Economic Study Report	P WMA 15/Q92/00/2113/9
Feasibility Study for Foxwood Dam: Water Quality	P WMA 15/Q92/00/2113/10
Feasibility Study for Foxwood Dam: Geotechnical Investigation	P WMA 15/Q92/00/2113/11
Feasibility Study for Foxwood Dam: Dam Feasibility Design	P WMA 15/Q92/00/2113/12
Feasibility Study for Foxwood Dam: Project Feasibility Costing	P WMA 15/Q92/00/2113/13
Feasibility Study for Foxwood Dam: Economic Impact Assessment	P WMA 15/Q92/00/2113/14
Feasibility Study for Foxwood Dam: Record of Implementation Decisions	P WMA 15/Q92/00/2113/15
Feasibility Study for Foxwood Dam: Book of Maps	P WMA 15/Q92/00/2113/16
Feasibility Study for Foxwood Dam: Public Participation (Queries & Responses Report)	P WMA 15/Q92/00/2113/17

REPORT REFERENCE

This report is to be referred to in bibliographies as:

Department of Water and Sanitation, 2015. Feasibility Study for Foxwood Dam: Economic Impact Assessment, P WMA 15/Q92/00/2113/14

Note on Departmental name change

In 2014, the Department of Water Affairs (DWA) changed its name to the Department of Water and Sanitation (DWS). This occurred during the course of this study and as a result some reporting which was commenced and/or approved prior to the name change may still refer to DWA. References herein to DWA and DWS should be considered one and the same.

EXECUTIVE SUMMARY

The Department of Water and Sanitation (DWS) has appointed Arup (Pty) Ltd to carry out an investigation into the feasibility of developing a multi-purpose dam on the Koonap River outside of Adelaide in the Eastern Cape. The proposed Foxwood Dam site is located immediately upstream of Adelaide in the Koonap River catchment area with a catchment area of 3 334 km², and is situated in the Eastern Cape Province and lies within the Fish to Tsitsikamma Water Management Area (WMA). The project is being considered for implementation as a strategic initiative to mobilize the water resources in the area as a stimulus for socio-economic development in this rural, economically depressed region. This initiative would support the objectives of the National Development Plan (NDP) and is consistent with the National Water Resource Strategy 2 (NWRS2).

This study constitutes an economic impact assessment of the construction and operation of the proposed dam and the potential for irrigated agriculture which is created by the dam, as well as a socio-demographic overview of Adelaide and the local and district municipalities. The establishment of irrigated agriculture within the valley will have significant positive socio-economic impacts into the community through the entire value chain, and will stimulate supply side input industry as well as downstream opportunities for value addition and possibly export markets.

The assessment of economic activity of the Foxwood Dam project has focused on the construction and operation of the dam and the construction and operation of the proposed associated Government Irrigation Scheme only. The economic activity of the dam results from the construction of the dam, over a four year period, and then the operation of the dam and sale of water from the dam. The operation of the dam has been assessed over 6 years, which is the period until the full take up of water from the dam is assumed to be achieved, primarily from the development of the Irrigation Scheme. **It is assumed that the capital expenditure for the construction of the dam (estimated at R 2 084 million) will be funded by Treasury with no recovery of this cost. The construction of the dam will be as enabling infrastructure to support the development of the proposed Irrigation Scheme and the economic activity and job creation that this will stimulate.**

Assuming a discount rate of 8%, the URV for water yielded by Foxwood Dam would be R11,77 /m³. However, as it is assumed that the capital funding for Foxwood Dam would be from Treasury, the modelled *price* of water has been calculated based on the URV resulting from the annual maintenance and operation costs (and including major refurbishment) of the dam over the life of the day which was R 0,60c/m³ has been applied. In the event that the project is developed, the price of water must be determined in accordance with the National Water Pricing Strategy and allow for a full review of Water Allocation within the Koonap River catchment.

- The dam construction costs have been calculated at 2014 prices and have not been escalated.
- The socio-economic impact of the project has been assessed against a Nxuba baseline using 2011 data with 1% growth projection and assuming construction of the Irrigation Scheme takes place in 2018 and planting commences in 2019 with first use of water from the dam.
- Construction of the dam has been assumed to take place over four years from 2015 to 2018 with first controlled release of water achieved in 2019.
- In the event of project implementation, the economic analysis should be revised and benchmarked to the actual implementation programme.

The Gross Domestic Product for operations and construction of the dam has been modelled, together with peak employment and sustainable employment within the Nxuba municipal area.

The rates and utilities which will increase as a result of the project are also calculated, as well as the increase in fiscal revenue due to the payment of corporate taxes by contractors and the wages earned from operations. These metrics are indicated in Table 1 below:

Table 1: Summarised Construction and Operations Economic Impact for Foxwood Dam

Economic Impact and Year:	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	TOTALS
Construction Impacts:											
Project / Construction Costs - Rm	313	521	834	417							2,084
Gross Domestic Product (GDP) Impact - Rm	335	559	894	447							2,235
Direct Employment - Jobs Per Year	474	759	1,166	559							2,958
Operations Impacts:											
Operating Revenue - Rm					6	7	9	10	12	14	59
Gross Value Added (GVA) Impact - Rm					7	9	10	12	15	17	69
Direct Employment - Jobs Per Year					3	3	4	5	5	6	26
Sustained Employment - All - Jobs Per Year					8	9	11	12	14	15	69
Sustained GVA in Municipality - Per Year					6	7	8	10	12	13	56
Construction & Operations Impacts:											
Rates & Utilities Paid to the Munic. - Rm	4.8	8.2	13.3	7.3	1.0	1.0	1.0	1.0	1.0	1.0	40
Taxes Payable to the Fiscus - Rm	23.9	39.8	63.7	31.8	0.6	0.7	0.8	1.0	1.2	1.4	165

Source: Summary of Project Cost Benefit Analysis.

Irrigation Scheme Financial Model

A large portion of the yield from the multi-purpose dam at Foxwood would be supplied to establish an irrigated agriculture industry within the Koonap River valley and an independent study, carried out by Arup and Agri-Africa has investigated the most suitable crops which could be grown in the valley based upon soil and slope conditions and a range of other agricultural conditions, including market conditions and prevailing prices. This economic impact study has worked closely with the model assumptions used to perform the agricultural analysis and used the various inputs and operating parameters to establish an economic base case and then evaluate the various scenarios postulated.

The agricultural study has recommended that there is potential within the Koonap River valley for the establishment of 1 250 ha of irrigated agriculture which would need to use 10 000 m^3 of irrigation water per hectare per annum (equivalent to 1 000 mm irrigation depth), or 12,5 million m^3/a.

The crops that have been investigated are lemons, peaches and macadamia nuts. For each crop type three scale scenarios have been investigated for farm size, with these being one hectare, twenty hectare and fifty hectare plots. Typically the employment profiles for the valley remain constant for each option, but the profitability tends to vary with the larger farms being more profitable due to the economies of scale which can be harnessed. There is no standard labour policy or union which regulates wages paid in the agricultural sector. In order to determine what an optimum wage should be for a farm worker and the ideal annual farm profit or Net Farm Income (NFI), various sources have been consulted and an average daily wage of R 104,00 has been used against the national average minimum wage of R 70,00 per day. The NFI has been deemed to be R 300 000 per annum per farm. The average daily wage has been used to estimate job

creation from the projected revenue generated by the Irrigation Scheme. The NFI is used as a bench mark to consider the long term financial sustainability of the proposed Irrigation Scheme. Detailed reporting on the proposed Irrigation Scheme is provided in the Agro-Economic study report (DWS, 2015a). The summary financial output from this analysis, for a total development size of 1 250 ha (using averaged data from all crop types with individual farm sizes of 20 ha) is provided in Table 2 below. Based on a review of the projected IRR for each crop type and farm size as well as the projected employment creation for each scheme, the 20 ha farm model has been used throughout this economic impact analysis, although it is noted that various permutations of proposed Irrigation Scheme could be implemented subject to a detailed Irrigation Scheme investigation. The economic activity of the Irrigation Scheme has been assessed over the period of construction, 1 year, and then for 4 years of farm establishment and then over 6 years of revenue generation until full yields are achieved. A snapshot of financial indicators at this 10 year stage are provided to indicate the financial performance of the scheme. To assess the longer term financial sustainability of the Irrigation Scheme the IRR of the scheme has been assessed after 15 years of establishment of the scheme.

Table 2: Averaged financial performance for 1 250 ha scheme (assuming 20 ha portions)

Financial data (averaged for 1 250 ha scheme for all crops)	1 250 ha irrigation scheme	Comment
Peak funding (ZAR) (4-5 year timeframe)	437 398 862	The peak funding that Government would need to provide
Internal Rate of Return (IRR) @ year 15	8,15%	The IRR that would be achieved by year 15
Accumulated retained earnings by year 15 (ZAR)	315 284 832	These earnings indicate whether the business is worth pursuing over the medium to long term
Revenue potential in year 10 (ZAR)	389 531 163	The revenue potential of the farming operation once it is in full production.
Profit earned in year 10 (ZAR)	56 651 682	Substantially more than R300k 'success' benchmark per farm (which is R 18 million for all farms)
Wages earned by year 10 (ZAR)	41 830 135	The wages earned by the farm workers.
Total direct employment (including farmer) per scenario) in year 10	1 934	Back calculated from wages, based on average daily wage per labourer of R 104.00
Total indirect & induced employment in year 10	728	Based on IDC ratio of 0.38 relative to direct jobs created
Taxation paid in year 10 (ZAR)	25 427 326	The taxes paid to the national fiscus by the farming operation
Potential beneficiation in year 10 (ZAR)	352 237 752	Assumed multiplier of potential beneficiation: 1.75 times
Gross Domestic Product in year 10 (ZAR)	503 196 788	Assumed multiplier of 'All' GDP impact 2.50 times
Export potential in year 10 (ZAR)	150 959 036	Assumed % of revenue exported: 50% Assumed % price improvement of: 150%

Socio-Economic Impact of Irrigation Scheme

A baseline assessment of the agriculture sector in Nxuba was carried out to project the growth of agriculture in Nxuba in the event that the Foxwood Dam in not constructed. This is an assessment of the 'no-go' scenario and demonstrates the substantial impact that Foxwood Dam would have

on the economic activity in the municipality. Agriculture is responsible for 37% of employment in the municipality, however there has been a 16,5% reduction in employment in Agriculture in the 10 years from 2001 to 2011. Agriculture makes up approximately 14% of GVA contribution within the municipality however this also reduced by 2,2% in the 10 years from 2001 to 2011. In contrast to these trends, Figure 1 and Figure 2 illustrate the projected impact of the proposed Irrigation Scheme on GVA and Employment in Nxuba municipality. An average growth of agricultural sector employment over fifteen years of 5,3% is realised with 1 934 irrigated agriculture employment opportunities created, or 55% of the total of 3 488 employment opportunities project for Nxuba LM by the year 2028. An average growth of agricultural sector GVA over fifteen years of 12,5% is realised with R 352 million irrigated agriculture economic activity created, or 88,1% of the total of R 396 million agricultural sector GVA for Nxuba LM by the year 2028.

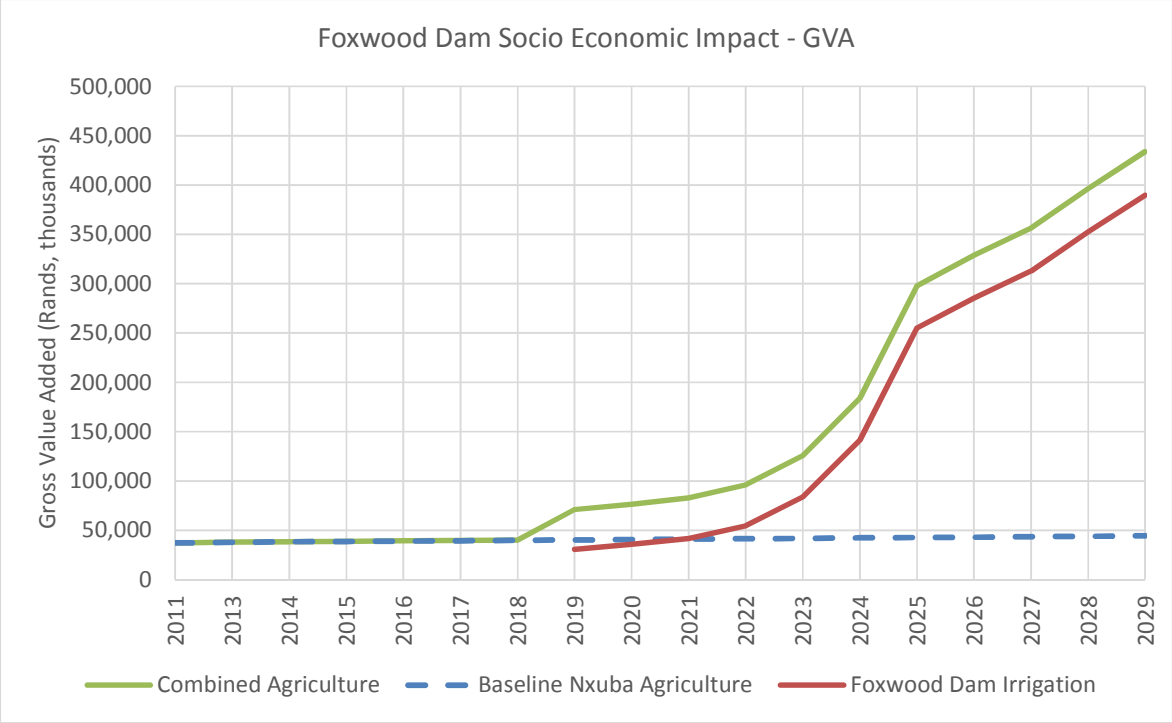


Figure 1: Projected GVA Impact in Nxuba from Foxwood

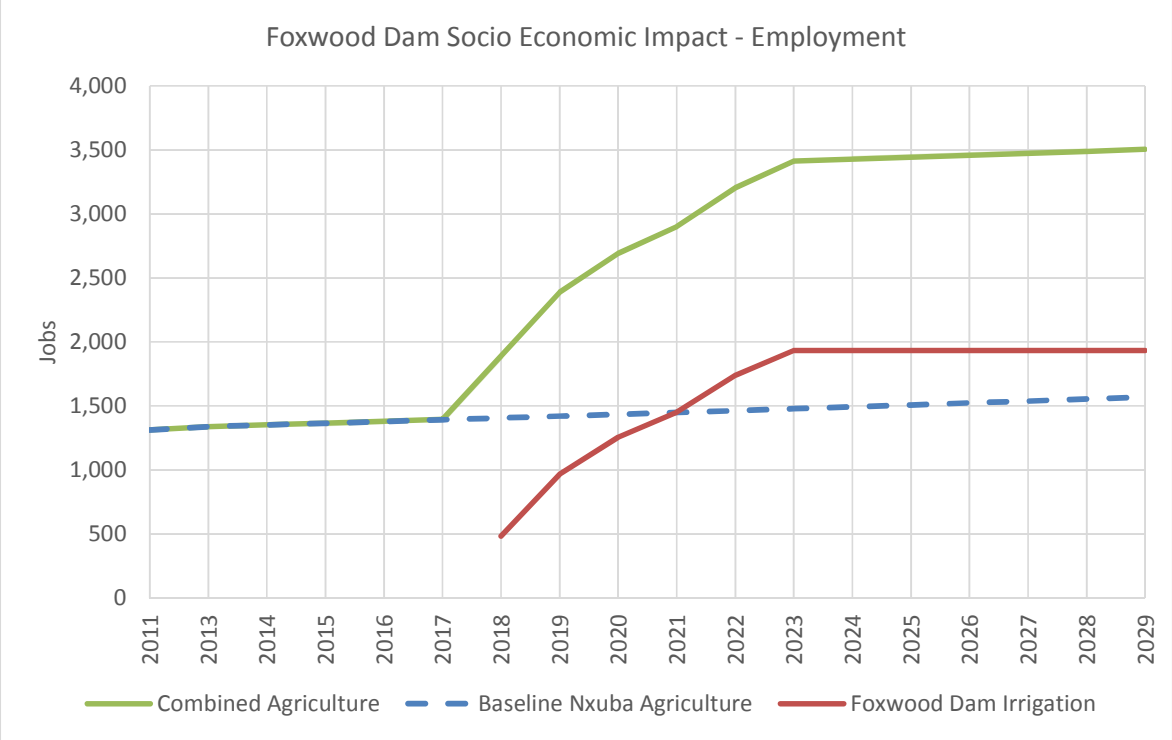


Figure 2: Projected Employment Impact in Nxuba from Irrigation Scheme

Opportunity Cost

The project opportunity cost to Government has been calculated over a fifty year life cycle for the combined Foxwood Dam and irrigated agriculture project. An opportunity cost economic simulation has been undertaken based upon the projects combined capital expenditure and operating cost scenarios over a fifty year timeframe, with the deemed cost of funds to Government being 6,5% per annum.

The positive cash flow has been calculated based upon the potential taxation revenue from the Foxwood Dam and the irrigated agriculture, together with the escalated revenue from the irrigated agriculture. The opportunity cost calculations indicate that over the 50 year life cycle of the dam, the Government would attain an Internal Rate of Return of 2,9% on the funds utilized for the combined projects. The project opportunity cost for 30 and 50 years has not been calculated as the compound interest results in an unrealistically high return. Although the opportunity cost is a valid economical indictor and is fairly low, we do not consider it to be a negative factor in the context of the proposed investment in Foxwood Dam by Government, where the primary objective of the scheme is to stimulate socio-economic upliftment and poverty alleviation.

Funding Requirement from Government

Figure 3 below illustrates the estimated required funding from Government to implement the Foxwood Dam project and associated Irrigation Scheme. It is assumed that the capital expenditure for the dam, approximately R 2 084 million over four years, would be funded by Treasury and not recovered. The total funding required by Government for the Irrigation Scheme is estimated at R 437 million and would be invested over six years. The projected returns from the Irrigation Scheme would allow payback of this investment over five years, or eleven years from the start of investment in the Irrigation Scheme. **Copies of the full economic assessment model are provided in Appendix F.**

Conclusion

The overall economic benefit of the combined projects is positive, however there are in all likelihood additional infrastructure requirements for the establishment of the irrigated agriculture as well as the need for financing and training of the new or emerging farmers. A full agricultural options analysis report has been prepared for the various options and provides recommendations as to how the irrigated agriculture could be implemented.

Certain of the important economic benefits which are realized are as follows:

- Additional economic activity is stimulated in a region which needs it, with **R 532 million** of additional economic activity with all of its positive knock-on effects added in year 10 of the development
- Additional employment opportunities are created – **1 934 sustainable direct employment** opportunities
- Emerging and BEE farmers will be established and empowered with financial benefits and skills transfer
- There is a reasonable return on investment of approximately **8%** for the Irrigation Scheme, with payback of the peak funding estimated to be completed within approximately **11 years** of commencement of the scheme.
- The municipality will earn additional rates and charges from the project
- The national fiscus will receive additional taxation which will ultimately justify the capital expenditure of the project – **R 36,6 m** in year 10
- The potential exists for the further beneficiation of the agricultural product, and
- Potential exists for agricultural product export promotion.

The ultimate economic benefits of the combined project, the Foxwood Dam and the irrigated agriculture are in favour of the project being implemented based on the prime objectives of socio-economic upliftment. However, it needs to be noted that the implementation of the irrigated agriculture programme as envisaged in this report and the associated agricultural report, assumes that a competent implementation agency will be appointed and will implement the projects within the time and financial budgets as contained herein.

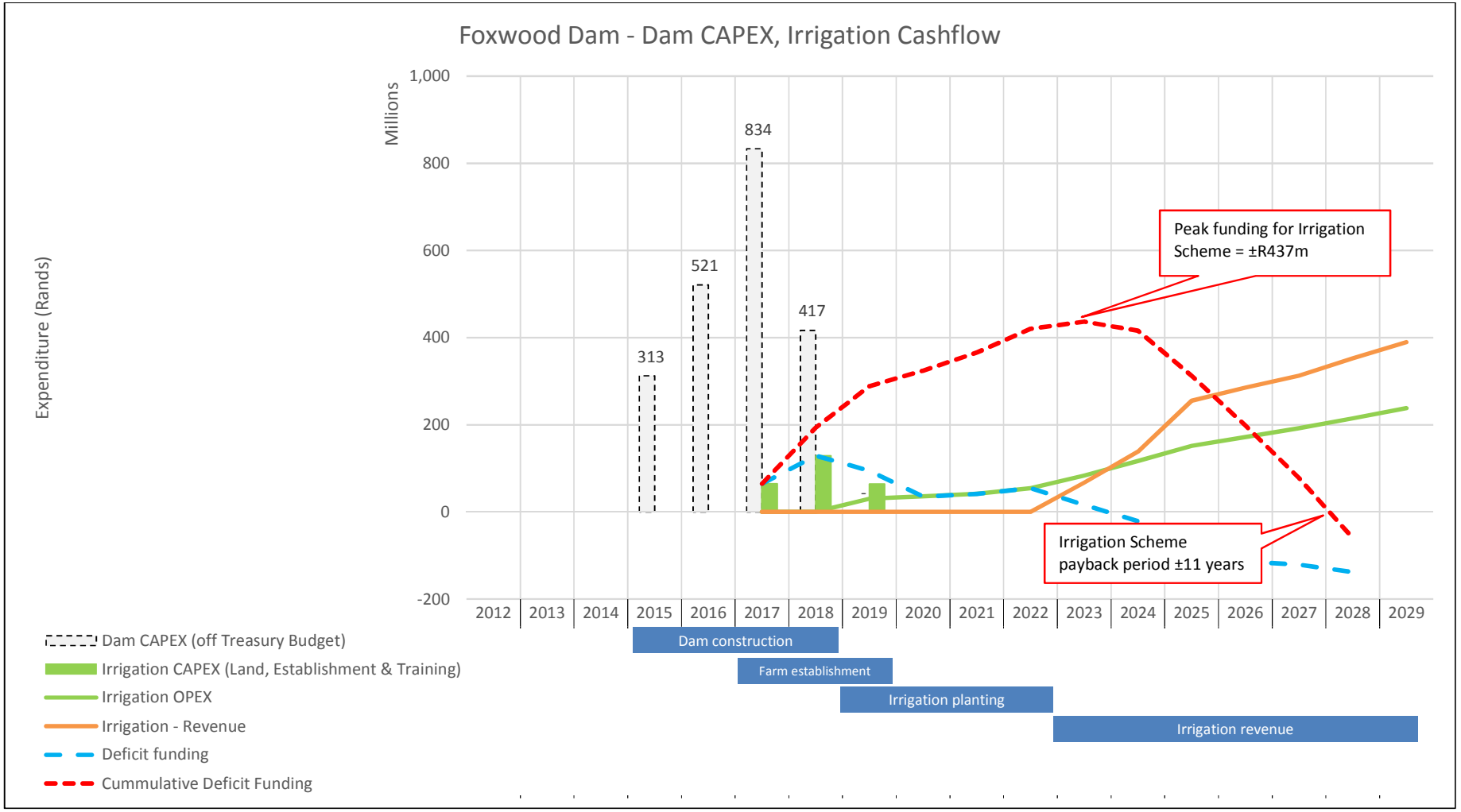


Figure 3: Projected dam CAPEX and Irrigation Scheme establishment cashflow

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

LIST OF ACRONYMS

ACRONYM	Full Description
ADM	Amathole District Municipality
AW	Amatola Water
BEE	Black Economic Empowerment
BFAP	Bureau for Food and Agriculture Policy
CBA	Cost Benefit Analysis
CEAS	Central Economic Advisory Service
DWS	Department of Water and Sanitation (formerly DWA)
ECBA	Economic Cost Benefit Analysis
ECSECC	Eastern Cape Socio Economic Consultative Council
EIA	Economic Impact Assessment
FTE	Full Time Equivalent – Relating to Employment
GDP	Gross Domestic Product
GGP	Gross Geographic Product
GVA	Gross Value Added
HFY	Historic Firm Yield
IDC	Industrial Development Corporation
IRR	Internal Rate of Return
NDP	National Development Plan
NFI	Net Farm Income
NPV	Net Present Value
SAM	Social Accounting Matrix
SMME	Small, Medium and Micro-size Enterprises
WMA	Water Management Area
WSA	Water Service Authority
WSP	Water Service Provider

Definitions of key financial and economic terminology is provided in Appendix A.

LIST OF UNITS

MEASURE	UNIT
Height	m.a.s.l.
Distance	m or km
Dimension	mm, m
Flow rate	l/s or m^3/s
Area	m^2, ha or km^2
Volume (storage)	m^3, million m^3

1 INTRODUCTION & BACKGROUND

The Department of Water and Sanitation is carrying out an investigation into the feasibility of developing a multi-purpose dam on the Koonap River outside of Adelaide in the Eastern Cape. The proposed site is known as the Foxwood Dam site. Investigations into the potential development of the water resource within the Koonap River Valley date back to the 1960's. The project is once again being considered due to the potential for the development of the water resource in this area to provide stimulus for development in the region in line with the objectives of the National Development Plan and the National Water Resource Strategy 2. Development of a dam at the Foxwood Dam site could provide additional assurance of water supply to improve resilience of domestic water supply within the region. In addition, development of a dam at the Foxwood site could provide additional assurance of supply of water for irrigation development in the region which may provide stimulus for socio-economic development when combined with agriculture and land reform policies.

A rendering of the feasibility design of the dam is shown in Figure 4 below. The Foxwood Dam site is located immediately upstream of Adelaide (coordinates 32˚40'30"S, 26˚16'0"E) in the Koonap River catchment indicated in Figure 5. The Koonap River catchment has a catchment area of 3 334 km², is situated in the Eastern Cape Province and lies within the Fish to Tsitsikamma Water Management Area (WMA). The location of Foxwood Dam within the context of Adelaide is shown in Figure 6. Adelaide is located within Nxuba Local Municipality (Nxuba) within the Amathole District Municipality (ADM). ADM is the Water Service Authority (WSA) responsible for water services in the Nxuba and Amatola Water (AW) is the Water Service Provider (WSP).

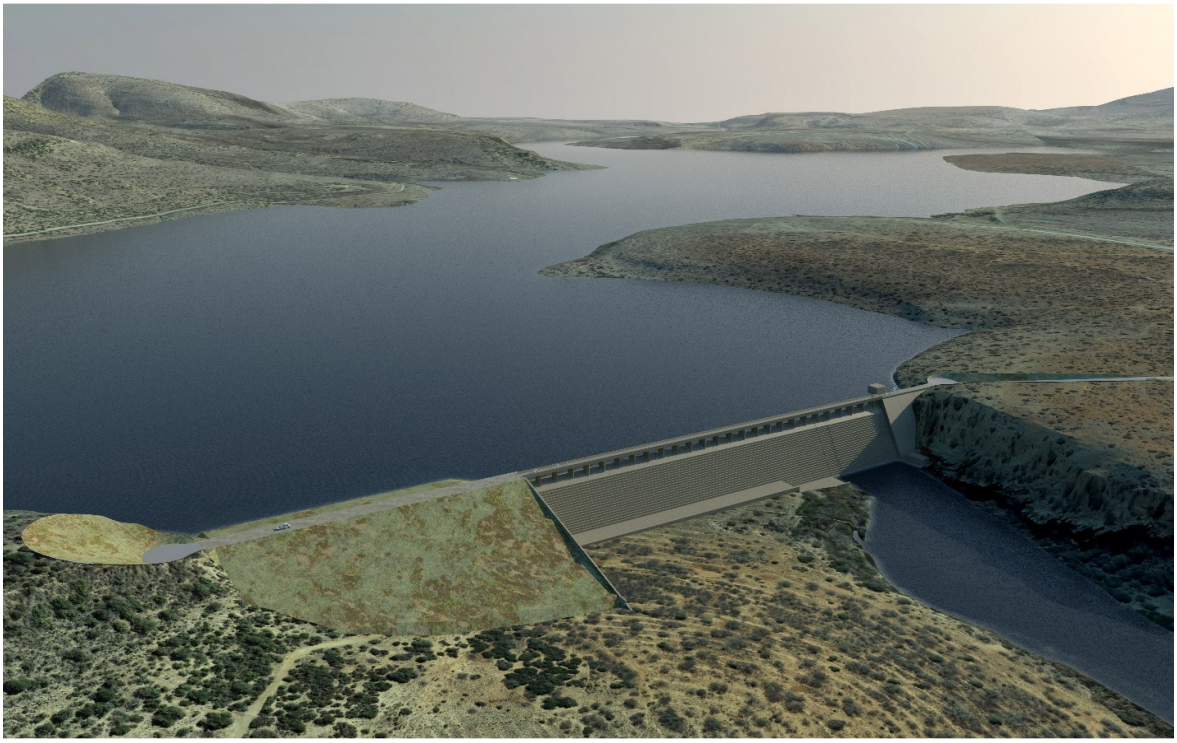


Figure 4: Rendering of the proposed Foxwood Dam

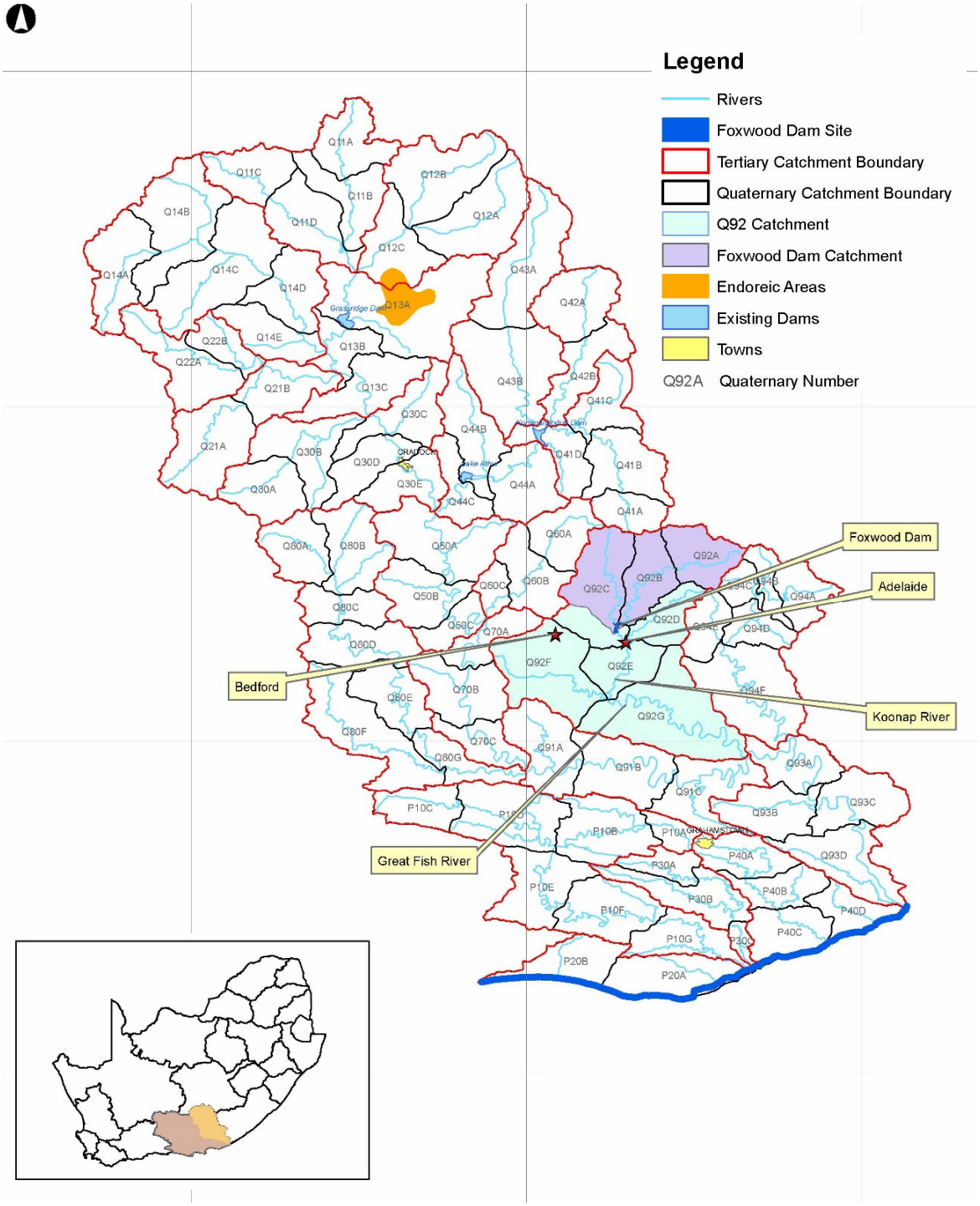


Figure 5: Fish River Catchment with Koonap River Sub-catchment

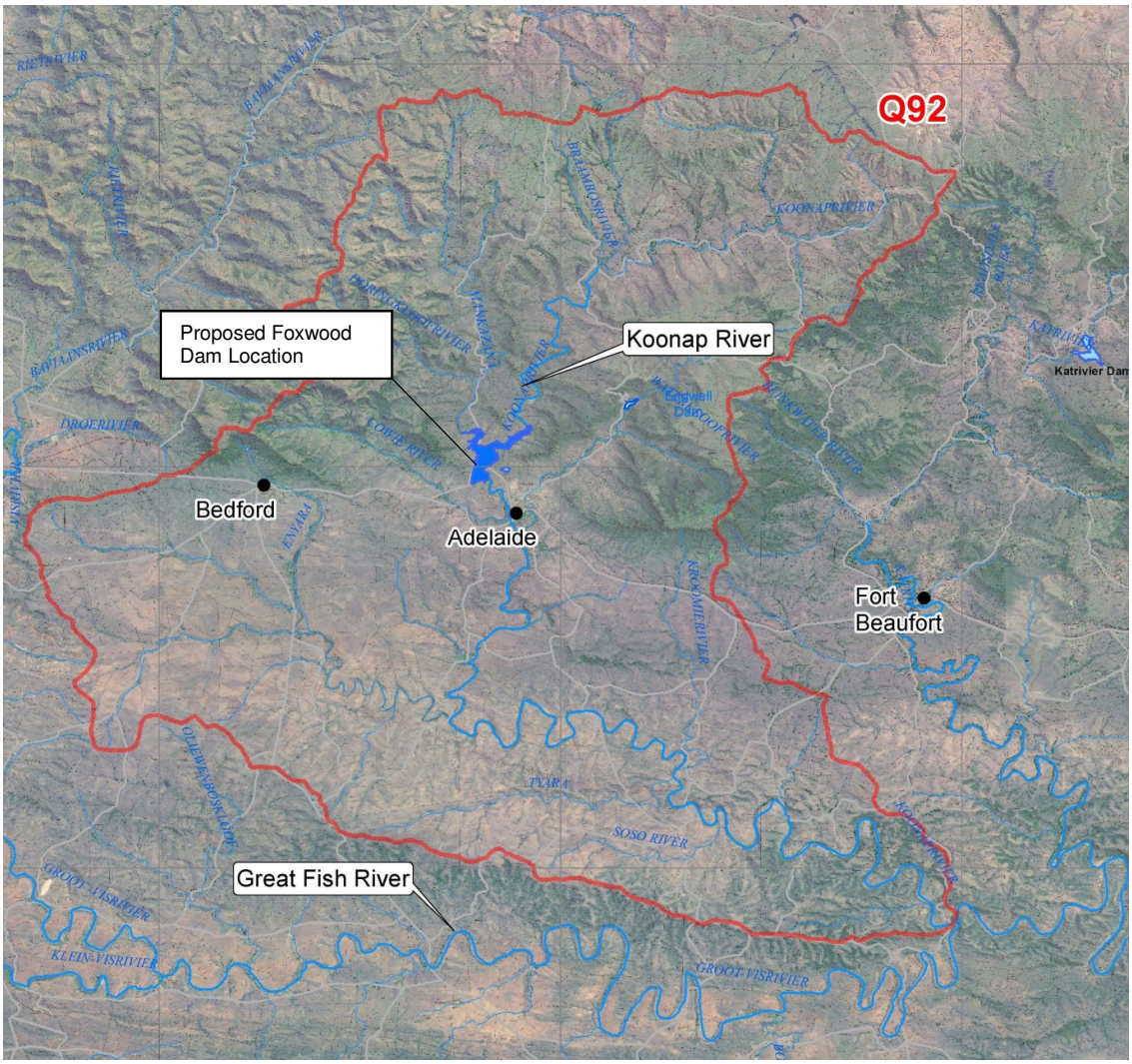


Figure 6: Koonap River Valley showing Adelaide, Bedford and Fort Beaufort

1.1 Economic Impact Assessment Process

The goal with any economic impact assessments is to arrive at an estimate of the incremental impact that the investment may have on the local economy. In other words, those changes that will not have occurred in the economy in the absence of the planned investment. The focus of this economic impact assessment has been to apply the project information and set up an economic impact simulation model to fully capture and assess the impact of the dam and its related activities on the local, regional and national economy. The impact assessment has addressed the quantification of, *inter alia*:

- Investment in infrastructure & capital projects
- Operational revenue streams
- Other relevant transaction flows
- Employment expenditure
- Operational expenditure
- Development spending

All of the above imply changes in the economy which have been identified and captured in an impact simulation model identifying impacts locally, regionally and nationally in terms of, *inter alia:*

- Increased production
- Increased revenue
- Small business impact
- Skills requirements
- Employment creation
- Increased taxes
- Sectoral impacts
- Poverty alleviation

The objectives of this assessment have been to:

- Substantiate whether there is a clear economic rationale for the project,
- Identify and quantify the economic consequences of all financial flows and other impacts of the project,
- Identify an appropriate 'no-project' scenario and calculate the associated economic flows, treating them as opportunity costs to the project,
- Detail the calculation for all inputs and outputs,
- Identify the economic benefits to BEE, and the opportunity costs to BEE of a 'no-project' scenario, and
- Provide a breakdown of the economic costs and benefits of the project into its financial costs and benefits and various externalities.

An economic impact 'Input-Output' methodology has been used for the Economic Impact Assessment of the construction and operation of the dam, and the economic impacts of the Irrigation Scheme have been determined over an initial ten year horizon, until both systems have reached stability.

1.2 Economic Impact Assessment Methodology for Foxwood Dam

A sequential project methodology has been developed and adopted through the following stages:

1. Carrying out of a ***Desktop analysis*** of previous and current work,
2. Interaction with ***agricultural experts*** and preliminary reports and initial findings,
3. The establishment of an ***ideal crop profile***, Yields, Capital and Operating costs, Funding requirements, Returns On Investment (ROI), Employment profiles, Wages payable, Profits that could be earned, Export potential for the various crops, Gross Value Added (GVA) profiles for farming,
4. Establishment of ***current agro-economic profile***,
5. Determination of the ***potential agro-economic profile*** with stabilised irrigation water from Foxwood dam,
6. ***Valuation of the costs and benefits*** over 15 years and produce IRR, NPV, Benefit Cost ratios for evaluation,
7. Determination of a **Cost Benefit Analysis (*CBA)*** for Capital Expenditure plus Operating Expenditure of the ***dam infrastructure*** construction and water sales income.

An analysis of these activities has allowed a detailed modelling framework to be compiled which allows the socio-economic benefits to be evaluated and for comparison to the base case, or if no irrigated agriculture were to be facilitated. The benefits and costs evaluated have been grouped under the following broad categories:

- Dam construction,
- Dam operation,
- Irrigated agriculture.

These have been evaluated against the current socio-economic baseline:

- Demographics and population growth,
- Employment and unemployment trends,
- Gross Value Added (GVA) for economic sectors,
- Employment per GVA sector,
- Evaluate project impact on socio-economic baseline:
- Opportunities for BEE in the value chain, and
- Upstream and downstream opportunities for the agro-industry. [National Development Plan etc.]

2 ECONOMIC IMPACT ASSESSMENT - DAM

The construction of the Foxwood Dam will have two significant economic impacts, with the first being the actual construction of the dam and the second being the economic benefits flowing from the use of the water provided.

The economic impact and Cost Benefit Analysis (CBA) methodology used in this report is based upon the Input-Output analysis and multipliers as used by the Industrial Development Corporation (IDC), with the most recent set of multipliers being benchmarked to the year 2010.

2.1 Economic Impact and Multipliers Used

Every aspect of the economy has direct linkages with another in the form of a backward linkage to the suppliers which it may need for the conduct of its business. These linkages result in additional expenditure being incurred in the economy which leads to a positive increase in a country's Gross Domestic Product (GDP), which is the sum of all economic activity which occurs within a time period, usually one calendar year.

A detailed explanation of the origin and importance of these impacts and multipliers is provided in Appendix C.

2.2 Dam Construction

The construction of the dam has been budgeted to cost **R 2 084 million** and construction is anticipated to take three years with the planning taking an additional year (giving a four year investment period) and having commenced in the current year of 2014.

- The GDP of the dam should be **R 2 235 million** with the majority of this expenditure taking place within the province of the Eastern Cape.

- The cumulative annual Full Time Equivalent (FTE) direct construction employment opportunities are expected to be **2 958** employment opportunity years over 4 years of construction with the peak occurring in the third year when **1 166** employment opportunities are created.

- The construction activities will result in utilities being consumed and both corporate and employee taxes being paid which could amount to **R 205 million** being paid over the construction period. These summarised figures are portrayed in the Table 3 below.

Table 3: Construction Economic Impacts for the Foxwood Dam

Economic Impact and Year:	Year 1	Year 2	Year 3	Year 4	TOTAL
Year	**2015**	**2016**	**2017**	**2018**	
Construction Impacts:					
Project / Construction Costs - Rm	313	521	834	417	2,084
Gross Domestic Product (GDP) Impact - Rm	335	559	894	447	2,235
Direct Employment - Jobs Per Year	474	759	1,166	559	2,958
Construction & Operations Impacts:					
Rates & Utilities Paid to the Munic. - Rm	4.8	8.2	13.3	7.3	40
Taxes Payable to the Fiscus - Rm	23.9	39.8	63.7	31.8	165

Source: Summary of Project Cost Benefit Analysis.

2.2.1 Gross Domestic Product Impacts

The anticipated construction profile has been applied to the IDC Input Output multipliers for the Civil Engineering sector, sector number 36 in their multiplier tables, after an allowance for imported goods leakage has been provided for in order to determine the GDP impact of the dam. The total GDP impact is R 2 235 million and this represents the total GDP impact on the project within South Africa. It is anticipated that **85%** of the GDP impact or R 1 899 million will be spent within the province, and **60%** of the total or R 1 329 million should be spent within the Nxuba municipality.

Table 4: Construction Gross Domestic Product Impacts for the Foxwood Dam

GDP & Employment Multipliers	Year 1	Year 2	Year 3	Year 4	TOTALS	
Construction - Rand Million	**2015**	**2016**	**2017**	**2018**		
Development Costs - (36 - Civil Engineering)	**312,63**	**521,05**	**833,67**	**416,84**	**2,084,19**	**100%**
After Leakage Effect (Imports):	297,00	494,99	791,99	396,00	1,979,98	95%
Initial Impact (GDP)	109,74	182,90	292,64	146,32	731,60	35%
Construction GDP Impact (Rand)	**335,25**	**558,75**	**894,00**	**447,00**	**2,235,00**	**107%**
- Direct Impact	173,74	289,57	463,31	231,66	1,158,29	52%
- Indirect Impact	61,89	103,16	165,05	82,53	412,63	18%
- Induced Impact	99,58	165,97	265,55	132,78	663,89	30%
- National - RSA	335,25	558,75	894,00	447,00	2,235,00	100%
- Province (% of SA)	284,96	474,94	759,90	379,95	1,899,75	85%
- Municipality (% of SA)	199,47	332,46	531,93	265,96	1,329,82	60%

2.2.2 Employment Impacts

The annual Full Time Equivalent (FTE) construction employment opportunities are expected to be 6 236 employment opportunity years for the full value chain with direct, indirect and induced jobs, with the direct jobs being 2 958 over the four year construction period. These values are derived by applying the IDC Water Supply sector multipliers against the capital expenditure for the project.

It is anticipated that **80%** of the FTE employment opportunities will be created within the province at 4 989, and that **68%** of these or 4 241 could be within the Nxuba. The majority of the employment opportunities will be mid-level or administrative and semi-skilled.

Table 5: Construction Employment Impacts for the Foxwood Dam

GDP & Employment Multipliers	Year 1	Year 2	Year 3	Year 4	TOTALS	
Construction - Rand Million	**2015**	**2016**	**2017**	**2018**		
Development Costs - (36 - Civil Engineering)	**312,63**	**521,05**	**833,67**	**416,84**	**2 084,19**	100%
After Leakage Effect (Imports):	297,00	494,99	791,99	396,00	1 979,98	95%
Initial Impact (GDP)	109,74	182,90	292,64	146,32	731,60	35%
Construction Employment (36 Civil Engineering)	**1 000**	**1 600**	**2 457**	**1 179**	**6 236**	**100%**
- National - RSA (Factor - Jobs per R 1 m)	**1 000**	**1 600**	**2 457**	**1 179**	**6 236**	**100%**
- Direct Employment	474	759	1 166	559	2 958	47%
- Indirect Employment	198	317	487	234	1 237	20%
- Induced Employment	327	524	804	386	2 041	33%
- Province (% of SA)	800	1 280	1 966	944	4 989	80%
- Municipality (% of SA)	680	1 088	1 671	802	4 241	68%

GDP & Employment Multipliers	Year 1	Year 2	Year 3	Year 4	TOTALS	
Construction - Rand Million	**2015**	**2016**	**2017**	**2018**		
Construction Employment Impact & Skills	**1 000**	**1 600**	**2 457**	**1 179**	**6 236**	**100%**
- High Level - Management	100	160	246	118	624	10%
- Mid-Level - Administrative	250	400	614	295	1 559	25%
- Semi-skilled - Labourers	650	1 040	1 597	767	4 053	65%

2.3 Dam Operation Costs and Revenue

The revenue profile for a dam is based upon the volume of water that it supplies and the tariff which it charges per cubic metre of water. In this instance the dam is a multi-purpose dam and will be supplying potable water to the residents of Adelaide and the surrounding rural communities, as well as supplying water for the irrigation of agricultural land to new and current farmers within the Koonap River Valley. There has been some debate as to the tariff that should be applied for the sale of Foxwood Dam water, with the traditional approach being a cost recovery based tariff which realises an acceptable Internal Rate of Return (IRR) over the expected life of the infrastructure. The costs to be recovered would be the initial capital expenditure as well as the annual operating costs, including the maintenance costs. This is discussed further in Section 3 below.

A tariff which adequately covers the operating cost component of the Foxwood Dam has been postulated and this has been set at R 0,60 /m^3 which is the Unit Reference Value of water yielded from the dam, when taking into account the cost of operation and maintenance (including major refurbishment) over the life of the dam, but excluding the capital cost of the dam. The revenue profile for the dam has been modelled on a tariff of R 0,60 /m^3, escalated by 4% per annum and based upon a maximum supply of 19,1 million m^3/a from the sixth year of operation of the dam.

The revenue profile, operating costs and profitability of the dam up to year 10 – by which time full take of water has been assumed – have been projected in Table 6 below based upon the assumptions above. The civil and mechanical & electrical operating and maintenance costs are 0,25% and 4% of the capital value of the dam in accordance with guidance in the Vaal Augmentation Planning Study.

Table 6: Revenue and Operating Costs Profile for the Foxwood Dam

	2019	2020	2021	2022	2023	2024
Economic Impact and Year:	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**
Operating Revenue (Water Sales)	**6 070 000**	**7 259 720**	**8 682 625**	**10 384 420**	**12 419 766**	**14 105 509**
Water Delivered in m^3	10 000 000	11 500 000	13 225 000	15 208 750	17 490 063	19 100 000
Tariff per m^3	0,6070	0,6313	0,6565	0,6828	0,7101	0,7385
Operating & Maintenance Costs (OPEX)	**7 001 283**	**7 281 334**	**7 572 588**	**7 875 491**	**8 190 511**	**8 518 131**
Civil Costs	2 927 809	3 044 921	3 166 718	3 293 387	3 425 122	3 562 127
Maintenance & E Costs	4 073 474	4 236 413	4 405 869	4 582 104	4 765 388	4 956 004
Other Operating Costs						
Project Operating Revenue	**(931 283)**	**(21 614)**	**1 110 037**	**2 508 928**	**4 229 255**	**5 587 377**

2.3.1 Gross Domestic Product Impacts

The revenue profile has been applied to the IDC Input Output multipliers for the 'Water Supply' sector in order to determine the Gross Domestic Product impacts of the project, after an allowance for leakage, or a reduction in GDP, due to imported services and components of 5% has been provided for.

By year ten, which is the sixth year of operation of the dam and the point at which it has attained its full capacity the escalated revenue is R 14,11 million with an initial GDP impact of R 5,14 million. The full GDP impact is 117% of revenue for this sector and in year ten this is R 16,55 million, and 50% of this or R 8,31 million is direct impact.

Table 7: Operations GDP Economic Impacts for the Foxwood Dam

Operations (34 - Water Supply)	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten Year	
Rand Million	**2019**	**2020**	**2021**	**2022**	**2023**	**202**	**TOTALS**	
Operations Revenue/Expenditure - Rm:	**6,07**	**7,26**	**8,68**	**10,38**	**12,42**	**14,11**	**58,92**	**100%**
After Leakage Effect (Imports):	5,61	6,72	8,03	9,61	11,49	13,05	54,50	93%
Initial Impact (GDP)	2,21	2,65	3,17	3,79	4,53	5,14	21,48	36%
Operations GDP Impact	**7,12**	**8,52**	**10,19**	**12,18**	**14,57**	**16,55**	**69,13**	**117%**
- Direct Impact	3,58	4,28	5,11	6,12	7,32	8,31	34,71	50%
- Indirect Impact	1,44	1,72	2,06	2,46	2,95	3,35	13,99	20%
- Induced Impact	1,58	1,89	2,26	2,70	3,23	3,67	15,32	22%
- National - RSA	7,12	8,52	10,19	12,18	14,57	16,55	69,13	100%
- Province (% of SA)	6,77	8,09	9,68	11,57	13,84	15,72	65,67	95%
- Municipality (% of SA)	5,75	6,88	8,23	9,84	11,77	13,36	55,82	81%

2.3.2 Employment Impacts

The Full Time Equivalent (FTE) employment opportunities have been determined with reference to the IDC Input Output multipliers for the 'Water Supply' sector. By the sixth year of operations and once full capacity has been attained it is estimated that 19 FTE employment opportunities will be in place, with 6 of these being direct employment opportunities. It would be likely that the direct employment opportunities may not be local, but the indirect and induced jobs would in all likelihood be within Nxuba municipal area.

Table 8: Operations Employment Economic Impacts for the Foxwood Dam

Operations (34 - Water Supply)	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten Year	
Rand Million	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**TOTALS**	
Operations Revenue/Expenditure - Rm:	**6,07**	**7,26**	**8,68**	**10,38**	**12,42**	**14,11**	**58,92**	**100%**
Operations Employment - FTE	10	11	13	15	17	19	85	100%
- National - RSA	10	11	13	15	17	19	85	100%
- Direct Employment	3	3	4	5	5	6	26	30%
- Indirect Employment	2	3	3	4	4	5	21	25%
- Induced Employment	4	5	6	7	8	8	38	45%
- Province (% of SA)	9	10	12	13	15	17	76	90%
- Municipality (% of SA)	8	9	11	12	14	15	69	81%
Operations Employment Impact & Skills	**10**	**11**	**13**	**15**	**17**	**19**	**85**	**100%**
- High Level - Management	1	1	2	2	2	2	10	12%
- Mid-Level - Administrative	2	2	2	3	3	3	15	18%
- Semi-skilled - Labourers	7	8	9	10	12	13	59	70%

Note: The calculated values derived in the table above are calculated using the IDC multipliers based to 2010 and devalued by inflation to arrive at present day real values.

2.4 Dam Construction and Operations - Taxation Impacts

Assuming that the operation of the Foxwood Dam is a taxpaying entity, then the taxation to the state would be an amount of R 164,89 million over the first ten years of the projects life, which would be four years of construction and six years of operation. The municipal rates and utility revenue would be R 39,96 million over the same period, with the combined fiscal revenue being R 204,85 million, which represents 9,6% of the combined capital expenditure and operating revenue for the first ten years.

Table 9: Construction and Operations Taxation Impact for the Foxwood Dam

Foxwood Dam - Adelaide	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten Year
PROJECT REVENUE & TAXATION - Rm	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**TOTALS**
Employment Tax	**9,38**	**15,63**	**25,01**	**12,51**	**0,27**	**0,32**	**0,38**	**0,46**	**0,55**	**0,62**	**65,12**
National Company Tax Paid	**14,51**	**24,18**	**38,68**	**19,34**	**0,32**	**0,38**	**0,45**	**0,54**	**0,65**	**0,73**	**99,77**
National Tax Paid (Employ & Co.)	**23,88**	**39,81**	**63,69**	**31,85**	**0,58**	**0,70**	**0,83**	**1,00**	**1,19**	**1,35**	**164,89**
Municipal Revenue Paid	**4,85**	**8,23**	**13,34**	**7,29**	**1,04**	**1,04**	**1,04**	**1,04**	**1,04**	**1,04**	**39,96**
Total Fiscal Revenue	**28,73**	**48,04**	**77,03**	**39,14**	**1,62**	**1,74**	**1,88**	**2,04**	**2,23**	**2,40**	**204,85**

2.5 Summarised Construction and Operations Economic Impact

The combined GDP economic impact for the construction and operation of the Foxwood Dam is indicated in the Table 10 below, with sustainable GGP (the portion of GDP that is within the municipality) being R 13 million by the tenth year and after six years of operations.

Table 10: Summarised Construction and Operations GDP Impact for the Foxwood Dam

CONSOLIDATED INFORMATION:	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	Ten Year
Total Project GDP Impact: - SA (Rand M)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Totals**
Initial Project Value / Revenue:	**313**	**521**	**834**	**417**	**6**	**7**	**9**	**10**	**12**	**14**	**2 143**
Initial GDP Impact	110	183	293	146	2	3	3	4	5	5	753
Total GDP Impact	**335**	**559**	**894**	**447**	**7**	**9**	**10**	**12**	**15**	**17**	**2 304**
- Direct Impact	174	290	463	232	4	4	5	6	7	8	1 193
- Indirect Impact	62	103	165	83	1	2	2	2	3	3	427
- Induced Impact	100	166	266	133	2	2	2	3	3	4	679
Total Project GDP Impact: - SA (Rand m)	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Totals**
Construction	335	559	894	447	-	-	-	-	-	-	2 235
Maintenance	-	-	-	-	-	-	-	-	-	-	-
Operations	-	-	-	-	7	9	10	12	15	17	69
Totals:	335	559	894	447	7	9	10	12	15	17	2 304
Total GGP Impact: - Municipal Area (Rand m)											
Construction	199	332	532	266	-	-	-	-	-	-	1 330
Maintenance	-	-	-	-	-	-	-	-	-	-	-
Operations	-	-	-	-	6	7	8	10	12	13	56
Totals:	199	332	532	266	6	7	8	10	12	13	1 386
% of National GDP Impact experienced in municipality	60%	60%	60%	60%	81%	81%	81%	81%	81%	81%	60%
Sustained GGP in Municipality	**-**	**-**	**-**	**-**	**6**	**7**	**8**	**10**	**12**	**13**	**56**

The combined employment impact for the construction and operation of the Foxwood Dam is indicated in Table 11 below, with sustainable employment within the Nxuba municipal area being 15 FTE employment opportunities by the tenth year and after six years of operations.

Table 11: Summarised Construction & Operations Employment for Foxwood Dam

Total Employment Impact: - South Africa	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Totals
	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	10 Years
South Africa											
Construction	1 000	1 600	2 457	1 179							6 236
Operations					10	11	13	15	17	19	85
Totals:	**1 000**	**1 600**	**2 457**	**1 179**	**10**	**11**	**13**	**15**	**17**	**19**	**6 321**
Nxuba Municipality											
Construction	680	1 088	1 671	802							4 241
Operations					8	9	11	12	14	15	69
Totals:	**680**	**1 088**	**1 671**	**802**	**8**	**9**	**11**	**12**	**14**	**15**	**4 309**
% of National Project Employment experienced in municipality	68%	68%	68%	68%	81%	81%	81%	81%	81%	81%	68%
Sustained Employment in Municipality					**8**	**9**	**11**	**12**	**14**	**15**	**69**

The graphs below illustrate the projected GDP growth and job creation from the construction and operation of Foxwood Dam, both at the National level and within Nxuba Local Municipality.

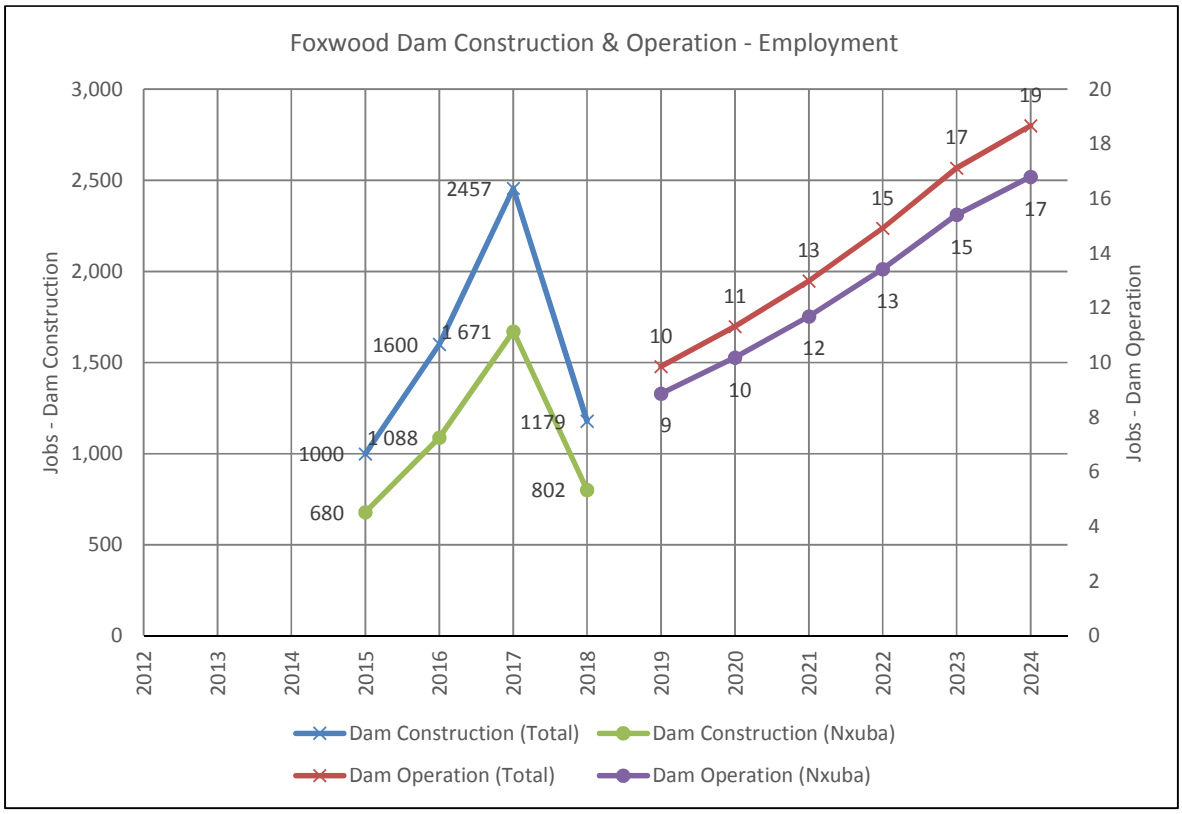


Figure 7: Foxwood Dam Construction & Operation Employment

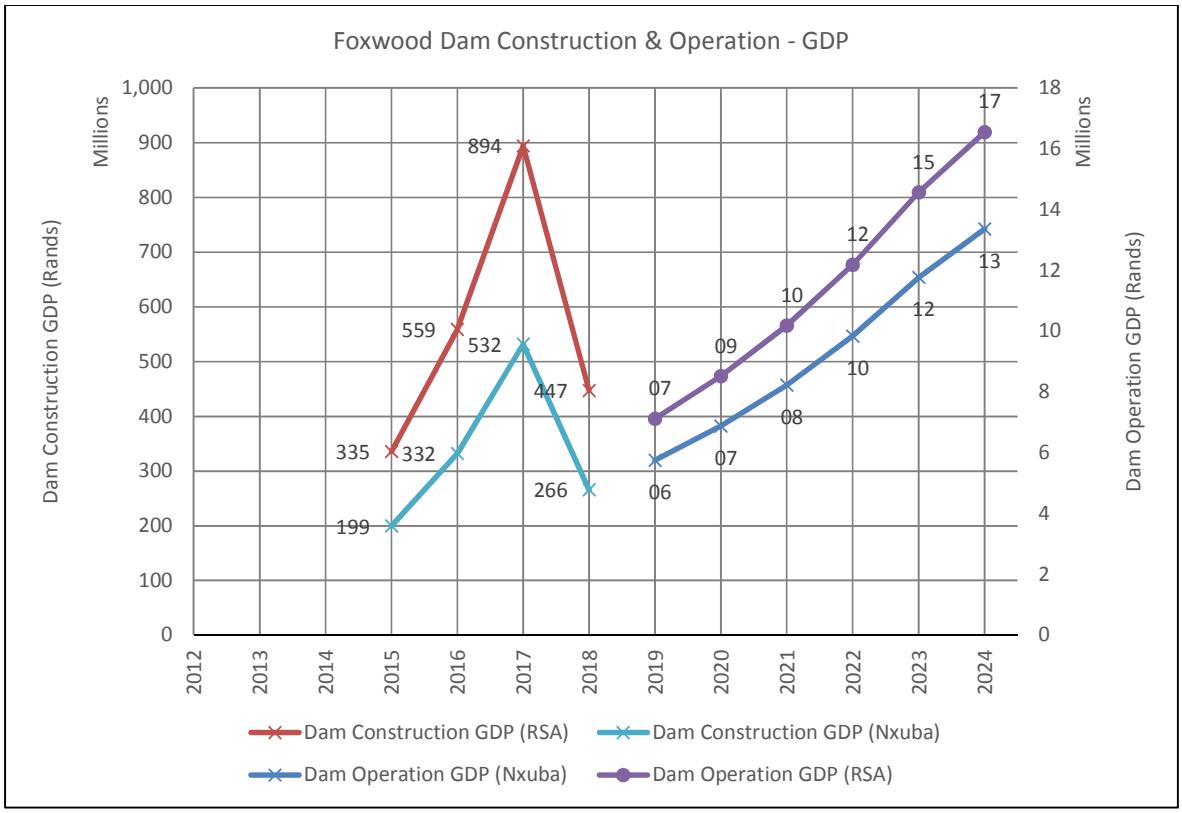


Figure 8: Foxwood Dam Construction & Operation GDP

3 COST OF WATER

The NWRS2 recognises that further development of surface water resources in South Africa to increase available yields will be expensive relative to historic costs of water. The Unit Reference Value (URV) is a common measure in South Africa to assess the economic efficiency of proposed water projects. To determine the URV of a particular scheme, the water supplied (i.e. the primary benefit derived from it) is projected over the same period and 'discounted' at the same rate to derive a 'present value' in cubic meters. The URV of the scheme is derived by dividing the present value of the costs with the present value of the water supplied, as shown in the equation below.

$$URV = \frac{Present\ Value\ of\ Costs}{Present\ Value\ of\ Quanity\ of\ Water\ Supplied}$$

The URV for the proposed Foxwood Dam has been calculated (see Appendix E) and the results given in the table below for a range of discount rates:

Table 12: URV for Water from Capital, Operational & Refurbishment Costs

Discount Rate	Unit Reference Value (R/m^3)
6,0%	8,96
8,0%	11,77
10%	14,96

Assuming a discount rate of 8%, the URV for water yielded by Foxwood Dam would be R 11,77 /m^3. This value provides a reference value to reflect the expense of the water that would be yielded by the proposed Foxwood Dam and to allow comparison against other potential water resource development projects in South Africa.

However, it is assumed that the capital cost of the Foxwood Dam project would be funded as it is not financially feasible for an Irrigation Scheme to afford water at that price. Nevertheless, it may be reasonable for the Irrigation Scheme to be expected to cover the future cost of water from Foxwood Dam resulting from the operational, maintenance and refurbishment costs for the dam over its life. Table 13 below gives the result for the URV calculation allowing for operational, maintenance and refurbishment costs of the dam only. **Assuming a discount rate of 8%, the URV for water yielded by Foxwood Dam has been taken as R 0,60 /m^3.** This figure has been assumed in the economic assessment of the dam construction as well as the Irrigation Scheme (DWS 2015a). The final water price must be determined by DWS in line with the national water pricing strategy.

Table 13: URV for Water from Operational, Maintenance and Refurbishment Costs

Discount Rate	Unit Reference Value (R/m^3)
6,0%	0,619
8,0%	0,608
10%	0,602

4 ECONOMIC IMPACT ASSESSMENT – IRRIGATED AGRICULTURE

As part of the Feasibility Study for Foxwood Dam, an investigation into the potential for irrigation development has been carried out, building on information available from previous studies. Within this investigation, a potential Irrigation Scheme has been postulated with various crop types and farm sizes being compared. Full details of the proposed agricultural development including financial information is provided in the Agro-Economic study report (DWS, 2015a). The summary outputs from the Irrigation Scheme financial model are reproduced in this report for inclusion in the economic impact assessment of the proposed dam construction and Irrigation Scheme.

4.1 Farm Income

When reviewing the economic impact of an agricultural scheme, it is important to review the current background and policy to agriculture in South Africa. A review for the current Agriculture situation in South Africa is included in Appendix D. Key relevant points are:

- The National Development Plan (NDP) provides for 'An integrated and inclusive Rural Economy',
- The NDP sees water as a critical strategic resource,
- The Governments land reform process over the past 20 years has not been as successful as anticipated,
- There has been a general decline in agricultural production in South Africa,
- After the De Doorns agricultural labour unrest in 2012 a comprehensive review of farm wages was undertaken in South Africa,
- This review proposed that an average daily wage of R 104,00 per day would be the norm, and,
- The target mean Net Farm Income (NFI) should be R 300 000 per farm per annum, irrespective of the actual size.

These figures have been escalated and used in the financial modelling for this report.

4.2 Irrigation Development Potential

The Agro-Economic study has investigated further into the crop types and farm sizes which could be accommodated within the Koonap River valley. The crops that have been investigated are lemons, peaches and macadamia nuts. For each crop type three scale scenarios have been investigated for farm size, with these being one hectare, twenty hectare and fifty hectare plots. Typically the employment profiles for the valley remain constant for each option, but the profitability tends to vary with the larger farms being more profitable due to the economies of scale which can be harnessed. It is noted that when the irrigation scheme is implemented, it will be necessary to consider combinations of crop types and farm sizes.

A 1 250 ha has been modelled and it is noted that due to land constraints in area, it is assumed that of the order of 13 000 ha will need to be purchased to develop 1 250 ha of irrigable land.

The revenue potential and input costs for one hectare of each crop has been determined and then financial models produced for all nine scenarios. The price for water used has been **R 0,60 /m^3** as noted in section 3.

To determine the total establishment cost (or financing that would need to be provided to establish an economically self-sustaining Irrigation Scheme) the cumulative deficit funding is calculated. The cumulative deficit funding is the total input costs during farm operation (management and employee salaries and operational spending on farming activities) less all revenue generated up until the year when no further deficit funding is required (ie when revenue generated exceeds

input costs.) The breakdown of peak funding is provided in Table 14 below. Refer to the Agro-Economic Study report for the complete financial data (DWS, 2015a).

IRR is also calculated (at Year 15) as an indicator of the time-value of money. The IRR calculates what the rate of return would have to be to make the NPV equal to zero (breakeven or an acceptable investment at the Discount Rate used.) A 15 year period is selected as it is indicative of the long term performance of the scheme after the farming operations have reached their steady state.

Table 14: Peak funding to reach self-sustaining farming operations (Rands)

		Capital Expenditure			Operational Expenditure		
		Land purchase	**Mentoring & training**	**Farm establishment**	**Working capital (Cumulative deficit funding)**	**Peak funding**	**IRR (@ year 15)**
1 ha	Lemons	130 000 000	20 700 000	126 281 250	472 898 047	749 879 297	-9,63
	Peaches	130 000 000	20 700 000	156 975 000	403 001 252	710 676 252	4,53
	Macadamias	130 000 000	20 700 000	133 692 500	528 507 135	812 899 635	0,79
	Average	**130 000 000**	**20 700 000**	**138 982 917**	**468 135 478**	**757 818 395**	**-1,44**
20 ha	Lemons	130 000 000	2 880 000	125 271 000	147 734 717	405 885 717	9,11
	Peaches	130 000 000	2 880 000	155 719 200	135 177 201	423 776 401	8,87
	Macadamias	130 000 000	2 880 000	132 822 960	186 831 509	452 534 469	6,47
	Average	**130 000 000**	**2 880 000**	**137 937 720**	**156 581 142**	**437 398 862**	**8,15**
50 ha	Lemons	130 000 000	2 325 000	126 281 250	163 387 626	421 993 876	7,33
	Peaches	130 000 000	2 325 000	156 975 000	123 944 219	413 244 219	9,31
	Macadamias	130 000 000	2 325 000	133 692 500	173 684 300	439 701 800	8,23
	Average	**130 000 000**	**2 325 000**	**138 982 917**	**153 672 048**	**424 979 965**	**8,29**

Note: It is important to note that the relatively high working capital requirements for the one hectare farms are occasioned by the R 60 000 annual management fee that is allocated to the farmer or management.

The highest IRR achieved is 9,11% for the 20 hectare lemon farm, with the lowest IRR being -9,63% for a one hectare lemon farm. The 20 hectare lemon farm also has the lowest peak funding requirement at R 405 million for the whole agriculture scheme. Generally the table tells us that higher yields are achieved when economies of scale are harnessed through the 20 and 50 hectare farming operations, with lemons having the highest yield for 20 hectares and peaches the highest yield for 50 hectares. For the purpose of carrying out the economic impact assessment, the mean values across all three crop types have been calculated for the 20 ha scenario. The resulting economic indicators resulting from the 1 250 ha Irrigation Scheme divided into 20 ha plots are summarised in Table 15 below.

Table 15: Economic Indicators for Twenty Hectare Farming Operation

Financial data (averaged for 1 250 ha scheme for all crops)	1 250 ha irrigation scheme	Comment
Peak funding (ZAR) (4-5 year timeframe)	437 398 862	The peak funding that Government would need to provide
Internal Rate of Return (IRR) @ year 15	8,15%	The IRR that would be achieved by year 15
Accumulated retained earnings by year 15 (ZAR)	315 284 832	These earnings indicate whether the business is worth pursuing over the medium to long term
Revenue potential in year 10 (ZAR)	389 531 163	The revenue potential of the farming operation once it is in full production.
Profit earned in year 10 (ZAR)	56 651 682	Substantially more than R300k 'success' benchmark per farm (which is R 18 million for all farms)
Wages earned by year 10 (ZAR)	41 830 135	The wages earned by the farm workers.
Total direct employment (including farmer) per scenario) in year 10	1 934	Back calculated from wages, based on average daily wage per labourer of R 104.00
Total indirect & induced employment in year 10	728	Based on IDC ratio of 0.38 relative to direct jobs created
Taxation paid in year 10 (ZAR)	25 427 326	The taxes paid to the national fiscus by the farming operation
Potential beneficiation in year 10 (ZAR)	352 237 752	Assumed multiplier of potential beneficiation: 1.75 times
Gross Domestic Product in year 10 (ZAR)	503 196 788	Assumed multiplier of 'All' GDP impact 2.50 times
Export potential in year 10 (ZAR)	150 959 036	Assumed % of revenue exported: 50% Assumed % price improvement of: 150%

It is estimated that the development of a 1 250 ha Irrigation Scheme in the Koonap River valley could generate of the order of **1 934 direct jobs** in the local municipality, stimulate approximately **ZAR 503 million of GDP** contribution with estimated **taxation paid of ZAR 25 million**. The majority of economic indicators have been taken at year 10 as this is indicative of the cashflow of the farming operation once it has reached fully maturity. The IRR is calculated at year 15 as an indication of the longer term economic viability of the scheme.hy

4.2.1 Project Funding Cashflow

Figure 9 below illustrates the modelled cash flow for expenses incurred and revenue generated by the Irrigation Scheme and projects the likely timeframe over which the funding could be paid back. It is expected that approximately **R 437 million** of total funding from government will be required over a period of approximately **7 years** until the point where revenue from the scheme exceeds expenses and repayment of the funding can commence. It is then expected that over a further **5 years** the Irrigation Scheme will generate sufficient revenue to payback the funding.

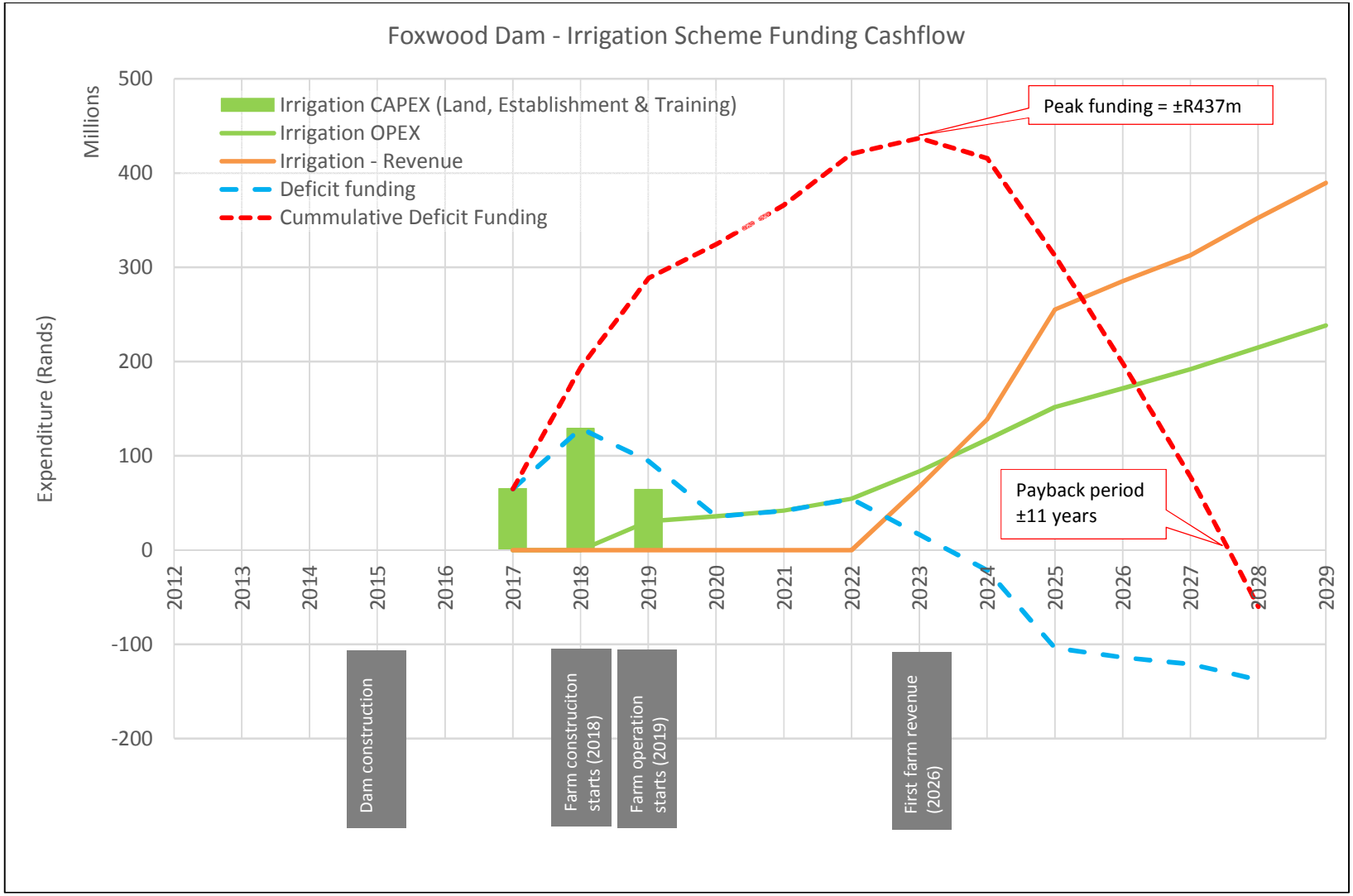


Figure 9: Foxwood Dam Irrigation Scheme Cashflow

5 DEMOGRAPHIC PROFILE – NXUBA LOCAL MUNICIPALITY

To assess the impact of this development on the municipality, this section identifies the baseline situation in Nxuba Local Municipality. The economic outputs from the Irrigation Scheme are then compared to this baseline to measure the difference the proposed development would have on activity in Nxuba municipality.

The demographic profile as provided in this chapter is used in the following section to determine the population, employment and agricultural economy baseline and projections in order to evaluate the economic impact of the Foxwood Dam and the associated irrigated agriculture.

Adelaide and the Foxwood Dam are situated in the Nxuba Local Municipality, which is one of seven local municipalities within the Amathole District Municipality (ADM), situated within the Eastern Cape Province. Nxuba is classed as a Category B3 (small towns, agricultural) local municipality, reflecting limited institutional capacity and areas characterised by small centres, limited Small, Medium and Micro-sized Enterprises (SMMEs) and market opportunities, and greater dependence on public support. Nxuba comprises of the towns of Bedford and Adelaide and surrounding rural areas.

A summary of the more detailed demographic report is contained in Appendix B.

5.1 Socio-economic Baseline for Nxuba Municipality

The administrative seat for Nxuba is in Adelaide. The urban population is mainly located in the two small towns of Adelaide and Bedford. The Nxuba Local Municipality is a product of the amalgamation of the now dis-established Adelaide TLC & Bedford TLC and surrounding farm areas. It is situated in the Winterland of the Eastern Cape under the jurisdiction of Amatole District Municipality. The municipality is approximately 230 kilometres from Port Elizabeth and approximately 200 kilometres from East London and represents an area of approximately 274 945,79 hectares.

The population for Nxuba Local Municipality was 23 177 in 2010 with the town of Adelaide population being 10 714 in 2013, or 46,2% with both of these figures anticipated to have remained in alignment with one another over the intervening two years.

5.1.1 Socio-economic Baseline for Nxuba Municipality

The Gross Value Added (GVA) for a region is the level of economic activity which is recorded for the various economic sectors and over a period of time it provides a useful gauge of the expanding and declining sectors within a regional economy, as well as the dominant sectors within that economy. GVA is used to calculate GDP as GDP is equal to GVA plus taxes on products less subsidies.

The Global Insight data used indicates that for the year 2011 the GDP for Nxuba was R 272 million, with agriculture being the second largest sector after community services at R 37,2 million and 13,6% of the economy. Agriculture has declined by 2,2% over the past decade and the financial sector has shown the highest growth at 87%. This is indicated in Table 16 below.

Table 16: GVA / GDP Per Economic Sector for Nxuba LM (Constant 2005 Prices)

GVA Per Economic Sector (R 1000's	2001	2011	% of Total	
1 Agriculture	**38 003**	**37 169**	**13,6%**	**-2,2%**
2 Mining	0	0	0,0%	0,0%
3 Manufacturing	3 626	3 538	1,3%	-2,4%
4 Electricity	0	0	0,0%	0,0%
5 Construction	2 400	4 032	1,5%	68,0%
6 Trade	17 300	18 233	6,7%	5,4%
7 Transport	65	57	0,0%	-12,8%
8 Finance	17 070	31 941	11,7%	87,1%
9 Community services	113 301	151 523	55,6%	33,7%
Total Industries (GVA)	**191 766**	**246 492**	**90,4%**	**28,5%**
Taxes less Subsidies on products	**21 263**	**26 189**	**9,6%**	**23,2%**
Total (Gross Domestic Product - GDP)	**213 029**	**272 681**	**100,0%**	**28,0%**
Source: Global Insight data supplied by ECSECC, November 2012				

The employment profile for Nxuba indicates that during 2011 there were 3 511 people employed of which 1 313 where employed in the agricultural sector, or 37,4% of all employees, a decline of 16,5% over the past decade, which tends to indicate a level of mechanization as the employment has decreased more substantially than the GVA. The largest real growth has occurred in the Community Services sector at 49% which indicates the success of the Governments employment policies. This is indicated in Table 17 below.

Table 17: Employment Per Economic Sector for Nxuba LM

Employment per Economic Sector	2001	2011	% of Total	10 yr Growth
1 Agriculture	**1 572**	**1 313**	**37,4%**	**-16,5%**
2 Mining	0	0	0,0%	0,0%
3 Manufacturing	36	26	0,7%	-27,4%
4 Electricity	0	0	0,0%	0,0%
5 Construction	101	107	3,1%	6,3%
6 Trade	334	284	8,1%	-14,8%
7 Transport	15	28	0,8%	87,4%
8 Finance	31	58	1,7%	87,7%
9 Community services	856	1 276	36,3%	49,0%
10 Households	335	418	11,9%	24,9%
Total	**3 279**	**3 511**	**100,0%**	**7,1%**
Source: Global Insight data supplied by ECSECC, November 2012				

The population for the town of Adelaide for the various residential areas including the non-urban areas has been sourced to Quantec Data courtesy of UrbanEcon for the year 2013. The main residential areas in the town of Adelaide are indicated in Figure 10 below:

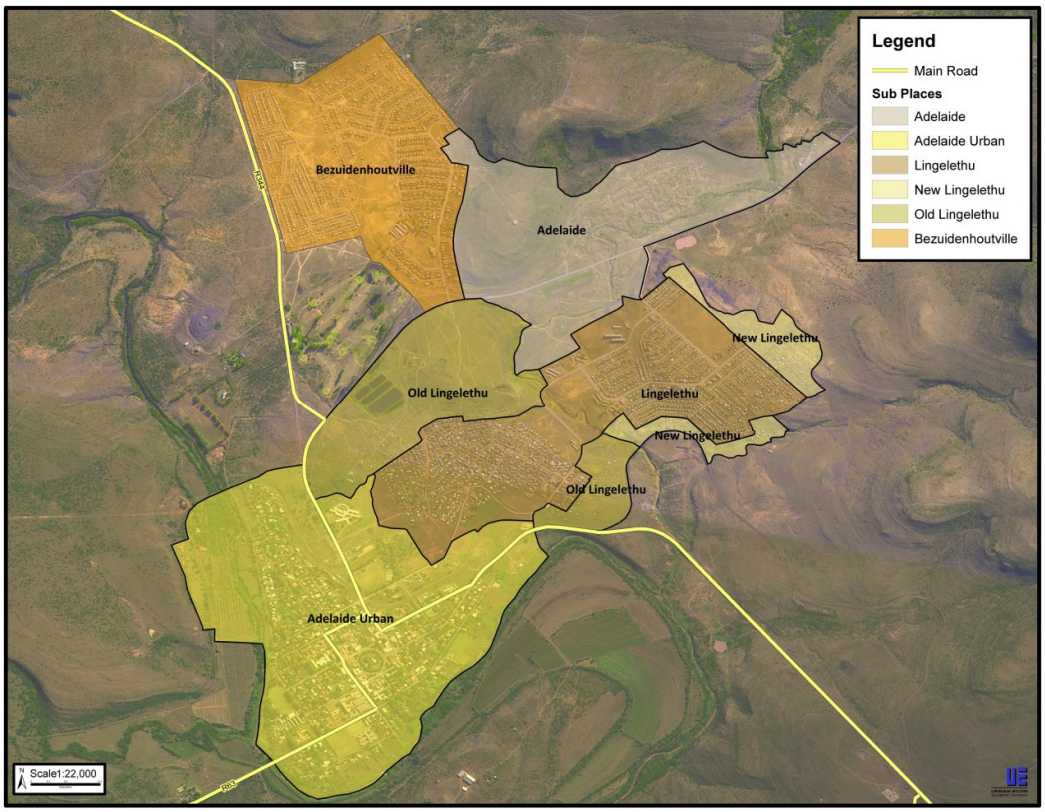


Figure 10: Adelaide Residential Areas.

A fifteen year population projection has been prepared based upon the assumption that it will take five years to approve and construct the Foxwood Dam and then a further ten years for the irrigated agriculture to reach full productive capacity and therefore attain its full employment and GVA potential. The population projections for Adelaide are indicated in Table 18 below. Although the census data indicates a negative population trend, a growth factor of 1% per annum has been assumed for the baseline to ensure a conservative analysis.

Table 18: Projected Population Growth for Nxuba

Year - Dam Project	-1	0	1	5	10	11	12	13	14
Year - Agriculture				**1**	**6**	**7**	**8**	**9**	**10**
Year - Calendar	**2013**	**2014**	**2015**	**2019**	**2024**	**2025**	**2026**	**2027**	**2028**
Adelaide (Urban)	1 303	1 303	1 303	1 342	1 411	1 425	1 439	1 454	1 468
Bezuidenhoutville	2 052	2 052	2 052	2 114	2 222	2 244	2 267	2 290	2 312
Lingelethu SP	5 941	5 941	5 941	6 121	6 434	6 498	6 563	6 628	6 695
New Lingelethu	673	673	673	693	729	736	743	751	758
Old Lingelethu	634	634	634	653	686	693	700	707	714
Adelaide (Non-Urban)	111	111	111	115	120	122	123	124	125
Totals	**10 714**	**10 714**	**10 714**	**11 039**	**11 602**	**11 718**	**11 835**	**11 953**	**12 073**
Growth Rate p.a.		0,0%	0,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
Note: Although UrbanEcon have projected a negative population growth rate, it is anticipated that with the									
Foxwood Dam there will be a reversal of this trend over and above the irrigated agriculture potential.									

5.1.2 Settlement Dynamics

Three distinctive areas are identified with these being the two urban nodes, rural hinterland and the high-lying hinterland.

Rural Hinterland:

The rural hinterland forms part of the Nxuba Municipal area, where a relatively small proportion of the population reside. Due to the fact that farming plays a major role in the economic growth of the Nxuba Municipal area, there is a need to promote diversification of the rural economy and to promote the policy of protecting the best quality agricultural land for development where ever possible.

High lying Hinterland:

This area is mainly characterised by mountainous terrain and hills. The highest point occurs in the mountainous terrain to the west of Adelaide where a height of 1 047 masl is attained.

Urban nodes:

The urban form is characterised by the promotion of the former separate development policies. An important spatial imperative of this urban form was the Group Areas Act, which required the provision of separate residential areas for the different population groups. The Nxuba Spatial Development Framework (SDF) however seeks to promote integration rather that separation. The two urban areas are:

- Adelaide, including, Adelaide Town, Bezuidenhoutsville, Lingelethu
- Bedford, including, Bedford Town, Goodwin Park, Nyarha

5.2 Service Delivery – Water and Sanitation

This section provides a summary of water related services in the local municipality to provide context to the proposed significant development that would result from the proposed Foxwood Dam.

5.2.1 Water Supply and Infrastructure

The Amathole District Municipality is the Water Services Authority (WSA) and the Water Service Provider for the Nxuba Local Municipality area of jurisdiction and therefore responsible for the planning and provision of water and sanitation services.

Approximately 96% of the households have access to water within the standard set for RDP provision of which 15,6% consists of taps within a range of 200 m. Approximately 3,8% of the inhabitants use water from tankers, boreholes and other sources. This data is summarised in Figure 11 below. Due to the dispersed farming settlement patterns it is concluded that the majority of inhabitants living in the rural hinterlands make use of boreholes, tanks and other water sources in the rural areas.

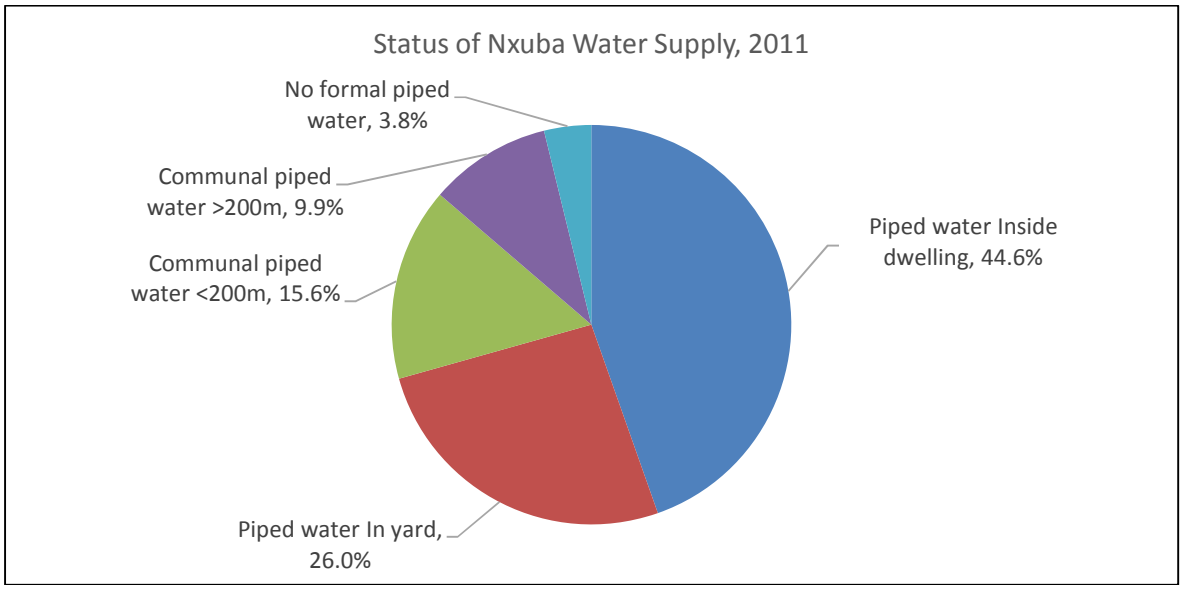


Figure 11: Water Infrastructure in Nxuba, by % of households

Source: ECSECC Global Insight data for 2011.

Water reticulation is only provided in the urban areas. In June 2009 Nxuba was declared a drought stricken area. Due to the seriousness of the drought and below-normal rainfall conditions, ADM embarked on a groundwater exploration study in Nxuba with funding received from the Department of Water and Sanitation in 2010.

5.2.2 Sanitation Provision and Infrastructure.

The Eastern Cape Society for Economic Consultation Council (ECSECC) data at 2011 reveals that a high number (10,6%) of the residents within Nxuba are using a bucket toilet system, 22,6% have no sanitation services and 17,4% uses pit latrines. Over the past ten years there has been a 47,7% increase in the provision of flush toilets, but the combined figure of 33,2% for no toilets and bucket system use is unacceptably high. The key data is summarised in Figure 12 below.

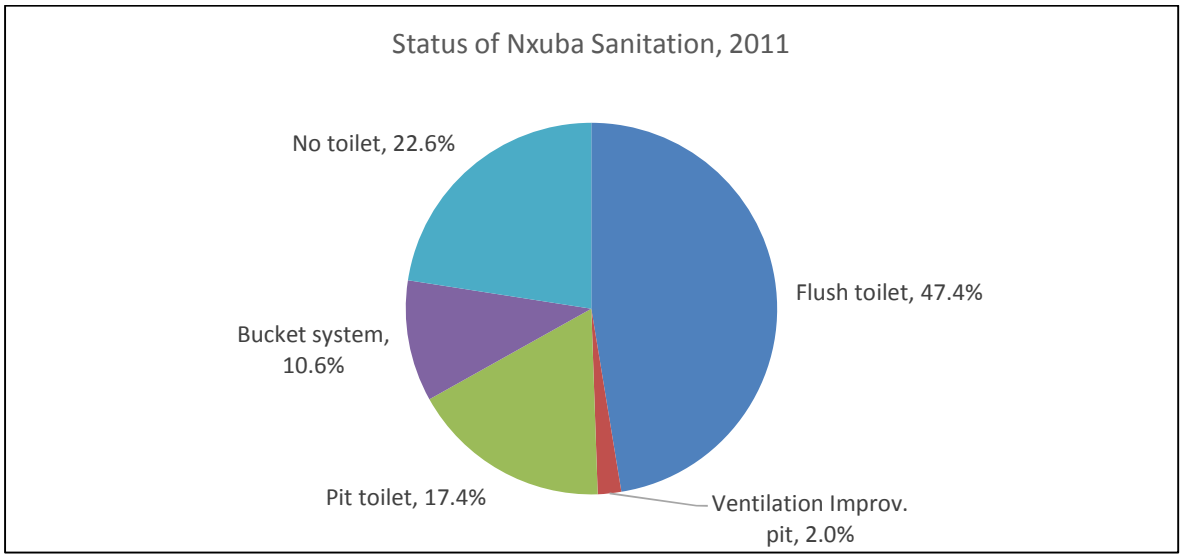


Figure 12: Sanitation Infrastructure in Nxuba, by % of households

Source: ECSECC Global Insight data for 2011.

The sanitation constraints are mostly being experienced in Lingelethu (100% bucket system) and Nyarha (30% waterborne and 70% bucket system). It should, however be noted that the inadequate sanitation system has been upgraded but not connected to the waterborne sewerage system due to the severe shortage of water and limited capacity of the sewerage treatment plants. No formal sanitation service is offered for rural hinterlands, as these are privately owned farms.

6 SOCIO-ECONOMIC IMPACTS OF THE PROJECT

The socio-economic baseline data which has been established in the previous section is used to determine the anticipated impact of the **combined Foxwood Dam and Government Irrigation Scheme projects** at the scale and timing as presented in this report. The positive impact on employment and Gross Value Added in the agricultural sectors of the Nxuba Local Municipality are considered hereafter.

6.1 Employment Impacts

In order to estimate the impact of the irrigated agriculture which is occasioned by the construction of the Foxwood Dam and the implementation and financing of coordinated agricultural programme as considered in this report, a projected employment baseline has been prepared based upon no Irrigation Scheme being developed. This is in effect the 'no-go' scenario. This employment profile constitutes the baseline against which the irrigated agriculture initiative will be measured. The 2011 Global Insight employment data has been used as the starting point, brought to 2013 values and then extrapolated over the future fifteen years. Total employment is seen to increase from 3 510 to 4 157 and agricultural employment from 1 313 (year 2011) to 1 555 (year 2028) over this period, as indicated in Table 19 below.

Table 19: Baseline Employment Projections for Nxuba to 2028

Year - Agriculture			**0**	**1**	**6**	**7**	**8**	**9**	**10**
Year - Calendar	**2 011**	**2013**	**2018**	**2019**	**2024**	**2025**	**2026**	**2027**	**2028**
1 Agriculture	**1 313**	**1 339**	**1 394**	**1 422**	**1 494**	**1 509**	**1 524**	**1 539**	**1 555**
2 Mining	-	-	-	-	-	-	-	-	-
3 Manufacturing	26	27	28	28	30	30	30	30	31
4 Electricity	-	-	-	-	-	-	-	-	-
5 Construction	107	109	114	116	122	123	124	125	127
6 Trade	284	290	301	308	323	326	330	333	336
7 Transport	28	29	30	30	32	32	33	33	33
8 Finance	58	59	62	63	66	67	67	68	69
9 Community services	1 276	1 302	1 354	1 382	1 452	1 467	1 481	1 496	1 511
10 Households	418	426	444	453	476	480	485	490	495
Totals	**3 510**	**3 580**	3 726	**3 800**	**3 994**	**4 034**	**4 075**	**4 115**	**4 157**
Growth Rate p.a.		2,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%
	Source: ECSECC Global Insight data for the year 2011, escalated to 2013 values and then a growth factor applied per year.								

The irrigated agriculture employment impacts as modelled in the earlier section as at full production in year ten (once the crops have reached full maturity) have been overlaid over the employment profile to produce the following agricultural employment profile given in Table 20:

Table 20: Agriculture Employment Projections for Nxuba to 2028

Summarised Irrigated Agriculture Employment Creation.									
Year - Agriculture			**0**	**1**	**6**	**7**	**8**	**9**	**10**
Year - Calendar	**2011**	**2013**	**2018**	**2019**	**2024**	**2025**	**2026**	**2027**	**2028**
Current Agriculture	1 313	1 339	1 408	1 422	1 494	1 509	1 524	1 539	1 555
Foxwood Irrigated Scheme			**483**	**967**	**1 934**	**1 934**	**1 934**	**1 934**	**1 934**
Agriculture Combined	1 313	1 339	1 891	2 388	3 428	3 443	3 458	3 473	3 488
Irrigated % of Total			25,6%	40,5%	56,4%	56,2%	55,9%	55,7%	55,4%
Growth of All Agriculture - %		2,0%	26,3%	20,8%	0,4%	0,4%	0,4%	0,4%	0,4%
Average over 17 Years									**5,6%**

An average growth of agricultural sector employment over fifteen years of 5,3% is realised with 1 934 irrigated agriculture employment opportunities created, or 55% of the total of 3 488 employment opportunities projected for Nxuba LM by the year 2028. The projected impact of the Irrigation Scheme on employment in the Agriculture sector in Nxuba is illustrated in Figure 13 below.

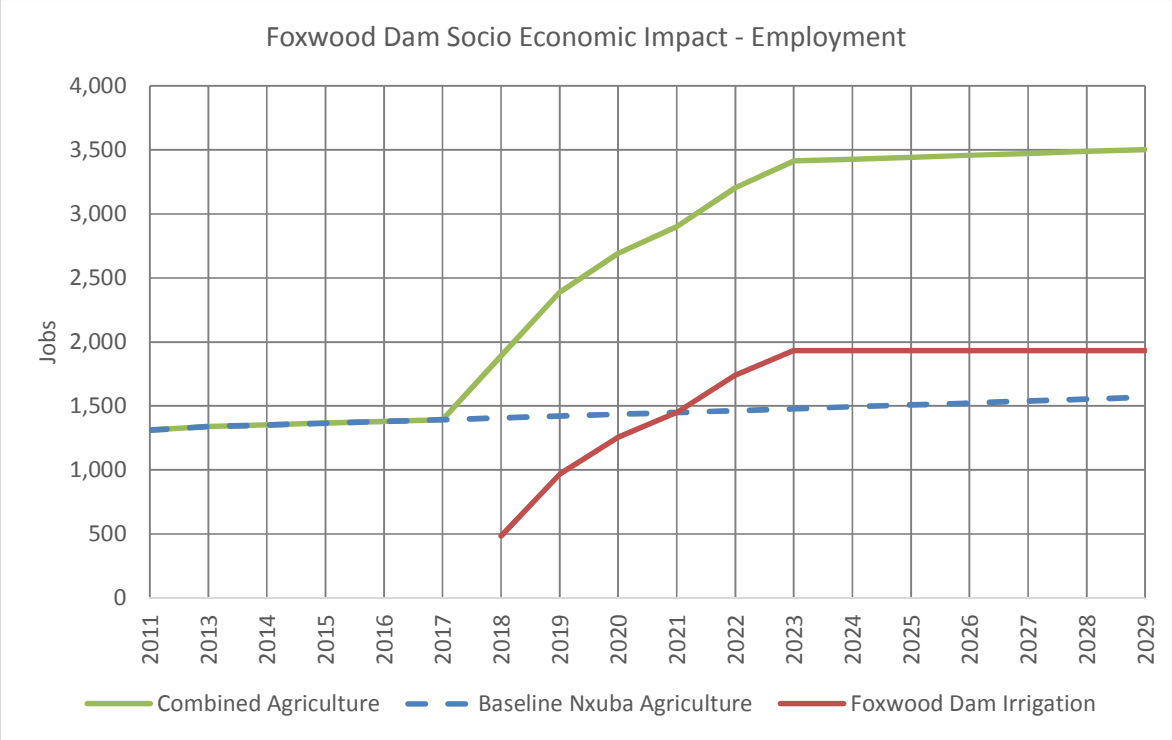


Figure 13: Foxwood Dam Impact on Nxuba Agriculture Employment

6.2 Gross Value Added (GVA) Impacts

On the same basis as the agricultural employment profile, a Gross Value Added profile for all of the economic sectors for the Nxuba LM has been prepared from 2011 to 2028. This profile has been prepared based upon the assumption that a 1% real growth rate will be achieved over this period, with a total growth of 18,4% over the period. (Real growth means that inflation has been excluded). The economic growth is indicated in the table below.

Table 21: Gross Value Added (GVA) Projections for Nxuba to 2028 (R million)

Gross Value Added (GVA) Projections - Nxuba (July 2014) - Rand Thousands									
Year - Agriculture			**0**	**1**	**6**	**7**	**8**	**9**	**10**
Year - Calendar	**2 011**	**2013**	**2018**	**2019**	**2024**	**2025**	**2026**	**2027**	**2028**
1 Agriculture	**37 169**	**37 912**	**39 846**	**40 245**	**42 298**	**42 721**	**43 148**	**43 579**	**44 015**
2 Mining	-	-	-	-	-	-	-	-	-
3 Manufacturing	3 538	3 609	3 793	3 831	4 026	4 066	4 107	4 148	4 189
4 Electricity	-	-	-	-	-	-	-	-	-
5 Construction	4 032	4 112	4 322	4 365	4 588	4 634	4 680	4 727	4 774
6 Trade	18 233	18 597	19 546	19 741	20 748	20 956	21 165	21 377	21 591
7 Transport	57	58	61	62	65	65	66	67	67
8 Finance	31 941	2 580	34 242	34 584	36 348	36 712	37 079	37 450	37 824
9 Community services	151 523	154 554	162 437	164 062	172 430	174 155	175 896	177 655	179 432
Total Industries	**246 492**	**251 422**	**264 247**	**266 890**	**280 504**	**283 309**	**286 142**	**289 003**	**291 893**
Add: Taxes & Subsidies	26 189	26 713	28 075	28 356	29 803	30 101	30 402	30 706	31 013
Total GVA	**272 681**	**278 135**	**292 322**	**295 246**	**310 306**	**313 409**	**316 543**	**319 709**	**322 906**
Growth Rate p.a.		**2,0%**	**1,0%**	**1,0%**	**1,0%**	**1,0%**	**1,0%**	**1,0%**	**1,0%**
Source: ECSECC Global Insight data for the year 2011, escalated to 2013 values and then a growth factor applied per year.									

The irrigated agriculture GVA impacts as modelled in the earlier section as at full production in year ten have been overlaid over the extrapolated GVA profile to produce the following agricultural GVA economic profile, in Table 22 below:

Table 22: Gross Value Added (GVA) Projections for Nxuba to 2028 (R million)

Year - Agriculture			**0**	**1**	**6**	**7**	**8**	**9**	**10**
Year - Calendar	**2011**	**2013**	**2018**	**2019**	**2024**	**2025**	**2026**	**2027**	**2028**
Current Agriculture	37 169	37 912	39 846	40 245	42 298	42 721	43 148	43 579	44 015
Foxwood Irrigated Scheme				**30 522**	**141 434**	**255 249**	**285 388**	**312 849**	**352 388**
Agriculture Combined	37 169	37 912	39 846	70 767	83 732	297 970	328 536	356 428	396 403
Irrigated % of Total			0,0%	43,1%	77,0%	85,7%	86,9%	87,8%	88,9%
Growth of All Agriculture - %		2,0%	1,0%	43,7%	31,6%	38,3%	9,3%	7,8%	10,1%
Average over 16 Years									12,5%

An average growth of agricultural sector GVA over fifteen years of 12,5% is realised with R 352 million of economic activity created from the Irrigation Scheme, or 88,9% of the total of R 396 million agricultural sector GVA for Nxuba LM by the year 2028. The projected impact of the Irrigation Scheme on employment in the Agriculture sector in Nxuba is illustrated in Figure 14 below.

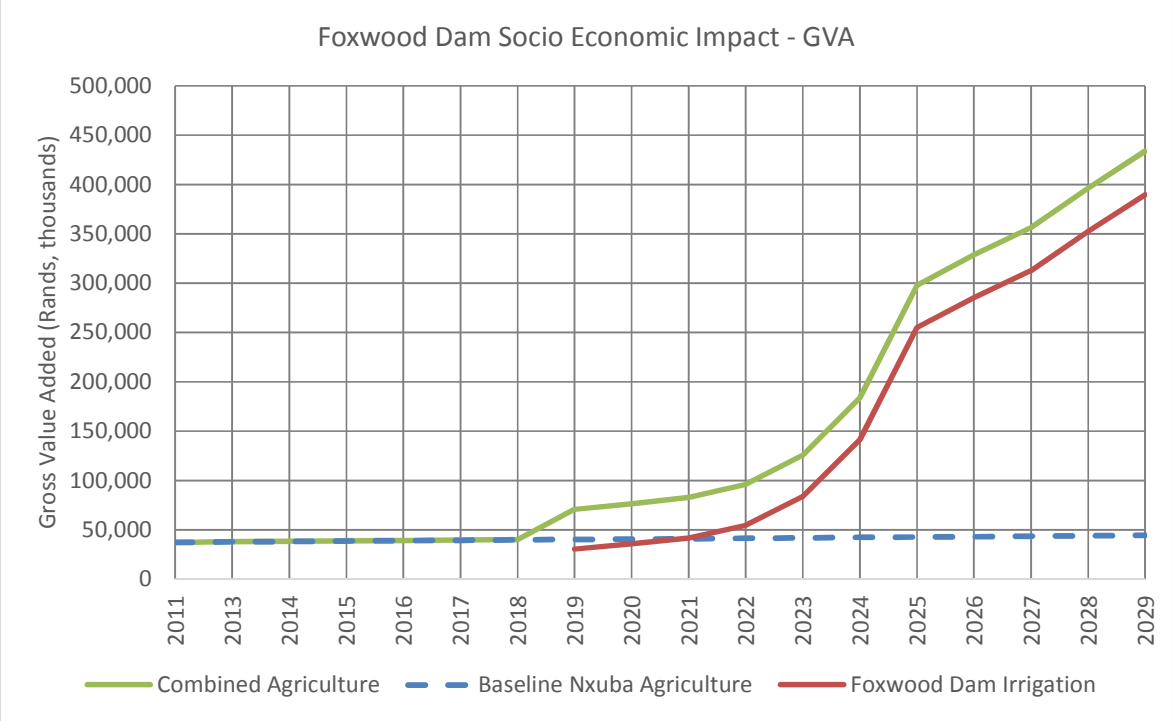


Figure 14: Foxwood Dam Impact on Nxuba Agriculture GVA

7 PROJECT OPPORTUNITY COSTS

The opportunity cost of a choice is the value of the best alternative forgone, in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources. Assuming the best choice is made, it is the "cost" incurred by not enjoying the benefit that would be gained by taking the second best choice available. It can be expressed in other words as 'the loss of potential gain from other alternatives when one alternative is chosen'. Opportunity cost is a key concept in economics, and has been described as expressing "the basic relationship between scarcity and choice".

The opportunity cost for the Foxwood Dam has been calculated by using the capital cost of the project and applying the interest rate that a Government organization could probably secure for a fixed deposit investment. The project opportunity cost to Government has been calculated over a fifty year physical life timeframe for the combined Foxwood Dam and irrigated agriculture project. An opportunity cost economic simulation has been undertaken based upon the projects combined capital expenditure and operating cost scenarios over a forty year timeframe, with the deemed cost of funds to Government being 6,5% per annum; ie the interest rate applied to the invested sum.

The positive cash flow has been calculated based upon the potential taxation revenue from the Foxwood Dam and the irrigated agriculture, together with the escalated revenue from the irrigated agriculture. The results are given in Table 23 below.

Table 23: Consolidated Opportunity Cost Indicators for the Dam and Irrigated Agriculture

Capital Costs Considered			
Foxwood Dam			R 2 084 m
Irrigation Infrastructure [From Foxwood Dam to farms based on 20ha developments]			R 48 m
Irrigated Agriculture Investment			R 424 m
Total Capital Costs			**R 2 556 m**
Opportunity Cost Determination	**15 Years**	**30 Years**	**50 Years**
Project Opportunity Cost (Capex @ 6,5%, 15 Years)	R 5 790 m	NA	NA
Project Full Economic Return (GVA, Taxes)	R 2 279 m	R 17 350 m	R 140 813 m
Net Cash Flow (Cumulative)	(R 278 m)	R 14 794 m	R 138 257 m
Net Present Value (NPV)	(R 1 274 m)	R 0 m	R 5 779 m
Internal Rate of Return (IRR)	-	(0%)	2,9%
Average Escalation Factor Applied:	4,5%	4,5%	4,5%
Discount Rate Applied:	8,0%	8,0%	8,0%

The opportunity cost calculations indicate that over the 50 year life span of the dam, the Government would attain an Internal Rate of Return of 2,9% on the funds utilized for the combined projects. The project opportunity cost for 30 and 50 years has not been calculated as the compound interest results in an unrealistically high return.

Although the opportunity cost is a valid economical indictor and is fairly low, we do not consider it to be a negative factor in the context of the proposed investment in Foxwood Dam by Government, where the primary objective of the scheme is to stimulate socio-economic upliftment and poverty alleviation.

8 PROJECT FUNDING AND CASHFLOW

Figure 15 below illustrates the estimated required programme of funding from Government to implement the Foxwood Dam project and associated Irrigation Scheme.

It is assumed that the capital expenditure for the dam, approximately **R 2 084 million** over four years, would be funded by Treasury and not recovered.

The total funding required by Government for the Irrigation Scheme is estimated at **R 437 million** and would be invested over six years. The calculation of deficit funding is the difference between capital and operational costs and the revenue generated by the scheme. At the start of the scheme, substantial investment is required for land purchase, farm establishment and mentoring. Over the first few years of the scheme, further investment is required as annual farming costs are incurred whilst no revenue is generated from the immature plants. The peak funding required for the scheme is the cumulative deficit funding up until the point when the revenue from the farming operation exceeds the input costs and profit is generated.

Repayment of the peak funding is made from profit generated by the scheme. It is projected that the returns from the Irrigation Scheme would allow payback of this investment over five years, or eleven years from the start of investment in the Irrigation Scheme.

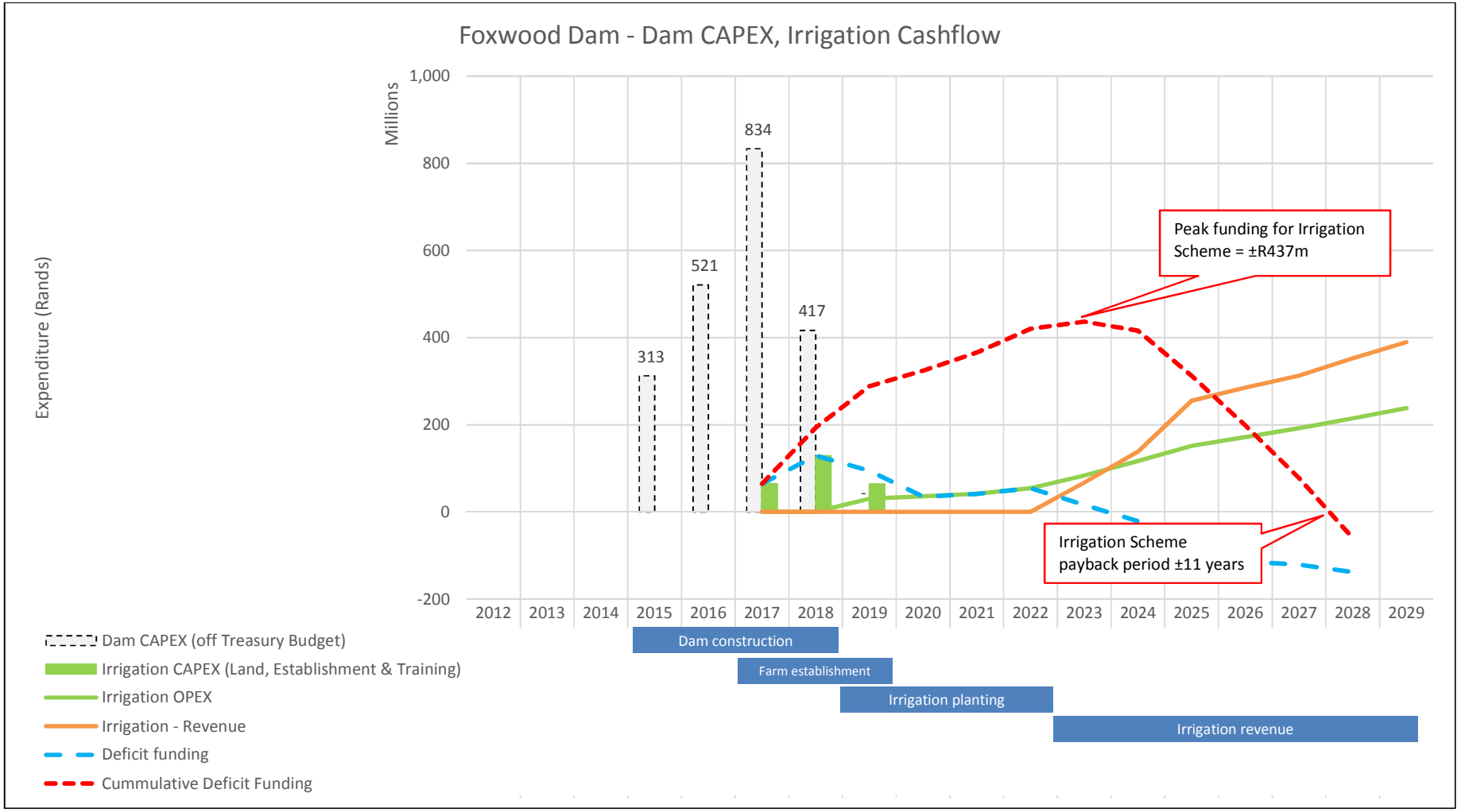


Figure 15: Projected dam CAPEX and Irrigation Scheme establishment cashflow

9 CONCLUSION

The construction of Foxwood Dam and associated Irrigation Scheme has the potential for substantial positive impact in Nxuba municipality. The Foxwood Dam financial parameters have been established in consultation with the consulting engineers, and the irrigated agriculture timeframes and operating dynamics merged with the dam operating parameters. This has resulted in a comprehensive model being developed which adequately forecasts the irrigated agriculture opportunity.

Socio-Economic Impact

The impact of the potential Irrigation Scheme on the agriculture sector in Nxuba Local Municipality, relative to the baseline scenario where no Irrigation Scheme is developed, was carried out. An average growth of agricultural sector employment over fifteen years of 5,3% is realised with 1 934 irrigated agriculture employment opportunities created, or 55% of the total of 3 488 employment opportunities project for Nxuba LM by the year 2028. An average growth of agricultural sector GVA over fifteen years of 12,5% is realised with R 352 million irrigated agriculture economic activity created, or 88,1% of the total of R 396 million agricultural sector GVA for Nxuba LM by the year 2028. This is in contrast to the 16,5% reduction in employment and 2,2% reduction in GVA within the Agriculture sector in Nxuba in the 10 years from 2001 to 2011.

The overall economic benefit of the combined projects is positive, however there are in all likelihood additional infrastructure requirements for the establishment of the irrigated agriculture as well as the need for financing and training of the new or emerging farmers. A full agricultural options analysis report has been prepared for the various options and provides recommendations as to how the irrigated agriculture could be implemented.

Certain of the important economic benefits which are realized are as follows:

- Additional economic activity is stimulated in a region which needs it, with **R 532 million** of additional economic activity with all of its positive knock-on effects added in year 10 of the development
- Additional employment opportunities are created – **1 934 sustainable direct employment** opportunities
- Emerging and BEE farmers will be established and empowered with financial benefits and skills transfer
- There is a reasonable return on investment of approximately **8%** for the Irrigation Scheme, with payback of the peak funding estimated to be completed within approximately **11 years** of commencement of the scheme.
- The municipality will earn additional rates and charges from the project
- The national fiscus will receive additional taxation which will ultimately justify the capital expenditure of the project – **R 36,6 m** in year 10
- The potential exists for the further beneficiation of the agricultural product, and
- Potential exists for agricultural product export promotion.

The ultimate economic benefits of the combined project, the Foxwood Dam and the irrigated agriculture are in favour of the project being implemented based on the prime objectives of socio-economic upliftment. However, it needs to be noted that the implementation of the irrigated agriculture programme as envisaged in this report and the associated agricultural report, assumes that a competent implementation agency will be appointed and will implement the projects within the time and financial budgets as contained herein.

10 REFERENCES

DWS, 2015a Department of Water and Sanitation, 2015. Feasibility Study for Foxwood Dam: Agro-Economic Study, P WMA 15/Q92/00/2113/9

DWS, 2015b Department of Water and Sanitation, 2015. Feasibility Study for Foxwood Dam: Feasibility Costing, P WMA 15/Q92/00/2113/13

Hagen D.J, Venter G.S.R., Dancwerts J.E. 1995.

An Agro-economic investigation on the feasibility of the proposed Foxwood Water Scheme in the Koonap River Valley. Department of Agriculture Eastern Cape, Agricultural Research Council 1995.

APPENDIX A: GLOSSARY OF ECONOMIC TERMS USED

APPENDIX A

Glossary of Economic Terms Used

#	Term Used	Definition
1	**Cost Benefit Analysis (CBA)**	**Cost-benefit analysis (CBA**), sometimes called benefit–cost analysis (BCA), is a systematic approach to estimating the strengths and weaknesses of alternatives that satisfy transactions, activities or functional requirements for a business or service. It is a technique that is used to determine options that provide the best approach for the adoption and practice in terms of benefits in labour, time and cost savings etcetera.
2	**Income distribution and CBA**	A fundamental point is that additional incomes for lower income groups should be relatively more important than additional incomes for higher income groups in CBA.
3	**Economic Impact Assessment (EIA)**	The goal with any **Economic Impact Assessment (EIA)** is to arrive at an estimate of the incremental impact that the investment or project may have on the local economy. In other words, those changes that will not have occurred in the economy in the absence of the planned investment. Determine who wins and who loses as a result of the project.
4	**Environmental Impact Assessment (EIA)**	An **Environmental Impact Assessment (EIA)** is a specific form of CBA which involves drawing together, in a systematic way, an assessment of a project's likely significant environmental effects. It is often used in planning and development projects. It is a requirement for certain types of project before they can be given 'development consent'. It is used primarily by Government agencies as a preventative measure for potentially harmful development.
5	**Economic Sectors, primary, secondary and tertiary.**	The classical breakdown of all **economic sectors** follows: **Primary:** Involves the retrieval and production of raw materials, such as corn, coal, wood and iron. (A coal miner and a fisherman would be workers in the primary sector.) **Secondary:** Involves the transformation of raw or intermediate materials into goods e.g. manufacturing steel into cars, or textiles into clothing. (A builder and a dressmaker would be workers in the secondary sector.) **Tertiary:** Involves the supplying of services to consumers and businesses, such as baby-sitting, cinema and banking. (A shopkeeper and an accountant would be workers in the tertiary sector.)
6	**Gross Domestic Product (GDP)**	**Gross Domestic Product (GDP)** is the market value of all officially recognized final goods and services produced within a country in a year, or over a given period of time. It includes all of private and public consumption, government outlays, investments and exports less imports that occur within a defined territory.
7	**Gross Geographic Product (GGP)**	**Gross Geographic Product (GGP)** provides a measure of the total and sectoral economic activity on an annual basis within local municipalities of South Africa.

#	Term Used	Definition
8	**Gross Value Added (GVA)**	**Gross Value Added (GVA)** is linked as a measurement to gross domestic product (GDP), as both are measures of output. As the total aggregates of taxes on products and subsidies on products are only available at whole economy level, Gross Value Added is used for measuring gross regional domestic product and other measures of the output of entities smaller than a whole economy. Restated: - GVA = GDP + subsidies – taxes.
9	**Full Time Equivalent (FTE) Jobs**	**Full-time equivalent (FTE)** is a unit that indicates the workload of an employed person (or student) over a period of time in a way that makes workloads comparable across various contexts. An FTE of 1,0 means that the person is equivalent to a full-time worker over a period of one standard employment year. This would usually be 49 weeks at 40 hours per week. One FTE over a period of two years remains one FTE.
10	**Social Impacts**	**Social impact** refers to how the organization's actions affect the surrounding community. **Social impact assessment (SIA)** is a methodology to review the social effects of infrastructure projects and other development interventions on the community in which they are planned.
11	**Discount Rate**	The **rate used** to express an **expected future cash stream** in present value terms. In most instances, the discount rate is equal to the **hurdle rate (Also the WACC – Weighted Average Cost of Capital).** Mathematically, the hurdle rate of a property is the sum of its market **capitalization rate** and the **expected constant growth rate** of its **cash flow** in perpetuity. (Capitalization Rate + CPI or Escalation %) The World Bank uses 10%.
12	**Environmental Discount Rate**	In view of the contrasting view by economist regarding the **discount rate** that should be used for **environmental projects**, it is proposed that these projects in SA should be discounted at the official discount rate of 8%, and that this base rate should be further tested against much lower rates as well. (Conningarth Economists. 2007. *A manual for CBA in SA with specific reference to water resource development. Page 68)*
13	**Opportunity cost of public funds (Discount Rate)**	**Opportunity cost** of a choice is the value of the best alternative forgone, in a situation in which a choice needs to be made between several mutually exclusive alternatives given limited resources. Assuming the best choice is made, it is the "cost" incurred by not enjoying the benefit that would be had by taking the second best choice available. "The loss of potential gain from other alternatives when one alternative is chosen". Opportunity cost is a key concept in economics, and has been described as expressing "the basic relationship between scarcity and choice"
14	**Opportunity cost of water**	Water is a scarce resource in SA. Any **additional demand** for water implies that there is not only a **storage and transfer cost** involved, but also and **economic cost (opportunity cost).** This is because the additional water demand **may deprive** a current or future water user of water. The **opportunity cost** is the highest economic use of water. In SA the opportunity cost of water for industrial and urban use is higher than for irrigation and forestry.
15	**Marginal cost of public funds**	The **marginal cost of public funds** (MCF) is a concept in public finance which measures the loss incurred by society in raising additional revenues

#	Term Used	Definition
		to finance government spending due to the distortion of resource allocation caused by taxation. In economics and finance, **marginal cost** is the change in the total cost that arises when the quantity produced has an **increment by one unit**. That is, it is the cost of producing one more unit of a good.
16	**Hurdle Rate or Yield**	The **minimum total return** (income yield plus expected capital appreciation) **required by potential investors** to induce them to invest in a property. Also known as the **required rate**. As such this is normally the correct rate to use when doing discounted cash flow (DCF) analyses. This is a similar concept to a company's cost of capital, and it is not to be confused with the cost of money (say, overdraft interest rate). One way of measuring the **total return** on an investment, ex post or ex ante, is the **internal rate of return** (IRR) method.
17	**Net Present value (NPV)**	The **present value** of a **future stream of income**, compared to a safe and **secure interest bearing investment**, such as bank deposits. The NPV is found by taking the present values of the **future cash inflows** and **adding these to the investment cost (As a negative value)**. If the **NPV is positive** at a point in time, this investment will **add to shareholder wealth** as it earns a greater return than shareholders could earn elsewhere. (A Rand earned or held today, has more value than a Rand due in the future, with the difference in value being the interest that could have been earned at the prevailing interest rate or the **Weighted Average Cost of Capital** {WACC}. The WACC is the interest rate or **Discount Rate** used to calculate the present value from the stream of income. This situation always causes a future value to have a lower present value in real terms, due to the compounding, or in this instance, discounting effects of interest.)
18	**Internal Rate of Return (IRR)**	A performance measurement that takes cognisance of the time-value of money. The IRR calculates **what the rate of return would have to be to make the NPV equal to zero** (Breakeven or an acceptable investment at the **Discount Rate** used.) Any **value in excess of the discount rate indicates** the investment shows a higher return than the Weighted Average Cost of Capital (WACC) (or an equivalent secure investment)
19	**Return On Investment (ROI)**	A Return On Investment (ROI) is the **pure monetary return** earned in a particular year expressed as a percentage of the initial investment. It **usually applies to first year earnings**, as the time value of money, or interest earned or lost, has not been taken into account. The ROI serves as a general yardstick for comparing different investments. Essentially the same as the Initial Yield.
20	**Socio-demographic**	A **socio-demographic** is a word used to describe an element of a group within a society. For example, the average age of a population is a socio-demographic. Pertaining to or characterized by a combination of sociological and demographic characteristics. **Demographics** are the quantifiable statistics of a given population. Demographics are also used to identify the study of quantifiable subsets within a given population which characterize that population at a specific point in time.
21	**Socio-economic**	**Socio-economics** is the social science that studies how economic activity affects and is shaped by social processes. In general it analyzes how societies progress, stagnate, or regress because of their local or regional economy, or the global economy. **Socio-economic development** is

#	Term Used	Definition
		measured with indicators, such as GDP, life expectancy, literacy and levels of employment. Changes in less-tangible factors are also considered, such as personal dignity, freedom of association, personal safety and freedom from fear of physical harm, and the extent of participation in civil society.
22	**Tradable and non-tradable inputs**	**Tradability** is the property of a good or service that **can be sold in another location** distant from where it was produced. A good that is not tradable is called non-tradable. Different goods have differing levels of tradability: the higher the cost of transportation and the shorter the shelf life, the less tradable a good is. Prepared food, for example, is not generally considered a **tradable** good; it will be sold in the city in which it is produced and does not directly compete with other cities' prepared foods. Water and haircuts are also **non-tradable**.
23	**Consumer Surplus**	**Consumer surplus** is defined as the difference between the consumers' willingness to pay for a commodity and the actual price paid by them, or the equilibrium price. **Consumer surplus** or **consumers' surplus** is the monetary gain obtained by consumers because they are able to purchase a product for a price that is less than the highest price that they would be willing to pay.
24	**Producer Surplus**	**Producer surplus** or **producers' surplus** is the amount that producers benefit by selling at a market price that is higher than the least that they would be willing to sell for.
	Shadow Prices	**Shadow Prices** are used where price does not reflect the actual value of a good or commodity, or no market value for a good or commodity exists, shadow pricing can be used. **Shadow pricing is a proxy value** of a good, often defined by what an individual must give up to gain an extra unit of the good. In the real world, because market imperfections such as tariffs, quotas and monopolies create **distortions in demand and supply**, there is little chance that the market price will reflect the true economic value and cost of inputs and outputs. To rectify this situation and to demonstrate the **real measure of efficiency** with which an economy utilizes its scarce resources requires adjustments to the current prices of services and commodities. These **adjusted prices** are referred to as **shadow prices**.

APPENDIX B: DEMOGRAPHIC PROFILE FOR NXUBA LOCAL MUNICIPALITY

APPENDIX B

B1: Demographic Profile for Nxuba Local Municipality

A demographic profile has been prepared for the Nxuba Local Municipality which has the towns of Bedford and Adelaide within its jurisdiction and is a part of the Amathole District Municipality, which includes the Buffalo City Metropole (see Figure A below).

B2: Study Area and Context

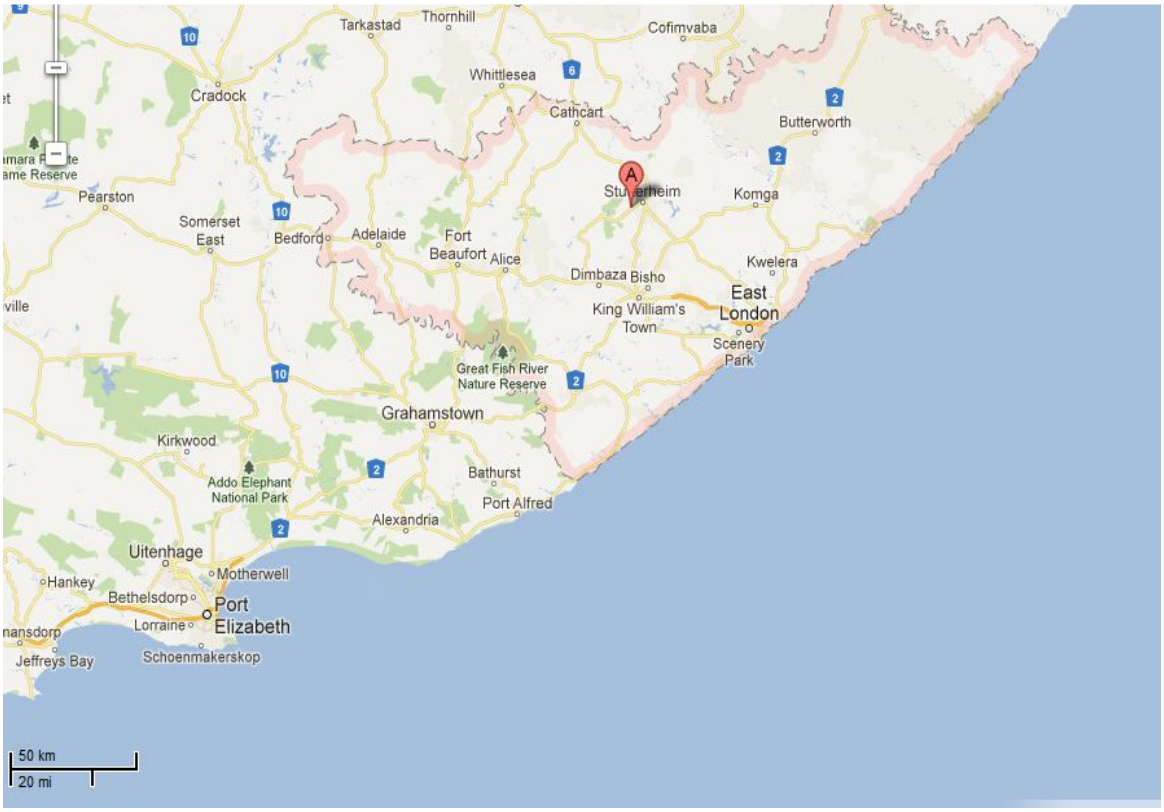


Figure A: Amathole District Municipality, Showing location of Adelaide

B3: Amathole District Municipality (ADM)

This section focuses in on the Amathole District, and progresses from a demographic overview of the District and the family of local municipalities, to an unpacking of the structure and key sectors of the economy.

The Amathole 2011/12 IDP notes that Buffalo City Municipality (BCM) became a Category A (metropolitan) municipality following the 2011 municipal elections but that the BCM will continue to feature prominently in economic activities of Amathole residents and to also be the major industrial regional hub servicing the region. Accordingly, the economic fortunes of both the District and the BCM "will continue to be linked and will not be hindered by the Metro Status of the Buffalo City Municipality which is mainly an administrative issue." (ADM 2011)

This section considers the BCM, albeit separately from the District, given strong economic and functional linkages with the BCM and recognition that the country's newest metropolitan municipality will require a phased and incremental process of political and administrative changes. (www.businesslinkmagazine.co.za) The BCM includes South Africa's only commercial river port city of East London, together with the surrounding urban centres of Mdantsane and Dimbaza,

coastal towns and numerous peri-urban and rural settlements and the inland town of King William's Town twinned with the provincial capital of Bhisho.

Amathole District occupies the central coastal portion of the Province, bordered by the Eastern Cape districts of Cacadu, Chris Hani and OR Tambo, respectively to the west, north and east. The District is largely rural, with generally low urbanisation rates (see Table A), and includes seven local municipalities, as follows:

- Mbhashe, comprising the towns of Idutywa, Elliotdale and Willowvale, and numerous peri-urban and rural settlements;
- Mnquma, comprising the main town of Butterworth, the small towns of Ngqamakwe and Centani, numerous peri-urban and rural settlements;
- Great Kei, comprising the town of Komga, the small coastal towns of Kei Mouth, Haga, Morgan Bay and Cintsa, and a number of rural settlements;
- Amahlathi, comprising the towns of Stutterheim, Cathcart, Keiskammahoek and Kei Road, numerous peri-urban and rural settlements;
- Ngqushwa, comprising the town of Peddie, the coastal town of Hamburg, numerous peri-urban and rural settlements;
- Nkonkobe, comprising the towns of Alice, Fort Beaufort and Middledrift, the smaller towns of Hogsback and Seymour, numerous peri-urban and rural settlements; and
- Nxuba, comprising the towns of Bedford and Adelaide and surrounding rural areas.

Mbhashe, Mnquma and Ngqushwa are classed as Category B4 (rural, mainly subsistence), and Great Kei, Amahlathi, Nkonkobe and Nxuba as B3 (small towns, agricultural) local municipalities, reflecting limited institutional capacity and areas characterised by small centres, limited SMMEs and market opportunities, and greater dependence on public support. The ADM includes all former administrative areas of the Eastern Cape, namely former Transkei and Ciskei homeland areas and former Cape Provincial Administration areas. The natural environment is similarly diverse, from inland moist mountainous areas, centred on the Amatola Mountains, to well-watered coastal areas, including the natural tourism assets of the Wild Coast and the Cwebe and Dwesa Nature Reserves, together with semi-arid Karoo, thornveld, succulent and thicket areas.

Table A: Amathole District Socio-Economic Snapshot[1]

		SA	EC	ADM	Mbhashe	Mnquma	Great Kei	Amahlathi	Ngqushwa	Nkonkobe	Nxuba	BCM
Area (km^2) [a]		1,221,246	169,063	**21,064**	3,052	3,302	1,737	4,272	2,242	3,726	2,734	2,529
Population (No.)		49,991,472	6,743,823	**975,269**	266,137	305,191	37,664	121,980	86,049	135,072	23,177	761,996
Population distribution (%)			13.49	**14.46**	27.29	31.29	3.86	12.51	8.82	13.85	2.38	11.30
Population Density (people/km^2)		40.93	39.89	**46.30**	87.20	92.44	21.68	28.56	38.38	36.25	8.48	301.31
Total Households		13,109,845	1,733,298	**273,142**	63,819	81,705	13,957	40,918	27,911	37,827	7,006	228,541
Average Household Density (people/hh)		3.81	3.89	**3.57**	4.17	3.74	2.70	2.98	3.08	3.57	3.31	3.33
Average Urbanisation rate (%, 2009)				**15.19**	3.09	15.45	24.31	18.78	5.99	27.39	80.29	72.39
Population growth rate (2000-10 %pa)		1.20	0.46	**-0.15**	0.15	0.31	-1.57	-1.38	-0.20	0.05	-0.78	0.63
Households growth rate (2000-10 %pa)		1.54	1.39	**1.69**	1.52	1.82	2.31	1.79	2.30	1.15	0.80	1.75
Sex (%)	Male	48.67	48.08	**47.24**	45.39	47.17	49.93	48.64	47.94	48.14	49.69	49.77
	Female	51.33	51.92	**52.76**	54.61	52.83	50.07	51.36	52.06	51.86	50.31	50.23
Male : Female ratio (per one male)		1.05	1.08	**1.12**	1.20	1.12	1.00	1.06	1.09	1.08	1.01	1.01
Age (%)	0 – 4	10.24	10.72	**10.71**	12.49	10.76	9.36	9.18	9.78	9.68	9.43	8.52
	5 – 19	31.23	34.51	**36.78**	42.73	38.55	30.00	32.72	32.84	30.94	26.02	26.14
	20 – 64	53.58	48.77	**45.01**	37.50	44.09	53.18	50.26	47.22	51.44	56.69	60.43
	65+	4.95	6.00	**7.50**	7.28	6.60	7.46	7.84	10.16	7.93	7.87	4.92
'Working age' population (%, 15-64 years)		64.03	61.16	58.60	51.78	58.32	66.42	62.96	60.18	64.33	65.52	70.84
HDI [a]		0.56	0.50	**0.43**	0.35	0.44	0.42	0.46	0.43	0.50	0.50	0.60
HIV/AIDS antenatal prevalence rate (%) [a]		10.13	9.65	**9.18**								11.65
Functional Literacy (% age 20+; Gr7+) [a]		73.24	66.42	**56.73**	41.40	60.10	52.55	61.83	56.11	70.14	68.73	84.57
Education Levels (% age 15+) [a]	None	8.65	11.03	**14.20**	23.41	12.12	16.40	9.43	14.85	7.06	6.91	4.80
	Grade 7-9	23.10	26.41	**28.21**	25.61	28.78	26.51	31.33	27.62	28.50	30.55	24.93
	Grade 12 / FETC	25.20	18.14	**14.01**	10.42	14.47	13.44	13.46	15.92	19.26	15.55	25.76
	Tertiary	9.71	7.41	**5.98**	5.04	7.03	4.71	5.27	5.44	7.12	6.33	10.73
Monthly Household Income [a] (% households)	R0-2500	26.16	34.07	**37.19**	45.14	36.94	40.08	33.27	31.59	27.04	36.06	23.64
	R2501-6000	29.40	33.22	**37.54**	37.39	37.89	33.91	38.52	39.26	36.74	35.12	30.93
	> R6000	44.44	32.71	**25.27**	17.47	25.17	26.01	28.22	29.15	36.22	28.83	45.43
Household Disposable Income (Rm, Constant 2005)		1,248,609	114,912	**12,126.51**	1,635.89	5,612.26	627.03	1,658.23	904.56	1,371.39	317.16	19,322.00
Household Consumption Expenditure (Rm, Constant 2005)		1,264,708	115,361	**12,074.44**	1,642.15	5,533.89	668.26	1,681.37	875.73	1,343.01	330.04	19,273.55
Total Household Savings (Rm, Constant 2005)		-16,099	-449	**52.07**	-6.26	78.37	-41.23	-23.14	28.83	28.38	-12.88	48.45
Households below poverty line (%, <R3,500pm) [a]		37.71	47.98	**53.08**	62.16	52.98	55.52	48.95	46.98	40.91	50.89	35.32
People in poverty (%) [a]		39.93	49.51	**53.47**	63.17	52.81	59.38	48.35	43.72	42.73	51.18	33.37
Poverty Gap (Rm) [a]		47,877.58	9,233.30	**1,944.53**	436.73	484.69	55.16	176.11	527.19	225.87	38.76	524.86
Poverty Gap per capita (R) [a]		981.53	1,373.88	2,019.24	1,623.45	1,698.99	1,060.20	1,226.84	7,090.89	2,006.25	1,480.18	671.67
Gini Coefficient [a]		0.65	0.64	0.59	0.56	0.59	0.60	0.58	0.56	0.60	0.61	0.64
Public sector reliance (% Services)	GVA	21.45	31.82	40.46	40.15	44.66	25.53	34.49	42.29	45.03	38.00	34.04
	Employ	31.87	34.99	41.64	44.05	50.25	31.66	33.98	46.50	37.19	29.27	39.29
Dominant sector (excludes Public Services)	GVA	Finance	Finance	Finance	Trade	Finance	Finance	Finance	Trade	Finance	Finance	Finance
	Employ	Finance	Agric	Agric	Trade	Trade	**Agric**	Agric	Trade	Agric	**Agric**	Finance

		SA	EC	ADM	Mbhashe	Mnquma	Great Kei	Amahlathi	Ngqushwa	Nkonkobe	Nxuba	BCM
Tress Index		44.79	58.23	**61.91**	64.47	65.01	49.75	58.67	64.15	66.67	58.33	61.45
Share of aggregate economy GVA (%)			7.85	**8.84**	14.18	37.66	6.88	18.51	5.66	12.90	4.22	21.13
Shift in Share of aggregate economy GVA (%, 2000-10)			-0.30	**1.65**	0.22	5.37	0.57	-0.86	-0.33	-4.03	-0.93	-0.77
GVA growth rate (%pa, 2000-10)		3.60	3.21	**5.37**	5.53	7.00	6.29	4.89	4.77	2.54	3.28	2.84
GVA per capita (R)		33,031	19,216	**11,745**	6,101	14,135	20,911	17,383	7,535	10,938	20,838	35,938
GVA per formal worker (R)		161,585	130,867	**114,948**	122,918	126,500	88,862	115,914	109,755	103,662	96,187	157,541
Average Remuneration per formal employee (R pa)		101,010	87,934	**78,713**	81,422	85,124	54,576	81,067	77,165	77,529	67,250	105,192
Formal employment growth rate (%pa, 2000-10)		0.53	-0.21	**0.32**	0.65	3.56	-0.61	-1.31	0.77	-1.88	-3.36	-0.14
Unemployment rate (%, official definition) [a]		24.73	31.84	**43.92**	36.27	41.67	16.86	33.90	70.30	58.36	41.30	24.45
Age Dependency Rate (%, *<15; >65*)		56.17	63.50	**70.65**	93.11	71.45	50.55	58.84	66.18	55.44	52.63	41.16
Dependency Ratio (per formally employed person)		3.89	5.81	**8.79**	19.15	7.95	3.25	5.67	13.57	8.48	3.62	3.38
Social Grantees (% accessing 1/> grant) [b]		22.68	31.54	**37.70**	42.33	37.00	34.19	33.84	38.43	34.58	32.81	21.65
Equitable Share Allocation (R'm, 2011/12) [c]		34,107.90	5,243.05	**1,029.28**	105.24	136.07	28.21	79.62	55.14	76.10	18.63	583.63
Equitable Share per capita (R, 2011) [c]		682.27	777.46	**1,055.38**	395.43	445.85	748.96	652.70	640.80	563.40	803.67	765.92
Access to basic services [a]	Water	78.77	60.92	**46.27**	19.87	39.35	72.90	69.13	52.46	69.53	85.26	83.62
(% households)	Sanitation	69.18	53.95	**31.44**	8.84	29.24	54.54	58.84	26.51	38.64	63.99	72.34
(RDP minimum, 2009)	Electricity	80.63	66.50	**55.87**	40.41	64.18	52.92	59.68	67.17	55.09	71.53	77.54
	Refuse	60.89	37.24	**12.48**	5.38	5.80	36.74	15.94	9.01	15.63	82.41	61.91
	Housing	72.41	56.10	**45.26**	23.91	46.87	54.51	46.74	55.53	67.69	86.35	69.25

B4: Amathole Demographic Profile

As reflected in Table A above, Amathole is home to 14.46% of the provincial population who are unevenly distributed across the District, ranging from the most populous local municipalities of Mnquma (31.29%) and Mbhashe (27.29%) to the least populated areas of Nxuba (2.38%) and Great Kei (3.86%). The population has contracted, from 2000 to 2010, at a negative growth rate of -0.15%pa for the District and at similarly negative rates for the local municipalities of Great Kei (-1.57%pa), Amahlathi (-1.38%pa), Nxuba (-0.78%pa) and Ngqushwa (-0.20%pa); Modest population growth rates are seen for the remaining municipalities of Nkonkobe (0.05%pa), Mbhashe (0.15%pa) and Mnquma (0.31%pa). By contrast, the number of households across the family of municipalities has increased at an average of 1.69%pa over the same period, indicating that households are getting smaller in size. Average household density in Amathole stands at less than four (3.57) people per household in 2010, ranging from around three people in Great Kei (2.70), Amahlathi (2.98) and Ngqushwa (3.08); Mbhashe is the only area with an average household size in excess of four (4.17) people.

The District is overwhelmingly rural, with an urbanisation rate of around only 15.19% in 2009, ranging from a mere 3.09% (Mbashe) to the exceptional 80.29% (Nxuba). As may be expected in such a rural environment, females outnumber males at an average ratio of 1.12 to one. Women form the majority in the District (52.76%) and across all local economies, ranging from 50.07% (Great Kei) through 52.06% (Ngqushwa) and 52.83% (Mnquma) to 54.61% (Mbhashe). The District population is youthful, with almost half (47.49%) of Amathole residents aged under 20 years, ranging from 35.45% (Nxuba) through 42.62% (Ngqushwa) to 49.31% (Mnquma) and a striking 55.22% (Mbhashe). The District also claims a higher proportion of retirement age residents (7.50%) than at provincial (6.00%) and national (4.95%) level. Representation of retirement age residents ranges from 6.60% (Mnquma) to a significant 10.16% (Ngqushwa), with the remaining five local municipalities averaging between 7% and 8%. (Refer to Table A)

Amathole reflects a lower HDI (0.43) than for the Eastern Cape (0.50) and South Africa (0.56), indicating relatively higher rates of poverty, illiteracy and mortality. Within the District, HDI ranges from only 0.35 (Mbhashe) to 0.50 (Nkonkobe and Nxuba). The poverty rate is significant in Amathole (53.47%) and is above the national average (39.93%) across all local economies, ranging from 42.73% (Nkonkobe) and 43.72% (Ngqushwa), through 51.18% (Nxuba) and 52.81% (Mnquma), to 59.38% (Great Kei) and 63.17% (Mbhashe). The proportion of poor households, earning less than R2501 monthly, follows a comparable pattern, averaging 37.19% in the District, ranging from 27.04% (Nkonkobe) to 45.14% (Mbhashe). The poverty gap is significant for Amathole, approaching R2 billion, translating into a per capita gap of around R2,019, ranging from R1,060 (Great Kei) to a staggering R7,091 (Ngqushwa). Functional literacy is below national average (73.24%) across the District (56.73%) and its local economies, ranging from only 41.40% (Mbhashe) to 70.14% (Nkonkobe). Almost one quarter (23.41%) of Mbhashe residents have no formal schooling and only one in ten residents (10.42%) have gained at least a Matric or equivalent level education. Nkonkobe reflects the best overall achievements in education, with almost one fifth (19.26%) achieving a secondary (Matric / FETC) qualification and a further 7.12% of the local population achieving tertiary levels. (Refer to Table A)

The rate of unemployment averages 43.92% in Amathole but ranges enormously across the District, from 16.86% (Great Kei) to an alarming 70.30% (Ngqushwa). Dependency similarly ranges significantly, approaching an average ratio of nine (8.79) people per employed person in the District, from just over three in Great Kei (3.25) and Nxuba (3.62) to almost twenty (19.15) dependents per formal worker in Mbhashe. Dependency on social grants, in 2007, is correspondingly higher in the District (37.70%) than at provincial (31.54%) and national (22.68%) levels based on the proportion of total population accessing at least one grant. Highest social grant dependence is seen in Mbhashe (42.33%), then Ngqushwa (38.43%) and Mnquma

(37.00%). Lowest social grant dependence is seen for Nxuba (32.81%), then Amahlathi (33.84%). (Refer to Table A)

The District performs poorly in respect of access to RDP minimum levels of basic services, for 2009, particularly for municipal refuse collection (12.48%) and sanitation (31.44%). Access to electricity is the only service which is accessed by the majority (55.87%) of households in Amathole, while 46.27% have access to water services and 45.26% to formal housing. Nxuba emerges as the best served local municipality across all measures such that the majority of households has access to the full range of basic services. On the other extreme, Mbhashe emerges as the worst served local municipality across all measures, where less than one fifth of households have access to the basic services of water (19.87%), sanitation (8.84%) and refuse (5.38%), with housing access at only 23.91% and electricity at 40.41%. (See Table A)

It is worth noting that the 2009 housing backlogs, as determined by Global Insight (2011), consider traditional housing as below minimum standard; If traditional housing is included into housing access, the situation across Amathole changes dramatically, as reflected in Table B below. Drawing on the 2001 Census, the majority of households in Amathole were resident on tribal land in 2001 (StatsSA 2003) and this situation is not expected to have changed fundamentally over a ten year period. The only local municipality to claim no tribal settlement is Nxuba, while tribal settlement dominates across the remaining local economies to average 79.59% in the District, compared to the provincial average of 56.64%. The proportion of tribal settlement is particularly striking for the local economies of Mbhashe (95.41%) and Ngqushwa (92.37%), then Mnquma (80.96%) and Amahlathi (70.49%).

Table B: Access to Housing in Amathole and BCM, 2007[2]

	% Access to Formal brick / Traditional Housing	Backlog (%, 2007)	% Access to Formal only (excl. Traditional)	Backlog (%, 2007)	Tribal Settlement (%, 2001)
ADM *(excl.BCM)*	94.71	5.29	45.71	54.29	79.59
Mbhashe	99.36	0.64	20.62	79.38	95.41
Mnquma	90.86	9.14	45.30	54.70	80.96
Great Kei	89.88	10.12	52.15	47.85	59.04
Amahlathi	91.71	8.29	47.69	52.31	70.49
Ngqushwa	96.57	3.43	57.07	42.93	92.37
Nkonkobe	99.11	0.89	69.88	30.12	65.07
Nxuba	91.21	8.79	85.04	14.96	0.00
BCM	*75.35*	*24.65*	*70.86*	*29.14*	*21.84*

Returning to the more current data afforded by the Global Insight database, it is considered likely that the rather bleak view on access to basic infrastructure and services across Amathole has improved since 2009, where the trend has been consistently upwards since 1996, as revealed by the Household Infrastructure Index determined by Global Insight (See Figure B).

The performance of Nxuba is particularly striking, moving from an index below that of South Africa and the BCM, from 1996 to 2008, to surpass both of national and metropolitan indices (each 0.69) with a household infrastructure index of 0.71 in 2009. The relative performances of Great Kei and Amahlathi are also notable, where both move from the low index values of 0.32 and 0.31 respectively, in 1996, to second and fourth highest indices of 0.50 and 0.48, respectively, by 2009, outstripping the fairly steady performance of the District's other local municipalities over this period. Nkonkobe is displaced from second to claim the third highest index value (0.49) by 2009.

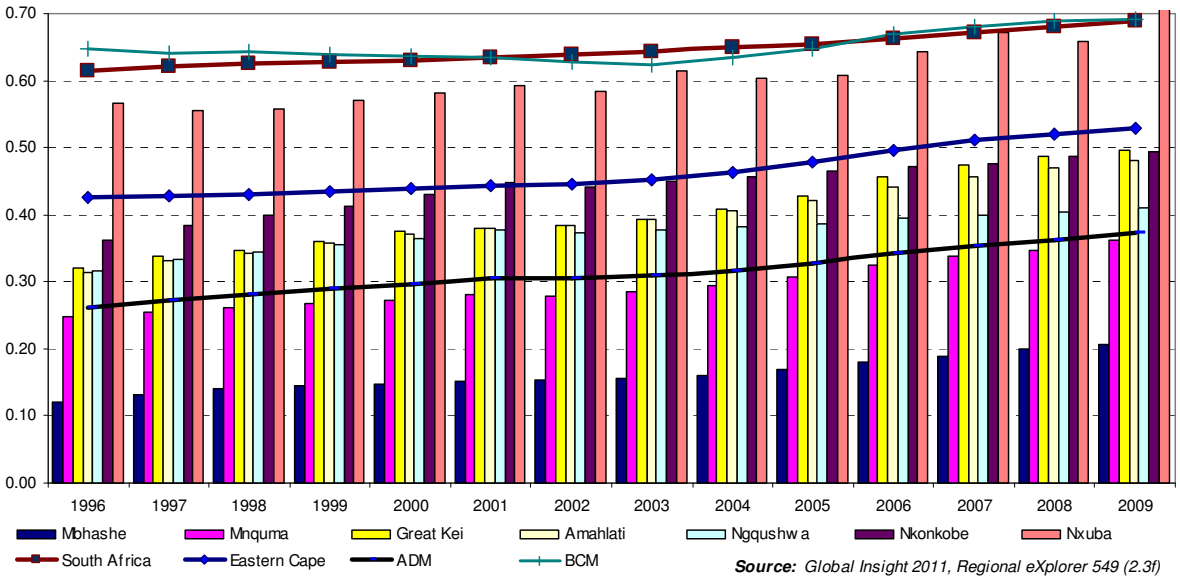


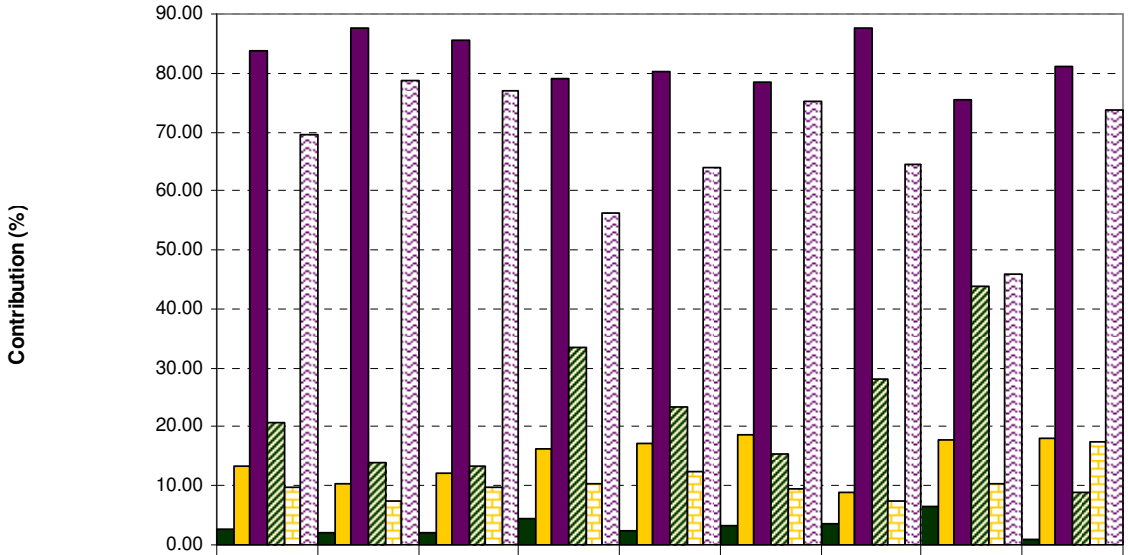
Figure B: Household Infrastructure Index, 1996 -2009

Concluding Comments

Smaller household sizes have a significant impact on increased housing demand, even with a declining population size. The youthfulness of the population has immediate implications for education, sports and recreation and places additional demands on further education and particularly employment generation. The higher incidence of retirement age residents has immediate implications on health and social services or welfare. The combination of a youthful and ageing population translates into escalating dependency rates where more people become reliant on the economic activities, and income, of fewer people.

ADM Economic Structure

The tertiary sector contributes the greatest share of GVA (83.89%) and formal employment (69.51%) to the District economy. Tertiary sector dominance is evident across all local economies of Amathole and is particularly striking for the Mbhashe (87.53% GVA; 78.72% formal employment), Mnquma (85.69%; 76.93%) and Nkonkobe (87.49%; 64.51%) and, to a lesser degree, the local economies of Ngqushwa (78.35%; 75.14%) and Amahlathi (79.8%; 65.7%), then Nxuba (75.50%; 45.75%). (See Figure C) Community services and general government account for 41.64% of all formal employment in the District and similarly dominate formal employment opportunities across the local economies – ranging from 29.27% (Nxuba), through 37.19% (Nkonkobe), to a striking 50.25% (Mnquma). Services' GVA contribution is slightly less significant but remains the dominant sectoral contributor (considering both community and government services together) to GVA for the District economy (40.46%) and for all local economies – from 25.53% (Great Kei) through 34.49% (Amahlathi) and 38.00% (Nxuba) to 44.66% (Mnquma) and 45.03% (Nkonkobe). A comparable economic structure is seen for the BCM, where the tertiary sector contributes 81.07% GVA and 73.76% formal employment and where Services generates over one third (34.04%) of the Metro's GVA and 39.29% formal employment in 2010.



	ADM	Mbhashe	Mnquma	Great Kei	Amahlati	Ngqushwa	Nkonkobe	Nxuba	BCM
GVA Primary	2.75	1.99	2.11	4.50	2.43	3.13	3.51	6.64	0.86
GVA Secondary	13.36	10.48	12.20	16.39	17.27	18.52	8.99	17.87	18.07
GVA Tertiary	83.89	87.53	85.69	79.11	80.30	78.35	87.49	75.50	81.07
Employment Primary	20.85	13.96	13.38	33.44	23.47	15.46	28.06	43.77	8.86
Employment Secondary	9.64	7.32	9.69	10.37	12.44	9.40	7.43	10.47	17.38
Employment Tertiary	69.51	78.72	76.93	56.19	64.09	75.14	64.51	45.75	73.76

Figure C: Relative GVA and Formal employment contribution, 2010

The structure of the District economy has not shifted significantly from 2000 to 2010, where the tertiary sector has grown relatively more dominant, from 82.51% to 83.89% GVA, while the primary sector has declined from 3.95% to 2.75% and the secondary sector has experienced a modest shift in share of District GVA from 13.54% to 13.36% over the same period. Beyond the Services sector (40.46%), the greatest contributors to District GVA are the tertiary sectors of Finance (18.55%) and Trade (16.27%) – comparative contributions for 2000 are 48.62% for Services, 12.60% for Finance and 16.18% for Trade. The secondary sector of Manufacturing emerges as the fourth greatest GVA contributor (9.61%), marginally down from its contribution of 9.97% in 2000. The tertiary sector of Transport is the fifth most significant GVA contributor in 2010, at 8.61%, substantially up from 5.12% in 2000. In respect of formal employment, Services retains its dominance (41.64%), but the primary sector of Agriculture is the next most prominent employer (20.48%), followed by Trade (16.29%) and Finance (9.03%), the Manufacturing (5.96%). Comparative contributions of these sectors to formal employment in 2000 are: 43.66% (Services); 28.06% (Agriculture); 11.96% (Trade); 5.17% (Finance); and 3.75% (Manufacturing).

The local economies of Amathole do not exhibit characteristics consistent with the District economic structure beyond the dominance of Services in GVA contribution and, for the majority, in formal employment contribution. The local economies of Amahlathi and Nkonkobe most closely resemble the structure of the District economy in respect of the relative contribution, or ranking, of both sectoral GVA and formal employment. The local economies of Mbhashe and Ngqushwa each claim Trade as the next most prominent contributor to GVA and employment, after Services, followed by Finance for GVA and Agriculture for employment. The remaining local economies of Mnquma, Great Kei and Nxuba each claim Finance as next most significant GVA contributor, although Agriculture is the dominant employer – ahead of Services – in Great Kei and Nxuba. Ngqushwa is the only local economy to claim Utilities as a significant contributor to GVA, at 4.26%, after Services (42.49%), Trade (21.21%), Finance (12.73%) and Manufacturing (12.34%). The Mbhashe and Great Kei local economies are notable as exceptions with regard to formal

employment, where both claim Construction as the fifth largest employer, respectively at 3.47% and 6.32%. The BCM economic structure most closely resembles that of Nxuba in respect of relative GVA contributions, being Services, then Finance, Manufacturing and Trade, but the Metro economy stands apart considering sectoral formal employment where Finance is the next biggest employer after Services, followed by Manufacturing then Agriculture. (Refer to Table C and Table D)

Table C: Relative Sectoral GVA Contributions as a Percentage, 2010.

	EC	ADM	Mbhashe	Mnquma	Great Kei	Amahlati	Ngqushwa	Nkonkobe	Nxuba	BCM
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
PRIMARY SECTOR	**2.22**	**2.75**	**1.99**	**2.11**	**4.50**	**2.43**	**3.13**	**3.51**	**6.64**	**0.86**
Agriculture, forestry & fishing	2.12	2.62	1.79	2.08	4.37	2.23	2.84	3.30	6.58	0.80
Mining & quarrying	0.10	0.13	0.20	0.03	0.13	0.20	0.29	0.21	0.05	0.06
SECONDARY SECTOR	**20.27**	**13.36**	**10.48**	**12.20**	**16.39**	**17.27**	**18.52**	**8.99**	**17.87**	**18.07**
Manufacturing	***16.33***	***9.61***	***6.06***	***10.08***	***10.10***	***12.87***	***12.34***	***4.31***	***14.72***	***14.27***
Food, beverages & tobacco	3.56	1.58	1.51	2.06	2.34	1.32	1.55	0.33	1.29	2.48
Textiles, clothing & leather goods	0.86	0.90	0.24	1.23	0.05	0.89	1.88	0.74	0.74	1.14
Wood, paper, publishing & printing	1.04	0.70	0.00	0.10	0.19	2.39	1.42	0.74	0.64	0.64
Petroleum products, chemicals, rubber & plastic	2.55	1.42	1.39	0.48	2.69	3.27	2.22	0.39	1.77	2.67
Other non-metal mineral products	0.79	0.87	0.65	0.51	0.51	0.98	0.72	0.22	7.14	0.34
Metals, metal products, machinery & equipment	1.86	1.88	1.58	2.84	1.38	1.35	1.84	0.70	1.17	1.39
Electrical machinery & apparatus	0.79	0.29	0.00	0.46	0.53	0.00	0.56	0.08	1.02	0.89
Radio, TV, instruments, watches & clocks	0.15	0.08	0.00	0.18	0.00	0.07	0.00	0.00	0.00	0.19
Transport equipment	3.52	0.28	0.13	0.24	0.96	0.30	0.79	0.07	0.00	3.46
Furniture & other manufacturing	1.21	1.60	0.58	1.98	1.45	2.28	1.35	1.04	0.95	1.06
Utilities	***1.11***	***1.33***	***1.94***	***0.65***	***0.50***	***1.98***	***4.26***	***1.09***	***0.72***	***1.10***
Electricity	0.80	0.69	0.69	0.50	0.00	0.61	2.85	0.75	0.72	0.89
Water	0.30	0.64	1.25	0.15	0.50	1.37	1.40	0.33	0.00	0.21
Construction	2.83	2.42	2.48	1.47	5.78	2.42	1.93	3.59	2.43	2.71
TERTIARY SECTOR	**77.51**	**83.89**	**87.53**	**85.69**	**79.11**	**80.30**	**78.35**	**87.49**	**75.50**	**81.07**
Trade	***13.40***	***16.27***	***21.95***	***12.38***	***15.44***	***17.87***	***21.21***	***18.62***	***12.53***	***12.39***
Wholesale & retail trade	12.61	15.23	21.07	11.77	13.30	17.28	18.38	16.65	12.15	11.63
Catering & accommodation services	0.79	1.04	0.88	0.61	2.15	0.59	2.83	1.97	0.38	0.76
Transport	***8.84***	***8.61***	***6.89***	***11.11***	***16.41***	***7.37***	***2.12***	***4.07***	***7.25***	***9.23***
Transport & storage	4.59	4.95	4.72	4.96	12.47	5.19	1.69	3.22	1.94	4.89
Communication	4.25	3.66	2.17	6.15	3.93	2.18	0.42	0.85	5.31	4.34
Finance	***23.46***	***18.55***	***18.55***	***17.54***	***21.73***	***20.57***	***12.73***	***19.76***	***17.72***	***25.41***
Finance & insurance	12.74	11.53	10.36	11.27	14.08	12.40	5.48	12.32	15.53	13.19
Business services	10.72	7.02	8.19	6.27	7.65	8.17	7.26	7.44	2.19	12.22
Services	***31.82***	***40.46***	***40.15***	***44.66***	***25.53***	***34.49***	***42.29***	***45.03***	***38.00***	***34.04***
Community, social & personal services	10.86	13.72	15.24	14.08	13.74	10.07	15.35	15.99	12.31	10.62
General government	20.96	26.73	24.90	30.57	11.79	24.43	26.94	29.05	25.69	23.42

ECSECC 2011 databases (accessed at http://www.ecsecc.org/statistics-database).

Table D: Relative Sectoral Formal Employment Contributions, 2010

	EC	ADM	Mbhashe	Mnquma	Great Kei	Amahlati	Ngqushwa	Nkonkobe	Nxuba	BCM
Total	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**	**100.00**
PRIMARY SECTOR	**19.61**	**20.85**	**13.96**	**13.38**	**33.44**	**23.47**	**15.46**	**28.06**	**43.77**	**8.86**
Agriculture, forestry & fishing	19.31	20.48	13.23	13.26	33.14	23.00	14.70	27.62	43.65	8.71
Mining & quarrying	0.30	0.37	0.74	0.12	0.30	0.47	0.76	0.45	0.13	0.14
SECONDARY SECTOR	**16.08**	**9.64**	**7.32**	**9.69**	**10.37**	**12.44**	**9.40**	**7.43**	**10.47**	**17.38**
Manufacturing	***12.03***	***5.96***	***3.25***	***7.03***	***3.96***	***8.10***	***6.10***	***3.65***	***7.97***	***13.12***
Food, beverages & tobacco	1.92	0.60	0.64	0.64	0.81	0.68	0.54	0.20	0.68	1.71
Textiles, clothing & leather goods	0.99	0.96	0.26	1.43	0.05	0.99	1.56	0.92	0.46	1.71
Wood, paper, publishing & printing	0.95	0.72	0.00	0.12	0.16	2.49	0.72	0.93	0.55	0.64
Petroleum products, chemicals, rubber & plastic	0.97	0.31	0.25	0.20	0.41	0.65	0.43	0.10	0.28	1.12
Other non-metal mineral products	0.54	0.54	0.41	0.35	0.25	0.59	0.36	0.15	3.80	0.30
Metals, metal products, machinery & equipment	1.82	1.65	1.36	2.91	0.95	1.09	1.24	0.61	0.64	1.78
Electrical machinery & apparatus	0.54	0.14	0.00	0.24	0.25	0.00	0.27	0.04	0.34	0.74
Radio, TV, instruments, watches & clocks	0.10	0.03	0.00	0.05	0.00	0.07	0.00	0.00	0.00	0.12
Transport equipment	3.49	0.21	0.11	0.19	0.60	0.20	0.55	0.08	0.00	4.18
Furniture & other manufacturing	0.71	0.81	0.22	0.91	0.49	1.34	0.43	0.63	1.22	0.81
Utilities	***0.28***	***0.35***	***0.60***	***0.23***	***0.09***	***0.49***	***0.79***	***0.29***	***0.25***	***0.35***
Electricity	0.19	0.18	0.21	0.16	0.00	0.15	0.52	0.19	0.25	0.27
Water	0.09	0.17	0.39	0.06	0.09	0.34	0.27	0.10	0.00	0.08
Construction	3.77	3.33	3.47	2.44	6.32	3.85	2.52	3.48	2.26	3.91
TERTIARY SECTOR	**64.32**	**69.51**	**78.72**	**76.93**	**56.19**	**64.09**	**75.14**	**64.51**	**45.75**	**73.76**
Trade	***14.15***	***16.29***	***21.53***	***14.17***	***12.92***	***17.76***	***19.17***	***17.39***	***10.96***	***15.11***
Wholesale & retail trade	12.65	14.27	19.81	12.80	9.63	16.50	14.50	13.98	10.37	13.64
Catering & accommodation services	1.50	2.02	1.72	1.38	3.29	1.27	4.67	3.41	0.60	1.47
Transport	***2.43***	***2.54***	***2.62***	***3.34***	***3.96***	***2.40***	***0.72***	***1.12***	***1.15***	***2.93***
Transport & storage	2.03	2.20	2.43	2.67	3.67	2.22	0.70	1.09	0.74	2.42
Communication	0.40	0.34	0.19	0.67	0.29	0.18	0.02	0.03	0.42	0.51
Finance	***12.75***	***9.03***	***10.52***	***9.16***	***7.65***	***9.94***	***8.75***	***8.80***	***4.37***	***16.44***
Finance & insurance	2.36	2.05	2.11	2.34	1.37	1.98	1.07	2.08	2.46	2.96
Business services	10.38	6.98	8.42	6.83	6.28	7.96	7.68	6.72	1.91	13.48
Services	***34.99***	***41.64***	***44.05***	***50.25***	***31.66***	***33.98***	***46.50***	***37.19***	***29.27***	***39.29***
Community, social & personal services	15.77	18.30	21.96	18.89	22.20	14.24	19.86	16.79	15.01	16.32
General government	19.22	23.34	22.08	31.37	9.46	19.74	26.63	20.40	14.26	22.97

B5: Nxuba Municipality – Household Infrastructure

Household Infrastructure

Formal Housing

Number of households by type of dwelling unit

	Very Formal	Formal	Informal	Traditional	Other	Total	% Formal	Dwell Backlog
2001	1 166	4 182	941	303	71	6 663	80.3%	1 315
2002	1 105	4 439	925	331	55	6 854	80.9%	1 311
2003	1 063	4 684	877	370	42	7 035	81.7%	1 289
2004	1 084	4 838	825	414	30	7 190	82.4%	1 268
2005	1 110	5 016	770	440	19	7 355	83.3%	1 229
2006	1 124	5 278	695	441	8	7 547	84.8%	1 145
2007	1 136	5 549	618	457	0	7 760	86.1%	1 075
2008	1 161	5 699	572	470	0	7 902	86.8%	1 042
2009	1 146	5 834	529	507	0	8 017	87.1%	1 036
2010	1 163	6 022	454	488	0	8 127	88.4%	942
2011	1 184	6 129	416	512	0	8 241	88.7%	928
Change from 2001	18	1 946	-525	209	-71	1 578		-387
% Change over 10 years	1.5%	31.8%	-126.1%	40.8%		19.1%		-41.7%
% of Total:	14.4%	74.4%	5.0%	6.2%	0.0%	100.0%		

Sanitation

Number of households by type of Toilet

	Flush toilet	Ventilation Improv. Pit	Pit toilet	Bucket system	No toilet	Total	% Share Hygenic	Backlog: Non-Hygenic
2001	2 043	95	543	2 490	1 492	6 663	32.1%	4 525
2002	2 174	117	494	2 642	1 427	6 854	33.4%	4 563
2003	2 323	126	473	2 750	1 363	7 035	34.8%	4 586
2004	2 489	124	445	2 895	1 237	7 190	36.3%	4 577
2005	2 710	117	451	2 896	1 181	7 355	38.4%	4 528
2006	2 904	137	415	3 120	971	7 547	40.3%	4 506
2007	3 170	165	372	3 205	847	7 760	43.0%	4 424
2008	3 347	185	532	2 691	1 147	7 902	44.7%	4 370
2009	3 590	170	780	2 154	1 323	8 017	46.9%	4 257
2010	3 742	182	1 085	1 429	1 688	8 127	48.3%	4 203
2011	3 909	167	1 435	871	1 860	8 241	49.5%	4 165
Change from 2001	1 866	71	892	-1 619	368	1 578		-360
% Change over 10 years	47.7%	42.7%	62.2%	-186.0%		19.1%		-8.6%
% of Total:	47.4%	2.0%	17.4%	10.6%	22.6%	100.0%		

Water infrastructure

Number of households by level of access to Water

	Piped Water Inside Dwelling	Piped Water In Yard	Communal Piped water < 200 m	Communal Piped water > 200 m	No formal Piped Water	Total	Piped Water Above RDP Level	backlog Households Below RDP
2001	1 518	2 478	1 041	1 121	505	6 663	75.6%	1 625
2002	1 498	2 446	1 130	1 229	551	6 854	74.0%	1 780
2003	1 475	2 524	1 081	1 380	576	7 035	72.2%	1 956
2004	1 611	2 550	1 083	1 399	547	7 190	72.9%	1 947
2005	1 850	2 454	1 053	1 476	522	7 355	72.8%	1 998
2006	2 230	2 368	1 055	1 398	496	7 547	74.9%	1 894
2007	2 637	2 401	1 022	1 264	436	7 760	78.1%	1 700
2008	2 874	2 487	1 048	1 136	358	7 902	81.1%	1 494
2009	3 017	2 477	1 177	1 020	326	8 017	83.2%	1 346
2010	3 269	2 373	1 256	912	317	8 127	84.9%	1 230
2011	3 675	2 147	1 289	815	315	8 241	86.3%	1 130
Change from 2001	2 157	-331	247	-305	-190	1 578		-495
% Change over 10 years	58.7%	-15.4%	19.2%	-37.4%		19.1%		-43.8%
% of Total:	44.6%	26.0%	15.6%	9.9%	3.8%	100.0%		

Electricity connections

Number of households by electricity usage

	Electricity for Lighting only	Elect for Lighting & other purp.	Not using electricity	Total	Share of Households with connect	No. of HH with no elect connection
2001	3 058	2 176	1 429	6 663	78.6%	1 429
2002	3 256	2 394	1 204	6 854	82.4%	1 204
2003	3 149	2 653	1 233	7 035	82.5%	1 233
2004	3 000	3 046	1 144	7 190	84.1%	1 144
2005	2 721	3 607	1 027	7 355	86.0%	1 027
2006	2 265	4 329	952	7 547	87.4%	952
2007	1 725	5 087	947	7 760	87.8%	947
2008	1 421	5 585	896	7 902	88.7%	896
2009	1 165	5 977	875	8 017	89.1%	875
2010	971	6 281	875	8 127	89.2%	875
2011	794	6 620	827	8 241	90.0%	827
Change from 2001	-2 265	4 444	-602	1 578		-602
% Change over 10 years	-285.4%	67.1%	-72.8%	19.1%		-72.8%
% of Total:	9.6%	80.3%	10.0%	100.0%		

B6: Nxuba Municipality – Employees Per Sector

Employment - Employees per Sector												
Total Employment (Formal + Informal)												
2001	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	% of Total
1 Agriculture	1 572	1 570	1 482	1 379	1 320	1 322	1 440	1 455	1 401	1 359	1 313	37.4%
2 Mining	0	0	0	0	0	0	0	0	0	0	0	0.0%
3 Manufacturing	36	29	28	28	31	33	34	34	29	28	26	0.7%
4 Electricity	0	0	0	0	0	0	0	0	0	0	0	0.0%
5 Construction	101	79	96	114	128	117	113	113	98	104	107	3.1%
6 Trade	334	267	279	265	319	321	293	305	278	277	284	8.1%
7 Transport	15	12	13	15	17	18	18	27	26	28	28	0.8%
8 Finance	31	33	34	37	40	42	44	50	55	55	58	1.7%
9 Community services	856	864	891	912	957	993	1 068	1 169	1 197	1 202	1 276	36.3%
10 Households	335	334	346	342	347	365	410	453	444	424	418	11.9%
Total	3 279	3 188	3 169	3 091	3 158	3 211	3 419	3 606	3 528	3 476	3 511	100.0%
Employment - Percentage Change Year on Year												
Total Employment (Formal + Informal)												
2001	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
1 Agriculture		0%	-6%	-7%	-4%	0%	9%	1%	-4%	-3%	-3%	
2 Mining												
3 Manufacturing		-18%	-5%	0%	11%	6%	4%	0%	-16%	-3%	-7%	
4 Electricity												
5 Construction		-21%	21%	18%	12%	-8%	-4%	0%	-13%	5%	3%	
6 Trade		-20%	5%	-5%	20%	1%	-9%	4%	-9%	0%	3%	
7 Transport		-22%	16%	9%	14%	5%	0%	53%	-3%	6%	1%	
8 Finance		6%	5%	7%	8%	7%	4%	13%	11%	-1%	6%	
9 Community services		1%	3%	2%	5%	4%	7%	10%	2%	0%	6%	
10 Households		0%	3%	-1%	1%	5%	13%	10%	-2%	-4%	-1%	
Total		-3%	-1%	-2%	2%	2%	6%	5%	-2%	-1%	1%	

B7: Nxuba Municipality – Gross Value Added Per Sector

Economic												
Gross Value Added by Region (GVA-R)												
Broad Economic Sectors (9 sectors)												
Constant 2005 prices (R 1000)												
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	% of Total
1 Agriculture	38 003	34 757	34 329	34 199	28 285	31 560	32 544	38 740	36 112	37 814	37 169	13.6%
2 Mining	0	0	0	0	0	0	0	0	0	0	0	0.0%
3 Manufacturing	3 626	3 550	3 490	3 600	3 616	3 642	3 661	3 610	3 209	3 460	3 538	1.3%
4 Electricity	0	0	0	0	0	0	0	0	0	0	0	0.0%
5 Construction	2 400	2 061	2 720	2 901	3 098	3 321	3 575	3 721	4 056	3 980	4 032	1.5%
6 Trade	17 300	16 957	17 057	17 761	18 395	18 625	18 593	18 066	17 187	17 703	18 233	6.7%
7 Transport	65	67	70	72	72	69	69	66	62	59	57	0.0%
8 Finance	17 070	17 395	17 914	19 698	20 162	25 897	29 487	30 323	30 536	30 909	31 941	11.7%
9 Community services	113 301	116 865	118 866	121 022	128 103	130 925	136 750	139 903	143 471	145 272	151 523	55.6%
Total Industries	191 766	191 651	194 446	199 253	201 730	214 039	224 679	234 429	234 632	239 198	246 492	90.4%
Taxes less Subsidies on	21 263	21 264	21 804	22 318	22 597	23 808	24 793	25 079	24 526	25 167	26 189	9.6%
Total (Gross Domestic P	213 029	212 915	216 251	221 571	224 327	237 847	249 472	259 507	259 158	264 365	272 681	100.0%

Economic - Percentage Change Year on Year											
Gross Value Added by Region (GVA-R)											
Broad Economic Sectors (9 sectors)											
Constant 2005 prices (R 1000)											
	2001	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**
1 Agriculture		-8.5%	-1.2%	-0.4%	-17.3%	11.6%	3.1%	19.0%	-6.8%	4.7%	-1.7%
2 Mining											
3 Manufacturing		-2.1%	-1.7%	3.2%	0.4%	0.7%	0.5%	-1.4%	-11.1%	7.8%	2.2%
4 Electricity											
5 Construction		-14.1%	32.0%	6.7%	6.8%	7.2%	7.7%	4.1%	9.0%	-1.9%	1.3%
6 Trade		-2.0%	0.6%	4.1%	3.6%	1.3%	-0.2%	-2.8%	-4.9%	3.0%	3.0%
7 Transport		1.9%	5.2%	2.5%	-0.2%	-3.1%	-0.6%	-4.3%	-6.6%	-4.9%	-2.9%
8 Finance		1.9%	3.0%	10.0%	2.4%	28.4%	13.9%	2.8%	0.7%	1.2%	3.3%
9 Community services		3.1%	1.7%	1.8%	5.9%	2.2%	4.4%	2.3%	2.6%	1.3%	4.3%
Total Industries		-0.1%	1.5%	2.5%	1.2%	6.1%	5.0%	4.3%	0.1%	1.9%	3.0%
Taxes less Subsidies on products		0.0%	2.5%	2.4%	1.2%	5.4%	4.1%	1.2%	-2.2%	2.6%	4.1%
Total (Gross Domestic Product - GDP)		-0.1%	1.6%	2.5%	1.2%	6.0%	4.9%	4.0%	-0.1%	2.0%	3.1%

APPENDIX C: ECONOMIC IMPACT METHODOLOGY AND MULTIPLIERS USED

APPENDIX C

C1: Economic Impact Methodology and Multipliers Used

Every aspect of the economy has direct linkages with another in the form of a backward linkage to the suppliers which it may need for the conduct of its business. These linkages result in additional expenditure being incurred in the economy which leads to a positive increase in a country Gross Domestic Product (GDP), which is the sum of all economic activity which occurs within a time period, usually one calendar year.

The Central Economic Advising Services (CEAS) and the IDC have developed a set of Input-Output factors which are based upon modelling various sectors of the economy in order to determine these interdependences of economic activity. The models comprise of mathematical equations linking the economic flows between sectors and provinces, with thirty two sectors being distinguished for each of the nine provinces. In addition to this, equations for value added activity, international imports needed in the production process, company tax, personal tax, Value Added Tax and other taxes, subsidies, job creation and capital needed are included in the model, most of these factors being marginal rather than average functions. Extensive modelling is undertaken using the above factors and input-output tables are calculated which indicate the effect of one Rand spend in the economy. These multipliers give an indication of the additional GDP created throughout the entire economy due to an increase in demand for a specific sector's products. These multipliers will be used, in current date terms, to estimate the economic impact of the project in the local, regional and national economies.

Employment multiplier effects result from the additional economic and business activity generated by the establishment of a new venture in an area. The multiplier effects refer specifically to the additional (multiplied) employment opportunities and economic activity (income) which results from the development of a project within a specific area.

The IDC has also developed a series of employment multipliers which are based upon the employment effect that is stimulated by an additional R1 million expenditure by a particular sector into the national economy. Employment multipliers will be used to calculate the employment effects of the project at local, regional and national level.
National and regional spending profiles have been established for both domestic and foreign visitors, with there being clear distinctions between the two categories. The prevailing data will be used to establish the current baseline and information from survey research will be used to refine these patterns as deemed necessary.

All of the above information and projections of employment and economic activity will enable a total business economic activity profile to be established, which will be used to estimate fiscal revenue to the State and the local authorities in the form of taxation and rates and utility charges.

The economic evaluation process referred to above analyses every aspect of the proposed project from the business case viability and economic performance itself, through to employment creation by the project within the local national and regional arena, during implementation and operation; as well as the economic multiplier effects of the project into the regional and national economies, including the taxation and utility impacts generated.

Economic Impact and Multipliers for Construction Activities

The production of goods, supply of services or construction of infrastructure results in expenditure within a regional economy which has knock-on effects and results in additional expenditure which contributes to the regional economy. These effects can be measured with the most widely accepted approaches being based on input-output models. An input-output model is a representation of the flows of economic activity within a region. The model captures what each business or sector must purchase from every other sector in order to produce a Rand's worth of goods or services. Using such a model, flows of economic activity associated with any change in

spending may be traced either forwards (spending generating income which induces further spending) or backwards (visitor purchases of meals leads restaurants to purchase additional inputs - groceries, utilities, etc.). By tracing these linkages between sectors, input-output models can estimate secondary effects of visitor spending or construction activity, often captured in the form of multipliers.

Before a multiplier can be applied to a stream of expenditure, it needs to be determined what proportion of that expenditure is being incurred and retained within the region. In certain instances it is possible to quantify certain costs or leakages associated with a development or expenditure. We have identified the following economic costs relevant to the infrastructure projects, notably:

- Leakages;
- Import propensities; and
- Revenue transfer.

The degree of income leakage in a destination economy could have negative consequences for the economic development of the area. The more developed the economy the greater the potential that the demand for goods and services can be met from internal supply, rather than depend on imports which causes an outflow of funds in the form of taxation and other transfer payments to suppliers. Regional and local multipliers tend to be lower than national multipliers due to the greater potential for leakages. Consequently, a higher propensity to import exists in smaller economies, which in turn usually have high leakage factors and lower multipliers.

We have had extensive experience with socio-economic impact assessments for the Coega and East London Industrial Development Zones in South Africa and after various stakeholder engagements and reviews have agreed that 5% is an acceptable leakage factor for industrial estates in South Africa. The import propensity will vary for different projects as some of the increased demand caused by a domestic economic expansion falls not on domestic goods but on foreign goods. This effect will be larger; the higher is the marginal propensity to import of the domestic country. The size of the marginal propensity to import is affected by changes in the relative prices of domestic and foreign goods and could therefore change in the long run, or if the economy is hit by a significant exchange rate shock. Due to these leakage effects we have reduced the infrastructure expenditure profile by 5% and then used the Industrial Development Corporation (IDC) open model multiplier for the construction sector for calculating the construction expenditure and total GDP impact. This implies that for every one Rand of construction activity in the region, an additional component of expenditure is occasioned in the national economy.

In measuring the economic footprint of an enterprise, its “direct” (or “first-round”), “indirect” (“second-round”) and “induced” (“third-round”) effects must all be taken into account.

This report draws mainly upon South Africa's Input-Output (I-O) tables and Social Accounting Matrices (SAMs) in order to generate macro-data on such economic effects as job creation and labour income.

The goal with any economic impact assessments is to arrive at an estimate of the incremental impact that the investment may have on the local economy. In other words, those changes that will not have occurred in the economy in the absence of the planned investment.

The following impacts can usually be quantified:

- **Direct impact:** The direct impact is calculated from macro-economic aggregates occurring as a direct result of the project. The initial impact on GDP for example, is taken from the financial information and equals the value added generated by a specific scenario.
- **Indirect impact:** Indirect impacts are calculated from the activities of suppliers. For purposes of this study, indirect suppliers include those industries who deliver goods and

services to the activity under discussion, being the construction of a dam (first round suppliers) including suppliers who on their part deliver goods and services to the first mentioned indirect suppliers.

- **Induced impacts:** The impacts are the impacts on goods and services demanded due to the project. Examples include the income of employees and shareholders of the project as well as the income arising through the backward linkages of this spending in the economy.

C2: Industrial Development Corporation (IDC) Multipliers Used [Based to 2010]

AVERAGE SECTORAL GDP MULTIPLIERS FOR SOUTH AFRICA IN 2010

NR	INDUSTRY	CHANGE IN GDP WITH R1 CHANGE IN FINAL DEMAND					
		Initial impact (GDP)	First round impact	Direct impact	Indirect impact	Induced impact	Total impact
		A	B	C = (A + B)	D	E	(C + D + E)
1	**Agriculture**	0.4109	0.1843	0.5953	0.1903	0.3010	1.0866
	Mining						
2	Coal mining	0.5984	0.1571	0.7556	0.1158	0.3257	1.1971
3	Gold mining	0.6963	0.1079	0.8042	0.0954	0.5725	1.4721
4	Other mining	0.5947	0.1700	0.7646	0.1183	0.3146	1.1976
	Manufacturing						
5	Processed food	0.2366	0.2977	0.5342	0.2770	0.4118	1.2231
6	Beverages	0.3727	0.2512	0.6239	0.2337	0.4155	1.2731
7	Tobacco	0.2074	0.2928	0.5002	0.2899	0.3524	1.1425
8	Textiles	0.1754	0.2612	0.4366	0.2758	0.4178	1.1301
9	Clothing, excl. footwear	0.3082	0.2242	0.5324	0.2444	0.5305	1.3073
10	Leather and leather products	0.0759	0.2754	0.3513	0.3605	0.4125	1.1243
11	Footwear	0.2271	0.1747	0.4019	0.2743	0.4135	1.0897
12	Wood and wood products	0.2679	0.2609	0.5288	0.2811	0.5220	1.3319
13	Paper and paper products	0.1721	0.2534	0.4255	0.3022	0.3976	1.1253
14	Printing and publishing	0.3280	0.2112	0.5392	0.2544	0.5824	1.3760
15	Petroleum and petroleum products	0.2297	0.2656	0.4953	0.1456	0.1887	0.8295
16	Industrial chemicals	0.2190	0.2385	0.4575	0.1933	0.2854	0.9362
17	Other chemical products	0.2555	0.2257	0.4812	0.2295	0.3951	1.1057
18	Rubber products	0.2751	0.2312	0.5063	0.2271	0.4104	1.1438
19	Plastic products	0.3246	0.1968	0.5214	0.2148	0.5145	1.2507
20	Glass and glass products	0.3130	0.2482	0.5613	0.1955	0.5043	1.2611
21	Non-metallic mineral products nec	0.3416	0.2350	0.5766	0.1566	0.2773	1.0105
22	Basic iron and steel products	0.1547	0.3015	0.4561	0.1957	0.3384	0.9902
23	Non-ferrous metal products	0.2998	0.2202	0.5200	0.1525	0.2303	0.9028
24	Metal products, excl. machinery	0.2682	0.2189	0.4871	0.2362	0.4951	1.2184
25	Non-electrical machinery	0.3192	0.1903	0.5095	0.1864	0.4194	1.1153
26	Electrical machinery	0.2131	0.2269	0.4399	0.2357	0.4261	1.1017
27	Radio, TV and communication apparatus	0.2861	0.1848	0.4708	0.1530	0.3980	1.0218
28	Professional equipment etc.	0.2840	0.2483	0.5323	0.2154	0.3941	1.1418
29	Motor vehicles, parts and accessories	0.1442	0.2007	0.3449	0.2399	0.3243	0.9091
30	Other transport equipment	0.2808	0.1846	0.4654	0.1835	0.4731	1.1220
31	Furniture	0.1739	0.2558	0.4297	0.3266	0.4901	1.2464
32	Other manufacturing	0.4290	0.1925	0.6215	0.1207	0.2402	0.9824
	Electricity, gas and water						
33	Electricity, gas and steam	0.5730	0.2130	0.7860	0.1331	0.3493	1.2684
34	Water supply	0.3941	0.2428	0.6368	0.2566	0.2810	1.1745
	Construction						
35	Building construction	0.3340	0.2140	0.5480	0.2475	0.3354	1.1309
36	Civil engineering	0.3695	0.2155	0.5850	0.2084	0.3353	1.1288
	Trade & accommodation						
37	Wholesale and retail trade	0.5640	0.1995	0.7636	0.1592	0.4242	1.3470
38	Catering and accommodation	0.5019	0.2116	0.7134	0.1961	0.3126	1.2221
	Transport, storage & communication						
39	Transport and storage	0.5287	0.1728	0.7015	0.1508	0.3211	1.1735
40	Communication	0.3725	0.2266	0.5991	0.1996	0.3382	1.1369
	Financial & business services						
41	Finance and insurance	0.6181	0.2024	0.8205	0.1363	0.4548	1.4116
42	Business services	0.5147	0.2213	0.7360	0.1724	0.3559	1.2643
	Other services						
43	Medical, dental and veterinary services	0.4953	0.2108	0.7061	0.1758	0.3458	1.2277
44	Other services	0.5030	0.2187	0.7217	0.1762	0.2853	1.1831
45	Other producers	0.6893	0.1186	0.8079	0.1018	0.8148	1.7246
	Government services						
46	General government	0.5811	0.1964	0.7775	0.1407	0.7391	1.6573
	Total economy	**0.4571**	**0.2098**	**0.6669**	**0.1765**	**0.4218**	**1.2651**

AVERAGE SECTORAL EMPLOYMENT MULTIPLIERS FOR SOUTH AFRICA IN 2010

NR	INDUSTRY	CHANGE IN EMPLOYMENT WITH R1 MILLION CHANGE IN FINAL DEMAND					
		Initial impact (GDP)	First round impact	Direct impact	Indirect impact	Induced impact	Total impact
		A	B	C = (A + B)	D	E	(C + D + E)
1	**Agriculture**	4.1911	0.6520	4.8431	0.7261	1.0980	6.6673
	Mining						
2	Coal mining	0.9608	0.5859	1.5467	0.4104	1.1883	3.1455
3	Gold mining	2.3734	0.5155	2.8889	0.3462	2.0884	5.3235
4	Other mining	1.1546	0.5537	1.7082	0.4102	1.1478	3.2663
	Manufacturing						
5	Processed food	0.8545	2.1685	3.0230	1.1055	1.5022	5.6306
6	Beverages	0.5641	1.4785	2.0426	0.9443	1.5158	4.5027
7	Tobacco	0.1970	2.3210	2.5180	1.0961	1.2857	4.8998
8	Textiles	1.6958	1.5084	3.2043	1.0614	1.5240	5.7897
9	Clothing, excl. footwear	3.0728	1.5118	4.5846	1.0035	1.9352	7.5233
10	Leather and leather products	1.0218	1.3623	2.3841	1.6490	1.5049	5.5380
11	Footwear	1.2814	1.0563	2.3377	1.1753	1.5083	5.0213
12	Wood and wood products	1.3252	1.7002	3.0253	1.2008	1.9041	6.1302
13	Paper and paper products	0.5435	1.2279	1.7714	1.1824	1.4504	4.4042
14	Printing and publishing	1.5510	1.0565	2.6075	1.0127	2.1246	5.7448
15	Petroleum and petroleum products	0.2401	0.5891	0.8291	0.4869	0.6882	2.0043
16	Industrial chemicals	0.2122	0.7566	0.9688	0.6528	1.0410	2.6626
17	Other chemical products	0.4821	0.9335	1.4156	0.8057	1.4412	3.6626
18	Rubber products	0.8519	1.1073	1.9593	0.8063	1.4971	4.2627
19	Plastic products	1.4089	0.8745	2.2834	0.7989	1.8769	4.9592
20	Glass and glass products	1.3666	1.2082	2.5748	0.7191	1.8397	5.1335
21	Non-metallic mineral products nec	1.2741	0.7743	2.0484	0.5337	1.0116	3.5937
22	Basic iron and steel products	0.5102	0.8883	1.3985	0.6745	1.2345	3.3074
23	Non-ferrous metal products	0.6464	0.5302	1.1767	0.4613	0.8400	2.4780
24	Metal products, excl. machinery	1.5872	1.0989	2.6861	0.7973	1.8062	5.2896
25	Non-electrical machinery	1.6307	0.9681	2.5988	0.6584	1.5299	4.7870
26	Electrical machinery	0.8713	1.0500	1.9213	0.8404	1.5543	4.3160
27	Radio, TV and communication apparatus	0.6968	1.0375	1.7343	0.5681	1.4518	3.7542
28	Professional equipment etc.	1.5212	1.1066	2.6278	0.7789	1.4378	4.8445
29	Motor vehicles, parts and accessories	0.5305	0.9378	1.4683	0.9216	1.1832	3.5731
30	Other transport equipment	1.2219	0.8673	2.0892	0.6663	1.7258	4.4812
31	Furniture	1.7988	1.3782	3.1770	1.4421	1.7878	6.4070
32	Other manufacturing	0.8078	0.6183	1.4261	0.4300	0.8761	2.7322
	Electricity, gas and water						
33	Electricity, gas and steam	0.4392	0.4127	0.8518	0.4604	1.2743	2.5864
34	Water supply	0.3490	0.3444	0.6934	0.5743	1.0252	2.2930
	Construction						
35	Building construction	1.6341	0.8529	2.4870	0.9399	1.2235	4.6503
36	Civil engineering	0.9567	0.8156	1.7723	0.7409	1.2231	3.7363
	Trade & accommodation						
37	Wholesale and retail trade	2.6500	0.6779	3.3279	0.5486	1.5474	5.4239
38	Catering and accommodation	2.6906	0.8151	3.5057	0.7692	1.1405	5.4153
	Transport, storage & communication						
39	Transport and storage	0.9075	0.6203	1.5278	0.5014	1.1714	3.2006
40	Communication	0.5134	0.6710	1.1844	0.6712	1.2336	3.0892
	Financial & business services						
41	Finance and insurance	0.8970	0.5202	1.4172	0.4385	1.6590	3.5147
42	Business services	2.2175	0.7594	2.9769	0.5871	1.2983	4.8623
	Other services						
43	Medical, dental and veterinary services	1.9000	0.8058	2.7058	0.6136	1.2615	4.5809
44	Other services	0.7320	0.8934	1.6253	0.6216	1.0407	3.2877
45	Other producers	13.1538	0.4956	13.6494	0.3667	2.9725	16.9886
	Government services						
46	General government	2.6008	0.7840	3.3848	0.5169	2.6963	6.5979
	Total economy	**1.8194**	**0.8106**	**2.6299**	**0.6303**	**1.5386**	**4.7989**

APPENDIX D: AGRICULTURAL BACKGROUND AND POLICY ENVIRONMENT

APPENDIX D

D1: Agricultural Background and Policy Environment

Recent Agricultural Policy and the Land Reform Programme

The National Development Plan (NDP) in Chapter six, *An Integrated and Inclusive Rural Economy*, states that 'Since 1994, the main challenge for rural development has been marginalisation of the poor. Combating this required changes in access to resources (land, water, education and skills), and improved rural infrastructure and other government services.' (NDP, 2011. Page 217)

The NDP Vision 2030 strategy states that by 2030, South Africa's rural communities must have better opportunities to participate fully in the economic, social and political life of the country. The NDP states that as the primary economic activity in rural areas, agriculture has the potential to create close to 1 million new jobs by 2030, a significant contribution to the overall employment target. To achieve this, South Africa needs to:

- 'Expand irrigated agriculture. Evidence shows that the 1,5 million hectares under irrigation (which produce virtually all of South Africa's horticultural harvest and some field crops) can be expanded by at least 500 000 hectares through the better use of existing water resources and developing new water schemes.
- Use some underused land in communal areas and land-reform projects for commercial production.
- Pick and support commercial agriculture sectors and regions that have the highest potential for growth and employment.
- Support job creation in the upstream and downstream industries. Potential employment will come from the growth in output resulting from the first three strategies.
- Find creative combinations between opportunities. For example, emphasis should be placed on land that has the potential to benefit from irrigation infrastructure; priority should be given to successful farmers in communal areas, which would support further improvement of the area; and industries and areas with high potential to create jobs should receive the most support. All these will increase collaboration between existing farmers and the beneficiaries of land reform.
- Develop strategies that give new entrants access to product value chains and support from better-resourced players.' (NDP, 2011. Page 217)

In the National Development Plan 2030, a number of winning industries were identified that provide sufficient potential for growth but are also labour intensive. All of these labour intensive industries are dependent on water and therefore the consistent availability, quality and price of water is a key driver in the strategy of intensification and expansion. In order to reach the target of approximately 380,000 additional jobs in commercial agriculture, the total area under irrigation has to increase by 145,000 hectare, over and above the current total under irrigation of approximately 1.6 million ha. In other words, a net expansion in the area under irrigation of almost 10% is required. Various sources from the literature argue that efficiency losses in many of the irrigation schemes of the country could be as high as 30%, with improved efficiency being an early gain which could be readily attained.

In the National Development Plan water takes on a role as critical strategic resource. With an increasing demand for water in industries such as mining and electricity generation and the rapid growth in demand by domestic and urban growth, agriculture finds itself in a tight space within government's new National Water Resource Strategy 2 (NWRS-2) framework of water allocation, taxes and quotas. This brings to the fore the current debate between conflicting parties competing for water in South Africa and the need to fully evaluate the impact of water as a key component in the agricultural sector. (BFAP, 2013. Agricultural Outlook, 2013 – 2022. Page 125)

South Africa has a dual agricultural economy, with both well-developed commercial farming and smaller-scale communal farming (located in the former homeland areas). Agriculture contributes a relatively small share of the total GDP, but is important in providing employment and earning foreign exchange. The commercial agricultural sector has grown by approximately 14% per year since 1970, while the total economy has grown by 14,5% over the same period, resulting in a decline of agriculture's share of the GDP to 2,5% in 2008. However, there are strong backward and forward linkages into the economy, so that the sector is estimated to actually contribute about 14% of the GDP of South Africa.

Over the last 20 years, South Africa has undergone immense social and economic changes, with fundamental structural reforms resulting in an open, market-oriented economy. Some of these changes were intended, while others are the result of the country's integration into the global economy following the end of apartheid-era sanctions. The changes in policy were intended to remove the socialist control of agriculture prevalent under the Nationalist Government, improve the position of farm labourers, and redress land inequalities.

Closing agricultural marketing boards, phasing out of certain import and export controls and introducing certain import tariffs all converted a stagnant and state-controlled sector into a vibrant market economy. Dismantling state support to farmers combined with low import tariffs did, however, leave many South African farmers unable to compete in certain areas, such as wheat and milk, against farmers from developed countries who receive generous state subsidies and dump their products in South Africa. On the other hand, government led initiatives to increase irrigated farmland has enabled other farmers to successfully grow high-value export crops such as deciduous fruit, grapes and citrus. The volume of agricultural exports increased dramatically, and the rand value of exports increased from 5% of agricultural production in 1988 to 51% in 2008 (SA Yearbook 2008/9). The net result has been a decrease in the area under production for staple low-value crops such as wheat and maize, and a dramatic increase in the export of high-value crops.

Regarding the government land reform programme, the World Wildlife Fund (WWF) summarise the position as:

> 'An important share of public financial resources has been devoted to land reform and agricultural support programmes for disadvantaged farming communities. New programmes were introduced in 2005 to support the development of market-oriented family farms emerging from the land reform process, mainly through investment grants and provision of micro credit and retail financial services in rural areas. The Land Reform Programme has doubtless reduced social tensions in certain areas and has redressed previous wrongs, but progress has been slow and projects have shown a 90% failure rate, reducing agricultural output in certain areas. (WWF. Agriculture: Facts & Trends. South Africa. 2009)

The success of the land reform process is in doubt and has been described as:

> 'The establishment of an *"integrated and inclusive rural economy"* has been identified by the National Planning Commission (NPC) as one of the key goals for achieving their vision 2030. In real terms (measured in 2013 values), more than R69 billion has been spent by the State on the three main sub-programmes of land reform since the 1994, each with a variety of instruments that have changed over time. Yet these programmes share one distinguishing characteristic, namely they all represent attempts to solve the problem of the skewed distribution of land in South Africa by focussing narrowly on the land market. Thus far, the exact extent of the resulting transfer of land is not known due to limitations in data, specifically on the extent of land transferred to beneficiaries by the State and the land acquired by black people through normal market transactions. What is known is that the extent of land transfer falls far short of the 30% of white-owned farm land promised in the early years after the transition to democracy, that it has not been accompanied by the

transformation of the livelihoods of the supposed beneficiaries, and that the land market has performed as well or as badly as the state.' (BFAP, Land reform in the Free State. 2013. Page i)

In this regard, the key policy vision for agriculture, as spelled out in the NDP, has to be the provision of integrated farmer support services that favour smaller farmers, while the key policy vision for land reform should be to ensure property rights that allow all farmers to mobilise capital; to ensure flexible land markets that also allow farmers to grow, shrink, stagnate and/or get out; to reflect diversity of natural resources and (historical) modes of production; and to accommodate the high cost of entry. Merely transferring land to reach a target can be detrimental if not accompanied with the necessary and appropriate support services. (BFAP, Land reform in the Free State. 2013. Page iii)

In a report which was undertaken by the Bureau for Food and Agricultural Policy (BFAP) following labour unrest in De Doorns last year which was accompanied by demands for a minimum wage of R150,00 per day, an evaluation of wages and benefits within the South African agricultural sector was undertaken in order to *"provide the salient factual background that will enable the responsible parties to make well-informed decisions about these weighty matters". (*Bureau for Food and Agriculture Policy [BFAP], 2012. Farm sectoral determination: An analysis of agricultural wages in South Africa.)

The Report makes for interesting although somewhat depressing reading, with the main conclusions of the report being that the agricultural sector will gradually react to higher wages by initiating structural changes in the way it operates (e.g. mechanization). There will, therefore, not be a sudden or dramatic change in response to externally influenced wage increases and the report emphasises that the current policy framework within which the sector operates falls woefully short of meeting the needs of both farmers and their workers, both permanent and seasonal, and that this needs to be addressed.

Indicative Wages and Net Farm Income (NFI) for the Agricultural Sector

With regard to wages and earnings, South Africa's agricultural sector has long been dependent on cheap and unskilled labour. However, it is becoming clear that this system will not survive into the future, which will be characterised by fewer, more skilled and better paid workers. The transition between these production systems is already in motion, and has many policy implications. One thing that has become evident with the recent spate of agricultural labour unrest is that public policy is not adequately positioned and able to ease this transition for either the workers or the farmers.

On the 22nd of November 2012, violent protests erupted in the De Doorns area of the Hex River Valley of the Western Cape Province. The most prominent immediate demand of the striking workers was for an increase in the minimum wage to R150,00 per day from the prevailing R 84,00 per day. In reaction, the Department of Labour decided to revisit the Sector Determination for Agriculture, the most recent being concluded in March 2012. The BFAP report introduces some of the more important concepts and trends in agriculture, followed by an in depth analysis of the farm level impact of incremental increases in the minimum wage for selected industries and then an aggregate approach in calculating the total impact of higher wages on the labour bill in agriculture. This is weighed against the dilemma of the workers in terms of rising food prices and the required level of income to make a living.

Structural adjustments will need to be made to accommodate these higher wage rates. The structural adjustments could include mechanization and consolidation of farming units to become more efficient. This does not imply that the larger farms are always more cost efficient, but that the larger farming units have the ability to mechanize and as wages rise, the mechanization option becomes more attractive. This is a general phenomenon in agriculture both globally and locally and the trend of larger farming units that are more mechanized with more skilled labour that is compensated at a significantly higher rate will in all likelihood continue.

This highlights the importance of the 2030 strategy that was published by the National Planning Commission in 2011. For this strategy to work, BFAP identified the winning industries and the potential to expand and intensify South African agriculture from a natural resource potential as well as a marketing potential and thereby create close to 1 million jobs. Knowing that South Africa has un-cultivated arable soils suitable for expansion and intensification as well as additional sources of water under efficient water management systems, mechanization should not necessarily be seen as a threat against manual labour, but it should rather be thought of as an opportunity to increase the output delivered per worker and stimulate the agro-economic sector under a favourable economic and political environment. Increases in production could result in building human capital, where agriculture will employ more skilled, well paid and younger workers.

When BFAP compiled the employment report for the National Planning Commission in 2011, a labour multiplier model was developed. For the De Doorns study, this labour multiplier model was further refined to provide more detail on labour multipliers per industry in order to estimate the total impacts of higher wages on the agriculture industry at large. The table below provides an overview of the top ten industries in agriculture with respect to the number of people employed in the industry.

Table E: BFAP Labour Model for Top Ten Agricultural Products Employment Figures

		Permanent	Seasonal	Total
1	Citrus	10 200	75 000	85 200
2	Sugar cane	7 560	70 875	78 435
3	Grapes (Table & Dry)	20 478	18 903	39 381
4	Tomatoes	33 284		33 284
5	Potatoes	5 972	24 885	30 857
6	Wine grapes	24 136	6 034	30 170
7	Apples	14 248	13 152	27 400
8	Pineapples	15 858		15 858
9	Bananas	15 600		15 600
10	Pears	7 575	6 992	14 567

Source: BFAP, 2012. Farm sectoral determination: An analysis of agricultural wages in South Africa.

The total compensation for the agriculture, forestry and fishing sector amounts to R19,8 billion. If forestry and fisheries are excluded, the total compensation bill in agriculture amounts to R12,7 billion.

The table below presents a summary of the number of permanent and seasonal workers employed in each of the major categories in agriculture as well as the total estimated compensation paid out to farm workers.

Table F: BFAP Labour Model for Agricultural Employment Figures and Wages Earned

	Number of workers			Wages (R million)		
	Permanent	Seasonal	Total	Permanent	Seasonal	Total
Horticulture	180 420	282 178	462 597	4 994	3 679	8 673
Field crops	49 725	29 731	79 456	1 734	55	1 165
Livestock	139 465		139 465	3 781	-	3 781
TOTAL	**369 610**	**311 908**	**681 518**	**10 509**	**3 734**	**13 619**

Source: BFAP, 2012. Farm sectoral determination: An analysis of agricultural wages in South Africa.

These figures tend to indicate that the average farm worker in 2012 earned wages of R 19,983 per annum, or R 1,665 per month, which in a twenty-one day month would equate to R 79,29 per day.

We can conclude then, that with regard to the average farm labourer wages, that a ***daily wage of approximately R 104,00 per day*** would be the norm today, versus the prevailing average of R 84,00 at the time of the De Doorns strikes at the end of 2012, when the minimum regulated wage for 2012 was R 70,00 per day.

With regard to the Net Farm Income (NFI), profits or remuneration to the farm owner, a farm owner has to produce a return that is sufficient to pay for:

1. the farming requisites that are used in production (fertilizer, herbicides and insecticides),
2. the labour that is used for production,
3. the capital that is used (working capital such as tractors; and fixed capital such as land and the orchards on the land), and
4. have something left over as remuneration for the entrepreneur. If the cost of one of these four factors increases irrevocably, the owner generally has one of four choices:

    a) Decrease the remuneration to one of the other factors of production (e.g. use less borrowed capital and reduce the return to own equity); or
    b) Change the ratio of factors (e.g. use less labour and more capital in the form of machinery); or
    c) Increase productivity (measured as the physical output produced divided by the inputs used); or
    d) Exit from farming, at least in those specific commodities.

The reality of these options being exercised is evident in the number of employees in the agricultural, forestry and fishing sector which has declined from 1,52 million in 2002 to 709,000 in the first quarter of 2014.

With regard to the average level of earnings that is deemed to be acceptable to the farmer, BFAP have analysed potential NFI in terms of the prevailing wage profile of a potato farmer in the Western Cape and state as follows:

> 'It is also evident from the analysis that the fact that a negative net farm income (NFI) is generated under scenarios where wages rise by more than R20 per day from the base case scenario does not imply that there will be no farming in South Africa in years to come. What it does mean is that structural adjustments will be made to accommodate the higher wage rates. These structural adjustments include mechanization and consolidation of farming units to become more efficient. For example, in the case of potatoes, the BFAP

FINSIM model clearly shows that a potato farm needs to be at least 150ha in size to achieve a positive NFI under a R150/day wage scenario and then principal payments, income taxes and family living cost still need to be deducted from the net farm income. Thus a typical potato farm that is smaller than 150ha will not be financially sustainable.' (BFAP, 2012. Farm sectoral determination: An analysis of agricultural wages in South Africa)

The figure below illustrates the net farming income of a typical potato farm in the Sandveld region of the Western Cape Province. The average wage rate for workers was already above the previous minimum wage and calculated at approximately R84 per day. Under this base scenario the income of potato farmers in the Western Cape region (green line in the figure) is already under pressure, especially as NFI only refers to cash income and expenditure which includes interest on borrowed funds and depreciation.

However, income and land taxes, principal payments and family living costs are not included in the calculation. With the announcement of the new minimum wage rate in February 2013, the outlook for NFI of this typical potato farm is represented by the yellow line in Figure D below, which paints a bleak picture for the farmer negative earnings being incurred five years from the wage increase.

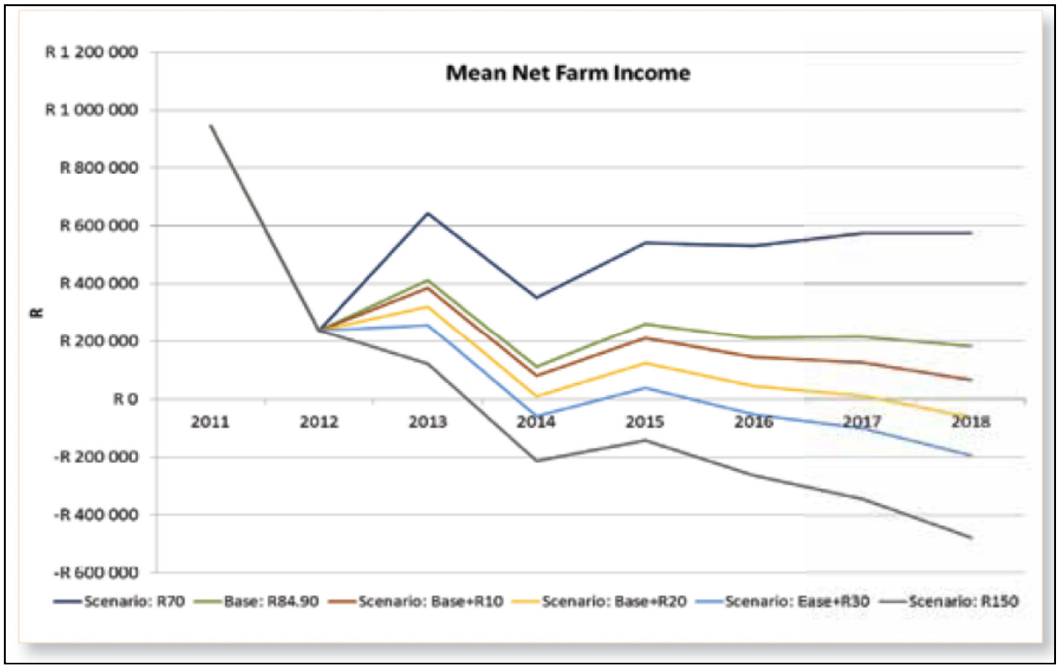


Figure D: Net Farming Income of a Farm in Sandveld, Western Cape (2011 – 2018)

Source: BFAP, 2013. Agricultural Outlook, 2013 – 2022. Page 129

The BFAP figure tends to indicate that Mean Net Farm Income per farming operation has dropped from approximately R 920,000 per annum in 2011 to a grossly reduced R 250,000 in the year 2012, with the base wage of R 84,00 allowing the farm operation to improve NFI to R 400,000 per annum. We would like to suggest that an *adequate NFI should be in the region of R 300,000 per farm per annum***.**

APPENDIX E

E1: Unit Reference Value calculation

Foxwood Dam URV - Maintenance, Operation & Refurbishment Only

Date	Feb-15
Project Name	Foxwood Dam
Dam Type Option	**Composite**
Dam Capacity Option (MAR / Storage Ratio)	**1**
Capacity	53,7 million m3
Yield Return Period	1:20 / 95%
Yield (m³per annum)	19 100 000 m3
Initial Take Up of Yield	10 000 000 m3
Base Year	2014
Component life	45

INPUT

Capital Costs

Total	Civil	Mech & Elec
	92,5%	7,5%
1 760 410 383	1 628 379 604	132 030 779

Timing

Start	End	Duration (Yrs)
2015	2018	4

Construction Cash Flow

Year 1	Year 2	Year 3	Year 4
312 627 912	521 046 521	833 674 433	416 837 216

Annual Maintenance and Operation Costs

Civil	Mech & Elec
0,25%	4%

RESULT Maintenance with refurbishment

Discount Rate	Present Worth of Costs in 2013 (R)	Present Value of Water Delivered	Unit Reference Value (R/m3)
6,0%	132 702 321	214 371 815	0,619
8,0%	92 878 974	152 672 405	0,608
10%	68 168 328	113 212 565	0,602

Composite
1,0 MAR

Construction Costs

	Component Life	Year	Civil	M&E	Eng	Total	Present Value 2014 @ 6%	Present Value 2014 @ 8%	Present Value 2014 @ 10%
Notes									
2nd year expenditure		2014				-	-	-	-
		2015				-	-	-	-
		2016				-	-	-	-
		2017				-	-	-	-
		2018				-	-	-	-
	1	2019				-	-	-	-
	2	2020				-	-	-	-
	3	2021				-	-	-	-
	4	2022				-	-	-	-
	5	2023				-	-	-	-
	6	2024				-	-	-	-
	7	2025				-	-	-	-
	8	2026				-	-	-	-
	9	2027				-	-	-	-
	10	2028				-	-	-	-
	11	2029				-	-	-	-
	12	2030				-	-	-	-
	13	2031				-	-	-	-
	14	2032				-	-	-	-
	15	2033				-	-	-	-
	16	2034				-	-	-	-
	17	2035				-	-	-	-
	18	2036				-	-	-	-
	19	2037				-	-	-	-
	20	2038				-	-	-	-
	21	2039				-	-	-	-
	22	2040				-	-	-	-
	23	2041				-	-	-	-
	24	2042				-	-	-	-
	25	2043				-	-	-	-
	26	2044				-	-	-	-
	27	2045				-	-	-	-
	28	2046				-	-	-	-
	29	2047				-	-	-	-
	30	2048		**132 030 779**		132 030 779	18 208 567	9 644 229	5 168 016
	31	2049				-	-	-	-
	32	2050				-	-	-	-
	33	2051				-	-	-	-
	34	2052				-	-	-	-
	35	2053				-	-	-	-
	36	2054				-	-	-	-
	37	2055				-	-	-	-
	38	2056				-	-	-	-
	39	2057				-	-	-	-
	40	2058				-	-	-	-
	41	2059				-	-	-	-
	42	2060				-	-	-	-
	43	2061				-	-	-	-
	44	2062				-	-	-	-
	45	2063				-	-	-	-
Totals			-	132 030 779	-	132 030 779	18 208 567	9 644 229	5 168 016

8% of capital cost of dam structure allowed for major maintenance of Mechanical and Electric Works - eg outlet works and pump station

Composite
1,0 MAR

Maintenance & Operating Costs

Year	Civil	M&E	Total	Present Value 2014 @ 6%	Present Value 2014 @ 8%	Present Value 2014 @ 10%
2014						
2015						
2016						
2017						
2018						
2019	4 070 949	5 281 231	9 352 180	6 988 493	6 364 937	5 806 968
2020	4 070 949	5 281 231	9 352 180	6 592 918	5 893 460	5 279 062
2021	4 070 949	5 281 231	9 352 180	6 219 734	5 456 907	4 799 147
2022	4 070 949	5 281 231	9 352 180	5 867 674	5 052 692	4 362 861
2023	4 070 949	5 281 231	9 352 180	5 535 541	4 678 418	3 966 237
2024	4 070 949	5 281 231	9 352 180	5 222 209	4 331 869	3 605 670
2025	4 070 949	5 281 231	9 352 180	4 926 612	4 010 990	3 277 882
2026	4 070 949	5 281 231	9 352 180	4 647 747	3 713 879	2 979 893
2027	4 070 949	5 281 231	9 352 180	4 384 667	3 438 777	2 708 993
2028	4 070 949	5 281 231	9 352 180	4 136 478	3 184 053	2 462 721
2029	4 070 949	5 281 231	9 352 180	3 902 338	2 948 197	2 238 838
2030	4 070 949	5 281 231	9 352 180	3 681 451	2 729 812	2 035 307
2031	4 070 949	5 281 231	9 352 180	3 473 067	2 527 604	1 850 279
2032	4 070 949	5 281 231	9 352 180	3 276 478	2 340 374	1 682 072
2033	4 070 949	5 281 231	9 352 180	3 091 017	2 167 013	1 529 156
2034	4 070 949	5 281 231	9 352 180	2 916 054	2 006 493	1 390 142
2035	4 070 949	5 281 231	9 352 180	2 750 994	1 857 864	1 263 765
2036	4 070 949	5 281 231	9 352 180	2 595 278	1 720 245	1 148 878
2037	4 070 949	5 281 231	9 352 180	2 448 375	1 592 819	1 044 434
2038	4 070 949	5 281 231	9 352 180	2 309 788	1 474 833	949 486
2039	4 070 949	5 281 231	9 352 180	2 179 045	1 365 586	863 169
2040	4 070 949	5 281 231	9 352 180	2 055 703	1 264 431	784 699
2041	4 070 949	5 281 231	9 352 180	1 939 342	1 170 770	713 363
2042	4 070 949	5 281 231	9 352 180	1 829 568	1 084 046	648 511
2043	4 070 949	5 281 231	9 352 180	1 726 008	1 003 746	589 556
2044	4 070 949	5 281 231	9 352 180	1 628 309	929 395	535 960
2045	4 070 949	5 281 231	9 352 180	1 536 141	860 551	487 236
2046	4 070 949	5 281 231	9 352 180	1 449 189	796 806	442 942
2047	4 070 949	5 281 231	9 352 180	1 367 160	737 783	402 675
2048	4 070 949	5 281 231	9 352 180	1 289 773	683 133	366 068
2049	4 070 949	5 281 231	9 352 180	1 216 767	632 530	332 789
2050	4 070 949	5 281 231	9 352 180	1 147 894	585 676	302 535
2051	4 070 949	5 281 231	9 352 180	1 082 919	542 293	275 032
2052	4 070 949	5 281 231	9 352 180	1 021 621	502 123	250 029
2053	4 070 949	5 281 231	9 352 180	963 794	464 929	227 299
2054	4 070 949	5 281 231	9 352 180	909 239	430 490	206 636
2055	4 070 949	5 281 231	9 352 180	857 773	398 601	187 851
2056	4 070 949	5 281 231	9 352 180	809 220	369 075	170 773
2057	4 070 949	5 281 231	9 352 180	763 415	341 737	155 248
2058	4 070 949	5 281 231	9 352 180	720 203	316 423	141 135
2059	4 070 949	5 281 231	9 352 180	679 437	292 984	128 305
2060	4 070 949	5 281 231	9 352 180	640 978	271 281	116 640
2061	4 070 949	5 281 231	9 352 180	604 696	251 187	106 037
2062	4 070 949	5 281 231	9 352 180	570 468	232 580	96 397
2063	4 070 949	5 281 231	9 352 180	538 177	215 352	87 634
Totals	183 192 705	237 655 402	420 848 107	114 493 754	83 234 745	63 000 312

Composite
1,0 MAR

Water Delivered (m³)

Year	Water Delivered (m³) 15,0% up to Yield	Present Value 2014 @ 6%	Present Value 2014 @ 8%	Present Value 2014 @ 10%
2014				
2015				
2016				
2017				
2018				
2019	10 000 000	7 472 582	6 805 832	6 209 213
2020	11 500 000	8 107 046	7 246 951	6 491 450
2021	13 225 000	8 795 380	7 716 660	6 786 516
2022	15 208 750	9 542 158	8 216 814	7 094 994
2023	17 490 063	10 352 341	8 749 386	7 417 494
2024	19 100 000	10 665 340	8 846 996	7 363 877
2025	19 100 000	10 061 642	8 191 663	6 694 433
2026	19 100 000	9 492 115	7 584 873	6 085 849
2027	19 100 000	8 954 825	7 023 030	5 532 590
2028	19 100 000	8 447 948	6 502 806	5 029 627
2029	19 100 000	7 969 763	6 021 117	4 572 388
2030	19 100 000	7 518 644	5 575 108	4 156 716
2031	19 100 000	7 093 060	5 162 137	3 778 833
2032	19 100 000	6 691 566	4 779 756	3 435 303
2033	19 100 000	6 312 799	4 425 700	3 123 003
2034	19 100 000	5 955 470	4 097 871	2 839 093
2035	19 100 000	5 618 368	3 794 325	2 580 994
2036	19 100 000	5 300 347	3 513 264	2 346 358
2037	19 100 000	5 000 328	3 253 022	2 133 053
2038	19 100 000	4 717 290	3 012 057	1 939 139
2039	19 100 000	4 450 274	2 788 942	1 762 854
2040	19 100 000	4 198 372	2 582 354	1 602 594
2041	19 100 000	3 960 728	2 391 068	1 456 904
2042	19 100 000	3 736 536	2 213 952	1 324 458
2043	19 100 000	3 525 034	2 049 956	1 204 053
2044	19 100 000	3 325 504	1 898 107	1 094 593
2045	19 100 000	3 137 267	1 757 507	995 085
2046	19 100 000	2 959 686	1 627 321	904 623
2047	19 100 000	2 792 157	1 506 779	822 384
2048	19 100 000	2 634 110	1 395 165	747 622
2049	19 100 000	2 485 010	1 291 820	679 656
2050	19 100 000	2 344 349	1 196 129	617 869
2051	19 100 000	2 211 650	1 107 527	561 699
2052	19 100 000	2 086 462	1 025 488	510 636
2053	19 100 000	1 968 360	949 526	464 214
2054	19 100 000	1 856 944	879 191	422 013
2055	19 100 000	1 751 834	814 066	383 648
2056	19 100 000	1 652 673	753 764	348 771
2057	19 100 000	1 559 126	697 930	317 065
2058	19 100 000	1 470 873	646 232	288 241
2059	19 100 000	1 387 616	598 363	262 037
2060	19 100 000	1 309 072	554 039	238 215
2061	19 100 000	1 234 974	512 999	216 559
2062	19 100 000	1 165 070	474 999	196 872
2063	19 100 000	1 099 122	439 814	178 975
Totals	831 423 813	214 371 815	152 672 405	113 212 565

Foxwood Dam URV - Capital, Maintenance & Refurbishment

Date	Feb-15
Project Name	Foxwood Dam
Dam Type Option	**Composite**
Dam Capacity Option (MAR / Storage Ratio)	**1**
Capacity	53,7 million m3
Yield Return Period	1:20 / 95%
Yield (m³per annum)	19 100 000 m3
Initial Take Up of Yield	10 000 000 m3
Base Year	2014
Component life	45

INPUT

Capital Costs

Total	Civil	Mech & Elec	
	92,5%	7,5%	
2 084 186 082			**Total Project**
1 760 410 383	1 628 379 604	132 030 779	**Dam only**

Construction Timing

Start	End	Duration (Yrs)
2015	2018	4

Construction Cash Flow

	Year 1	Year 2	Year 3	Year 4
	312 627 912	521 046 521	833 674 433	416 837 216

Annual Maintenance and Operation Costs

Civil	Mech & Elec
0,25%	4%

RESULT

Discount Rate	Present Worth of Costs in 2013 (ZAR)	Present Value of Water Delivered	Unit Reference value
6,0%	1 921 507 109	214 371 815	8,96
8,0%	1 797 248 114	152 672 405	11,77
10%	1 694 049 848	113 212 565	14,96

Composite
1,0 MAR

Construction Costs

	Component Life	Year	Civil	M&E	VAT	Total	Present Cost 2014 @	Present Cost 2014 @	Present Cost 2014 @
Notes							*6%*	*8%*	*10%*
					14%				
		2014				-	-	-	-
		2015	252 296 210	21 938 801	38 392 901	312 627 912	294 931 992	289 470 289	284 207 193
		2016	420 493 684	36 564 668	63 988 169	521 046 521	463 729 549	446 713 410	430 616 960
		2017	672 789 893	58 503 469	102 381 071	833 674 433	699 969 130	661 797 643	626 351 941
		2018	336 394 946	29 251 734	51 190 535	416 837 216	330 174 117	306 387 798	284 705 427
	1	2019			-	-	-	-	-
	2	2020			-	-	-	-	-
	3	2021			-	-	-	-	-
	4	2022			-	-	-	-	-
	5	2023			-	-	-	-	-
	6	2024			-	-	-	-	-
	7	2025			-	-	-	-	-
	8	2026			-	-	-	-	-
	9	2027			-	-	-	-	-
	10	2028			-	-	-	-	-
	11	2029			-	-	-	-	-
	12	2030			-	-	-	-	-
	13	2031			-	-	-	-	-
	14	2032			-	-	-	-	-
	15	2033			-	-	-	-	-
	16	2034			-	-	-	-	-
	17	2035			-	-	-	-	-
	18	2036			-	-	-	-	-
	19	2037			-	-	-	-	-
	20	2038			-	-	-	-	-
	21	2039			-	-	-	-	-
	22	2040			-	-	-	-	-
	23	2041			-	-	-	-	-
	24	2042			-	-	-	-	-
	25	2043			-	-	-	-	-
	26	2044			-	-	-	-	-
	27	2045			-	-	-	-	-
	28	2046			-	-	-	-	-
	29	2047				-	-	-	-
	30	2048				132 030 779	18 208 567	9 644 229	5 168 016
	31	2049			-	-	-	-	-
	32	2050			-	-	-	-	-
	33	2051			-	-	-	-	-
	34	2052			-	-	-	-	-
	35	2053			-	-	-	-	-
	36	2054			-	-	-	-	-
	37	2055			-	-	-	-	-
	38	2056			-	-	-	-	-
	39	2057			-	-	-	-	-
	40	2058			-	-	-	-	-
	41	2059			-	-	-	-	-
	42	2060			-	-	-	-	-
	43	2061			-	-	-	-	-
	44	2062			-	-	-	-	-
	45	2063			-	-	-	-	-
Totals			1 681 974 733	146 258 672	255 952 677	2 216 216 861	1 807 013 355	1 714 013 368	1 631 049 537

8% of capital cost of dam structure allowed for major maintenance of Mechanical and Electric Works - eg outlet works and pump station

Composite
1,0 MAR

Maintenance & Operating Costs

Year	Civil	M&E	Total	Present Cost 2014 @	Present Cost 2014 @	Present Cost 2014 @
				6%	*8%*	*10%*
2014						
2015						
2016						
2017						
2018						
2019	4 070 949	5 281 231	9 352 180	6 988 493	6 364 937	5 806 968
2020	4 070 949	5 281 231	9 352 180	6 592 918	5 893 460	5 279 062
2021	4 070 949	5 281 231	9 352 180	6 219 734	5 456 907	4 799 147
2022	4 070 949	5 281 231	9 352 180	5 867 674	5 052 692	4 362 861
2023	4 070 949	5 281 231	9 352 180	5 535 541	4 678 418	3 966 237
2024	4 070 949	5 281 231	9 352 180	5 222 209	4 331 869	3 605 670
2025	4 070 949	5 281 231	9 352 180	4 926 612	4 010 990	3 277 882
2026	4 070 949	5 281 231	9 352 180	4 647 747	3 713 879	2 979 893
2027	4 070 949	5 281 231	9 352 180	4 384 667	3 438 777	2 708 993
2028	4 070 949	5 281 231	9 352 180	4 136 478	3 184 053	2 462 721
2029	4 070 949	5 281 231	9 352 180	3 902 338	2 948 197	2 238 838
2030	4 070 949	5 281 231	9 352 180	3 681 451	2 729 812	2 035 307
2031	4 070 949	5 281 231	9 352 180	3 473 067	2 527 604	1 850 279
2032	4 070 949	5 281 231	9 352 180	3 276 478	2 340 374	1 682 072
2033	4 070 949	5 281 231	9 352 180	3 091 017	2 167 013	1 529 156
2034	4 070 949	5 281 231	9 352 180	2 916 054	2 006 493	1 390 142
2035	4 070 949	5 281 231	9 352 180	2 750 994	1 857 864	1 263 765
2036	4 070 949	5 281 231	9 352 180	2 595 278	1 720 245	1 148 878
2037	4 070 949	5 281 231	9 352 180	2 448 375	1 592 819	1 044 434
2038	4 070 949	5 281 231	9 352 180	2 309 788	1 474 833	949 486
2039	4 070 949	5 281 231	9 352 180	2 179 045	1 365 586	863 169
2040	4 070 949	5 281 231	9 352 180	2 055 703	1 264 431	784 699
2041	4 070 949	5 281 231	9 352 180	1 939 342	1 170 770	713 363
2042	4 070 949	5 281 231	9 352 180	1 829 568	1 084 046	648 511
2043	4 070 949	5 281 231	9 352 180	1 726 008	1 003 746	589 556
2044	4 070 949	5 281 231	9 352 180	1 628 309	929 395	535 960
2045	4 070 949	5 281 231	9 352 180	1 536 141	860 551	487 236
2046	4 070 949	5 281 231	9 352 180	1 449 189	796 806	442 942
2047	4 070 949	5 281 231	9 352 180	1 367 160	737 783	402 675
2048	4 070 949	5 281 231	9 352 180	1 289 773	683 133	366 068
2049	4 070 949	5 281 231	9 352 180	1 216 767	632 530	332 789
2050	4 070 949	5 281 231	9 352 180	1 147 894	585 676	302 535
2051	4 070 949	5 281 231	9 352 180	1 082 919	542 293	275 032
2052	4 070 949	5 281 231	9 352 180	1 021 621	502 123	250 029
2053	4 070 949	5 281 231	9 352 180	963 794	464 929	227 299
2054	4 070 949	5 281 231	9 352 180	909 239	430 490	206 636
2055	4 070 949	5 281 231	9 352 180	857 773	398 601	187 851
2056	4 070 949	5 281 231	9 352 180	809 220	369 075	170 773
2057	4 070 949	5 281 231	9 352 180	763 415	341 737	155 248
2058	4 070 949	5 281 231	9 352 180	720 203	316 423	141 135
2059	4 070 949	5 281 231	9 352 180	679 437	292 984	128 305
2060	4 070 949	5 281 231	9 352 180	640 978	271 281	116 640
2061	4 070 949	5 281 231	9 352 180	604 696	251 187	106 037
2062	4 070 949	5 281 231	9 352 180	570 468	232 580	96 397
2063	4 070 949	5 281 231	9 352 180	538 177	215 352	87 634
Totals	183 192 705	237 655 402	420 848 107	114 493 754	83 234 745	63 000 312

Composite
1,0 MAR

Water Delivered (m³)

Year	Water Delivered (m³)	Present Cost 2014 @	Present Cost 2014 @	Present Cost 2014 @
	15,0%	6%	8%	10%
	up to Yield			
2014				
2015				
2016				
2017				
2018				
2019	10 000 000	7 472 582	6 805 832	6 209 213
2020	11 500 000	8 107 046	7 246 951	6 491 450
2021	13 225 000	8 795 380	7 716 660	6 786 516
2022	15 208 750	9 542 158	8 216 814	7 094 994
2023	17 490 063	10 352 341	8 749 386	7 417 494
2024	19 100 000	10 665 340	8 846 996	7 363 877
2025	19 100 000	10 061 642	8 191 663	6 694 433
2026	19 100 000	9 492 115	7 584 873	6 085 849
2027	19 100 000	8 954 825	7 023 030	5 532 590
2028	19 100 000	8 447 948	6 502 806	5 029 627
2029	19 100 000	7 969 763	6 021 117	4 572 388
2030	19 100 000	7 518 644	5 575 108	4 156 716
2031	19 100 000	7 093 060	5 162 137	3 778 833
2032	19 100 000	6 691 566	4 779 756	3 435 303
2033	19 100 000	6 312 799	4 425 700	3 123 003
2034	19 100 000	5 955 470	4 097 871	2 839 093
2035	19 100 000	5 618 368	3 794 325	2 580 994
2036	19 100 000	5 300 347	3 513 264	2 346 358
2037	19 100 000	5 000 328	3 253 022	2 133 053
2038	19 100 000	4 717 290	3 012 057	1 939 139
2039	19 100 000	4 450 274	2 788 942	1 762 854
2040	19 100 000	4 198 372	2 582 354	1 602 594
2041	19 100 000	3 960 728	2 391 068	1 456 904
2042	19 100 000	3 736 536	2 213 952	1 324 458
2043	19 100 000	3 525 034	2 049 956	1 204 053
2044	19 100 000	3 325 504	1 898 107	1 094 593
2045	19 100 000	3 137 267	1 757 507	995 085
2046	19 100 000	2 959 686	1 627 321	904 623
2047	19 100 000	2 792 157	1 506 779	822 384
2048	19 100 000	2 634 110	1 395 165	747 622
2049	19 100 000	2 485 010	1 291 820	679 656
2050	19 100 000	2 344 349	1 196 129	617 869
2051	19 100 000	2 211 650	1 107 527	561 699
2052	19 100 000	2 086 462	1 025 488	510 636
2053	19 100 000	1 968 360	949 526	464 214
2054	19 100 000	1 856 944	879 191	422 013
2055	19 100 000	1 751 834	814 066	383 648
2056	19 100 000	1 652 673	753 764	348 771
2057	19 100 000	1 559 126	697 930	317 065
2058	19 100 000	1 470 873	646 232	288 241
2059	19 100 000	1 387 616	598 363	262 037
2060	19 100 000	1 309 072	554 039	238 215
2061	19 100 000	1 234 974	512 999	216 559
2062	19 100 000	1 165 070	474 999	196 872
2063	19 100 000	1 099 122	439 814	178 975
Totals	831 423 813	214 371 815	152 672 405	113 212 565

APPENDIX F

F1: Economic Assessment Models

Foxwood Dam - Agro-Economic Study - Financial & Economic Data Summary

Water @ R0.607/m³	1ha Farm (Each)			20 ha Farm (Each)			50 ha Farm (Each)		
Enterprise	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %
Lemons	R 101 025	R 479 343	-9,63	R 2 020 500	R 4 403 318	9,11	R 5 051 250	R 11 586 755	7,33
Peaches	R 125 580	R 447 981	4,53	R 2 511 600	R 4 691 877	8,87	R 6 279 000	R 11 236 769	9,31
Macadamia Nuts	R 86 954	R 509 760	0,79	R 1 739 080	R 4 752 491	6,47	R 4 347 700	R 11 295 072	8,23

Water @ R0.4127/m³	1ha Farm (Each)			20 ha Farm (Each)			50 ha Farm (Each)		
Enterprise	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %
Lemons	R 101 025	R 393 258	-8,58	R 2 020 500	R 4 325 598	9,82	R 5 051 250	R 11 392 455	8,07
Peaches	R 125 580	R 414 500	4,96	R 2 511 600	R 4 614 157	9,52	R 6 279 000	R 11 045 033	9,98
Macadamia Nuts	R 86 954	R 486 728	1,22	R 1 739 080	R 3 803 279	7,12	R 4 347 700	R 10 212 983	8,86

Water @ R0.9590/m³	1ha Farm (Each)			20 ha Farm (Each)			50 ha Farm (Each)		
Enterprise	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %
Lemons	R 101 025	R 401 453	-11,78	R 2 020 500	R 4 544 118	7,78	R 5 051 250	R 11 938 755	5,93
Peaches	R 125 580	R 422 695	3,72	R 2 511 600	R 4 832 677	7,66	R 6 279 000	R 11 454 758	8,07
Macadamia Nuts	R 86 954	R 500 658	0,00	R 1 739 080	R 3 967 169	5,27	R 4 347 700	R 10 759 283	7,08

Water @ R6.4127/m³	1ha Farm (Each)			20 ha Farm (Each)			50 ha Farm (Each)		
Enterprise	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %	CAPEX	Peak funding	IRR %
Lemons	R 101 025	R 483 258	Not workable	R 2 020 500	R 6 725 598	Not Workable	R 5 051 250	R 17 392 455	Not workable
Peaches	R 125 580	R 504 500	-20,40	R 2 511 600	R 7 014 157	Not Workable	R 6 279 000	R 15 545 033	Not workable
Macadamia Nuts	R 86 954	R 639 728	-17,72	R 1 739 080	R 5 603 279	Not Workable	R 4 347 700	R 16 212 983	-23,44

Note 1: IRR is calculated over 15 year time period including all costs (direct, indirect & overheads)

Assumptions:

1. Assuming an 800mm per hectare irrigation use, Foxwood dam would supply enough water for 1250 new hectares of irrigated lanc

Cost to implement

Scenario 1 - 1ha plots for 1250 emerging individual growers growing **lemons** only

Lemons.	Units - 1 Ha	Unit Rate	1 Ha	20 Ha	50 Ha
Land purchase	13000	R 10 000	R 130 000 000	R 130 000 000	R 130 000 000
CAPEX [Est. Costs]	1250	R 101 025	R 126 281 250	R 125 271 000	R 126 281 250
Working Capital	1250	R 378 318	R 472 898 047	R 147 734 717	R 163 387 626
Training	1250	R 15 000	R 18 750 000	R 930 000	R 375 000
Mentoring	260	R 7 500	R 1 950 000	R 1 950 000	R 1 950 000
Totals:			**R 749 879 297**	**R 405 885 717**	**R 421 993 876**

Scenario 2 - 1ha plots for 1250 emerging individual growers growing **peaches** only

Peaches	Units - 1 Ha	Unit Rate	1 Ha	20 Ha	50 Ha
Land purchase	13000	R 10 000	R 130 000 000	R 130 000 000	R 130 000 000
CAPEX [Est. Costs]	1250	R 125 580	R 156 975 000	R 155 719 200	R 156 975 000
Working Capital	1250	R 322 401	R 403 001 252	R 135 177 201	R 123 944 219
Training	1250	R 15 000	R 18 750 000	R 930 000	R 375 000
Mentoring	260	R 7 500	R 1 950 000	R 1 950 000	R 1 950 000
Totals:			**R 710 676 252**	**R 423 776 401**	**R 413 244 219**

Scenario 3 - 1ha plots for 1250 emerging individual growers growing **macadamias** only

Macadamias	Units - 1 Ha	Unit Rate	1 Ha	20 Ha	50 Ha
Land purchase	13000	R 10 000	R 130 000 000	R 130 000 000	R 130 000 000
CAPEX [Est. Costs]	1250	R 86 954	R 108 692 500	R 107 822 960	R 108 692 500
Processing factory	1	R 25 000 000	R 25 000 000	R 25 000 000	R 25 000 000
Working Capital	1250	R 422 806	R 528 507 135	R 186 831 509	R 173 684 300
Training	1250	R 15 000	R 18 750 000	R 930 000	R 375 000
Mentoring	260	R 7 500	R 1 950 000	R 1 950 000	R 1 950 000
Totals:			**R 812 899 635**	**R 452 534 469**	**R 439 701 800**

Scenario 4 - 20ha plots for 62 emerging enterprises growing lemons only

Land purchase	13000	R 10 000	R	130 000 000
CAPEX [Est. Costs]	62	R 2 020 500	R	125 271 000
Working Capital	62	R 2 382 818	R	147 734 717
Training	62	R 15 000	R	930 000
Mentoring	260	R 7 500	R	1 950 000
			R	**405 885 717**

Scenario 5 - 20ha plots for 62 emerging enterprises growing peaches only

Land purchase	13000	R 10 000	R	130 000 000
CAPEX [Est. Costs]	62	R 2 511 600	R	155 719 200
Working Capital	62	R 2 180 277	R	135 177 201
Training	62	R 15 000	R	930 000
Mentoring	260	R 7 500	R	1 950 000
			R	**423 776 401**

Scenario 6 - 20ha plots for 62 emerging enterprises growing macadamias only

Land purchase	13000	R 10 000	R	130 000 000
CAPEX [Est. Costs]	62	R 1 739 080	R	107 822 960
Processing factory	1	R 25 000 000	R	25 000 000
Working Capital	62	R 3 013 411	R	186 831 509
Training	62	R 15 000	R	930 000
Mentoring	260	R 7 500	R	1 950 000
			R	**452 534 469**

Scenario 7 - 50ha plots for 25 emerging enterprises growing lemons only

Land purchase	13000	R 10 000	R	130 000 000
CAPEX [Est. Costs]	25	R 5 051 250	R	126 281 250
Working Capital	25	R 6 535 505	R	163 387 626
Training	25	R 15 000	R	375 000
Mentoring	260	R 7 500	R	1 950 000
			R	**421 993 876**

Scenario 8 - 50ha plots for 25 emerging enterprises growing peaches only

Land purchase	13000	R 10 000	R	130 000 000
CAPEX [Est. Costs]	25	R 6 279 000	R	156 975 000
Working Capital	25	R 4 957 769	R	123 944 219
Training	25	R 15 000	R	375 000
Mentoring	260	R 7 500	R	1 950 000
			R	**413 244 219**

Scenario 9 - 50ha plots for 25 emerging enterprises growing macadamias only

Land purchase	13000	R 10 000	R	130 000 000
CAPEX [Est. Costs]	25	R 4 347 700	R	108 692 500
Processing factory	1	R 25 000 000	R	25 000 000
Working Capital	25	R 6 947 372	R	173 684 300
Training	25	R 15 000	R	375 000
Mentoring	260	R 7 500	R	1 950 000
			R	**439 701 800**

Crop	Lemons	Peaches	Macadamias	Totals
% of Total	20%	30%	50%	100%
1 Ha Farms	10%	10%	10%	30%
20 Ha Farms	60%	60%	60%	180%
50 Ha farms	30%	30%	30%	90%
Hectar Farmed	250	375	625	1 250
1 Ha Farms	25	38	63	125
20 Ha Farms	150	225	375	750
50 Ha farms	75	113	188	375
Implementation Cost				
Capital Expenditure				
Peak Funding				
IRR				
Accummulated Earnings				
Revenue Potential - Yr 10				
Profit Earned - Yr 10/Farm				
Profit Earned - Yr 10/Total				
Wages Earned - Yr 10				
Taxation Paid - Year 10				
Employment Creation - All				
Beneficiation Value				
Value Chain - GDP Impact				
Export Revenue				

520

ref: http://www.pamgolding.co.za/eastern-cape/adelaide/for-sale/1681ha-mixed-farm

Assumes 3 main courses @R5,000 per course
Assumes 1 consultant available 5 days per week 52 weeks
R 0,6070 **Tariff Used All Calc's Below:**

RIC ECONOMIC SUMMARY TABLES:-

Implementation Cost Summary With Factory - All Ha Applied

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 749 879 297	R 405 885 717	R 421 993 876
Peaches	R 710 676 252	R 423 776 401	R 413 244 219
Macadamia	R 812 899 635	R 452 534 469	R 439 701 800

Note: This means the full potential of each option applied to 1,250 Ha

Implementation Cost Summary Without Factory - All Ha Applied

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 724 879 297	R 380 885 717	R 396 993 876
Peaches	R 685 676 252	R 398 776 401	R 388 244 219
Macadamia	R 787 899 635	R 427 534 469	R 414 701 800

Capital Expenditure Per Option - All Ha Applied

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 126 281 250	R 125 271 000	R 126 281 250
Peaches	R 156 975 000	R 155 719 200	R 156 975 000
Macadamia	R 108 692 500	R 107 822 960	R 108 692 500

Peak Funding Per Option (Working Capital) - All Ha Applied

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 599 179 297	R 273 005 717	R 289 668 876
Peaches	R 559 976 252	R 290 896 401	R 280 919 219
Macadamia	R 637 199 635	R 294 654 469	R 282 376 800

IRR Per Option — Water Cost Option - R / m3: **R 0,6070**

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	-9,63%	9,11%	7,33%
Peaches	4,53%	8,87%	9,31%
Macadamia	0,79%	6,47%	8,23%

Accumulated Retained Earnings After 15 Years - Per Farm

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R -276 295	R 4 814 041	R 9 456 583
Peaches	R 212 522	R 5 085 239	R 12 933 321
Macadamia	R 40 863	R 4 118 183	R 13 430 761
All Peach Farms:	265 653 103	315 284 832	323 333 035

Revenue Potential in Year 10 - Per Farm [No Price Escalation]

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 152 109	R 3 009 118	R 7 522 795
Peaches	R 170 200	R 3 403 990	R 8 299 551
Macadamia	R 170 677	R 3 326 185	R 8 512 569

Revenue Potential in Year 10 - All Farms [No Price Escalation]

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 190 136 584	R 186 565 322	R 188 069 882
Peaches	R 212 749 377	R 211 047 382	R 207 488 784
Macadamia	R 213 346 250	R 206 223 441	R 212 814 214
Average Rev. with Escalation:		389 531 164	

Profit Earned in Year 10 - Per Farm

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 16 651	R 770 538	R 1 726 889
Peaches	R 61 157	R 801 748	R 1 977 384
Macadamia	R 77 939	R 1 168 925	R 3 209 483
Operating Costs - Peaches		R 161 339 034	

Profit Earned in Year 10 - All Farms

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 20 813 481	R 47 773 333	R 43 172 227
Peaches	R 76 446 242	R 49 708 348	R 49 434 595
Macadamia	R 97 423 603	R 72 473 364	R 80 237 082
		56 651 682	

Profit as a % of Revenue in Year 10 - All Farms

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	11%	26%	23%
Peaches	36%	24%	24%
Macadamia	46%	35%	38%

Profit Earned in Year 10 - Accumulated Totals

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R -359 549	R 961 353	R 822 137
Peaches	R -93 262	R 1 076 502	R 3 238 518
Macadamia	R -348 832	R -1 726 443	R -2 616 655
Macs - Year 15 - 20ha all		255 327 360	

Wages Earned in Year 10 - Per Farm [No Inflation Escalation]

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 1 220	R 563 013	R 1 407 534
Peaches	R 6 524	R 674 680	R 1 678 229
Macadamia	R 270	R 1 333 505	R 3 333 761

Note: Wages lower for 1 ha as farmer expected to do the work

Wages Earned in Year 10 - All Farms

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	1 525 173	34 906 831	R 35 188 338
Peaches	R 8 155 393	41 830 135	R 41 955 736
Macadamia	R 337 309	R 82 677 283	R 83 344 036
		53 138 083	

Taxation Paid in Year 10 - All Farms

Size in Ha	1	20	50	
Farmers	1250	62	25	
Lemons	R 6 102 306	R 19 659 763	R 18 422 124	28% Corporate
Peaches	R 22 872 919	R 21 447 762	R 21 393 719	18% Wages
Macadamia	R 27 339 325	R 35 174 453	R 37 468 309	
		25 427 326		

Employment Creation - All Farms - Year 10 (Excluding Farmers)

Size in Ha	1	20	50	
Farmers	1250	62	25	
Lemons	54	1 229	1 239	Per year
Peaches	287	1 473	1 478	includes
Macadamia	12	2 912	2 935	13th cheque: R 28 392
Note: Average daily wage per labourer used:			R 104,00	

Employment Creation - All Farms - Year 10 (Including Farmers)

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	1 304	1 291	1 264
Peaches	1 537	1 535	1 503
Macadamia	1 262	2 974	2 960
Note: Average daily wage per labourer used:			R 104,00
Average Jobs for 20 Ha		1 934	

Potentional Beneficiation Value in SA - Year 10

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 332 739 021	R 326 489 314	R 329 122 293
Peaches	R 372 311 409	R 369 332 918	R 363 105 372
Macadamia	R 373 355 938	R 360 891 022	R 372 424 875
Note: Assume a multiplier of potential beneficiation		352 237 752	1,75 times

Value Chain - GDP Impact - Year 10

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 475 341 459	R 466 413 306	R 470 174 704
Peaches	R 531 873 441	R 527 618 454	R 518 721 960
Macadamia	R 533 365 625	R 515 558 603	R 532 035 536
Note: Assume a multiplier of 'All' GDP impact:		503 196 788	2,50 times

Export Revenue - Unbeneficiated Value - Year 10

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons	R 142 602 438	R 139 923 992	R 141 052 411
Peaches	R 159 562 032	R 158 285 536	R 155 616 588
Macadamia	R 160 009 688	R 154 667 581	R 159 610 661
Note: Assume a % of revenue exported:		150 959 036	50%
Note: Assume a % price improvement of:			150%

Size in Ha	1	20	50
Farmers	1250	62	25
Lemons			
Peaches			
Macadamia			
Note: Assume			
Note: Assume			

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026
Economic Impact and Year:	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Year 11**	**Year 12**
Cumulative Capital Expenditure	**312 627 912**	**833 674 433**	**1 667 348 866**	**2 084 186 082**								
Capital Expenditure (CAPEX)	**312 627 912**	**521 046 521**	**833 674 433**	**416 837 216**								
Civil Works												
M&E												
Engineering												
Irrigation												
Processing Plant												
Operating Revenue (Water Sales)					**6 070 000**	**7 259 720**	**8 682 625**	**10 384 420**	**12 419 766**	**14 105 509**	**14 669 729**	**15 256 518**
Water Delivered in m3					10 000 000	11 500 000	13 225 000	15 208 750	17 490 063	19 100 000	19 100 000	19 100 000
Tariff per m3					0,6070	0,6313	0,6565	0,6828	0,7101	0,7385	0,7680	0,7988
Operating & Maintenance Costs (OPEX)					**7 001 283**	**7 281 334**	**7 572 588**	**7 875 491**	**8 190 511**	**8 518 131**	**8 858 857**	**9 213 211**
Civil Costs					2 927 809	3 044 921	3 166 718	3 293 387	3 425 122	3 562 127	3 704 612	3 852 797
Maintenance & E Costs					4 073 474	4 236 413	4 405 869	4 582 104	4 765 388	4 956 004	5 154 244	5 360 414
Other Operating Costs						-	-	-	-	-	-	-
Project Operating Revenue:	**-**	**-**	**-**	**-**	**(931 283)**	**(21 614)**	**1 110 037**	**2 508 928**	**4 229 255**	**5 587 377**	**5 810 873**	**6 043 307**
Project Cash Flow (EBITDA):	**(312 627 912)**	**(521 046 521)**	**(833 674 433)**	**(416 837 216)**	**(931 283)**	**(21 614)**	**1 110 037**	**2 508 928**	**4 229 255**	**5 587 377**	**5 810 873**	**6 043 307**

Discounted Cash Flow (DCF) Analysis	DCF, sunk Capex cost, cover Operating Costs					DCF Breakeven at Year 40						
Year	**Year 10**	**Year 20**	**Year 30**	**Year 40**	**Year 50**	**Year 10**	**Year 20**	**Year 30**	**Year 40**	**Year 50**		
Internal Rate of Return (IRR)	#NUM!	#NUM!	-11,2%	-6,4%	-3,7%	-14,3%	5,3%	8,9%	10,0%	10,5%		
Net Present Value (NPV)	(1 782 862 535)	(1 765 229 845)	(1 755 166 899)	(1 749 423 993)	(1 746 146 527)	(918 827 253)	(432 364 476)	(154 740 866)	3 698 529	94 119 665		
Tariff per m3 and Annual Escalation:	R 0,607 /m3		4,0% Escalation Per Annum			R 7,000 /m3		4,0% Escalation Per Annum				
Net Present Value (NPV)	(284 207 193)	(786 306 567)	(1 475 293 702)	(1 788 469 672)	(1 789 105 751)	(1 789 119 172)	(1 788 492 585)	(1 787 205 108)	(1 785 232 129)	(1 782 862 535)	(1 780 622 193)	(1 778 504 050)

Foxwood Dam - Adelaide **Summarised Economic Impact**

Economic Impact and Year:	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTAL**
Year	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	
Construction Impacts:											
Project / Construction Costs - Rm	313	521	834	417	-	-	-	-	-	-	2 084
Gross Domestic Product (GDP) Impact - Rm	335	559	894	447	-	-	-	-	-	-	2 235
Direct Employment - Jobs Per Year	474	759	1 166	559	-	-	-	-	-	-	2 958
Operations Impacts:											-
Operating Revenue - Rm	-	-	-	-	6	7	9	10	12	14	59
Gross Value Added (GVA) Impact - Rm	-	-	-	-	7	9	10	12	15	17	69
Direct Employment - Jobs Per Year	-	-	-	-	3	3	4	5	5	6	26
Sustained Employment - All - Jobs Per Year	-	-	-	-	8	9	11	12	14	15	69
Sustained GVA in Municipality - Per Year	-	-	-	-	6	7	8	10	12	13	56
Construction & Operations Impacts:											-
Rates & Utilities Paid to the Munic. - Rm	4,8	8,2	13,3	7,3	1,0	1,0	1,0	1,0	1,0	1,0	40
Taxes Payable to the Fiscus - Rm	23,9	39,8	63,7	31,8	0,6	0,7	0,8	1,0	1,2	1,4	165

Source: Summary of Project Cost Benefit Analysis.

Foxwood Dam - Adelaide ***Cost Benefit Ananlysis (CBA) & Economic Impact (Rand Millions)***

A.

Operating Component and Year (R m):	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTALS**
7/24/2015 17:05	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Rand**
Development Costs - Construction	312,63	521,05	833,67	416,84	-	-	-	-	-	-	2 084,19
Cumulative Infrastructure	312,63	833,67	1 667,35	2 084,19	2 084,19	2 084,19	2 084,19	2 084,19	2 084,19	2 084,19	2 084,19
Maintenance Provision p.a.											-
Sales Turnover - Operations	-	-	-	-	6,07	7,26	8,68	10,38	12,42	14,11	58,92
Full Project Value - CAPEX & OPEX	**312,63**	**521,05**	**833,67**	**416,84**	**6,07**	**7,26**	**8,68**	**10,38**	**12,42**	**14,11**	**2 143,11**

GDP & Employment Multipliers:-	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTALS**	
Construction - Rand Million	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**		
B. **Development Costs - (36 - Civil Engineering)**	**312,63**	**521,05**	**833,67**	**416,84**	**-**	**-**	**-**	**-**	**-**	**-**	**2 084,19**	100%
After Leakage Effect (Imports):	297,00	494,99	791,99	396,00	-	-	-	-	-	-	1 979,98	95%
Initial Impact (GDP)	109,74	182,90	292,64	146,32	-	-	-	-	-	-	731,60	35%
100% **Construction GDP Impact (Rand)**	**335,25**	**558,75**	**894,00**	**447,00**	**-**	**-**	**-**	**-**	**-**	**-**	**2 235,00**	107%
52% - Direct Impact	173,74	289,57	463,31	231,66	-	-	-	-	-	-	1 158,29	52%
18% - Indirect Impact	61,89	103,16	165,05	82,53	-	-	-	-	-	-	412,63	18%
30% - Induced Impact	99,58	165,97	265,55	132,78	-	-	-	-	-	-	663,89	30%
- National - RSA	335,25	558,75	894,00	447,00	-	-	-	-	-	-	2 235,00	100%
85% - Province (% of SA)	284,96	474,94	759,90	379,95	-	-	-	-	-	-	1 899,75	85%
70% - Municipality (% of SA)	199,47	332,46	531,93	265,96	-	-	-	-	-	-	1 329,82	60%
Construction Employment (36 Civil Engineering)	**1 000**	**1 600**	**2 457**	**1 179**	**-**	**-**	**-**	**-**	**-**	**-**	**6 236**	100%
- National - RSA (Factor - Jobs per R 1 m)	1 000	1 600	2 457	1 179	-	-	-	-	-	-	6 236	100%
47% - Direct Employment	474	759	1 166	559	-	-	-	-	-	-	2 958	47%
20% - Indirect Employment	198	317	487	234	-	-	-	-	-	-	1 237	20%
33% - Induced Employment	327	524	804	386	-	-	-	-	-	-	2 041	33%
80% - Province (% of SA)	800	1 280	1 966	944	-	-	-	-	-	-	4 989	80%
85% - Municipality (% of Province)	680	1 088	1 671	802	-	-	-	-	-	-	4 241	68%
Construction Employment Impact & Skills	1 000	1 600	2 457	1 179	-	-	-	-	-	-	6 236	100%
- High Level - Management	100	160	246	118	-	-	-	-	-	-	624	10%
- Mid-Level - Administrative	250	400	614	295	-	-	-	-	-	-	1 559	25%
- Semi-skilled - Labourers	650	1 040	1 597	767	-	-	-	-	-	-	4 053	65%

C.

Maintenance (42 - Business Services)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**TOTALS**	
Rand Million	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**		
Maintenance (Incl. in Operations)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	#DIV/0!
After Leakage Effect (Imports):	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
Initial Impact (GDP)	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
Maintenance GDP Impact (Rand)	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	#DIV/0!
65% - Direct Impact	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
15% - Indirect Impact	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
32% - Induced Impact	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- National - RSA	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
85% - Province (% of SA)	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
80% - Municipality (% of SA)	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
Maintenance Employment	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- National - RSA (Factor - Jobs per R 1 m)	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- Direct Employment	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- Indirect Employment	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- Induced Employment	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
90% - Province (% of SA)	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
90% - Municipality (% of SA)	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
Maintenance Employment Impact & Skills	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- High Level - Management	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- Mid-Level - Administrative	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!
- Semi-skilled - Labourers	-	-	-	-	-	-	-	-	-	-	-	#DIV/0!

A.

Operations (34 - Water Supply)	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Ten Year**	
Rand Million	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**TOTALS**	
Operations Revenue/Expenditure - Rm:	**-**	**-**	**-**	**-**	**6,07**	**7,26**	**8,68**	**10,38**	**12,42**	**14,11**	**58,92**	100%
After Leakage Effect (Imports):	-	-	-	-	5,61	6,72	8,03	9,61	11,49	13,05	54,50	93%
Initial Impact (GDP)	-	-	-	-	2,21	2,65	3,17	3,79	4,53	5,14	21,48	36%
Operations GDP Impact	**-**	**-**	**-**	**-**	**7,12**	**8,52**	**10,19**	**12,18**	**14,57**	**16,55**	**69,13**	117%
56% - Direct Impact	-	-	-	-	3,58	4,28	5,11	6,12	7,32	8,31	34,71	50%
23% - Indirect Impact	-	-	-	-	1,44	1,72	2,06	2,46	2,95	3,35	13,99	20%
25% - Induced Impact	-	-	-	-	1,58	1,89	2,26	2,70	3,23	3,67	15,32	22%
- National - RSA	-	-	-	-	7,12	8,52	10,19	12,18	14,57	16,55	69,13	100%
95% - Province (% of SA)	-	-	-	-	6,77	8,09	9,68	11,57	13,84	15,72	65,67	95%
85% - Municipality (% of SA)	-	-	-	-	5,75	6,88	8,23	9,84	11,77	13,36	55,82	81%
Operations Employment - FTE	**-**	**-**	**-**	**-**	**10**	**11**	**13**	**15**	**17**	**19**	**85**	100%
- National - RSA	-	-	-	-	10	11	13	15	17	19	85	100%
- Direct Employment	-	-	-	-	3	3	4	5	5	6	26	30%
- Indirect Employment	-	-	-	-	2	3	3	4	4	5	21	25%
- Induced Employment	-	-	-	-	4	5	6	7	8	8	38	45%
90% - Province (% of SA)	-	-	-	-	9	10	12	13	15	17	76	90%
90% - Municipality (% of SA)	-	-	-	-	8	9	11	12	14	15	69	81%
Operations Employment Impact & Skills	-	-	-	-	10	11	13	15	17	19	85	100%
- High Level - Management	-	-	-	-	1	1	2	2	2	2	10	12%
- Mid-Level - Administrative	-	-	-	-	2	2	2	3	3	3	15	18%
- Semi-skilled - Labourers	-	-	-	-	7	8	9	10	12	13	59	70%
Deflation Rate (Employ. multipliers)	100,0%	96,0%	92,2%	88,5%	84,9%	81,5%	78,3%	75,1%	72,1%	69,3%		

B. **CONSOLIDATED INFORMATION:**

B.1 **Total Project GDP Impact: - SA (Rand M)**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Ten Year**
	2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Totals**
Initial Project Value / Revenue:	**313**	**521**	**834**	**417**	**6**	**7**	**9**	**10**	**12**	**14**	**2 143**
Initial GDP Impact	110	183	293	146	2	3	3	4	5	5	753
Total GDP Impact	**335**	**559**	**894**	**447**	**7**	**9**	**10**	**12**	**15**	**17**	**2 304**
- Direct Impact	174	290	463	232	4	4	5	6	7	8	1 193
- Indirect Impact	62	103	165	83	1	2	2	2	3	3	427
- Induced Impact	100	166	266	133	2	2	2	3	3	4	679

B.2 **Total Project GDP Impact: - SA (Rand m)**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Totals**
Construction	335	559	894	447	-	-	-	-	-	-	2 235
Maintenance	-	-	-	-	-	-	-	-	-	-	-
Operations	-	-	-	-	7	9	10	12	15	17	69
Totals:	**335**	**559**	**894**	**447**	**7**	**9**	**10**	**12**	**15**	**17**	**2 304**

B.3 **Total GGP Impact: - Municipal Area (Rand m)**											
Construction	199	332	532	266	-	-	-	-	-	-	1 330
Maintenance	-	-	-	-	-	-	-	-	-	-	-
Operations	-	-	-	-	6	7	8	10	12	13	56
Totals:	**199**	**332**	**532**	**266**	**6**	**7**	**8**	**10**	**12**	**13**	**1 386**
% of National GDP Impact	60%	60%	60%	60%	81%	81%	81%	81%	81%	81%	60%
Sustained GGP in Municipality	**-**	**-**	**-**	**-**	**6**	**7**	**8**	**10**	**12**	**13**	**56**

B.4 **Total Employment Impact: - South Africa**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Totals**
	Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**10 Years**
Construction	1 000	1 600	2 457	1 179	-	-	-	-	-	-	6 236
Operations	-	-	-	-	10	11	13	15	17	19	85
Totals:	**1 000**	**1 600**	**2 457**	**1 179**	**10**	**11**	**13**	**15**	**17**	**19**	**6 321**

B.5 **Total Employment Impact: - Municipality**											
Construction	680	1 088	1 671	802	-	-	-	-	-	-	4 241
Operations	-	-	-	-	8	9	11	12	14	15	69
Totals:	**680**	**1 088**	**1 671**	**802**	**8**	**9**	**11**	**12**	**14**	**15**	**4 309**
% of National Project Employment	68%	68%	68%	68%	81%	81%	81%	81%	81%	81%	68%
B.6 **Sustained Employment in Municipality**	**-**	**-**	**-**	**-**	**8**	**9**	**11**	**12**	**14**	**15**	**69**

Foxwood Dam - Adelaide	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**	**Ten Year**
PROJECT REVENUE & TAXATION - Rm	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**TOTALS**
Turnover (Infrastructure Provision)	312,63	521,05	833,67	416,84	-	-	-	-	-	-	2 084,19
Turnover (Maintenance Provision)	-	-	-	-	-	-	-	-	-	-	-
Turnover - Operations	-	-	-	-	6,07	7,26	8,68	10,38	12,42	14,11	58,92
Construction Employment Wages Paid	46,89	78,16	125,05	62,53	-	-	-	-	-	-	312,63
Maintenance Employment Wages Paid	-	-	-	-	-	-	-	-	-	-	-
Operations Employment Wages Paid	-	-	-	-	1,21	1,45	1,74	2,08	2,48	2,82	11,78
Construction Employment Tax paid	9,38	15,63	25,01	12,51	-	-	-	-	-	-	62,53
Maintenance Employment Tax paid	-	-	-	-	-	-	-	-	-	-	-
Operations Employment Tax paid	-	-	-	-	0,27	0,32	0,38	0,46	0,55	0,62	2,59
Employment Tax	**9,38**	**15,63**	**25,01**	**12,51**	**0,27**	**0,32**	**0,38**	**0,46**	**0,55**	**0,62**	**65,12**
VAT payable to SARS - Developer	7,50	12,51	20,01	10,00	-	-	-	-	-	-	50,02
VAT payable to SARS - Operator	-	-	-	-	0,15	0,17	0,21	0,25	0,30	0,34	1,41
Company Tax Paid - Developer	7,00	11,67	18,67	9,34	-	-	-	-	-	-	46,69
Company Tax Paid - Operations	-	-	-	-	0,17	0,20	0,24	0,29	0,35	0,39	1,65
National Company Tax Paid	**14,51**	**24,18**	**38,68**	**19,34**	**0,32**	**0,38**	**0,45**	**0,54**	**0,65**	**0,73**	**99,77**
National Tax Paid (Employ & Co.)	**23,88**	**39,81**	**63,69**	**31,85**	**0,58**	**0,70**	**0,83**	**1,00**	**1,19**	**1,35**	**164,89**
Rates - Land & Buildings	0,16	0,42	0,83	1,04	1,04	1,04	1,04	1,04	1,04	1,04	8,70
Utility charges - Operations	-	-	-	-	0,09	0,11	0,13	0,16	0,19	0,21	0,88
Utility charges - Construction	4,69	7,82	12,51	6,25	-	-	-	-	-	-	31,26
Municipal Revenue Paid	**4,85**	**8,23**	**13,34**	**7,29**	**1,04**	**1,04**	**1,04**	**1,04**	**1,04**	**1,04**	**39,96**
Total Fiscal Revenue	**28,73**	**48,04**	**77,03**	**39,14**	**1,62**	**1,74**	**1,88**	**2,04**	**2,23**	**2,40**	**204,85**

UrbanEcon Population Projections (May 2014)

Year		2013	2018	2023	2028	2033	2038	2043	2048	% of Total
Adelaide (Urban)		1 303	1 251	1 201	1 163	1 107	1 063	1 021	988	12,2%
Bezuidenhoutville		2 052	1 970	1 892	1 831	1 744	1 675	1 608	1 557	19,2%
Lingelethu SP		5 941	5 705	5 477	5 302	5 050	4 849	4 656	4 507	55,5%
New Lingelethu		673	646	620	600	572	549	527	510	6,3%
Old Lingelethu		634	608	584	565	539	517	497	481	5,9%
Adelaide (Non-Urban)		111	107	103	99	95	91	87	84	1,0%
Totals		**10 714**	**10 287**	**9 878**	**9 562**	**9 107**	**8 744**	**8 396**	**8 127**	**100,0%**
Growth Rate p.a.			-4,0%	-4,0%	-3,2%	-4,8%	-4,0%	-4,0%	-3,2%	

Population Projections (July 2014)

Year - Dam Project		-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Year - Agriculture								1	2	3	4	5	6	7	8	9	10	11
Year - Calendar		2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Adelaide (Urban)		1 303	1 303	1 303	1 303	1 316	1 329	1 342	1 356	1 369	1 383	1 397	1 411	1 425	1 439	1 454	1 468	1 483
Bezuidenhoutville		2 052	2 052	2 052	2 052	2 073	2 093	2 114	2 136	2 157	2 178	2 200	2 222	2 244	2 267	2 290	2 312	2 336
Lingelethu SP		5 941	5 941	5 941	5 941	6 001	6 061	6 121	6 182	6 244	6 307	6 370	6 434	6 498	6 563	6 628	6 695	6 762
New Lingelethu		673	673	673	673	680	686	693	700	707	714	721	729	736	743	751	758	766
Old Lingelethu		634	634	634	634	640	646	653	659	666	673	679	686	693	700	707	714	721
Adelaide (Non-Urban)		111	111	111	111	112	113	115	116	117	118	119	120	122	123	124	125	127
Totals		**10 714**	**10 714**	**10 714**	**10 714**	**10 821**	**10 929**	**11 039**	**11 149**	**11 261**	**11 373**	**11 487**	**11 602**	**11 718**	**11 835**	**11 953**	**12 073**	**12 194**
Growth Rate p.a.			0,0%	0,0%	0,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%

Note: Although UrbanEcon have projected a negative population growth rate, it is anticipated that with the Foxwood Dam there will be a reversal of this trend over and above the irrigated agriculture potential.

Employment Projections - Nxuba (July 2014)

Year - Dam Project	-3	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	% Growth
Year - Agriculture							0	1	2	3	4	5	6	7	8	9	10	11	Over
Year - Calendar	2 011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	17 Years
1 Agriculture	1 313	1 339	1 353	1 366	1 380	1 394	1 408	1 422	1 436	1 450	1 465	1 479	1 494	1 509	1 524	1 539	1 555	1 570	19,6%
2 Mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3 Manufacturing	26	27	27	27	27	28	28	28	28	29	29	29	30	30	30	30	31	31	19,6%
4 Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5 Construction	107	109	110	111	112	114	115	116	117	118	119	121	122	123	124	125	127	128	19,6%
6 Trade	284	290	293	296	298	301	304	308	311	314	317	320	323	326	330	333	336	340	19,6%
7 Transport	28	29	29	29	29	30	30	30	31	31	31	32	32	32	33	33	33	33	19,6%
8 Finance	58	59	60	60	61	62	62	63	63	64	65	65	66	67	67	68	69	69	19,6%
9 Community services	1 276	1 302	1 315	1 328	1 341	1 354	1 368	1 382	1 395	1 409	1 423	1 438	1 452	1 467	1 481	1 496	1 511	1 526	19,6%
10 Households	418	426	431	435	439	444	448	453	457	462	466	471	476	480	485	490	495	500	19,6%
Totals	**3 510**	**3 580**	**3 616**	**3 652**	**3 689**	**3 726**	**3 763**	**3 800**	**3 838**	**3 877**	**3 916**	**3 955**	**3 994**	**4 034**	**4 075**	**4 115**	**4 157**	**4 198**	19,6%
Growth Rate p.a.		2,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	

Source: ECSECC Global Insight data for the year 2011, escalated to 2013 values and then a growth factor applied per year.

Irrigated Agriculture - Direct Employment Creation. Farms [62 at 20 Ha each]

Year - Agriculture							0	1	2	3	4	5	6	7	8	9	10	11	
Year - Calendar	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Ratio:
Lemons	-	-	-	-	-	-	323	646	839	969	1 162	1 291	1 291	1 291	1 291	1 291	1 291	1 291	67%
Peaches	-	-	-	-	-	-	384	768	998	1 151	1 382	1 535	1 535	1 535	1 535	1 535	1 535	1 535	79%
Macadamia	-	-	-	-	-	-	743	1 487	1 933	2 230	2 677	2 974	2 974	2 974	2 974	2 974	2 974	2 974	154%
Average Jobs - All Crops	-	-	-	-	-	-	483	967	1 257	1 450	1 740	1 934	1 934	1 934	1 934	1 934	1 934	1 934	100%
Labour Ratio from Year 10							25%	50%	65%	75%	90%	100%	100%	100%	100%	100%	100%	100%	

Summarised Irrigated Agriculture Employment Creation.

Agriculture [Existing]	1 313	1 339	1 353	1 366	1 380	1 394	1 408	1 422	1 436	1 450	1 465	1 479	1 494	1 509	1 524	1 539	1 555	1 570
Irrigated Agriculture							483	967	1 257	1 450	1 740	1 934	1 934	1 934	1 934	1 934	1 934	1 934
Agriculture Combined	1 313	1 339	1 353	1 366	1 380	1 394	1 891	2 388	2 693	2 900	3 205	3 413	3 428	3 443	3 458	3 473	3 488	3 504
Irrigated % of Total							25,6%	40,5%	46,7%	50,0%	54,3%	56,7%	56,4%	56,2%	55,9%	55,7%	55,4%	55,2%
Growth of All Agriculture - %		2,0%	1,0%	1,0%	1,0%	1,0%	26,3%	20,8%	11,3%	7,2%	9,5%	6,1%	0,4%	0,4%	0,4%	0,4%	0,4%	0,4%
Average over 17 Years																	5,6%	5,3%
Cost as % of Adult Tree (Murray)								35%	40%	45%	50%	55%	60%	70%	80%	90%	100%	100%

Employment Value Chain Impact (IDC Multipliers Applied)
[Measures the change in employment with R 1 million change in demand]

	Multiplier:	Ratio:											
Direct Employment	4,8431		967	1 257	1 450	1 740	1 934	1 934	1 934	1 934	1 934	1 934	1 934	
Indirect Employment	0,7261	15%	145	188	217	261	290	290	290	290	290	290	290	
Induced Employment	1,0980	23%	219	285	329	395	438	438	438	438	438	438	438	728
Total Employment Impact	6,6672	38%	1 331	1 730	1 996	2 396	2 662	2 662	2 662	2 662	2 662	2 662	2 662	
													728	
Indicative Capital Cost / Job	Rand m													
Total Capital Cost	3 030		2,28	1,75	1,52	1,26	1,14	1,14	1,14	1,14	1,14	1,14	1,14	
- Dam Capital Cost	2 512		1,89	1,45	1,26	1,05	0,94	0,94	0,94	0,94	0,94	0,94	0,94	
- Irrigation Capital Cost	518		0,39	0,30	0,26	0,22	0,19	0,19	0,19	0,19	0,19	0,19	0,19	

Gross Value Added (GVA) Projections - Nxuba (July 2014) - Rand Thousands

Year - Dam Project	-3	-1	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	% Growth
Year - Agriculture							0	1	2	3	4	5	6	7	8	9	10	11	Over
Year - Calendar	2 011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	17 Years
1 Agriculture	37 169	37 912	38 292	38 674	39 061	39 452	39 846	40 245	40 647	41 054	41 464	41 879	42 298	42 721	43 148	43 579	44 015	44 455	19,6%
2 Mining	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
3 Manufacturing	3 538	3 609	3 645	3 681	3 718	3 755	3 793	3 831	3 869	3 908	3 947	3 986	4 026	4 066	4 107	4 148	4 189	4 231	19,6%
4 Electricity	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
5 Construction	4 032	4 112	4 153	4 195	4 237	4 279	4 322	4 365	4 409	4 453	4 497	4 542	4 588	4 634	4 680	4 727	4 774	4 822	19,6%
6 Trade	18 233	18 597	18 783	18 971	19 161	19 352	19 546	19 741	19 939	20 138	20 340	20 543	20 748	20 956	21 165	21 377	21 591	21 807	19,6%
7 Transport	57	58	59	59	60	60	61	62	62	63	64	64	65	65	66	67	67	68	19,6%
8 Finance	31 941	32 580	32 906	33 235	33 567	33 903	34 242	34 584	34 930	35 279	35 632	35 988	36 348	36 712	37 079	37 450	37 824	38 202	19,6%
9 Community services	151 523	154 554	156 099	157 660	159 237	160 829	162 437	164 062	165 702	167 359	169 033	170 723	172 430	174 155	175 896	177 655	179 432	181 226	19,6%
Total Industries	246 492	251 422	253 936	256 476	259 040	261 631	264 247	266 890	269 558	272 254	274 977	277 726	280 504	283 309	286 142	289 003	291 893	294 812	19,6%
Add: Taxes & Subsidies	26 189	26 713	26 980	27 250	27 522	27 797	28 075	28 356	28 640	28 926	29 215	29 508	29 803	30 101	30 402	30 706	31 013	31 323	19,6%
Total GVA	**272 681**	**278 135**	**280 916**	**283 725**	**286 563**	**289 428**	**292 322**	**295 246**	**298 198**	**301 180**	**304 192**	**307 234**	**310 306**	**313 409**	**316 543**	**319 709**	**322 906**	**326 135**	19,6%
Growth Rate p.a.		2,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	

Source: ECSECC Global Insight data for the year 2011, escalated to 2013 values and then a growth factor applied per year.

Irrigated Agriculture GVA Creation - Rand Thousands. [No Escalation] Farms [62 at 20 Ha each]

Year - Agriculture								1	2	3	4	5	6	7	8	9	10	11	
Year - Calendar	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	Ratio:
Lemons						-	-	-	-	-	-	55 970	111 939	186 565	186 565	186 565	186 565	186 565	93%
Peaches						-	-	-	-	-	-	63 314	126 628	211 047	211 047	211 047	211 047	211 047	105%
Macadamia						-	-	-	-	-	-	16 498	28 871	74 240	107 236	131 983	173 228	206 223	102%
Average - All Crops	-	-	-			-	-	-	-	-	-	45 261	89 146	157 284	168 283	176 532	190 280	201 279	100%
Avg Growth Per Annum:													97%	76%	7%	5%	8%	6%	
Cost as % of Adult Tree							0%	35%	40%	45%	50%	55%	60%	70%	80%	90%	100%	100%	

Summarised Irrigated Agriculture GVA Creation - Rand Thousands [Un-escalated].

Agriculture [Existing]	37 169	37 912	38 292	38 674	39 061	39 452	39 846	40 245	40 647	41 054	41 464	41 879	42 298	42 721	43 148	43 579	44 015	44 455
Irrigated Agriculture		-	-	-	-	-	-	-	-	-	-	45 261	89 146	157 284	168 283	176 532	190 280	201 279
Agriculture Combined	37 169	37 912	38 292	38 674	39 061	39 452	39 846	40 245	40 647	41 054	41 464	87 139	131 444	200 005	211 431	220 111	234 295	245 734
Irrigated % of Total							0,0%	0,0%	0,0%	0,0%	0,0%	51,9%	67,8%	78,6%	79,6%	80,2%	81,2%	81,9%
Growth of All Agriculture - %		2,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	1,0%	52,4%	33,7%	34,3%	5,4%	3,9%	6,1%	10,4%
Average over 17 Years																		9,2%

Irrigated Agriculture GVA Creation - Farm Revenue. [Escalated] 4,5% Esc. P.a. Farms [62 at 20 Ha each]

Year - Agriculture								1	2	3	4	5	6	7	8	9	10	11	
Year - Calendar	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	
Lemons								-	-	-	-	83 176	173 838	302 768	316 393	330 630	345 509	361 057	
Peaches								-	-	-	-	94 091	196 650	342 499	357 911	374 017	390 848	408 436	
Macadamia								-	-	-	-	24 517	44 836	120 481	181 860	233 900	320 808	399 101	
Average - All Crops								-	-	-	-	67 262	138 441	255 249	285 388	312 849	352 388	389 531	389 531 164

Irrigated Agriculture GVA Creation - Farm Expenses. [Escalated] 4,5% Esc. P.a. Farms [62 at 20 Ha each]

Year - Agriculture								1	2	3	4	5	6	7	8	9	10	11
Year - Calendar	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Lemons								30 193	36 133	43 139	69 811	105 422	151 051	173 912	195 147	217 941	242 392	268 602
Peaches								34 301	40 292	47 346	54 952	98 965	146 828	211 835	234 429	258 627	284 528	312 237
Macadamia								27 073	30 957	34 840	38 724	46 792	53 814	69 205	85 341	99 385	117 614	133 750
Average - All Crops							-	30 522	35 794	41 775	54 496	83 726	117 231	151 651	171 639	191 985	214 845	238 196

Irrigated Agriculture GVA Creation - Farm Revenue or Expense. [Escalat 4,5% Esc. P.a. Farms [62 at 20 Ha each]

Year - Agriculture								1	2	3	4	5	6	7	8	9	10	11
Year - Calendar	2011	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029
Lemons								30 193	36 133	43 139	69 811	105 422	173 838	302 768	316 393	330 630	345 509	361 057
Peaches								34 301	40 292	47 346	54 952	98 965	196 650	342 499	357 911	374 017	390 848	408 436
Macadamia								27 073	30 957	34 840	38 724	46 792	53 814	120 481	181 860	233 900	320 808	399 101
Average - All Crops								30 522	35 794	41 775	54 496	83 726	141 434	255 249	285 388	312 849	352 388	389 531

Summarised Irrigated Agriculture GVA Creation - Rand Thousands [Escalated]

Agriculture [Existing]	37 169	37 912	38 292	38 674	39 061	39 452	39 846	40 245	40 647	41 054	41 464	41 879	42 298	42 721	43 148	43 579	44 015	44 455
Irrigated Agriculture								30 522	35 794	41 775	54 496	83 726	141 434	255 249	285 388	312 849	352 388	389 531
Agriculture Combined	37 169	37 912	38 292	38 674	39 061	39 452	39 846	70 767	76 441	82 829	95 960	125 605	183 732	297 970	328 536	356 428	396 403	433 986
Irrigated % of Total							0,0%	43,1%	46,8%	50,4%	56,8%	66,7%	77,0%	85,7%	86,9%	87,8%	88,9%	89,8%
Growth of All Agriculture - %		2,0%	1,0%	1,0%	1,0%	1,0%	1,0%	43,7%	7,4%	7,7%	13,7%	23,6%	31,6%	38,3%	9,3%	7,8%	10,1%	17,9%
Average over 16 Years																		12,8%

Baseline Nxuba Agriculture
Foxwood Dam Irrigation
Combined Agriculture

Cost Benefit Analysis (CBA) - Opportunity Cost of Capital Expenditure

Year - Dam Project			0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15			
Year - Agriculture								1	2	3	4	5	6	7	8	9	10	11			
Year - Calendar			2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029			
Rand Millions:																					
Government Opportunity Cost Assumptions (Rand Millions):																					
Capital Expenditure p.a. (Capex):		Totals:		312,63	521,05	963,67	416,84	148,00	150,00	44,00	-	-	-	-							
- Foxwood Dam		2 084,19		312,63	521,05	833,67	416,84	-	-	-	-	-	-								
- Irrigation Installation		48,00						48,00													
- Irrigated Agriculture (Inc Land Purchase)		424,00				130,00		100,00	150,00	44,00											
Cumulative Capex (Net)		**2 556,19**		**312,63**	**833,67**	**1 797,35**	**2 214,19**	**2 362,19**	**2 512,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**
		-	424,00																		
Opening Capex (Begin of year)				-	332,95	909,50	1 994,94	2 568,54	2 893,11	3 240,92	3 498,44	3 725,83	3 968,01	4 225,93	4 500,62	4 793,16	5 104,72	5 436,52	5 789,90	6 166,24	6 567,04
Add: New Capex				312,63	521,05	963,67	416,84	148,00	150,00	44,00	-	-	-	-	-	-	-	-	-	-	-
Closing Capex (End of Year)				312,63	854,00	1 873,18	2 411,77	2 716,54	3 043,11	3 284,92	3 498,44	3 725,83	3 968,01	4 225,93	4 500,62	4 793,16	5 104,72	5 436,52	5 789,90	6 166,24	6 567,04
Add: Opportunity Cost	6,5%			20,32	55,51	121,76	156,77	176,58	197,80	213,52	227,40	242,18	257,92	274,69	292,54	311,56	331,81	353,37	376,34	400,81	426,86
Closing Capex (Inc. Opp. Cost)				332,95	909,50	1 994,94	2 568,54	2 893,11	3 240,92	3 498,44	3 725,83	3 968,01	4 225,93	4 500,62	4 793,16	5 104,72	5 436,52	5 789,90	6 166,24	6 567,04	6 993,90
Government Revenue / Value Assumptions (Rand Millions):																					
Foxwood Dam - Fiscal Revenue:-				28,73	48,04	77,03	39,14	1,62	1,74	1,88	2,04	2,23	2,40	2,50	2,62	2,73	2,86	2,99			
- Taxation - Dam	4,5%			23,88	39,81	63,69	31,85	0,58	0,70	0,83	1,00	1,19	1,35	1,42	1,48	1,55	1,61	1,69			
- Municipal Services - Dam	4,5%			4,85	8,23	13,34	7,29	1,04	1,04	1,04	1,04	1,04	1,04	1,09	1,14	1,19	1,24	1,30			
Irrigated Agriculture - Taxation:-				21,88	36,47	67,46	29,18	11,95	1,86	2,17	2,83	4,35	7,35	13,27	14,84	16,27	18,32	20,26			
- Taxation - Construction	7,0%			21,88	36,47	67,46	29,18	10,36													
- Taxation - Operations	4,0%						-	1,22	1,43	1,67	2,18	3,35	5,66	10,21	11,42	12,51	14,10	15,58			
- Taxation - Wages							-	0,37	0,43	0,50	0,65	1,00	1,70	3,06	3,42	3,75	4,23	4,67			
Total Taxation Revenue:				**50,61**	**84,51**	**144,49**	**68,32**	**13,57**	**3,60**	**4,05**	**4,87**	**6,59**	**9,75**	**15,78**	**17,46**	**19,00**	**21,18**	**23,24**			
Surplus / (Deficit) [Opportunity Cost to Tax]				30,29	29,00	22,73	(88,45)	(163,00)	(194,20)	(209,47)	(222,53)	(235,59)	(248,17)	(258,91)	(275,08)	(292,55)	(310,62)	(330,13)			
Cumulative Surplus / (Deficit)				30,29	59,30	82,03	(6,42)	(169,42)	(363,62)	(573,09)	(795,62)	(1 031,21)	(1 279,38)	(1 538,29)	(1 813,37)	(2 105,92)	(2 416,55)	(2 746,68)			
Irrigated Agriculture - GVA:-				**-**	**-**	**-**	**-**	**30,52**	**35,79**	**41,78**	**54,50**	**83,73**	**141,43**	**255,25**	**285,39**	**312,85**	**352,39**	**389,53**			
Note: The IDC multiplier of 2.644 for the Agriculture 'Closed Model' could be applied here. Full GDP or Value Chain impact.																					
Surplus / (Deficit) [Opportunity Cost to GVA]				(20,32)	(55,51)	(121,76)	(156,77)	(146,05)	(162,01)	(171,74)	(172,90)	(158,45)	(116,49)	(19,44)	(7,15)	1,29	20,58	36,16			
Cumulative Surplus / (Deficit)				(20,32)	(75,83)	(197,59)	(354,35)	(500,41)	(662,41)	(834,16)	(1 007,06)	(1 165,51)	(1 282,00)	(1 301,44)	(1 308,59)	(1 307,29)	(1 286,71)	(1 250,56)			
Irrigated Agriculture - Tax & GVA:-				**50,61**	**84,51**	**144,49**	**68,32**	**44,09**	**39,39**	**45,82**	**59,37**	**90,31**	**151,18**	**271,03**	**302,84**	**331,85**	**373,57**	**412,77**			
Surplus / (Deficit) [Opportunity Cost to Tax & GVA]				30,29	29,00	22,73	(88,45)	(132,48)	(158,41)	(167,70)	(168,03)	(151,86)	(106,74)	(3,66)	10,30	20,30	41,76	59,40			
Cumulative Surplus / (Deficit)				30,29	59,30	82,03	(6,42)	(138,90)	(297,30)	(465,00)	(633,03)	(784,90)	(891,63)	(895,29)	(884,99)	(864,69)	(822,93)	(763,53)			
Escalation Calculations:-																					
Year				1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
Escalation per annum:	4,5%		0,0%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%	4,5%			
Escalation Cumulative:	4,5%		1,00	1,05	1,09	1,14	1,19	1,25	1,30	1,36	1,42	1,49	1,55	1,62	1,70	1,77	1,85	1,94			
Economic Return to SA:-	15 Years	30 Years	50 Years																		
Project Capex (R m)	2 556	2 556	2 556	(312,63)	(521,05)	(963,67)	(416,84)	(148,00)	(150,00)	(44,00)	-	-	-	-	-	-	-	-	-	-	-
Opportunity Cost (Cumul.)	5 790	5 790	5 790																		
Project Economic Return (R m)	2 470	3 987	60 116	50,61	84,51	144,49	68,32	44,09	39,39	45,82	59,37	90,31	151,18	271,03	302,84	331,85	373,57	412,77	456,09	503,95	556,84
Net Cash Flow (R m)	(86)	1 431	57 560	(262,01)	(436,53)	(819,19)	(348,52)	(103,91)	(110,61)	1,82	59,37	90,31	151,18	271,03	302,84	331,85	373,57	412,77	456,09	503,95	556,84
Net Present Value (R m)	(1 162)	(0)	10 293	(504,62)	(878,87)	#######	#######	#######	#######	#######	(1 892,62)	(1 847,44)	(1 777,41)	(1 661,17)	(1 540,91)	(1 418,89)	(1 291,70)	(1 161,58)	#######	(892,25)	(752,90)
IRR	#NUM!	0,0%	4,9%	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!
Discount Rate Applied:-	8%	8%	8%																		
																					#NUM!
Project Economic Return % Growth					67,0%	71,0%	-52,7%	-35,5%	-10,7%	16,3%	29,6%	52,1%	67,4%	79,3%	11,7%	9,6%	12,6%	10,5%	10,5%	10,5%	10,5%

Cumulative Capex (Net)																												**2 556,19**
Opening Capex (Begin of year)																											**2 556,19**	#######
Add: New Capex	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**	**2 556,19**		-
Closing Capex (End of Year)																											35 959,14	#######
Add: Opportunity Cost	6 993,90	7 448,51	7 932,66	8 448,28	8 997,42	9 582,25	10 205,10	10 868,43	11 574,88	12 327,24	13 128,52	13 981,87	14 890,69	15 858,59	16 889,39	17 987,20	19 156,37	20 401,54	21 727,64	23 139,93	24 644,03	26 245,89	27 951,87	29 768,75	31 703,71	33 764,45	-	**2 489,27**
Closing Capex (Inc. Opp. Cost)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	35 959,14	#######
	6 993,90	7 448,51	7 932,66	8 448,28	8 997,42	9 582,25	10 205,10	10 868,43	11 574,88	12 327,24	13 128,52	13 981,87	14 890,69	15 858,59	16 889,39	17 987,20	19 156,37	20 401,54	21 727,64	23 139,93	24 644,03	26 245,89	27 951,87	29 768,75	31 703,71	33 764,45	**2 337,34**	
Government Revenue / Value Assumptions (Rand Millions):	**454,60**	**484,15**	**515,62**	**549,14**	**584,83**	**622,85**	**663,33**	**706,45**	**752,37**	**801,27**	**853,35**	**908,82**	**967,89**	**1 030,81**	**1 097,81**	**1 169,17**	**1 245,16**	**1 326,10**	**1 412,30**	**1 504,10**	**1 601,86**	**1 705,98**	**1 816,87**	**1 934,97**	**2 060,74**	**2 194,69**	38 296,49	
Year																												46
Escalation Cumulative:	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	
Project Capex (R m)																												-
Project Economic Return (R m)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	9 103,83
Net Cash Flow (R m)																												9 103,83
Net Present Value (R m)	615,27	679,84	751,18	830,01	917,12	1 013,36	1 119,70	1 237,20	1 367,04	1 510,50	1 669,01	1 844,16	2 037,69	2 251,52	2 487,80	2 748,87	3 037,34	3 356,09	3 708,28	4 097,43	4 527,42	5 002,53	5 527,50	6 107,56	6 748,49	7 456,69	8 239,20	1 356,57
IRR	615,27	679,84	751,18	830,01	917,12	1 013,36	1 119,70	1 237,20	1 367,04	1 510,50	1 669,01	1 844,16	2 037,69	2 251,52	2 487,80	2 748,87	3 037,34	3 356,09	3 708,28	4 097,43	4 527,42	5 002,53	5 527,50	6 107,56	6 748,49	7 456,69	8 239,20	4%
Discount Rate Applied:-	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	(752,90)	
	#NUM!	#NUM!	#NUM!	#NUM!	#NUM!	-14%	-11%	-9%	-8%	-6%	-5%	-4%	-3%	-2%	-1%	-1%	0%	1%	1%	2%	2%	3%	3%	3%	4%	4%	4%	
Project Economic Return % Growth																												10,5%

Data for graphs - highlighted cells are manually input

			Feasibility	feasibility	Feasibility																					
					EIA	EIA				Year 1	Year 2	Year 3														
Overall government spending graph						Design	Design	Construction																		
Projected Timeframe		**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	
								2015	**2016**	**2017**	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**2025**	**2026**	**2027**	**2028**	**2029**	**2030**	**2031**	**2032**	
Economic Impact and Year:								**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**	**Year 10**									
Irrigation year (Murray model)								**Year -4**	**Year -3**	**Year -2**	**Year -1**	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**	**Year 6**	**Year 7**	**Year 8**	**Year 9**					
DAM CONSTRUCTION & OPERATION - EXPENDITURE																										
Dam CAPEX (off Treasury Budget)								312 627 912,35	521 046 520,58	833 674 432,92	416 837 216,46	-														
Operating & Maintenance Costs (OPEX)												7 001 283,00	8 518 131,28	8 858 856,53	9 213 210,80	9 581 739,23	9 965 008,80	10 363 609,15	10 778 153,51	11 209 279,65	11 657 650,84					
Operating Revenue (Water Sales)												6 070 000,00	7 259 720,00	8 682 625,12	10 384 419,64	12 419 766,25	14 105 508,75	14 669 729,10	15 256 518,27	15 866 779,00	16 501 450,16					
IRRIGATION ESTABLISHMENT & OPERATION - EXPENDITURE																										
Land Purchase			130 000 000 - 13000ha @ R10000/ha							65 000 000	65 000 000															
Farm Establishment	**125 271 000**		1250ha @101,025/ha establishment costs								62 635 500	62 635 500														
Training & Mentoring	**2 880 000**		62x15000 (course for each farmer) & 1,950,000 - mentor salary for one year								1 440 000	1 440 000														
Irrigation CAPEX (TOTAL)			Sum of the above three items							65 000 000	129 075 500	64 075 500														
Irrigation OPEX										-	-	30 522 393,47	35 794 037,23	41 775 150,45	54 495 884,75	83 726 327,35	117 231 066,08	151 650 684,92	171 639 059,01	191 984 508,59	214 844 588,44	238 196 125,91	-	-	-	
Combined irrigation expenditure (CAPEX + OPEX)										65 000 000	129 075 500	94 597 893	35 794 037	41 775 150	54 495 885	83 726 327	117 231 066	151 650 685	171 639 059	191 984 509	214 844 588	238 196 126	-	-		
Agriculture revenue (per farm)																902 735	1 805 471	3 009 118	3 009 118	3 009 118	3 009 118	3 009 118	3 009 118,10	3 009 118,10		
Irrigation - Revenue										-	-	-	-	-	-	67 261 501,50	138 441 480,14	255 249 436,72	285 387 954,98	312 849 148,08	352 388 323,41	389 531 163,59	#REF!	-	-	-
Irrigation revenue (Derek) **(NO ESCALATION)**		[This revenue profile updated on 13.04.15 - DZ]														-	-	-	-	45 260 562,17	89 146 301	157 284 381	168 282 965	176 531 902	190 280 132	201 278 715
Deficit funding										65 000 000	129 075 500	94 597 893	35 794 037	41 775 150	54 495 885	16 464 826	-21 210 414	-103 598 752	-113 748 896	-120 864 639	-137 543 735	-151 335 038	#REF!	-		
Cummulative Deficit Funding										65 000 000	194 075 500	288 673 393	324 467 431	366 242 581	420 738 466	437 203 292	415 992 878	312 394 126	198 645 230	77 780 590	-59 763 145	-211 098 182	#REF!	#REF!		
ECONOMIC IMPACT - DIRECT EMPLOYMENT																										
Dam Construction (Total)								1 000	1 600	2 457	1 179															
Dam Construction (Nxuba)								680	1 088	1 671	802															
Dam Operation (Total)												10	11	13	15	17	19									
Dam Operation (Nxuba)												9	10	12	13	15	17									
Irrigation Establishment											483															
Irrigation Operation												967	1 257	1 450	1 740	1 934	1 934	1 934	1 934	1 934	1 934	1 934				
ECONOMIC IMPACT - GDP/GVA																										
Dam Construction GDP (RSA)								335 249 668	558 749 447	893 999 115	446 999 557															
Dam Construction GDP (Eastern Cape)								284 962 218	474 937 030	759 899 248	379 949 624															
Dam Construction GDP (Nxuba)	NB not ADM??							199 473 553	332 455 921	531 929 473	265 964 737															
Dam Operation GDP (RSA)												7 121 748,9	8 517 611,7	10 187 063,6	12 183 728,0	14 571 739,1	16 549 570,3									
Dam Operation GDP (Eastern Cape)												6 765 661,5	8 091 731,1	9 677 710,4	11 574 541,6	13 843 152,2	15 722 091,7									
Dam Operation GDP (Nxuba)												5 750 812,2	6 877 971,4	8 226 053,8	9 838 360,4	11 766 679,4	13 363 778,0									
Irrigation Establishment GVA											-	30 522 393,5	35 794 037,2	41 775 150,4	54 495 884,7	83 726 327,3										
Irrigation Revenue GVA																	138 441 480,1	255 249 436,7	285 387 955,0	312 849 148,1	352 388 323,4