P WMA 12/T30/00/5212/15



DIRECTORATE: OPTIONS ANALYSIS

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

COST ESTIMATES AND ECONOMIC ANALYSIS



FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

APPROVAL

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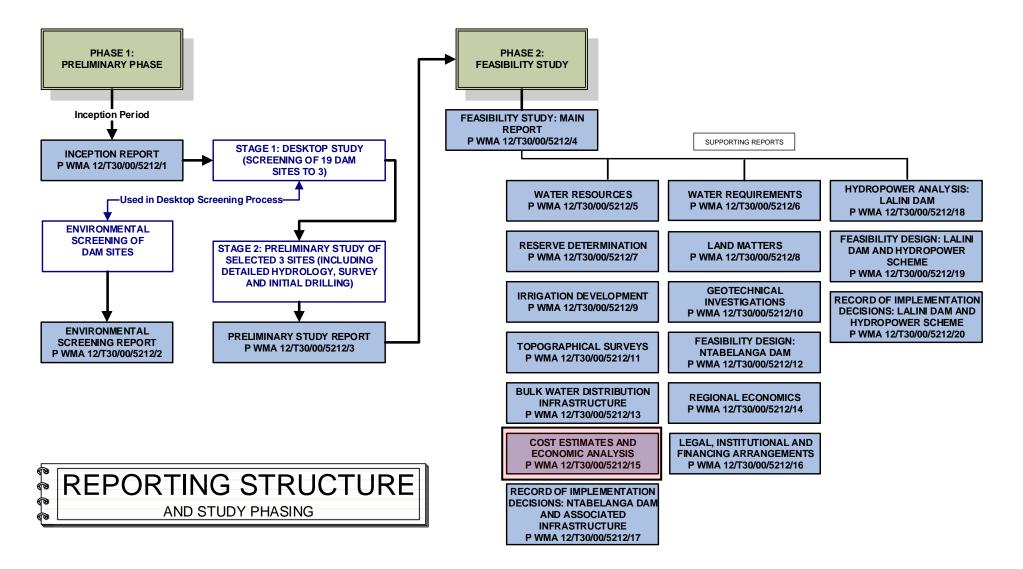
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LIST OF REPORTS

REPORT TITLE	DWS REPORT NUMBER
Inception Report	P WMA 12/T30/00/5212/1
Environmental Screening	P WMA 12/T30/00/5212/2
Preliminary Study	P WMA 12/T30/00/5212/3
Feasibility Study: Main Report	
Volume 1: Report	P WMA 12/T30/00/5212/4
Volume 2: Book of Drawings	
FEASIBILITY STUDY: SUPPORTING REPORTS:	
Water Resources	P WMA 12/T30/00/5212/5
Water Requirements	P WMA 12/T30/00/5212/6
Reserve Determination	
Volume 1: River	
Volume 2: Estuary: Report	P WMA 12/T30/00/5212/7
Volume 3 :Estuary: Appendices	
Land Matters	P WMA 12/T30/00/5212/8
Irrigation Development	P WMA 12/T30/00/5212/9
Geotechnical Investigations	
Volume 1: Ntabelanga, Somabadi and Thabeng Dam Sites: Report	
Volume 2: Ntabelanga, Somabadi and Thabeng Dam Sites: Appendices	P WMA 12/T30/00/5212/10
Volume 3: Lalini Dam and Hydropower Scheme: Report	
Volume 4: Lalini Dam and Hydropower Scheme: Appendices	
Topographical Surveys	P WMA 12/T30/00/5212/11
Feasibility Design: Ntabelanga Dam	P WMA 12/T30/00/5212/12
Bulk Water Distribution Infrastructure	P WMA 12/T30/00/5212/13
Regional Economics	P WMA 12/T30/00/5212/14
Cost Estimates and Economic Analysis	P WMA 12/T30/00/5212/15
Legal, Institutional and Financing Arrangements	P WMA 12/T30/00/5212/16
Record of Implementation Decisions: Ntabelanga Dam and Associated Infrastructure	P WMA 12/T30/00/5212/17
Hydropower Analysis: Lalini Dam	P WMA 12/T30/00/5212/18
Feasibility Design: Lalini Dam and Hydropower Scheme	P WMA 12/T30/00/5212/19
Record of Implementation Decisions: Lalini Dam and Hydropower Scheme	P WMA 12/T30/00/5212/20

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS



FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT

REFERENCE

This report is to be referred to in bibliographies as:

Department of Water and Sanitation, South Africa (2014). Feasibility Study for the Mzimvubu Water Project: Cost Estimates and Economic Analysis

DWS Report No: P WMA 12/T30/00/5212/15

Prepared for: Directorate – Options Analysis

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Note on Departmental Name Change:

In 2014, the Department of Water Affairs changed its name to the Department of Water and Sanitation, which happened during the course of this study. In some cases this was after some of the study reports had been finalized. The reader should therefore kindly note that references to the Department of Water Affairs and the Department of Water and Sanitation herein should be considered to be one and the same.

Note on Spelling of Laleni:

The settlement named Laleni on maps issued by the Surveyor General is locally known as Lalini and both names therefore refer to the same settlement.

EXECUTIVE SUMMARY

INTRODUCTION

The Mzimvubu River catchment in the Eastern Cape Province of South Africa is within one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country which is still largely unutilised, is considered by the Eastern Cape Provincial Government as offering one of the best opportunities in the Province to achieve such development. In 2007, a specialpurpose vehicle (SPV) called ASGISA-Eastern Cape (Pty) Ltd (ASGISA-EC) was formed in terms of the Companies Act to initiate planning and to facilitate and drive the Mzimvubu River Water Resources Development.

The five pillars on which the Eastern Cape Provincial Government and ASGISA-EC proposed to model the Mzimvubu River Water Resources Development are:

- Afforestation;
- Irrigation;
- Hydropower;
- Water transfer; and
- Tourism.

As a result of this the Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project Feasibility Study with the overarching aim of developing water resources schemes (dams) that can be multi-purpose reservoirs in order to provide benefits to the surrounding communities and to provide a stimulus for the regional economy, in terms of irrigation, forestry, domestic water supply and the potential for hydropower generation amongst others.

The study commenced in January 2012 and was completed in October 2014 in several stages as follows:

- Inception;
- Phase 1 Preliminary Study; and
- Phase 2 Feasibility Study.

The purpose of this study was not to repeat or restate the research and analyses undertaken on the several key previous studies described below, but to make use of that information previously collected, to update and add to this information, and to undertake more focussed and detailed investigations and feasibility level analyses on the dam site options that have then been identified as being the most promising and cost beneficial.

Report numbers P WMA 12/T30/00/5212/2 to 20 describe the feasibility study processes undertaken to prepare solutions that would be implemented to meet the development goals and social benefits.

Following the completion of the above feasibility study stages it was confirmed and agreed that the sizing and modus operandi of the Ntabelanga Dam and its associated works would take into account its multi-purpose role, namely:

- *i.* To supply potable water to an estimated current population of 502 822 people (rising to some 726 616 people in 2050), and other potable water consumers in the region;
- ii. To supply raw water for irrigation of some 2 868 ha of high potential agricultural land;
- *iii.* To generate hydropower locally at the dam wall to reduce the cost of energy consumption when pumping water;
- *iv.* To provide sufficient flow of water downstream of the Ntabelanga Dam to meet environmental water requirements for an ecological Class C; and
- v. To provide additional balancing storage volume and consistent downstream flow releases to enable a second dam at Lalini (just above the Tsitsa Falls) to generate significant hydropower for supply into the national grid.

The basis of approach listed in item v) was that the generating of hydropower could be used to cross-subsidize both operation and maintenance costs as well as the significant energy costs required for pumping water for the irrigation and domestic water supply schemes proposed to be supplied from the Ntabelanga Dam. The agricultural water requirements proposed for the Tsolo area would require lifting the water more than 150 m, which would normally render such a scheme non-viable in terms of the pumping cost component of water supplied, unless hydropower is developed to reduce the net unit cost of water.

The purpose of this second dam and hydropower scheme at Lalini would thus be to generate significant revenue by selling energy into the ESKOM grid, thus generating a net positive income stream which would be used to subsidise the energy and operating costs of the main Ntabelanga water supply and irrigation scheme, thus providing self-sustainability.

A more detailed hydropower analysis and feasibility design study was therefore undertaken to assess the output potential of the Lalini Dam hydropower scheme when used conjunctively with the Ntabelanga Dam. This analysis used the detailed hydrology developed for the catchment and the naturalised and historical flow series that was developed therefrom.

It was confirmed and agreed that the sizing and modus operandi of the Lalini Dam and its associated works would take into account its main role, namely:

- a) to generate hydropower both locally at the dam wall and in the Tsitsa River gorge downstream of the Tsitsa Falls, and
- b) to provide sufficient flow of water downstream of the Lalini Dam and these hydroelectrric plants (HEPs) to meet environmental water requirements for an ecological Class B/C.

In order to facilitate this analysis, detailed investigations were undertaken of the Lalini Dam components of the scheme, inter alia:

- detailed topographical survey and positioning of the proposed Lalini Dam,
- geotechnical investigations of the dam site, sources of construction materials, and tunnel alignments,
- investigation of various Lalini hydropower scheme configuration options, and
- hydropower modelling simulations of the Lalini hydropower plant and two minihydropower plants at Ntabelanga and Lalini dams for the conjunctive scheme.

The resulting project infrastructure comprises the following:

- A new dam on the Tsitsa River at Ntabelanga, with capacity to supply the raw and potable water requirements for i) and ii) above,
- A water treatment works at the Ntabelanga dam to supply the potable water requirements,
- Primary and secondary bulk water distribution systems the deliver potable water to the area to be supplied by the Ntabelanga Dam,
- A bulk raw water distribution system from Ntabelaenga Dam to supply irrigation water to some 2 868 ha of high potential land,
- A mini hydroelectric plant (HEP) at Ntabelanga Dam to generate up to 5 MW of power, and
- A hydropower scheme supplied with water by a new dam at Lalini, located on the Tistsa River some 3.5 km above the Tsitsa Falls. This would have a similar mini HEP to Ntabelanga at Lalini Dam itself, producing up to 5 MW, and a main HEP located in the gorge downstream of the Tsitsa Falls, supplied through a 7.85 km long conduit, which could produce up to 37.5 MW power on a base load basis.

An extensive tertiary pipelines system would also be required to distribute potable water in bulk to the settlements in the Ntabelanga Dam supply area. These tertiary lines would be supplied from the above primary and secondary bulk water distribution system to be developed by the DWS, and would be implemented by the relevant District Municipalities (DMs) that are the Water Service Authorities (WSAs) and Water Service Providers (WSPs) in the supply area.

The project components listed above would also include associated works such as roads, bridges, temporary water supplies, wastewater treatment facilities, accommodation villages, operations facilities, power supplies, and flow gauging stations. Other social and environmental mitigation infrastructure will be required as will be determined under the Environmental Impact Assessment (EIA) and its management Plan (EMP) as is being developed by an independent EIA Professional Services Provider (PSP).

PURPOSE OF REPORT

This report summarises the cost estimates prepared for the above Ntabelanga-Lalini Conjunctive Scheme components, and the results of economic and financial analyses undertaken on each component and on the fully integrated scheme. These analyses have been undertaken to optimise sub-components and to test for the viability and sustainability of the scheme, in terms of the Unit Reference Value (URV) of the water supplied by the scheme when comparing different options and also the Financial Impacts of proposed solutions. In particular, the beneficial impact on this viability created by the inclusion of the hydropower component is demonstrated.

Various scenarios are included to show the impact of various proportions of the works being grant funded rather than to have to include capital redemption in the water sales tariff. It is made clear that such a scheme, with its large indigent consumer base, is only sustainable if a significant portion of the works are grant funded. This is the norm in such scattered rural situations, and is especially so given the remote and rugged terrain which comprises the whole of the supply area.

A summary of the implementation cost estimates, and annual cash flow projections are given, with costs escalated from a 2014 costing baseline, to the actual expenditure year, at 5.5% p.a.

The impacts of various possible financing options for the hydropower component of the conjunctive scheme are also presented, with conclusions that a fully or partially grant-funded solution would enable the energy costs of the water supply scheme components to be fully cross-subsidized, as well as providing surplus energy sales revenue, which can be used for repaying either the full grant funding, or loan funding aspects, or otherwise used to fund other development projects in the region.

SUMMARY OF FINDINGS

Table 1 shows the overall cost estimate for the Ntabelanga-Lalini Conjunctive Scheme

This summarises the financial requirements for infrastructure implementation, based upon the proposed conjunctive scheme which includes potable and irrigation water supply, as well as the Ntabelanga and Lalini hydropower components, operated as a single ring-fenced project.

As shown, the Department of Environmental Affairs (DEA) allocated a budget of approximately R450 million to be spent over the next 10 years for the catchment restoration and rehabilitation programme which commenced in April 2014. This budget therefore already exists and has been allocated proportionally to the two dams.

Also shown is the estimated budget for the implementation of the tertiary pipelines. This component is not part of the DWS responsibility and falls under the jurisdiction of the three District Municipalities and their Implementing Agents. Such funding is normally sourced from the Regional Bulk Infrastructure Grant (RBIG) and Municipal Infrastructure Grant (MIG) programme,

Allowance has also been made for the potential investment costs for the establishment and equipping of each of the 60 ha (average) farming units, which are expected to be between R3 and 5 million per farming unit. A budget of R4 million including VAT has therefore been allowed per average farming unit, for 45 farms.

There are other potential offset costs might include:

- Environmental impact offsets including replacement of lost wetlands,
- Improvements to other infrastructure in the region for those directly affected by the works – including upgrades to schools, clinics, water supplies and sanitation, and other community facilities,
- Development of aquaculture,
- Development of tourism and recreational infrastructure, and
- Development of local industries and agri-processing.

Each of these aspects will require further studies to determine their specific requirements, viability and cost benefits.

The ongoing EIA study is to investigate the environmental and social impacts, and to determine resettlement, mitigations and compensation requirements, as well as these potential offset requirements.

In the meantime, a provisional budget of R100 million has been allowed for these offsets which has been evenly distributed between the Ntabelanga and Lalini components of the conjunctive scheme.

The capital works budgets include allowances for engineering (project management, design and supervision services providers) as well as the implementation of the EMP requirements. Escalation has been calculated from the 2014 baseline to the date of commissioning at 5.5 % p.a., based upon the original implementation programme.

A draft implementation programme has been submitted and is under review by DWS. The cash flows shown on Table 1 are based upon this provisional programme. This will need to be regularly reviewed and updated in the light of the most likely implementation programme, which will be dependent upon the way that the various scheme components are packaged, the funding availability, the procurement and approvals processes, and the time taken to resolve the many institutional and social issues that are always a feature of such a large project.

Table 1: Overall Conjunctive Scheme Cost Estimate and Cashflow Projection

COST ESTIMATES				A	NNUAL E	EXPENDI	TURES R	R'MILLIO	N		
COMPONENT	R'million	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
		2014							2021	2022	202
Ntabelanga dam and associated works	1 075		81	322	215	215	215	27			
Ntabelanga dam hydropower works	88				9	35	35	9			
Ntabelanga land compensation/mitigation costs	18		1	4	4	4	4	1			
Ntabelanga power transmission	29		3	23	3						
Sub-Total Ntabelanga Dam and Associated Works			85	349	231	254	254	37			
Engineering and EMP Costs (12%)	145		10	42	28	30	30	4			
Sub-Total Ntabelanga Dam and Associated Works incl Eng & EMP	1 354		95	391	259	284	284	41			
Escalation in Each Year @ 5.5% p.a.	265		5	44	45	68	87	16			
Sub-Total Ntabelanga Dam and Associated Works incl Eng, EMP & ESC	1 619		100	435	304	352	371	57			
VAT (14%)	227		14	61	43	49	52	8			
Add in R22 million per year for catchment management (no esc)	220	22	22	22	22	22	22	22	22	22	2
Allowance for other offset activities (50% of R100 million)	50				10	15	15	10			
Total Ntabelanga Dam and Associated Works (incl Esc + VAT)	2 116	22	136	518	378	438	460	97	22	22	22
COMPONENT	D 'million	2014	2015	2016	2017	2018	2019	2020	2021	2022	202
COMPONENT Ntabolanca water treatment works	R'million 643	2014	2015 32	32	193	193	129	2020 64	2021	2022	202
Ntabelanga water treatment works Ntabelanga primary & secondary bulk treated water distribution system	1 234		52	123	247	370	370	123			
	1 425			123	247	428	428	123			
Ntabelanga tertiary bulk treated water distribution system (DM's)	-			143					05		
Ntabelanga bulk irrigation water supply system	497		00	000	50	149	199	75	25		
Sub-Total Ntabelanga WTW and Bulk Water Systems	3 799		32	298	774	1 140	1 125	405	25		
Engineering and EMP Costs (12%)	456		4	36	93	137	135	49	3		
Sub-Total Ntabelanga WTW and Bulk Water Systems incl Eng & EMP			36	334	867	1 277	1 260	453	28		
Escalation in Each Year @ 5.5% p.a.	1 067		2	38	151	305	387	172	13		
Sub-Total Ntabelanga WTW and Bulk Water Systems incl Eng, EMP & ESC			38	372	1 019	1 581	1 647	625	40		
VAT (14%)	745		5	52	143	221	231	88	6		
Total Ntabelanga WTW and Bulk Water Systems (incl Esc + VAT)	6 068		43	424	1 161	1 803	1 878	713	46		
	 			Γ	<u>і</u> Г	I F	<u>і</u> Г	I F			
COMPONENT	R'million	2014	43 2015	424 2016	1 161 2017	1 803 2018	2019	2020	46 2021	2022	202
COMPONENT In-farm irrigation investment costs	R'million	2014		Γ	<u>і</u> Г	I F	2019 53	2020 53		2022	202
COMPONENT In-farm irrigation investment costs Engineering and EMP Costs (12%)	R'million 105 13	2014		Γ	<u>і</u> Г	I F	2019 53 6	2020 53 6		2022	202
COMPONENT In-farm irrigation investment costs Engineering and EMP Costs (12%) Sub-Total in-farm irrigation investment costs incl Eng & EMP	R'million 105 13 118	2014		Γ	<u>і</u> Г	I F	2019 53 6 59	2020 53 6 59		2022	202
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Page | v

DIRECTORATE: OPTIONS ANALYSIS

OCTOBER 2014

It should be noted that there are several risks involved in the accuracy of the above cost estimate:

- Estimating at feasibility level at best has a confidence level of $\pm 10\%$
- Escalation rates could increase or decrease, especially given the volatile nature of the economy at the moment
- Rand foreign exchange rates are also volatile and this will affect the cost of all imported materials, services and equipment.
- The timing of the various components implementation may change which, if later, would increase the escalation cost.
- The amount of non-grant finance is unknown, and if significant will increase costs, depending on the terms of such loans, interest rates and foreign exchange rates.

One example of the impact of the above risks is that every month's delay in fully implementing a R12.5 billion project increases escalation cost by R57 million (at 5.5% p.a.)

ECONOMIC ANALYSES RESULTS

The analysis was run for the potable scheme including the tertiary lines (Table 2 summarises the results) and for the scheme excluding the tertiary lines (Table 3).

Table 2: URV for Ntabelanga Potable Water Scheme Alone – Including Tertiary Pipeines

	URV: POTABLE WATER SCHEME ONLY INCL TERTIARIES						
Scenario	Components Grant Funded (R/m ³)						
		6%	8%	10%			
1	Full Capital Redemption	14.21	15.49	16.71			
2	Fully grant funded	3.22	2.96	2.72			
3	Fully grant funded + 50% Energy Subsidized	2.80	2.57	2.37			
4	Fully grant funded + 100% Energy Subsidized	2.37	2.19	2.01			

Table 3: URV for Ntabelanga Potable Water Scheme Alone – Excluding Tertiary Pipelines

	URV: POTABLE WATER SCHEME ONLY EXCL TERTIARIES						
Scenario	Components Grant Funded (R/m ³)						
		6%	8%	10%			
1	Full Capital Redemption	9.45	10.20	10.92			
2	Fully grant funded	2.47	2.27	2.08			
3	Fully grant funded + 50% Energy Subsidized	2.05	1.88	1.73			
4	Fully grant funded + 100% Energy Subsidized	1.62	1.49	1.38			

The results in Table 2 and 3 serve as an illustration of the obvious benefits of grant funding and the impacts of partial or full subsidization of the energy costs.

Whilst a URV value does not relate directly to the tariff requirements for a viable scheme, experience on other studies has shown that this value should be below R2.00/m³ in order to produce a unit water cost that would be affordable to the consumer, and financial sustainable from the operations and maintenance viewpoint.

Financial impact models have been built to test such sustainability and are presented in the next section.

As would be expected, the inclusion of the tertiary pipelines significantly increases the URV of water, but the analysis is based upon the DWS-developed scheme which includes delivery of potable water in bulk to the primary and secondary system only.

The tertiary pipelines would be the responsibility of the DMs to implement, and these are normally funded via grants under the RBIG and MIG funding process.

URV OF BULK IRRIGATION WATER SYSTEM

Appendix H shows the discounted cash flow models used to calculate the URV of potable water supplied, including all costs of abstracting raw water from the Ntabelanga Dam, the raw water pumping station, the intermediate bulk storage reservoir, and gravity pipelines to local tanks at each of the proposed farming units. The delivery of raw water to some of the farm units at higher elevation will also require two small booster pumping stations, which are also included in the analysis. In-field distribution costs and associated equipment are not included, and the URV of water supplied therefore relates to the bulk water to be purchased by the farm unit developers.

Capital redemption scenarios have again been modelled from no grant funding to full grant funding of the various system components. In this case, 50% and 100% subsidy of power cost was therefore also modelled.

Table 4 summarises the results of this analysis.

Table 4.	Table 4. Summary of Results of Imgation Water System ORV Analysis							
	URV: IRRIGATION SCHEME COMPONENTS ONLY							
Scenario Components Grant Funded URV OF WATER SUPPLIED (R/m ³)								
		6%	8%	10%				
1	Full Capital Redemption	3.94	4.26	4.56				
2	Fully Grant Funded	0.53	0.48	0.44				
3	Grant Funded and 50% Energy Subsidized	0.44	0.40	0.37				
4	Grant Funded and 100% Energy Subsidized	0.35	0.32	0.29				

 Table 4: Summary of Results of Irrigation Water System URV Analysis

The results again serve as an illustration of the obvious benefits of grant funding and the impacts of partial or full subsidization of the energy costs.

Whilst a URV value does not relate directly to the tariff requirements for a viable scheme, experience has shown that for irrigated agriculture, where low unit cost of water is required for viability, this value should be well below R0.50/m³ on grant funded schemes where operation, maintenance and staffing costs need to be recovered for sustainability.

The Table 3 shows the significant impact on the URV of raw water delivered in bulk to the edge of field of the proposed farming units, when capital costs and power costs are subsidized.

This is reflected when taking a straightforward non-discounting approach to the operation and maintenance cost of this component, as is shown in Table 5.

Reduction of this unit cost to around R0.25/m³ by subsidisation of energy (i.e. through the hydropower component), would considerably increase the gross margin produced by each farming unit, and viability of the irrigation component in total.

	N 3 - IRRIGATION PIPELINE DI						
ITEM	DESCRIPTION		AMOUNT	O&M per year			
1	Pipelines	R	405 636 748	0.50%	R	2 028 184	
2	Abstraction works	R	8 000 000	0.25%	R	20 000	
3	Pumpstations	R	23 280 152	4%	R	931 206	
4	Reservoirs	R	50 000 000	0.25%	R	125 000	
5	Electrical supply	R	10 000 000	4%	R	400 000	
6	Contingencies	R	49 691 690	1%	R	496 917	
7	Engineering fees	R	32 796 515				
	Allowance for M&E deprecia	tion ar	d replacement funding	3	R	956 515	
	Total 1	R	579 405 105		R	4 957 822	
	VAT	R	81 116 715		R	694 095	
	Total	R	660 521 820		R	5 651 917	
				Tot. Water			
O&M Cost for supply of raw water to edge of field excluding power			21 240 366		R 0.27		
Power Cost per ye	ar	R	18 559 958	21 240 366		R 0.87	
Cost for su	upply of raw water to edge of f	ield in	cluding power	R/m ³		R 1.14	

 Table 5: Annual Operation and Maintenance Costs for Irrigation Component

OVERALL URV OF CONJUNCTIVE SCHEME

The above discounted cash flow/URV models have been combined to test the impact of operating the potable water, irrigation water, and hydropower components as an integrated scheme. The combined URV models are given in Appendix I.

Whilst the URV models for the potable and irrigation water were added incrementally together with the capital, operating and maintenance costs of the conjunctive Ntabelanga-Lalini hydropower components, the value of an annual credit from the surplus energy income from the hydropower component over the annual energy costs of the water supply components was made.

This had the effect of significantly reducing the overall URV of water supplied as is shown on Table 6 and Figure 1. Again, the impact of various proportions of grant funding of the capital costs of the conjunctive scheme were also considered. Seven scenarios are shown, ranging from no grant funding (full capital redemption) to full grant funding, only operation and maintenance costs redeemed.

Ir							
URV: AL	URV: ALL WATER SUPPLIED: CONJUNCTIVE SCHEME INCL TERTIARIES						
Scenario	Components Grant Funded URV OF WATER SUPPLIE						
		6%	8%	10%			
1	None - Full Capital Redemption	11.47	12.95	14.33			
2	Lalini Scheme Only	7.78	8.78	9.71			
3	Ntabelanga Scheme Only	4.69	5.27	5.81			
4	Lalini + Tertiaries	5.86	6.59	7.26			
5	Lalini + Tertiaries + Irrigation	5.01	5.64	6.23			
6	Lalini + Tertiaries + Irrigation + Prim and Sec Bulk System	3.40	3.80	4.17			
7	All Works Grant Funded	0.77	0.82	0.87			

 Table 6:
 URV for Fully Conjunctive Ntabelanga-Lalini Scheme – Incl. Tertiaries

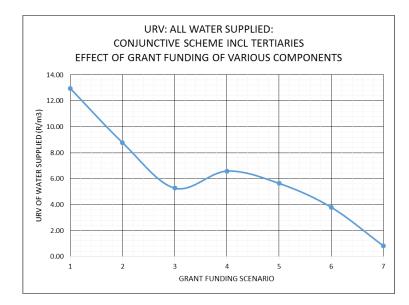


Figure 1: Conjunctive Scheme - URVs for Various Grant Funding Scenarios (Incl. Tertiaries)

Alternatives of only grant funding the Ntabelanga scheme or the Lalini scheme components are shown as scenarios 2 and 3.

The same analysis was repeated for the fully conjunctive scheme, but without the tertiary pipeline system included. Table 7 and Figure 2 show the results.

	URV: ALL WATER SUPPLIED: CONJUNCTIVE SCHEME EXCL TERTIARIES					
Scenario	URV OF WATER S					
		6%	8%	10%		
1	None - Full Capital Redemption	9.37	10.60	11.75		
2	Lalini Scheme Only	5.51	6.27	6.98		
3	Ntabelanga Scheme Only	4.29	4.89	5.45		
4	Lalini	5.47	6.22	6.92		
5	Lalini + Irrigation	4.63	5.28	5.89		
6	Lalini + Irrigation + Prim and Sec Bulk System	3.02	3.44	3.85		
7	All Works Grant Funded	0.41	0.49	0.57		

 Table 7: URV for Fully Conjunctive Ntabelanga-Lalini Scheme – Excl. Tertiaries

As can be expected the exclusion of the tertiary pipelines reduces the URV significantly and under the fully grant funded option almost halves the URV of water supplied.

Comparing the URV of water produced for scenario 2 on Table 1 (Ntabelanga scheme only – no energy subsidy as no hydropower included) with the URV of water produced in scenario 7 for the full conjunctive scheme on Table 7, shows the impact of the cross-subsidization of energy costs, and the benefit of surplus revenue generated by the conjunctive scheme, which produces (at 8% discount rate) a drop in URV value from R2.96/m3 to R0.82/m3.

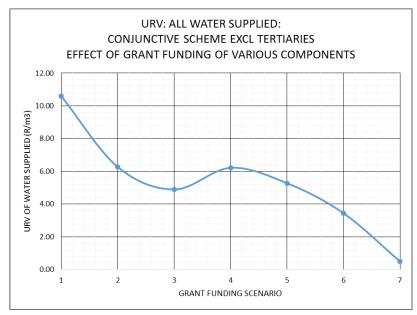


Figure 2: Conjunctive Scheme - URVs for Various Grant Funding Scenarios Excl Tertiaries

This finding indicated that there could be significant merit in development the conjunctive scheme instead of the Ntabelanga scheme only, and it was agreed that both options would be investigated in terms of financial impact assessment.

This is especially pertinent given the high proportion of operating costs that are due to energy charges, and the likely continuing increase in energy costs in the future at much higher a rate than normal inflation.

FINANCIAL IMPACTS ANALYSES

The financial impact models are different from the economic models in that they take into account the escalated costs, tariffs and cash flow year on year using realistic bulk water tariffs and projected escalation rates which take into account current the current and project economy indicators.

As with the URV models, these financial models were run for a 30 year simulation from this current year, and it was assumed that the bulk water supply operations would be undertaken by an implementing agent such as Amatola Water, who currently operate similar schemes in this region.

Water tariffs, costs and revenue streams were escalated to the date of expenditure, as follows:

- Capital and O&M cost are escalated at 5.5 % p.a., and
- Energy costs escalated at 8.5% p.a. for 3 years then at 6.5% p.a.

The scheme components analysed excluded the tertiary pipelines in order to replicate the limits of infrastructure that would be operated by the bulk water supply operator (such as Amatola Water), and it would then be up to the Water Services Providers (DMs) to reticulate and deliver the potable water onwards from this bulk supplier's terminal reservoirs to the customers.

In terms of actual sales quantities, the water requirements projections were used and adjusted for expected unaccounted for water in terms of losses, and deducting water supplied as free basic water (the latter estimated as some 25% of the total potable water produced).

Using Alfred Nzo DM as an example, their water supply tariffs to domestic customers allow for the first 6 m^3 /month per household free to indigent customers, but they also charge some R1.60/ m^3 in this lower consumption band if the customer is determined to be "non-indigent". Above 6 m^3 /month per household consumption, the tariffs increase steeply to R5.5/ m^3 for up to 21 m^3 /month/household consumption, and to R10.9/ m^3 in the next tariff band, and so on up to a maximum of R22/ m^3 .

Commercial/industrial customer tariffs start at R5.70/ m^3 in the first 10 m^3 /month band, rising to R11.5/ m^3 in the next 20 m^3 /month band and rising steadily to R28.6/ m^3 for consumption above 120 m^3 /month.

These tariffs bands are set to ensure that the poorer customers are cross-subsidized. In addition, each DM receives annual subsidies through the Local Government Equitable Share programme. These subsidies are to fund the provision of basic services to indigent households, which is currently of the order of R275 per month per indigent household, and of which some R87 per month (average nationally) is typically allocated for water supply services.

The above information was used as an indicator to try to ascertain what bulk potable water supply tariff could be afforded by the DMs that would be supplied by the proposed bulk water supply scheme.

As described in the Legal Institutional and Financing Arrangement Report No. P WMA 12/T30/00/5212/16, it is recommended that a well-resourced and experience bulk water supply operator be appointed to operate and maintain the bulk water supply system, and sites Amatola Water as a strong possible for this role.

According to Amatola Water's Annual Report 2014, they sell bulk raw water at a tariff of R1.57/m³, and potable water at a tariff of R6.36/m³, with a resulting composite average water sales tariff of R5.39/m³ (2014). This is relatively high when compared with the much larger Water Boards such as Rand Water and Umgeni Water, and reflects the benefits of economies of scale that these larger Water Boards enjoy.

The appointment of Amatola Water to operate and maintain the Ntabelanga bulk water supply scheme would more than double this organisation's annual potable water sales and triple the overall water sales, which would certainly add economies of scale to Amatola's operation, which could mean a lowering of the average bulk water tariff to sustain their business.

SOURCES OF CAPITAL WORKS FUNDING

Different sources of capital works funding were investigated:

Grant funding: Interest free and with no repayment requirement. The source of such funding would normally be from the National Treasury, although some international agencies can provide grant funding – normally for social upliftment project which otherwise would not be financially viable.

Loan funding: Borrowing funds at a certain interest rate per annum, with a requirement to repay the loan over a period (tenor) normally of the order of 20 to 25 years. The lender would set terms and conditions which would need to be complied with by the borrower. Loans which do not have an agreed fixed interest rate would have a higher risk than those which have fixed interest rates. If the loan funding is to be sourced and repaid in foreign currency, then there would be an exchange rate risk.

Equity funding: An investor raises funding for the purchase of a share in the works for which the investor receives an agreed annual dividend. The equity investment is not repaid but could be traded to other investors as shares.

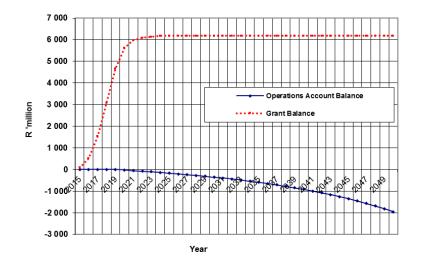
NTABELANGA BULK WATER SUPPLY SCHEME

This analysis was based upon the infrastructure illustrated on Figure 5-2, and excludes the tertiary pipeline system to be implemented by the DMs.

Taking the above situation into consideration, and in order to test the financial viability of the study scheme options, the initial potable and irrigation water sales tariffs in year 1 (2015) were set at R5.00/m³ and R0.30/m³ respectively.

Power cost projections were based upon the estimated initial power consumption, and expected power tariff, in the first year of operation (2020), escalated thereafter at 6.5% p.a. Capital works and associated implementation expenditures were escalated from the 2014-based cost estimates at 5.5% p.a. with annual expenditure cash flow estimated from the projected implementation programme timing.

Figure 3 shows that even with all capital costs grant funded, the income from water sales would not be sufficient to sustain the management, operation, maintenance and energy costs of the scheme.

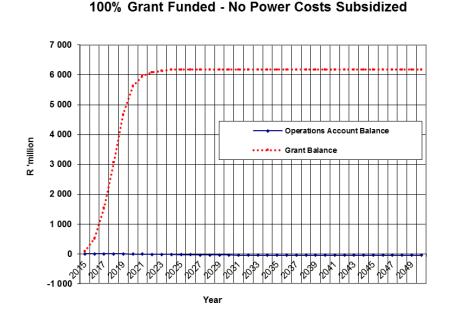


NTABELANGA ONLY SCHEME EXCL TERTIARIES 100% Grant Funded - No Power Costs Subsidized

Figure 3: Grant Funded Ntabelanga Water Supply Scheme – R5.00/m³ potable initial tariff

The operations account balance shows annual operating losses commencing at R25 million per year in the first year of operation rising to R130 million per year in 2050. Thus this scheme would not be financially sustainable in the absence of some subsidy of the management, operation, maintenance and energy costs.

Raising the initial (year 1) bulk water tariff to R6.00/m³ does bring the operating account into balance, but this is likely to be a non-affordable bulk water tariff for the DMs to pay when the additional management, operation and maintenance costs of the tertiary distribution systems are taken into consideration, together with the high proportion of indigent households to be supplied by this scheme. See Figure 4.



NTABELANGA ONLY SCHEME EXCL TERTIARIES

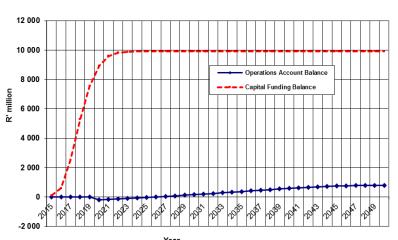
Figure 4: Grant Funded Ntabelanga Water Supply Scheme – R6.00/m³ initial tariff

GRANT FUNDED CONJUNCTIVE SCHEME EXCLUDING TERTIARY SYSTEM

This financial impact model was initially run for a fully grant funded situation, and using the same base data as for the Ntabelanga scheme excluding the tertiary system.

Apart from higher capital, operations and maintenance costs, the model also includes credit for the energy sold into the grid from the hydropower components of the conjunctive scheme. This energy would be sold as green energy trading certificates (as with the AGP example) and the year 1 (2015) tariff allowed for this was R0.80/kWh, which was then escalated at national escalation rate of 5.5 %p.a.

As shown in Figure 5, even with water sales tariffs set at ZERO for both potable and irrigation water sold, the revenue generated by hydropower sales alone would sufficient to financial sustain management, operation, maintenance and power costs for the conjunctive scheme.



CONJUNCTIVE SCHEME EXCL TERTIARIES 100% Grant Funded - Power Costs 100% Subsidized

Figure 5: Grant Funded Conjunctive Water Supply Scheme – R ZERO/m³ initial tariff

Page | xiii

It is of course not sensible to deliver bulk water at zero tariff and two more scenarios were explored for the fully grant funded conjunctive scheme, setting the bulk potable water tariff to R3.00/m³ and R5.00/m³ respectively, and setting the initial irrigation water tariff at R0.30/m³ in both cases. The results are shown in Figures 6 and 7.

CONJUNCTIVE SCHEME EXCL TERTIARIES

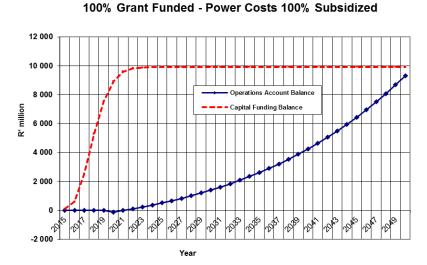
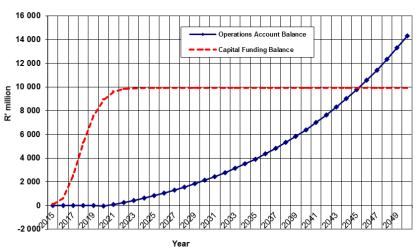


Figure 6: Grant Funded Conjunctive Water Supply Scheme – R3.00/m³ initial tariff

This scenario shows that by charging an initial bulk water tariff equivalent to R3.00/m³ for potable water and R0.30/m³ for irrigation water, all recurring costs can be met as well as generating cash surpluses, which over the 30 year period of analysis accumulate to over R9 billion and which could be utilized to either repay the grant funding or put into other social and economic development projects in the region.



CONJUNCTIVE SCHEME EXCL TERTIARIES 100% Grant Funded - Power Costs 100% Subsidized

Figure 7: Grant Funded Conjunctive Water Supply Scheme – R5.00/m³ initial tariff

Figure 7 shows that increasing the potable bulk water initial tariff to R5.00/m³ produces even more of cash surplus per annum which would accumulate to more than R14 billion over 30 years.

Under both of these circumstances there would be many options available for the utilisation of such surplus, from the above described usage for other development projects to the simpler action of treating the grant funding as an interest free loan from Treasury, which could be repaid over a given period.

OTHER CONJUNCTIVE SCHEME FINANCING OPTIONS

The options considered in this respect were as follows:

- Lalini 40% loan funded @ 9% interest p.a. with R3.00/m³ initial tariff
- Lalini 60% loan funded @ 6% interest p.a. with R3.00/m³ initial tariff
- Lalini 60% loan funded @ 9% interest p.a. with R5.00/m³ initial tariff
- Lalini 100% loan funded @ 6% interest p.a. with R5.00/m³ initial tariff
- Lalini 25% equity funded @ 15% return on investment with R5.00/m³ initial tariff

Each of these models was run and percentages of Lalini funded by loans adjusted until a stable operations account balance was maintained after meeting all other costs and debt repayment conditions.

This indicates the effect of different loan interest rates as well as the initial tariff impacts upon the size of loan that could be repaid within a reasonable period (less than 30 years).

The findings are summarized in Figures 8 to 12.

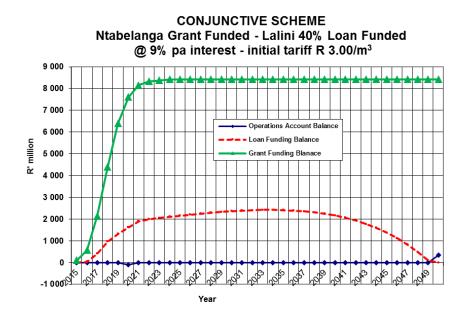


Figure 8: Conjunctive Scheme: Lalini 40% Loan Funded @ 9% interest: R3.00/m³ initial tariff

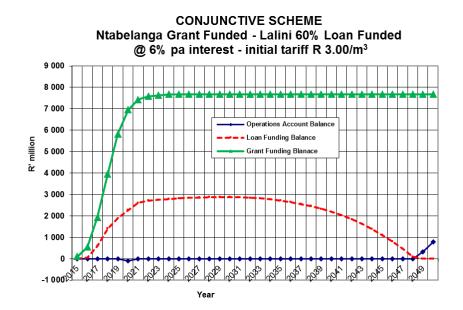
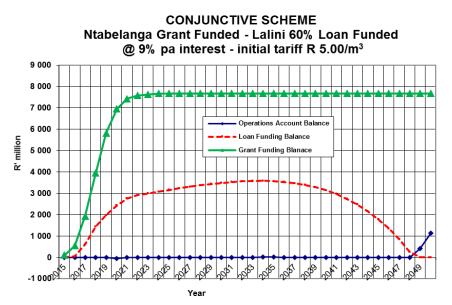
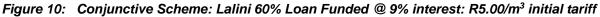


Figure 9: Conjunctive Scheme: Lalini 60% Loan Funded @ 6% interest: R3.00/m³ initial tariff

In these two cases it is indicated that from a relatively low bulk water tariff of R3.00/m³, a loan of between 40% and 60% of the Lalini component capital cost could be repaid through revenue generated, depending upon the interest terms of such a loan.





For a loan of 60% of the Lalini scheme cost to be repaid at 9% interest, the initial tariff would need to be increased to R5.00/m³.

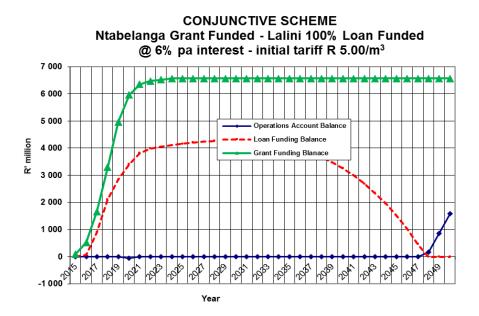


Figure 11: Conjunctive Scheme: Lalini 100% Loan Funded @ 6% interest: R5.00/m³ initial tariff

For a 100% loan for the Lalini scheme cost to be repaid at 6% interest, the initial tariff would again need to be set to $R5.00/m^3$.

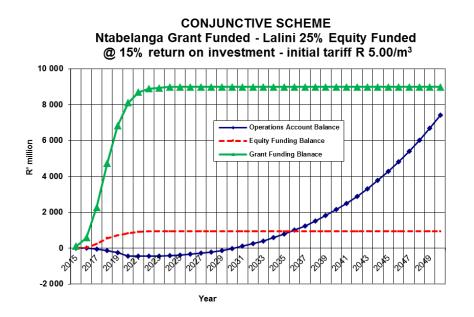


Figure 12: Conjunctive Scheme: Lalini 25% Equity @ 15% investment return: R5.00/m³ initial tariff

Equity investments are another option where the principal capital is not repaid, but an annual dividend (the equity investor's expected return on investment – normally of the order of 15% p.a.) must be paid. In this case it might be attractive for such an equity investor to also be involved in the operation and maintenance aspects, and there are certain entities that specialise in such utilities management. The financial impact model for a 25% equity investment of the Lalini components of the conjunctive scheme would be viable if the initial bulk water tariff was set to $R5.00/m^3$.

SUMMARY OF FINANCIAL ANALYSIS

In summary, the fully grant funded Ntabelanga scheme would require a high starting base for the bulk potable water tariff in order to be financially sustainable. This being of the order of R6.00/m³ before being further transferred and distributed through a new tertiary pipeline system that would need to be implemented by the DMs. This is therefore not considered a viable solution.

The conjunctive scheme would still require significant grant funding, as is normally the case on regional water supply systems – especially where constructed in mountainous rural areas with a high proportion of indigent households.

Grant funding of the full conjunction scheme including the Lalini hydropower component would allow low bulk water tariffs to be charged (say R3.00/m³) as well as generating cash surpluses, which over the 30 year period of analysis accumulate to over R9 billion and which could be utilized to either repay the grant funding or put into other social and economic development projects in the region.

If Amatola Water were to become the operator of the conjunctive scheme, this could radically improve their economies of scale which could also have the impact of reducing the overall average cost of bulk water to all of their other customers as well, which would widen the benefits to a larger area than just the Ntabelanga-Lalini region.

If it is considered necessary to reduce the amount of grant funding of the project through the sourcing of loans or equity investments, then there is also potential for this to happen at the same time as keeping the required bulk potable and irrigation water tariffs to a financially viable and sustainable level. However, the financial burdens imposed upon the scheme due to the need to repay loans, interest, and or equity shareholders dividends, would absorb the potential surplus revenue that could otherwise be used to repay grants and/or to spend on further social upliftment and economic development programmes in this area.

CONCLUSION

Given the above results, there is a business case for the implementation of a conjunctive integrated multi-purpose scheme incorporating potable water supply, irrigated agriculture, and hydropower under a single, ring-fenced institutional entity.

This concept has been discussed at several forums including the Project Steering Committee meetings, the Wildcoast Integrated Development Forum, and at the Eastern Cape Social Economic Consultative Council (ECSECC), who have been tasked with stewardship of the implementation of this project on behalf of the Provincial Government.

A recent critical review of the above study findings was also undertaken by Mr Mike Muller on behalf of ECSECC, who came to similar conclusions.

TABLE OF CONTENTS

EXECUTIVE SUMMARY

1.	BACKGROUND AND INTRODUCTION	1
1.1	Study Locality	1
1.2	Study Programme	1
1.2.	1 Inception Phase	3
1.2.		3
1.2.	3 Phase 2 – Feasibility Study	3
1.2.	4 Scheme Components	4
1.3	Purpose of this Report	5
1.4	Approach Taken	5
1.5	Basis of Cost Estimates	9
2.	DAM TYPE OPTIONS COST ESTIMATES	
2.1	Other Factors Affecting Decision-Making	
2.1.		
2.1.		
2.1.		
2.1.		
2.1.		
2.1.		
2.1.	.7 Environmental impacts	
2.2	Conclusion on Ntabelanga Dam Type Selection	13
3.	NTABELANGA DAM COST ESTIMATE	
3.1	Dam Cost Estimate	
3.2	Associated and Appurtenant Works	18
4.	NTABELANGA WATER TREATMENT WORKS	21
_		
5.	BULK WATER DISTRIBUTION INFRASTRUCTURE	
5.1	Potable Bulk Water Distribution Infrastructure	
5.2	Irrigation Bulk Water Distribution Infrastructure	
	1 Economic Analysis to Compare Options	
5.1.	2 Raw Water Pumping Configurations	38
-		
6.	HYDROPOWER GENERATION INFRASTRUCTURE	
6.1	Introduction	
6.2	Detailed Investigations of Conjunctive Scheme	45
7	ECONOMIC ANALYSIS OF THE NTABELANGA-LALINI CONJUNCTIVE SCHEME	
7.		-
7.1	Hydropower Component	
7.2	Arrangements for Connection to the Grid	
7.3	Economic Analysis of Scheme Configurations and Funding	
7.4	URV of Ntabelanga Potable Bulk Water System	
7.5	URV of Bulk Irrigation Water System	
7.6	Overall URV of Conjunctive Scheme	

8. F	FINANCIAL IMPACT ASSESSMENT	
8.1	Overview	
8.1.1	Sources of Capital Works Funding	67
	Ntabelanga Bulk Water Supply Scheme	
	Grant Funded Conjunctive Scheme Excluding Tertiary System	
	Other Conjunctive Scheme Financing Options	
8.1.5	Summary of Financial Analysis	74
	Conclusion	
9. (OVERALL COST ESTIMATE AND IMPLEMENTATION CASHFLOW	75
9.1	Other Costs	75

APPENDICES

- APPENDIX A: BILLS OF QUANTITY AND RATES OF MAJOR QUANTITY ITEMS IN DAM TYPE ANALYSES
- APPENDIX B: COST ESTIMATE FOR TWO RCC DAM WALL OPTIONS
- **APPENDIX C:** COST ESTIMATE FOR WATER TREATMENT WORKS
- APPENDIX D: COST ESTIMATE FOR BULK POTABLE WATER DISTRIBUTION INFRASTRUCTURE
- **APPENDIX E:** COST ESTIMATES FOR BULK IRRIGATION WATER SYSTEMS
- APPENDIX F: LEVELIZED COST OF ENERGY MODELS FOR HYDROPOWER COMPONENTS
- APPENDIX G: MODELS USED TO CALCULATE THE URV OF POTABLE WATER SUPPLIED
- APPENDIX H: MODELS USED TO CALCULATE THE URV OF IRRIGATION WATER SUPPLIED
- APPENDIX I: MODELS USED TO CALCULATE THE URV OF CONJUNCTIVE SCHEME

FIGURES

Figure 1-1: Figure 1-2: Figure 1-3: Figure 1-4:	Mzimvubu River Catchment Area Relative Locations of Ntabelanga and Lalini Dams Layout of Proposed Primary, Secondary and Tertiary Bulk Water Distribution System Layout Plan of Proposed Irrigation System	6 7
Figure 2-1: Figure 2-2: Figure 2-3: Figure 2-4:	Dam Options Cost Comparison RCC Dam and Stilling Basin Layout RCC Dam Wall and Spillway Typical Cross Section RCC Dam Embankment Plan and Longitudinal Elevations	14 15
Figure 3-1:	Ntabelanga Dam and Associated Works Layouts	19
Figure 4-1: Figure 4-2:	Typical Arrangement of the Water Treatment Works Hydraulic Profile through WTW	22 23
Figure 5-1: Figure 5-2: Figure 5-3: Figure 5-4: Figure 5-5: Figure 5-6: Figure 5-7: Figure 5-8:	Diagram of Primary Bulk Water Distribution System Illustration of Primary and Secondary Gravity and Rising Mains Layout Illustration of Primary, Secondary and Tertiary Parts of the Overall Distribution System Irrigation Areas and Bulk Distribution System Overall Layout Plan of Irrigation System Option 1 Overall Layout Plan of Irrigation System Option 2 Overall Layout Plan of Irrigation System Option 3 Overall Layout Plan of Irrigation System Option 4	26 32 33 34 35
Figure 6-1: Figure 6-2: Figure 6-3: Figure 6-4: Figure 6-5: Figure 6-6: Figure 6-7: Figure 6-8: Figure 6-9: Figure 6-10:	Conjunctive Hydropower Scheme General Arrangement of the RCC Dam Option and Associated Infrastructure RCC Dam Wall and Spillway Typical Cross Section RCC Dam Embankment Plan and Elevations Tunnel Horizontal and Vertical Alignment Options Boreholes Drilled along Tunnel Alignment Hydroelectric Power Plant Building (3 Turbine Option) Lalini Main Hydropower Plant Site Layout Turbine House and Outlet Works Cross-section Proposed New and Upgraded Access Roads and Bridges	48 50 51 52 53 54 55
Figure 7-1: Figure 7-2: Figure 7-3: Figure 7-4: Figure 7-5:	Energy offsetting with ESKOM Illustration of the Tradable Renewable Energy Credits / Certificates Arrangement Energy Trading with AGP Conjunctive Scheme - URVs for Various Grant Funding Scenarios (Incl. Tertiaries) Conjunctive Scheme - URVs for Various Grant Funding Scenarios Excl Tertiaries	60 60 64
Figure 8-1: Figure 8-2: Figure 8-3: Figure 8-4: Figure 8-5: Figure 8-6: Figure 8-6: Figure 8-7: Figure 8-8: Figure 8-9: Figure 8-10:	Grant Funded Ntabelanga Water Supply Scheme – R5.00/m ³ initial tariff Grant Funded Ntabelanga Water Supply Scheme – R6.00/m ³ initial tariff Grant Funded Conjunctive Water Supply Scheme – R ZERO/m ³ initial tariff Grant Funded Conjunctive Water Supply Scheme – R3.00/m ³ initial tariff Grant Funded Conjunctive Water Supply Scheme – R5.00/m ³ initial tariff Grant Funded Conjunctive Water Supply Scheme – R5.00/m ³ initial tariff Conjunctive Scheme: Lalini 40% Loan Funded @ 9% interest: R3.00/m ³ initial tariff Conjunctive Scheme: Lalini 60% Loan Funded @ 6% interest: R3.00/m ³ initial tariff Conjunctive Scheme: Lalini 100% Loan Funded @ 6% interest: R5.00/m ³ initial tariff Conjunctive Scheme: Lalini 100% Loan Funded @ 6% interest: R5.00/m ³ initial tariff Conjunctive Scheme: Lalini 100% Loan Funded @ 15% investment return: R5.00/m ³ initial tariff	68 70 70 71 72 72 73

TABLES

Table 2-1: Capital Cost Comparison of Ntabelanga Dam Type & Spillway Options	11
Table 3-1: Summary Ntabelanga Dam Cost Estimate	17
Table 3-2: Cost Estimates for Associated and Appurtenant Works	20
Table 4-1: Ntabelanga WTW Cost Estimate – Full Capacity - 85 000 m ³ /day	21
Table 4-2: Ntabelanga WTW Cost Estimate – Staged @ Half Capacity - 42 500 m³/day	
Table 5-1: Capital Costs: Primary and Secondary Bulk Water System	29
Table 5-2: Capital Costs: Tertiary Bulk Water System Only	30
Table 5-3: Split of Budgets Required by DMs to Implement Tertiary Lines	30
Table 5-4: Farm Unit Average Land Elevation Key	
Table 5-5: URV Analysis of Raw Water Transfer – Option 1	37
Table 5-6: URV Analysis of Raw Water Transfer – Option 2	37
Table 5-7: URV Analysis of Raw Water Transfer – Option 3	38
Table 5-8: URV Analysis of Raw Water Transfer – Option 4	38
Table 5-9: Estimated Annual Operation and Maintenance Costs for Raw Water – Option 3	
Table 5-10: Annual Energy Cost Estimates	40
Table 6-1: Comparison of Levelized (URV) Cost of Power Produced by the Hydropower Options	44
Table 6-2: Summary of Lalini Options Costing Analyses	
Table 7-1: URV for Ntabelanga Potable Water Scheme Alone – Including Tertiary Pipeines	61
Table 7-2: URV for Ntabelanga Potable Water Scheme Alone- Excluding Tertiary Pipelines	
Table 7-3: Summary of Results of Irrigation Water System URV Analysis	
Table 7-4: Annual Operation and Maintenance Costs for Irrigation Component	
Table 7-5: URV for Fully Conjunctive Ntabelanga-Lalini Scheme – Incl. Tertiaries	
Table 7-6: URV for Fully Conjunctive Ntabelanga-Lalini Scheme – Excl. Tertiaries	
Table 9-1: Overall Conjunctive Scheme Cost Estimate and Cashflow Projection	76

LIST OF ACRONYMS AND ABBREVIATIONS

ASGISA-EC Accelerated and Shared Growth Initiative for South Africa – Eastern Cape

CAPEX	Capital Expenditure
CFRD	Concrete-faced rockfill dam
CMA	Catchment Management Agency
CTC	Cost to Company
CV	Coefficient of Variability
DAFF	Department of Agriculture, Forestry and Fisheries
DBSA	Development Bank of Southern Africa
DEA	Department of Environment Affairs
DM	District Municipality
DME	Department of Minerals and Energy
DoE	Department of Energy
DRDAR	Department of Rural Development and Agrarian Reform
DRDLR	Department of Rural Development and Land Reform
DWA	Department of Water Affairs
DWS	Department of Water and Sanitation
EA	Environmental Authorisation
EAP	Environmental Assessment Practitioner
EC	Eastern Cape
ECRD	Earth core rockfill dam
EF	Earthfill (dam)
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
EPWP	Expanded Public Works Programme
ESIA	Environmental and Social Impact Assessment
EWR	Environmental Water Requirements
FSL	Full Supply Level
GERCC	Grout enriched RCC
GN	Government Notices
GW	Gigawatt
GWh/a	Gigawatt hour per annum
IAPs	Invasive Alien Plants
IB	Irrigation Board
IFC	International Finance Corporation
IPP	Independent Power Producer
IRR	Internal Rate of Return
IVRCC	Internally vibrated RCC
ISO	International Standards Organisation
kW	Kilowatt
LM	Local Municipality
ℓ/s	Litres per second
ℓ/c/d	Litres per capita per day

MAP	Mean Annual Precipitation
MAR	Mean Annual Runoff
MEC	Member of the Executive Council
MIG	Municipal Infrastructure Grant
million m ³	Million cubic metres
MW	Megawatt
NEMA	National Environmental Management Act
NERSA	National Energy Regulator of South Africa
NHRA	National Heritage Resources Act
NOCL	Non-overspill crest level
NWA	National Water Act
NWPR	National Water Policy Review
NWRMS	National Water Resources Management Strategy
O&M	Operations and Maintenance
OPEX	Operational Expenditure
PICC	Presidential Infrastructure Co-Ordinating Committee
PPA	Power Purchase Agreement
PPP	Public Private Partnership
PSC	Project Steering Committee
PSP	Professional Services Provider
RBIG	Regional Bulk Infrastructure Grant
RCC	Roller-compacted concrete
REIPPPP	Renewable Energy Independent Power Producer Procurement Programme
RWI	Regional Water Institution
RWU	Regional Water Utilities
SAWS	South African Weather Service
SEZ	Special Economic Zone
SIP	Strategic Integrated Project
SMC	Study Management Committee
SPV	Special Purpose Vehicle
TCTA	Trans Caledon Tunnel Authority
ToR	Terms of Reference
UOS	Use of System
URV	Unit Reference Value
WEF	Water Energy Food
WRYM	Water Resources Yield Model
WSA	Water Services Authority
WSP	Water Services Provider
WTE	Water Trade Entity
WUA	Water User Association

Description	Standard unit
Elevation	m a.s.l.
Height	m
Distance	m, km
Dimension	mm, m
Area	m², ha or km²
Volume (storage)	m ³
Yield, Mean Annual Runoff	m³/a
Rotational speed	rpm
Head of Water	m
Pressure	Pa
Diameter	mm or m
Temperature	٥C

LIST OF UNITS

Description	Standard unit
Velocity, speed	m/s, km/hr
Discharge	m³/s
Mass	kg, tonne
Force, weight	Ν
Gradient (V:H)	%
Slope (H:V) or (V:H)	1:5 (H:V) <u>or</u> 5:1 (V:H)
Volt	V
Power	W
Energy used	kWh
Acceleration	m/s ²
Density	kg/m³
Frequency	Hz

1. BACKGROUND AND INTRODUCTION

The Mzimvubu River catchment in the Eastern Cape Province of South Africa is situated in one of the poorest and least developed regions of the country. Development of the area to accelerate the social and economic upliftment of the people was therefore identified as one of the priority initiatives of the Eastern Cape Provincial Government.

Harnessing the water resources of the Mzimvubu River, the only major river in the country which is still largely unutilised, is considered by the Eastern Cape Provincial Government as offering one of the best opportunities in the Province to achieve such development. In 2007, a special-purpose vehicle (SPV) called ASGISA-Eastern Cape (Pty) Ltd (ASGISA-EC) was formed in terms of the Companies Act to initiate planning and to facilitate and drive the Mzimvubu River Water Resources Development.

The five pillars on which the Eastern Cape Provincial Government and ASGISA-EC proposed to model the Mzimvubu River Water Resources Development are:

- Forestry;
- Irrigation;
- Hydropower;
- Water transfer; and
- Tourism.

The Department of Water and Sanitation (DWS) commissioned the Mzimvubu Water Project with the overarching aim of developing water resources schemes (dams) that can be multi-purpose reservoirs in order to provide benefits to the surrounding communities and to provide a stimulus for the regional economy, in terms of irrigation, forestry, domestic water supply and the potential for hydropower generation amongst others.

1.1 Study Locality

The Mzimvubu River Catchment is situated in the Eastern Cape (EC) Province of South Africa which consists of six District Municipalities (DM) and two Metropolitan Municipalities (Buffalo City and Nelson Mandela Bay). These include Cacadu DM in the west across to the Alfred Nzo DM in the east with the two Metropolitan Areas being located around the two major centres of the province, East London and Port Elizabeth, both of which border the Indian Ocean.

The Mzimvubu River Catchment is situated within three of the DM's namely the Joe Gqabi DM in the north west, the OR Tambo DM in the south and the Alfred Nzo DM in the east and north east. A locality map of the whole catchment area and its position in relation to the DM's in the area is provided in Figure 1-1.

1.2 Study Programme

The study commenced in January 2012 and was completed in October 2014 in three stages as follows:

- Inception ;
- Phase 1 Preliminary Study; and
- Phase 2 Feasibility Study.

The purpose of the study is not to repeat or restate the research and analyses undertaken on the several key previous studies described below, but to make use of that information previously collected, to update and add to this information, and to undertake more focussed and detailed investigations and feasibility level analyses for the dam site options identified as being the most promising and cost beneficial.

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

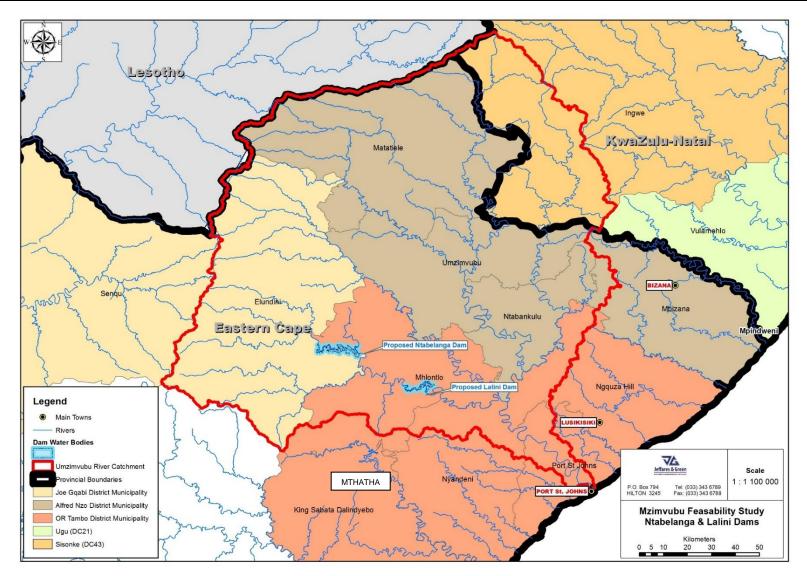


Figure 1-1: Mzimvubu River Catchment Area

1.2.1 Inception Phase

The aim of the Inception Phase was to finalise the Terms of Reference (TOR) as well as to include, *inter alia*, the following:

- A detailed review of all the data and information sources available for the assignment.
- A revised study methodology and scope of work.
- A detailed review of the proposed project schedule, work plan and work breakdown structure indicating major milestones.
- Provision of an updated organogram and human resources schedule.
- Provision of an updated project budget and monthly cash flow projections.

The Inception Phase has been completed and culminated in the production of an Inception Report (DWS Report Number P WMA 12/T30/00/5212/1) which also constitutes the final TOR for the study.

1.2.2 Preliminary Study Phase

This Preliminary Report describes the activities undertaken during the preliminary study phase, summarizes the findings and conclusions, and provides recommendations for the way forward and scope of work to be undertaken during the Feasibility Study phase.

The Preliminary Study Phase was divided into two Stages:

- 1. Desktop Study
- 2. Preliminary Study

The aim of the Desktop Study was, through a process of desktop review, analyses of existing reports and data, and screening, to determine the three best development options from the pre-identified 19 development options (from the previous investigation). This process is described in Section 2 of this Report.

The aim of the Preliminary Study was to gather more information with regard to the three selected development options as well as to involve the Eastern Cape Provincial Government and key stakeholders in the process of selecting the single best development option to be taken forward into Phase 2 of the Study.

The main activities undertaken during of the second stage of Phase 1 were as follows:

- Stakeholder involvement;
- Environmental screening;
- Water requirements (including domestic water supply, irrigation and hydropower);
- Hydrological investigations;
- Geotechnical investigations;
- Topographical survey investigations;
- Selection process; and
- Reporting.

1.2.3 Phase 2 – Feasibility Study

The Preliminary Study recommended a preferred dam site and scheme development to be taken forward to Feasibility Study level.

The key activities undertaken during the Feasibility Study are as follows:

- Detailed hydrology (over and above that undertaken during the Preliminary Study);
- Reserve determination;
- Water requirements investigation (including agricultural and domestic water supply investigations);
- Topographical survey (over and above that undertaken during the Preliminary Study);
- Geotechnical investigation (more detailed investigations than during the Preliminary Study);
- Dam design;
- Land matters;
- Public participation;
- Regional economics; and
- Legal, institutional and financial arrangements.

An Environmental Impact Assessment was undertaken by and independent PSP in a separate study that ran in parallel to this one.

1.2.4 Scheme Components

Following the completion of the above feasibility study stages it was agreed that the sizing and modus operandi of the Ntabelanga Dam and its associated works would take into account its multi-purpose role, namely:

- i) to supply potable water to some 726 616 people and other water consumers in the region;
- ii) to supply raw water for irrigation of some 2 868 ha of high potential agricultural land;
- iii) to generate hydropower locally at the dam wall to reduce the cost of energy consumption when pumping water;
- iv) to provide sufficient flow of water downstream of the Ntabelanga Dam to meet environmental water requirements for an ecological Class C; and
- v) to provide additional balancing storage volume and consistent downstream flow releases to enable a second, smaller dam at Lalini (located on the Tsitsa River some 3.5 km above the Tsitsa Falls) to generate significant hydropower for supply into the national grid.

The suite of study reports describe the development of solutions for these multi-purposes, and the resulting project infrastructure, which comprises the following:

- A new dam on the Tsitsa River at Ntabelanga, with capacity to reliably supply the raw and potable water requirements for i) and ii) above;
- A water treatment works at the Ntabelanga dam to supply the potable water requirements;
- Primary and secondary bulk water distribution systems the deliver potable water to the whole supply area. Tertiary distribution systems to the consumers will be implemented by the District Municipalities;
- A bulk raw water distribution system to supply irrigation water to some 2 868 ha of high potential land; and
- A mini hydropower plant at Ntabelanga Dam to generate up to 5 MW of power.

The Ntabelanga scheme is also expected to work conjunctively with a second hydropower scheme at the Lalini Dam, which is located on the same river and downstream of the Ntabelanga Dam, and which could produce an average of 23 MW of power on a continuous basis. This particular component of the conjunctive scheme has to date been studied only at high level, and it is planned to undertake a full feasibility study of this component shortly.

The relative locations of Ntabelanga Dam and Lalini Dam are shown on the above Figure 1-1 and Figure 1-2.

Figures 1-3 and 1-4 show the layouts of the potable and irrigation water bulk distribution systems.

1.3 Purpose of this Report

This report summarizes the cost estimates prepared for the many components of the above works, as well as the results of economic analysis undertaken to assist in the decision-making when considering different options.

1.4 Approach Taken

The Terms of Reference called for construction cost estimates to be prepared for the various different dam types considered, so that these options can be compared and an informed selected made of the best solution.

The first section of this report details the cost estimates and results of this selection process.

Having selected the preferred dam type option, the costs of the project project-related infrastructure such as access roads, power supplies, site buildings, bulk water distribution infrastructure and irrigation development were also to be estimated so that economic analyses could be undertaken and financing and implementation requirements established.

The second section of this report gives these cost estimates in detailed and summary format.

The fundamental principle as regards economic viability is for the capital, operation and maintenance costs of a proposed scheme to be redeemed by tariffs payable by the end beneficiaries of the scheme – e.g. the District Municipalities and their customers.

Whilst this is often the case with large bulk water supply schemes that benefit from economies of scale, in the case of scattered rural water supplies with a high proportion of indigent consumers there is a normally need to provide grant funding, e.g. Municipal Infrastructure Grants (MIG) and Regional Bulk Infrastructure Grants (RBIG), in order to reduce the burden of such cost recover on the beneficiaries, and to ensure that at least the full operation, maintenance and recurring plant replacement costs can be fully redeemed through tariffs.

The economic analysis models developed and presented herein therefore consider scenarios for both full capital redemption and grant-funded options, so that a comparison can be made between these options.

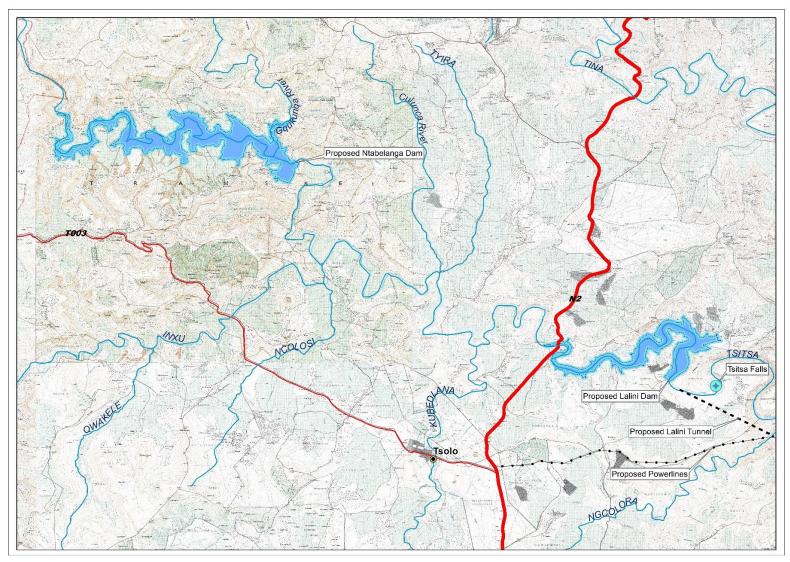


Figure 1-2: Relative Locations of Ntabelanga and Lalini Dams

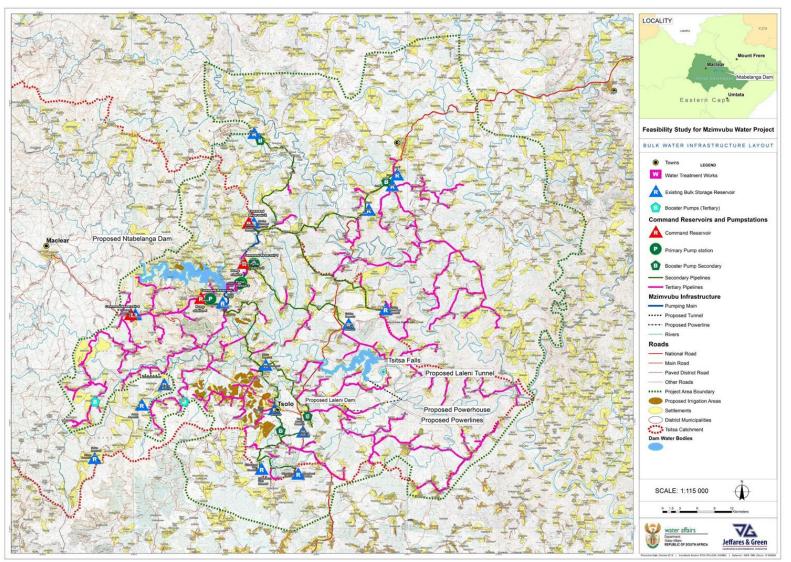


Figure 1-3: Layout of Proposed Primary, Secondary and Tertiary Bulk Water Distribution System

Page | 7

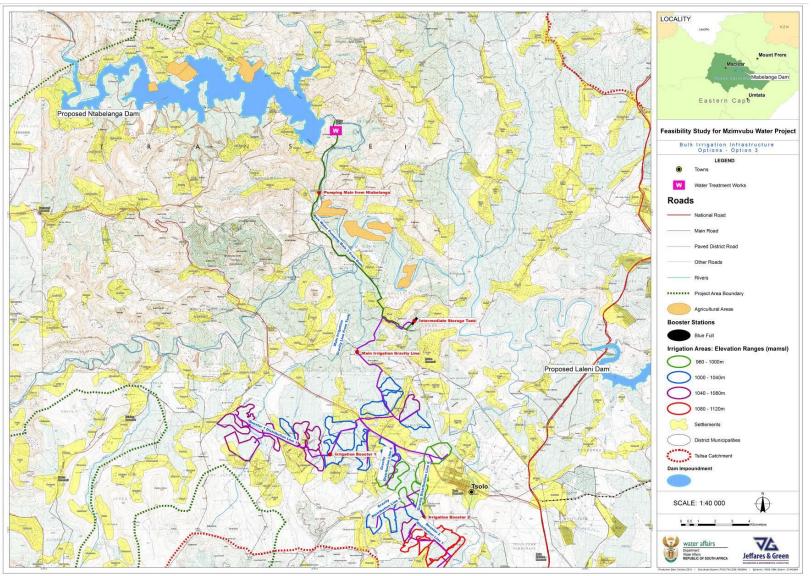


Figure 1-4: Layout Plan of Proposed Irrigation System

1.5 Basis of Cost Estimates

All cost estimates used for comparison of options were at 2014 price levels.

The cost estimates were based upon costing models that have recently been prepared for the following projects undertaken by Jeffares & Green:

- Nacala Dam Raising Project Feasibility Study, Design, Tendering, and Construction Supervision - Mozambique (construction commenced in July 2011);
- Bulwer Dam Feasibility Study, Design and Tender Documents Sisonke District, KwaZulu Natal;
- Dikgathlong Dam Design, Tender Documents, and Site Supervision Botswana (under construction); and
- Metolong Dam, Water Treatment Works, and Downstream Conveyance System Lesotho (tenders received indicate that models are accurate).

Additional costing information has also been derived from several other sources including internal cost estimation databases, the Department of Transport's annually published estimating rates, and information received on past and ongoing dam construction projects, including the following dams:

- De Hoop;
- Berg River;
- Braamhoek;
- Bedford;
- Spring Grove; and
- Ludeke.

Cost estimates of specific equipment such as raw and treated water pumps, large control valves, hydropower turbines and control systems, have been sourced through supplier quotations.

Sensitivity analyses were carried out on the major construction items including soft and hard excavation, reinforced concrete, steel, RCC, embankment material, clay core material, and filter material.

For each large volume item, a range of rates was developed based upon the contract rates sourced during research into the above projects. Some outlier values were ignored where special circumstances (eg very long haul for materials sources) did not apply to the particular situation at the Ntabelanga Dam site.

Management, operation and maintenance costs are also estimated by applying the following factors recommended in the DWS's "Technical Guidelines for the Development of Water and Sanitation Infrastructure":

Pump station:	0,50 % per annum (p.a.) of total pipeline costs
	0,25 % p.a. of pump station civil costs
	4.00% p.a. of pump station mechanical and electrical costs
Pipeline:	0,50 % p.a. of total costs
Civil Works:	0.25 % p.a. of total costs

In some cases, and due to the very large nature of some of the scheme components, these percentages produce excessively high annual costs considered to be unrealistic. In such cases, some discretion was applied in developing realistic annual costs which were used in the economic analysis.

2. DAM TYPE OPTIONS COST ESTIMATES

The cost estimates for both Ntabelanga and Lalini dams, and for all dam type and spillway options, were run using low, medium and high unit rate scenarios to test whether the ranking of different dam types changed with each scenario.

These consider not only the dam wall and spillway costs, but also take into account the costs of outlet works, routes of raw water pipelines, stilling basins, access roads, and temporary works requirements.

Haulage distances and costs of construction materials not available close to the dam and within the impoundment area were taken into consideration in the unit rates, as well as the additional cost implications of the removal and disposal of excess excavated materials, and the environmental costs of reinstating of those borrow pits and quarries which would not be inundated following impoundment.

Sensitivity to ranges of the major quantities unit rates was also tested to produce a ranking of total capital cost for the dam type options investigated.

In addition, for the highly sensitive cost of an RCC mix, a costing was developed for both low and high paste solutions from basic principles and taking into account all the individual processes required, as well as the cost of materials sourcing and processing, delivery of cement, fly ash and other special additives.

Most dam, water treatment and water transmission projects also require significant advance and ancillary works such as access roads, geotechnical and environmental investigations, materials source investigations, contractor's camps, plant compounds, and lay down areas, and temporary works such as cofferdams, temporary power, water, sanitation and solid waste disposal facilities.

For the various dam options analysed, most of these associated works were common to all options with only minor variations.

The following dam types were investigated:

- Roller compacted concrete (RCC) dam;
- Concrete faced rockfill dam (CFRD);
- Earth core rockfill dam (ECRD);
- Earthfill embankment dam with earth core (EF); and
- Composite central concrete gravity spillway/embankment flank options (CCS).

Key factors used in determining the optimum dam type were as follows:

- Availability of sufficient quantities and quality of construction materials in the vicinity of the dam wall;
- Constructability issues, especially relating to dealing with river flow during construction;
- The ability of DWS to design and construct the dam in-house;
- Spillway location and capacity requirements;
- Operational requirements and outlet works arrangements;
- Environmental impacts; and
- The cost of the works.

In order to assess materials requirements, quantities were calculated for all of the above dam types, based upon typical design criteria (foundation excavation depths, embankment slopes, etc), which were undertaken for all of the above dam types and their spillway options.

Page | 10

Appendix A – Tables A.1 and A.2 provide the Bills of Quantity thus derived, as well as the ranges used for the rates of major quantity items to test the sensitivity of changes in these rates to the ranking of the options.

Table 2-1 below summarises the results of this analysis for the Ntabelanga Dam for the low, medium and high rates ranges applied.

Option	Dom Wall Type		(Capital Cost (R mil	lion)
No.	Dam Wall Type	Spillway Type	Low	Medium	High
1	CFRD	Side Channel (SC)on Right Flank	932	1 043	1 153
2	CFRD	Cut-Through	989	1 103	1 218
3	CFRD	SC Left	1 036	1 158	1 279
4	ECRD	SC Right	848	944	1 040
5	ECRD	СТ	977	1 079	1 181
6	Earth fill	SC Right	1 147	1 224	1 301
7	Earth fill	СТ	1 305	1 390	1 474
8	RCC	Central Ogee	769	929	1 089
9	CCS	Composite Central Channel Spillway	1 009	1 203	1 397
				Lowest	
				Second Lowest	

Table 2-1: Capital Cost Comparison of Ntabelanga Dam Type & Spillway Options

The green highlighted cells show the lowest cost option. For the low and medium rate ranges of major quantity unit rates this is Option No. 8, an RCC dam, with Option No.4, the ECRD dam with a Side Channel Spillway cut through the Right-hand Flank, coming second lowest. Only for the highest rates does this ranking reverse. Figure 2 shows the comparative costs of all the options for the medium rates case, as well as main materials quantity information and how much excavated material needs to be disposed of to spoil.

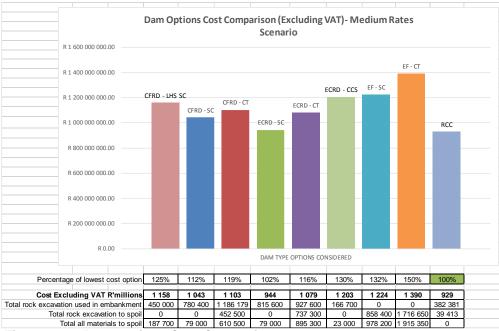


Figure 2-1: Dam Options Cost Comparison

As can be seen for the "medium rates" scenario, which is considered to be a reasonable assumption given the nature of the dam site and proximity to construction materials, the RCC and ECRD (with right hand side channel spillway) options are ranked very closely, with all other options more than 10% higher in cost.

It is therefore concluded that there is little to choose between these two options as far as costs are concerned, and other factors were therefore considered to inform the decision-making process.

2.1 Other Factors Affecting Decision-Making

The following considerations were made:

- Speed of implementation to first water delivery;
- Ability of DWS Infrastructure division to undertake detailed design in-house;
- Ability of DWS construction unit division to undertake construction in-house;
- Simplified infrastructure layout and access;
- Low maintenance inputs;
- Less risk when dealing with floods during construction; and
- Environmental impacts.

2.1.1 Speed of implementation to first water delivery

One of the advantages of an RCC solution over the embankment dam is faster speed of construction and, provided that the outlet works can be completed in time, delivery of water could commence well before the main structure of the dam is completed.

2.1.2 Ability of DWS Infrastructure division to undertake detailed design in-house

This project falls under a Strategic Infrastructure Projects (SIP) category and is therefore a very high priority project. Should there be a need to undertake a procurement process to appoint a PSP to undertake the detailed design of the works, this fast-track implementation programme would be significantly delayed. The solution being considered is for DWS's Infrastructure Directorate to undertake the design in-house. The Infrastructure Directorate has good experience of designing RCC structures but has limited experience of rock-fill dams.

2.1.3 Ability of DWS construction unit division to undertake construction in-house

For similar reasons to those given above, DWS are also considering construction of the works using their in-house construction division, rather than further extending the implementation period by having to undertake a prolonged contractor procurement process. Once again, the in-house expertise of RCC construction is available whereas there is limited recent in-house experience of construction of rock-fill embankments.

2.1.4 Simplified infrastructure layout and access

The optimum ECRD dam solution would have a right-bank side channel spillway which discharges back into the stilling basin below the dam wall. Given that the outlet works and water treatment works would also be sited on the right bank of the river below the dam, the outlet works and access road would need to cross over the spillway discharge chute. This would limit the space available for locating the hydropower plant near to the dam wall, and more complicated access would be required across the spillway chute.

The RCC dam would have a central discharge spillway, and the outlet works on the right bank of the river, leaving the right flank area downstream of the dam clear for the efficient location and development of a hydropower plant, water transfer pipelines to the water treatment works, and access roads to these works and to the dam itself.

2.1.5 Low maintenance inputs

Generally, an all-concrete solution such as an RCC dam, may have lower maintenance requirements than an embankment dam, given the need to regularly monitor and maintain embankment slopes, the more complex outlet tower, and its access bridge. A side channel spillway would also be mainly unlined, and regular inspection and maintenance of the rock channel surfaces may be needed.

2.1.6 Less risk when dealing with river diversion during construction

An RCC dam is more resilient to overtopping during construction than an earth core rock-fill dam, should unexpected flood events happen during construction, and temporary works fail to contain such floods. For example, both Ludeke and Dikgathlong dams mentioned above had unforeseen, and previously unrecorded flood events which damaged the works under construction, and delayed the completion of the works, with consequential increased costs.

2.1.7 Environmental impacts

An ECRD will require more rock excavation than the RCC dam option, and would source such rock from the right bank side channel spillway, whereas the rock for concrete for the RCC dam would be sourced from a quarry on the right bank, which quarry would be inundated when the dam fills.

The ECRD option also requires clay and filter sand sources, whereas the RCC dam requires sources of sand, all of which would be obtained from within the river basin above the dam wall. Once again, whilst the temporary environmental impacts of the winning and hauling of these materials would likely be higher for the ECRD option, it can be argued that the RCC option would have different temporary impact due to the need to transport other materials such as cement, fly ash and other additives from sources outside of the local area, via the national road network.

2.2 Conclusion on Ntabelanga Dam Type Selection

Taking the above decision-making factors into consideration, it is concluded that the preferred dam type is the RCC solution.

This would provide for a simplified operational layout, and better aesthetics and less environmental impact than an ECRD dam with a side channel spillway, and would offer the better opportunity for implementation in a shorter time period.

The fact that the DWS infrastructure and construction divisions are considering the implementation of the project in-house to reduce the implementation time, and that they have more experience with RCC technology than rock-fill, would further justify the preference of RCC as the dam type to be implemented.

Therefore the dam and ancillary works that will be further described in the following sections are based on the **RCC solution**.

A general arrangement and elevations of the Ntabelanga RCC dam solution is given on Figures 2-3, 2-4 and 2-5 overleaf.

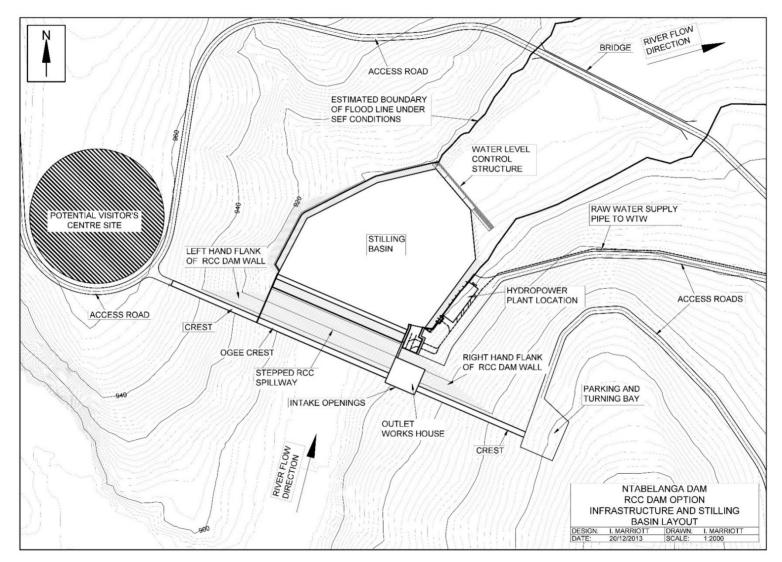


Figure 2-2: RCC Dam and Stilling Basin Layout

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

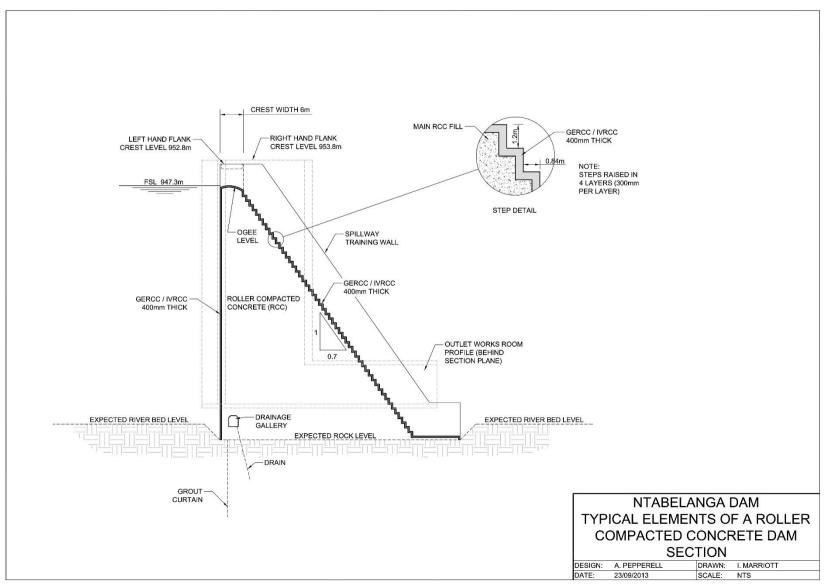


Figure 2-3: RCC Dam Wall and Spillway Typical Cross Section

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

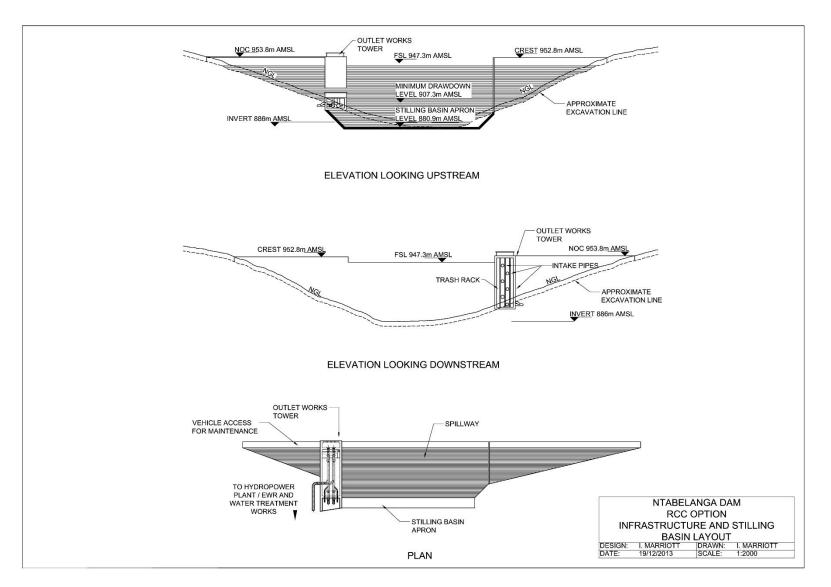


Figure 2-4: RCC Dam Embankment Plan and Longitudinal Elevations

3. NTABELANGA DAM COST ESTIMATE

3.1 Dam Cost Estimate

As described in the preceding sections, an RCC gravity dam is recommended, with an ogee spillway with stepped downstream face, with a slope of 1 to 0.70, or step dimensions of 1200 mm high by 840 mm wide.

During the undertaking of the feasibility design of this dam, the design process and relevant associated reports were reviewed by specialists on the Review Panel.

The main review expert also visited the site with the study team, and fine tuning of dam centreline alignments and other details were agreed. This involved adjusting the axis of the dam wall to be squarer to the contours on both flanks, and this effectively moved the centre point of the dam very slightly upstream. This also has the advantage of reducing the maximum dam wall height by 1.7 m and the crest length by some 33 m.

The proposed maximum height Ntabelanga Dam has the following parameters:

Full Supply Level (FSL):	947.3 m.a.s.l.
Non-Overspill Crest Level (NOCL):	952.8 m.a.s.l.
Minimum bed level in river at dam:	886.7 m.a.s.l.
Crest width:	6 m
Minimum operating level (MOL):	918.0 m.a.s.l.
Emergency drawdown min. outlet level:	907.0 m.a.s.l.
Maximum dam wall height to NOC:	66.1 m
Wall crest length (incl spillway):	407 m
Spillway crest length:	150 m
Gross stored volume at FSL:	490 million m ³
Mean Annual Runoff (present day) at dam:	415 million m ³
Surface area of lake behind dam:	31.5 km ²
Backwater reach upstream of dam:	15.5 km

As described in Feasibility Design: Ntabelanga Dam Report No. P WMA 12/T30/00/5212/12, the cost estimates were reviewed and reworked having undertaken more detailing of the dam wall, the spillway, the stilling pond, the outlet works, and transfer conduits to the hydropower plant, raw water pumping station (irrigation), and water treatment works.

Appendix B provides a breakdown of the cost estimate for the dam. This is summarised in Table 3-1 below.

Item	Capital Cost Estimate (2014 Price Levels) R'million
Dam Structure incl P&Gs	753.95
Contingencies (10.0 %)	75.40
Sub-Total	829.35
Engineering/EMP (12 %)	99.52
Sub-Total	928.87
VAT (14%)	130.04
Grand Total (Incl VAT)	1 058.91

 Table 3-1:
 Summary Ntabelanga Dam Cost Estimate

Note: Current (2014) price levels - Excludes escalation to date of construction

3.2 Associated and Appurtenant Works

Other associated and appurtenant works common to both dam size options were also costed, which included:

- Main access roads;
- Other local feeder roads requiring upgrade and/or realignment;
- Temporary haulage roads during construction;
- Temporary water treatment works;
- Operator housing;
- Wastewater treatment works for the above;
- Other earthworks, site roads and services;
- Power supplies; and
- Gauging stations.

Provisional Sums were also allowed for:

- Expropriation Costs;
- Environmental Mitigation;
- Resettlement; and
- Servitudes.

The actual cost provisions for these latter items should be confirmed during the EIA study.

The cost estimates are included in Appendix B, which also provides an explanation of the basis of calculation of key items.

Figure 3-1 shows the general layouts of the associated works and water treatment works located close to the Ntabelanga Dam.

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

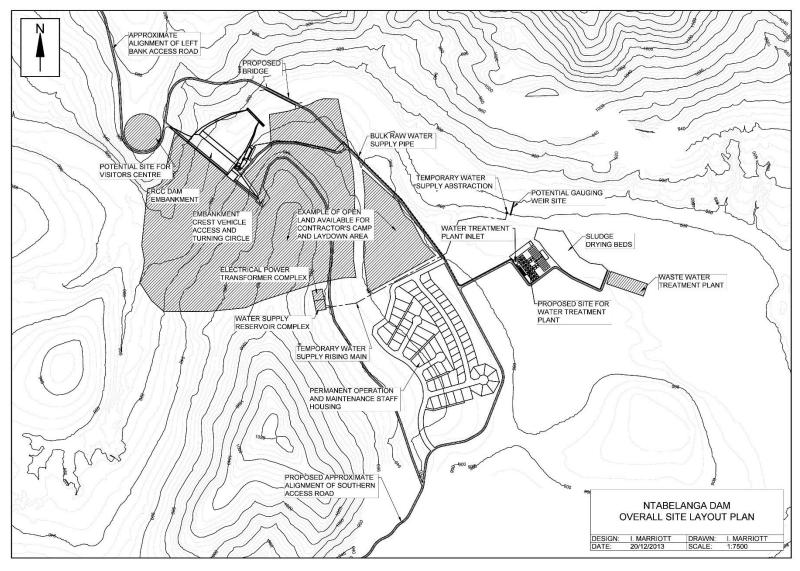


Figure 3-1: Ntabelanga Dam and Associated Works Layouts

	ates for Associated and Ap NTABELANGA DAM ASSOCIA	•			
	Upgrading surfaced main access				
Roads & Bridges	roads Upgrading gravel main access	km	R 4 000 000	14	R56 000 000
	roads	km	R 2 000 000	20	R40 000 000
	villages access roads	km	R 750 000	33	R24 750 000
	Temporary haul roads	km	R 500 000	10	R 5 000 000
	Downstream bridge across river	Sum	R25 000 000	1	R25 000 000
				Sub-Total	R150 750 000
			Contingencies	10%	R 15 075 000
				Sub-Total	R165 825 000
			Engineering/EMP	12%	R 19 899 000
				Sub-Total	R185 724 000
			VAT	14%	R 26 001 360
		Ro	ads & Bridges	Total	R 211 725 360
Operations Infrastructure	Operator Housing Complex	Sum	R26 000 000	1	R26 000 000
(excludes WTW)	Visitors Centre	Sum	R15 000 000	1	R15 000 000
	Temporary water supply, abstraction, treatment and supply	Sum	R1 500 000	1	R 1 500 000
	Wastewater treatment plant	Sum	R15 000 000	1	R15 000 000
	Gauging Weirs	Sum	R3 000 000	5	R15 000 000
				Sub-Total	R 72 500 000
			Contingencies	10%	R 7 250 000
				Sub-Total	R 79 750 000
			Engineering/EMP	12%	R 9 570 000
			<u> </u>	Sub-Total	R 89 320 000
			VAT	14%	R 12 504 800
		Operati	ions Infrastructure	Total	R 101 824 800
Power lines etc (22 kVA)		km	R1 000 000	26	R 26 000 000
				Sub-Total	R 26 000 000
			Contingencies	10%	R 2 600 000
			Ŭ	Sub-Total	R28 600 000
			Engineering/EMP	12%	R 3 432 000
				Sub-Total	R32 032 000
			VAT	14%	R 4 484 480
		Power	lines etc (22 kVA)	Total	R 36 516 480
	1		1		1
Other Mitigations	Expropriation Costs	Sum	R5 000 000	1	R 5 000 000
	Environmental Mitigation	Sum	R5 000 000	1	R 5 000 000
	Resettlement	Sum	R5 000 000	1	R 5 000 000
	Servitudes	Sum	R1 000 000	1	R 1 000 000
				Sub-Total	R16 000 000
			Contingencies	10%	R 1 600 000
				Sub-Total	R17 600 000
			Engineering/EMP	12%	R 2 112 000
				Sub-Total	R19 712 000
			VAT	14%	R 2 759 680
		Oth	ner Mitigations	Total	R22 471 680

Table 3-2: Cost Estimates for Associated and Appurtenant Works

Note: Current (2014) price levels - Excludes escalation to date of construction

4. NTABELANGA WATER TREATMENT WORKS

A cost estimate for the Ntabelanga Water Treatment Works (WTW) was prepared using a costing model developed under the Metolong Dam project in Lesotho for a similar type and capacity works. Figure 4-1 shows a general WTW arrangement.

The treatment process for the Ntabelanga WTW is expected to be similar to the Metolong Dam WTW given the similarities in raw water source being treated.

The full breakdown of the cost estimate for the full capacity works (year 2050 water demand) is given in Appendix C.

Table 4-1 summarises this cost estimate.

	Civil	Mechanical	Electrical	Non-Works	Total
Component Cost Estimates	239 009 024	103 463 246	76 921 681	48 171 874	467 565 825
P&Gs 25%	59 752 256	25 865 811	19 230 420	12 042 969	116 891 456
Sub-total	298 761 280	129 329 057	96 152 101	60 214 843	584 457 281
Contingencies 10%	29 876 128	12 932 906	9615210	6 021 484	58 445 728
Sub-total	328 637 408	142 261 963	105 767 311	66 236 327	642 903 009
Detail Design fees 12%	39 436 489	17 071 436	12 692 077	7 948 359	77 148 361
Sub-Total (Excl VAT)	368 073 896	159 333 398	118 459 389	74 184 686	720 051 370
VAT 14%	51 530 346	22 306 676	16 584 314	10 385 856	100 807 192
TOTAL COST RAND (incl vat)	419 604 242	181 640 074	135 043 703	84 570 542	820 858 562

Table 4-1: Ntabelanga WTW Cost Estimate – Full Capacity - 85 000 m³/day

Note: Current (2014) price levels - Excludes escalation to date of construction

It should be noted that this cost estimate includes for 4 MW of standby power supply so that the works and dam can continue to run at a nominal output during a power outage, ensuring that at least a basic level of water supply can be maintained at all times.

Also included is an allowance for 6 months of assisted operation, during which the WTW contractor will be required to undertake the operation and maintenance of the plant, and train the future operator's staff before handing over the plant fully to the operator.

A second cost estimate is also included in Appendix C, which is for the same WTW, but with only those units installed that will produce 50% of the ultimate design capacity.

This has been prepared to show the impact of implementing the works in stages to match projected demand. The resulting cost estimate is summarized below in Table 4-2.

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

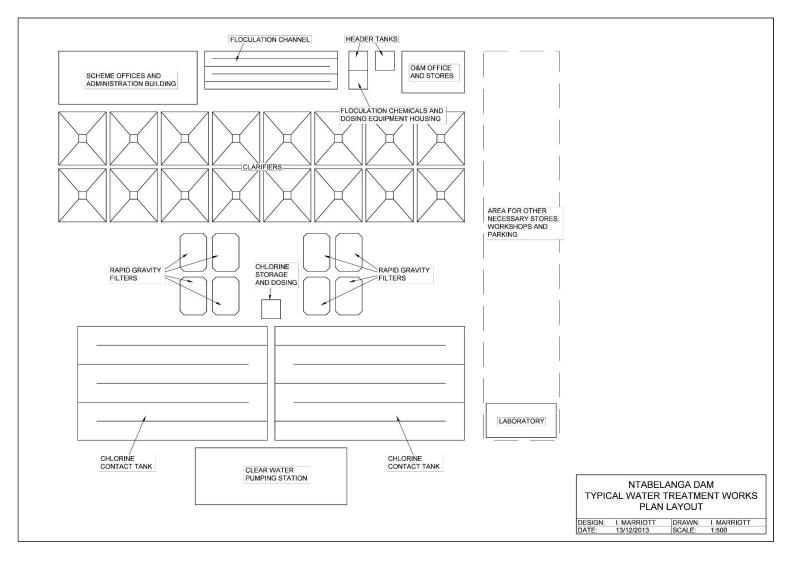


Figure 4-1: Typical Arrangement of the Water Treatment Works

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

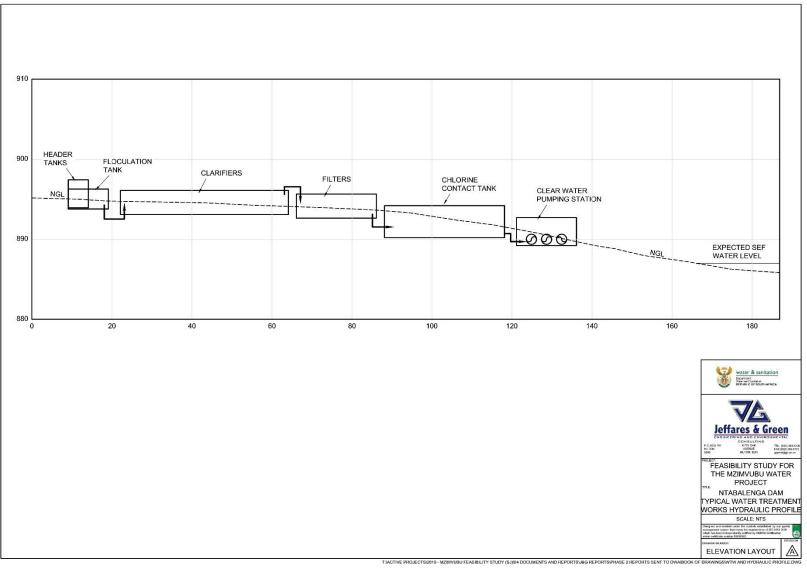


Figure 4-2: Hydraulic Profile through WTW

	Civil	Mechanical	Electrical	Non-Works	Total
Component Cost Estimates	192 593 642	69 607 320	58 355 528	29 558 138	350 114 629
P&Gs 25%	48 148 411	17 401 830	14 588 882	7 389 534	87 528 657
Sub-total	240 742 053	87 009 151	72 944 410	36 947 672	437 643 286
Contingencies 10%	24 074 205	8 700 915	7 294 441	3 694 767	43 764 329
Sub-total	264 816 258	95 710 066	80 238 851	40 642 440	481 407 615
Detail Design fees 12%	31 777 951	11 485 208	9 628 662	4 877 093	57 768 914
Sub-Total (Excl VAT)	296 594 209	107 195 273	89 867 514	45 519 532	539 176 529
VAT 14%	41 523 189	15 007 338	12 581 452	6 372 735	75 484 714
TOTAL COST RAND (incl vat)	338 117 398	122 202 612	102 448 966	51 892 267	614 661 243

As can be seen, it would be possible to defer the expenditure of some R206 million if the decision is made at the detailed design stage to implement the system in several stages.

However, this will depend upon the eventual programming of the bulk water delivery infrastructure implementation and the actual uptake of water demand on that new system.

If the more detailed design of the bulk distribution system determines that the initial demand on the scheme will be greater than the 43 000 m^3 /d half-sized WTW, then it would be prudent to develop the full capacity WTW in one stage.

5. BULK WATER DISTRIBUTION INFRASTRUCTURE

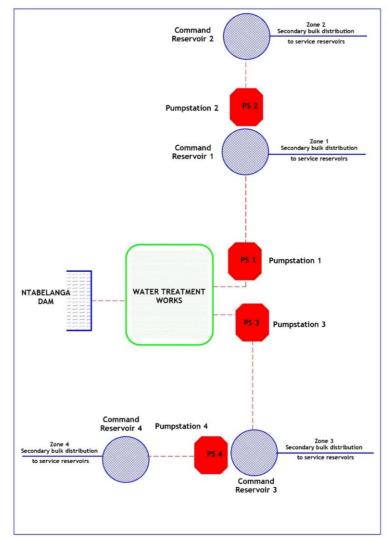
Report No. P WMA 12/T30/00/5212/13 describes the approach taken in developing the potable and irrigation water distribution systems. The cost estimates herein are based upon the quantities developed from the feasibility design models.

5.1 Potable Bulk Water Distribution Infrastructure

This system commences at the clear water pumping station within the water treatment works compound where treated water is pumped northwards and southwards to command reservoirs at strategic locations and elevations such that they can command and supply two major supply zones.

From these two command reservoirs, a proportion of the total water supplied from the dam is further pumped to two more command reservoirs as higher elevation, which supply the remaining areas in two other supply zones.

This Primary Bulk Water Distribution System layout is illustrated diagrammatically in Figure 5-1. The layouts of the whole Primary and Secondary bulk potable water distribution system to be implemented by DWS, and its interface with the Tertiary pipelines to be implemented by the District Municipalities are shown on Figures 5-2 and 5-3.





Page | 25

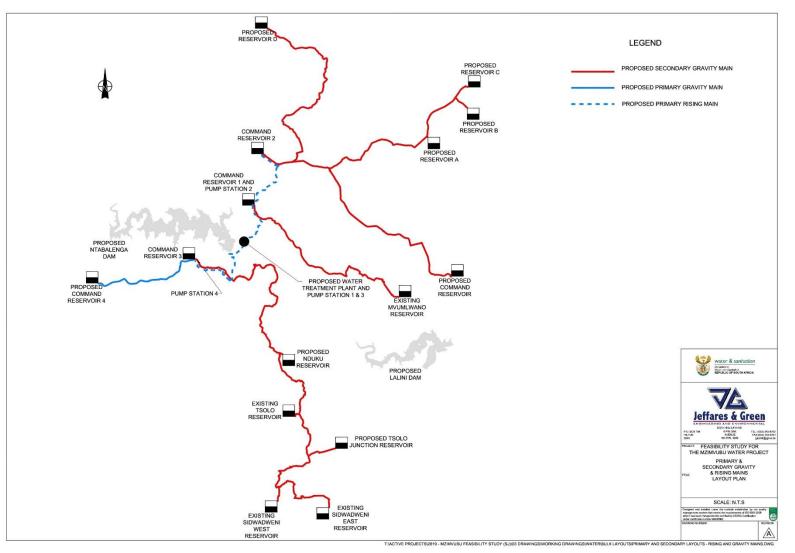


Figure 5-2: Illustration of Primary and Secondary Gravity and Rising Mains Layout

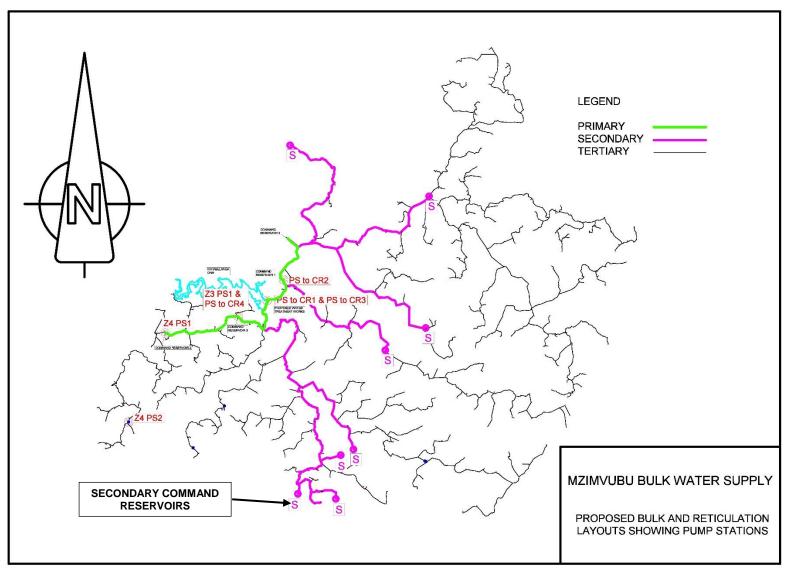


Figure 5-3: Illustration of Primary, Secondary and Tertiary Parts of the Overall Distribution System

These four command reservoirs supply a *Secondary bulk* distribution system predominantly by gravity, but with a small amount of local booster pumping required terminating in a series of secondary command reservoirs (both existing and new). These secondary pipelines and reservoirs are the limits of the main Mzimvubu Project itself, with the remaining extensive network of *Tertiary* pipelines to be implemented by the three relevant DMs within which the settlements to be supplied are located.

Each of the four primary command reservoirs service a supply zone, with secondary infrastructure also serving parts of these four zones. The cost estimates have been broken down into the Primary, Secondary and Tertiary elements of each of the four supply zones.

Unit costs of pipelines of various diameters, pressure classes and materials have been built-up using costing data taken from recently constructed pipelines, and taking cognisance of expected local conditions as regards excavation, bedding materials, etc.

Reservoir costs have also been estimated using all-in costing curves developed for various projects, which have proven to be reasonably accurate models on recent similar projects.

The build-up of these cost estimates are given in Appendix D.

Planning and implementation of these systems is still being undertaken by the three DMs through their Implementing Agent – Amatola Water – and the final sizing and phasing in of these systems will be reviewed during the detailed design and implementation phases of the project.

For the purposes of economic and financial impact analysis, it has been assumed that the design, construction and commissioning of all of the above bulk potable water supply infrastructure will be implemented over the next 6 years, with all systems in service by the beginning of the year 2020.

The economic optimisation of the pumping station plant and rising main diameters were undertaken using industry-standard unit reference value (URV) analysis which takes into account capital, operation and maintenance, and energy costs over a given operational lifespan, for a varying range of pipeline diameters.

The results are shown in the Bulk Water Distribution Infrastructure Report No P WMA 12/T30/00/5212/13.

The optimum pipeline diameters thus determined are also given in Appendix D.

A summary of the total capital cost estimate for this infrastructure is given in Table 5-1.

This is also presented by Primary, Primary and Secondary, and Tertiary pipelines in Table 5-2, and apportioned by the population served in each District Municipality in Table 5-3.

ITEM	COMPONENT		PRIMARY SYS	TEM COST (R)		SE	CONDARY SYST	TEM COST (R)		TOTAL (R)
	COMPONENT	ZONE 1	ZONE 2	ZONE 3	ZONE 4	ZONE 1	ZONE 2	ZONE 3	ZONE 4	IUTAL (K)
1	Pipelines	60 117 760	99 224 769	80 782 214	44 233 915	97 519 488	200 148 761	227 791 205	0	809 818 112
2	Pumpstations	20 000 000	20 000 000	20 644 000	16 500 000	0	0	8 814 000	0	85 958 000
3	Reservoirs	6 500 000	71 500 000	30 000 000	11 000 000	0	23 500 000	0	0	142 500 000
4	Electrical supply	10 000 000	10 000 000	7 500 000	5 000 000	0	0	2 500 000	0	35 000 000
	Sub-Total	96 617 760	200 724 769	138 926 214	76 733 915	97 519 488	223 648 761	239 105 205	0	1 073 276 112
5	Contingencies (15%)	14 492 664	30 108 715	20 838 932	11 510 087	14 627 923	33 547 314	35 865 781	0	160 991 417
	Sub-Total	111 110 424	230 833 484	159 765 147	88 244 002	112 147 411	257 196 075	274 970 986	0	1 234 267 528
6	Engineering/EMP Costs (12%)	13 333 251	27 700 018	19 171 818	10 589 280	13 457 689	30 863 529	32 996 518	0	148 112 103
	Sub-Total	124 443 675	258 533 502	178 936 964	98 833 282	125 605 100	288 059 604	307 967 504	0	1 382 379 632
	VAT 14%	17 422 114	36 194 690	25 051 175	13 836 660	17 584 714	40 328 345	43 115 451	0	193 533 148
	Total (Rand)	141 865 789	294 728 193	203 988 139	112 669 942	143 189 814	328 387 949	351 082 954	0	1 575 912 780

Table 5-1: Capital Costs: Primary and Secondary Bulk Water System

Note: Current (2014) price levels - Excludes escalation to date of construction

ITEM	COMPONENT		TOTAL (R)			
		ZONE 1	ZONE 2	ZONE 3	ZONE 4	
1	Pipelines	164 061 029	439 024 905	413 039 272	108 386 050	1 124 511 256
2	Pumpstations	0	0	4 238 000	2 184 000	6 422 000
3	Reservoirs	13 455 000	46 135 000	30 955 000	12 975 000	103 520 000
4	Electrical supply	0	0	3 750 000	1 250 000	5 000 000
	Sub-Total	177 516 029	485 159 905	451 982 272	124 795 050	1 239 453 256
5	Contingencies (15%)	26 627 404	72 773 986	67 797 341	18 719 257	185 917 988
	Sub-Total	204 143 433	557 933 891	519 779 613	143 514 307	1 425 371 244
6	Engineering/EMP Costs (12%)	24 497 212	66 952 067	62 373 554	17 221 717	171 044 549
	Sub-Total	228 640 645	624 885 958	582 153 167	160 736 024	1 596 415 794
	VAT 14%	32 009 690	87 484 034	81 501 443	22 503 043	223 498 211
	Total (Rand)	260 650 336	712 369 992	663 654 610	183 239 067	1 819 914 005

Table 5-2:	Capital Costs: T	Fertiary Bulk Water S	ystem Only
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Note: Current (2014) price levels - Excludes escalation to date of construction

Table 5-3: Split of Budgets Required by DMs to Implement Tertiary Lines

Tertiary Pipelines Funding	Alfed Nzo DM	Joe Gqabi DM	OR Tambo DM	TOTAL
Total cost by DM incl VAT	R 599 861 932	R121 298 035	R 1 098 754 038	R1 819 914 005

5.2 Irrigation Bulk Water Distribution Infrastructure

Four options were investigated for irrigation water distribution:

Options 1 and 2 considered pumping raw water directly from the two alternative sources given above to a single command reservoir located at a strategic location, to control flow and maintain pressure along this single rising main. Branches off the rising main are then fed to the edge of fields of the various irrigable land areas described above. Local distribution and sprinkler systems in-field are provided by the farm unit operators. One advantage of these options is the single pumping solution, but a disadvantage is that there will need to be pressure reduction on some branch lines and that all of the raw water is effectively being pumped to the maximum elevation. The end point command reservoir would also need to be an expensive reinforced concrete structure, as there is no suitable location at sufficient elevation for a simpler open, earth-bunded storage structure.

Options 3 and 4 considered breaking the delivery of the total bulk water transfer into a shorter rising main to an intermediate open-topped, earth-bunded storage tank, from where it gravitates flow to the distribution system supplying the majority of the land areas at elevations coded in green and blue on Figure 5-4.

The intermediate storage structure will have a volume of one day's storage of the full system demand, allowing for some flexibility in selection of pumping tariff bands, as well as catering for power outages. This storage facility is located on a ridge en route at an elevation of 1 068 m.a.s.l. Within this distribution system, two smaller booster pumping stations will be required to lift raw water further to the areas at higher elevation, shown in purple and red on Figure 5-4. Table 5-4 shows the elevation colour coding used on Figure 5-4.

Avearge Elevation Ranges:
930 to 1 000 m.a.s.l
1 000 to 1 040 m.a.s.l
1 040 to 1 080 m.a.s.l
1 080 to 1 120 m.a.s.l

Smaller balancing storage tanks will be provided at the end points of the branch lines, which will effect pressure regulation and pump control, and have six hours storage to cater for short power outages. Figures 5-5 to 5-8 show the proposed alignments and end delivery arrangements of these four options.

A discounted cash flow/URV analysis was undertaken to optimally size the rising mains and raw water pumping configurations of Options 1 to 4. The results are summarized in Tables 5-1 to 5-4. These models were run for a 30 year period of operation.

As with the potable water system, this analysis again uses the cost of pumps, power, pipelines, operation and maintenance for a range of pipeline diameter and pumping head combinations to seek the best solution. Other common costs such as the pumping station building structure, and command reservoir were not included, and this analysis is therefore only comparative rather than all-inclusive. From the feasibility design process, quantities were taken of the proposed infrastructure and an engineer's estimate was undertaken to establish the capital costs for the implementation of this infrastructure.

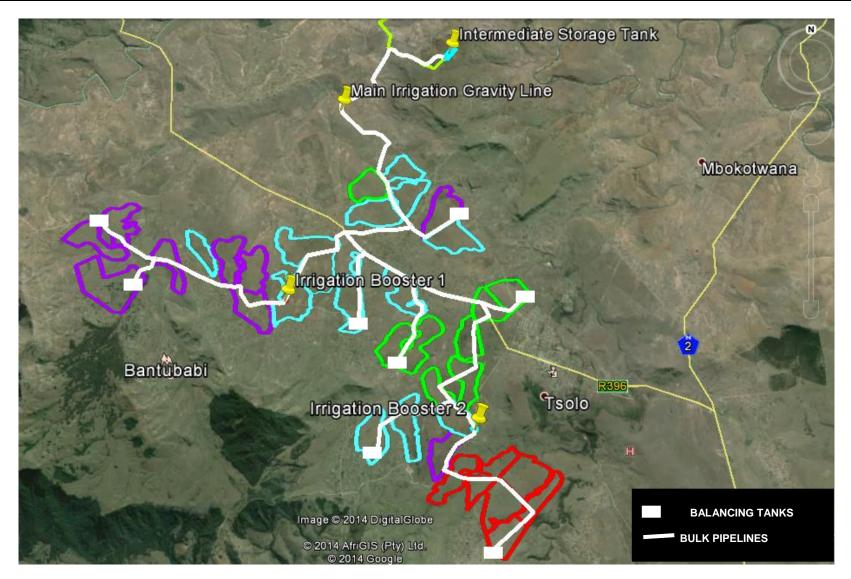


Figure 5-4: Irrigation Areas and Bulk Distribution System

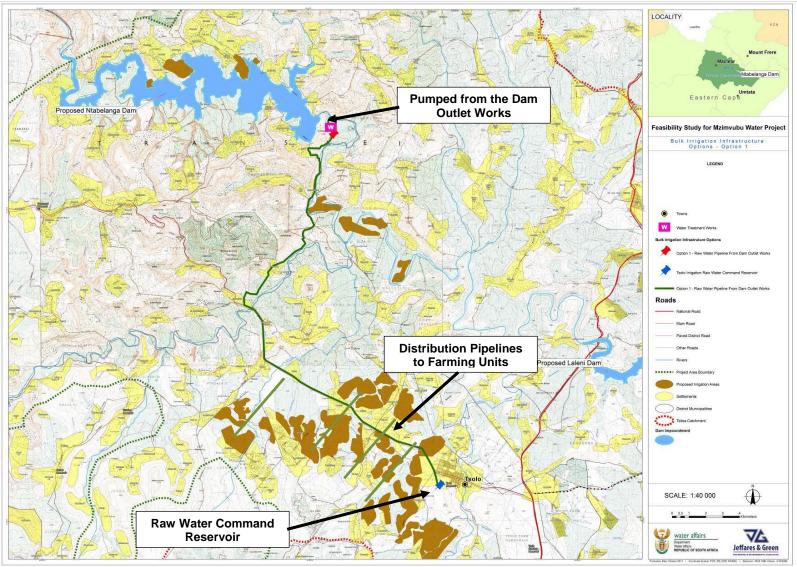


Figure 5-5: Overall Layout Plan of Irrigation System Option 1

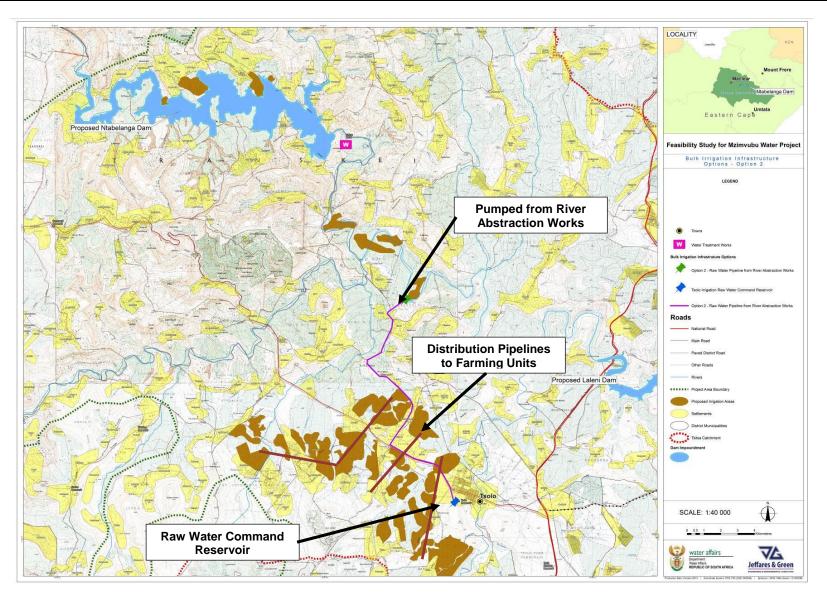


Figure 5-6: Overall Layout Plan of Irrigation System Option 2

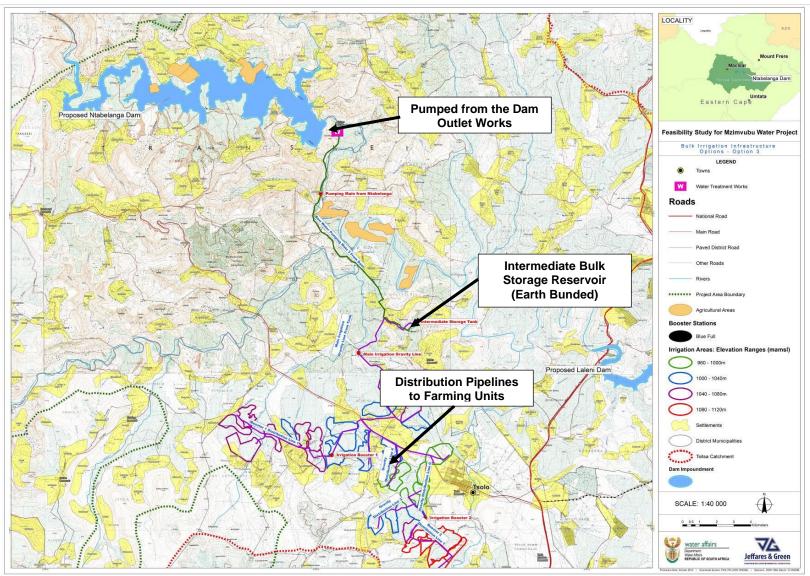


Figure 5-7: Overall Layout Plan of Irrigation System Option 3

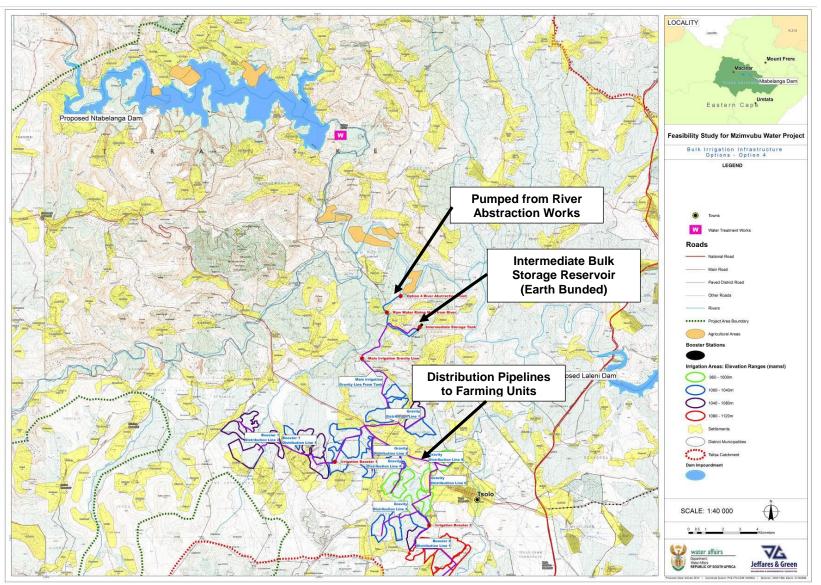


Figure 5-8: Overall Layout Plan of Irrigation System Option 4

Power costs were based upon an average current ESKOM Ruraflex tariff of R49.6 cents/kWh (incl VAT) which is based upon 20 hours pumping per day, thus avoiding peak hour tariff charges. This tariff is an aggregated average based upon hourly and seasonal tariff changes over each year.

Given that the bulk water pipelines are high pressure, all of the analysis was undertaken using steel pipeline materials. Various standard outside diameter options were analysed, and maximum working pressures calculated, taking into account the worst case as regard surge pressures are concerned. This, and other required pipe structure criteria were then used to determine the minimum wall thickness required for each option, and this determined the internal diameter to be used for hydraulic velocity and head loss calculation purposes.

Thus, pipeline internal diameters on the tables below are not nominal rounded figures but actual figures calculated from the standard production outside diameter sizes and with allowance for he designed pipe wall thickness requirements.

Appendix E provides breakdowns of the cost estimates for these options.

5.1.1 Economic Analysis to Compare Options

A discounted cash flow/URV analysis was undertaken to optimally size the rising mains and raw water pumping configurations of these options. Results are summarized in Tables 5-5 to 5-8.

Raw Water - Option 1								
INTERNAL PIPE DIA (mm):>		799	898	1000	1102			
MAX VELOCITY (m/s):		2.11	1.67	1.35	1.11			
MAX HEAD: (m)		349.30	277.86	237.80	218.98			
MAX POWER (kW):		6 055	4 816	4 157	3 796			
	4%		2.012	1.908	1.906	2.035		
URV (R/m³)	6%		2.146	2.085	2.118	2.277		
	8%		2.294	2.279	2.350	2.540		
	10%		2.451	2.484	2.594	2.819		

Table 5-5: URV Analysis of Raw Water Transfer – Option 1

NB: lowest URV for each discount rate marked in red

Raw Water - Option 2							
INTERNAL PIPE DIA (mm):>		799	898	1000	1102		
MAX VELOCITY (m/s):			2.11	1.67	1.35	1.11	
MAX HEAD: (m)		334.65	297.31	275.17	266.53		
MAX POWER (kW):			5 801	5 153	4 809	4 620	
	4%		1.630	1.576	1.575	1.642	
URV (R/m³)			1.690	1.659	1.676	1.759	
			1.758	1.751	1.787	1.887	
	10%		1.832	1.849	1.907	2.024	

NB: lowest URV for each discount rate marked in red

Raw Water - Option 3								
INTERNAL PIPE DIA (mm):>	INTERNAL PIPE DIA (mm):>				1000	1102		
MAX VELOCITY (m/s):		2.11	1.67	1.35	1.11			
MAX HEAD: (m)		232.65	197.04	178.07	167.69			
MAX POWER (kW):			4 033	3 415	3 087	2 907		
	4%		1.225	1.174	1.173	1.237		
$IIPV(P/m^3)$	6%		1.289	1.258	1.275	1.354		
URV (R/m³)			1.359	1.351	1.386	1.482		
	10%		1.434	1.450	1.505	1.617		

Table 5-7: URV Analysis of Raw Water Transfer – Option 3

NB: lowest URV for each discount rate marked in red

Raw Water - Option 4								
INTERNAL PIPE DIA (mm):>		799	898	1000	1102			
MAX VELOCITY (m/s):	MAX VELOCITY (m/s):				1.35	1.11		
MAX HEAD: (m)			230.24	220.82	215.80	213.05		
MAX POWER (kW):			3 991	3 828	3 741	3 693		
	4%		1.105	1.092	1.091	1.108		
	6%		1.117	1.109	1.113	1.134		
URV (R/m³)			1.132	1.130	1.139	1.164		
	10%		1.148	1.153	1.167	1.197		

Table 5-8: URV Analysis of Raw Water Transfer – Option 4

NB: lowest URV for each discount rate marked in red

Optimum pipe sizing lies between 914 mm and 1016 mm diameter and given that these URVs are within a few percent of each other, the recommendation would be made to opt for the larger sized pipeline, in order to reduce power costs and the risk of increased operating costs in the future.

In all options therefore, the 1 016 mm diameter pipeline is recommended.

5.1.2 Raw Water Pumping Configurations

The raw water pumping configurations for these options are based upon locally-available pumps suitable for the duties required and able to deal with sediment laden water.

As discussed in the Bulk Water Distribution Infrastructure Report No P WMA 12/T30/00/5212/13, pumping directly from the river downstream of the dam (option 4) was not considered to be the best operational solution given that raw water would still require extensive de-silting, and that the intake works would require a separate power supply and operational management establishment, would be at higher risk of damage during flood flows, and would have a higher energy cost.

Option 3, fed directly from the Ntabelanga dam outlet works, benefitted from clearer water pre-settled in the dam, less pumping head, no risk of flood damage, shared operational regime with the other works at the dam, and shared power supplies. In addition, this option had the lowest energy requirement. The present day capital and operational costs for this option were as shown in Table 5-9.

OPTI	ON 3 - IRRIGATION PIPELINE	E DIRECT F	ROM DAM			
ITEM	DESCRIPTION		AMOUNT	0&N	Л ре	r year
1	Pipelines	R	405 636 748	0.50%	R	2 028 184
2	Abstraction works	R	8 000 000	0.25%	R	20 000
3	Pumpstations	R	23 280 152	4%	R	931 206
4	Reservoirs	R	50 000 000	0.25%	R	125 000
5	Electrical supply	R	10 000 000	4%	R	400 000
6	Contingencies	R	49 691 690	1%	R	496 917
7	Engineering fees	R	32 796 515			
	Allowance for M&E depre	eciation and	l replacement funding	S	R	956 515
	Total 1	R	579 405 105		R	4 957 822
	VAT	R	81 116 715		R	694 095
	Total	R	660 521 820		R	5 651 917
				Tot. Water		
O&M Cost for su	pply of raw water to edge of	field exclue	dingpower	21 240 366		R 0.27
Power Cost per	year	R	18 559 958	21 240 366		R 0.87
Cost for	supply of raw water to edge	of field incl	uding power	R/m ³		R 1.14

 Table 5-9:
 Estimated Annual Operation and Maintenance Costs for Raw Water – Option 3

As can be seen the *prima face* indication is that, even with no capital redemption included, and at current average ESKOM energy tariffs, the unit cost of supplying raw water to the edge of fields at the proposed new Tsolo farming units is some R1.14/m³, which is considered to be non-viable economically.

According to the experience of agricultural development experts, including scheme roleplayers at the Eastern Cape Department of Rural Development and Agrarian Reform, this unit cost of water supplied should be of the order of R0.25/m³ or at least less than R0.50/m³, which is considered to be the maximum range of cost of water that would allow a reasonable annual margin to be made to viably sustain each farming unit. Given that energy is the majority of the cost component, the focus of seeking a solution to this problem was to reduce the effective cost of energy to the scheme, and hence, studies were made into the potential for self-generation of hydropower.

Energy costs form a major proportion of the overall unit cost of water supplied in both potable water and irrigation water schemes.

The estimated annual costs of energy expected from the proposed schemes are as given in Table 5-10. These are at 2014 tariff levels, and it should be noted that, given the current difficulties that ESKOM are experiencing, it is indicated that energy tariffs will increase at significantly higher a rate than general inflation for at least the next three to five years.

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

Table 5-10: Annual Energy Cost Estimates

		S	cheme Po	wer Requirer	nents at Year	2050			
Scheme Component	Flow (I/s)	Head (m)	Duty Water Power (kW)	Pump Efficiency (%)	Maximum Electricity Demand (kW)	Maximum Electricity Demand (kVA)	Max hours per day	Usage - kWh per year	Power cost/year (Rand)
Pump station PS1	935.27	246	2 257	75%	3 010	3 168	20	21 972 238	10 908 609
Pump station PS2	827.70	270	2 193	75%	2 924	3 077	20	21 342 186	10 595 806
Pump station PS3	476.66	279	1 305	75%	1 740	1 831	20	12 700 333	6 305 364
Pump station PS4	92.69	333	303	75%	404	425	20	2 947 673	1 463 438
Booster pump station Z3 PS1	170	94	157	75%	209	220	20	1 526 086	757 659
Booster pump station Z4 PS1	12.8	66	8	75%	11	12	20	80 678	40 054
Booster pump station Z4 PS2	3.53	195	7	75%	9	9	20	65 737	32 637
Water treatment plant processes	Estimated				500	526	varies	572 998	284 478
Waste water treatment works	Estimated				100	105	20	730 000	362 425
Housing	Estimated				250	263	12	1 095 000	543 637
Other, incl lighting etc	Estimated				250	263	12	1 095 000	543 637
TOTALS EXCL RAW WATER			6 230		9 406	9 901		64 127 929	31 837 745
Raw Water for Irrigation	1060	275	2 860	75%	3 813	4 014	20	23 110 937	11 473 942
TOTALS INCL RAW WATER			9 090		13 220	13 915	Year 2050	87 238 866	43 311 687
					Estim	ated at Commissioning	Year 2020	69 791 093	34 649 350

.....(cont.)

FEASIBILITY STUDY FOR THE MZIMVUBU WATER PROJECT COST ESTIMATES AND ECONOMIC ANALYSIS

		days/a	kWh/a	Charge/a
Service and admin charge (per account per day)	221.23	365		80 749
Reliability service charge (c/kWh)	0.33		87 238 866	287 888
Network demand charge (c/kWh)	18.97		87 238 866	16 549 213
Reactive charge (c/kWh) high season	7.2		21 809 716	1 570 300
				18 488 150
Other ESKOM Charges: (2020)		days/a	kWh/a	Charge/a
Service and admin charge (per account per		uays/a		Charge/a
			00 704 000	
•	221.23	365	69 791 093	80 749
day)	221.23 0.33	365	69 791 093	<u>80 749</u> 230 311
day) Reliability service charge (c/kWh)		365		
day) Reliability service charge (c/kWh) Network demand charge (c/kWh)	0.33	365	69 791 093	230 311
day) Reliability service charge (c/kWh) Network demand charge (c/kWh)	0.33	365	69 791 093 69 791 093 69 791 093	230 311 13 239 370
day) Reliability service charge (c/kWh) Network demand charge (c/kWh) Reactive charge (c/kWh) high season	0.33	365	69 791 093 69 791 093 69 791 093	230 311 13 239 370 1 256 240

These estimated energy costs were used in the undertaking of the economic analyses of various options described in Section 7 of this report.

6. HYDROPOWER GENERATION INFRASTRUCTURE

6.1 Introduction

Given the significant proportion of energy costs on the overall cost of water produced by the above schemes, investigations were carried out to ascertain whether the inclusion of hydropower into the overall scheme would have significant cost benefits, by reducing these energy costs.

From the investigations and analysis undertaken in Phases 1 and 2 of the study, it was agreed that the study should include the conjunctive operation of the Ntabelanga Dam with a second dam and hydropower scheme at Lalini, also located on the Tsitsa River, and downstream of Ntabelanga Dam.

Due to the constraints of the original study scope and budget, these hydropower investigations were initially undertaken at high level only. Preliminary analyses undertaken to date, indicated that there could be economies of scale and other cost-benefits by constructing a "large" capacity Ntabelanga dam to regulate flow to a "small" capacity Lalini dam, and thence through the hydropower scheme tunnel and powerhouse.

The general arrangement of this conjunctive usage scheme is shown in Figure 6-1.

Hydrological data were updated in Phase 2 of the study, and the hydropower module of the WRYM model was used to investigate two options:

- i. A Lalini Dam scheme with a "large" dam capacity of 0.78 MAR (Mean Annual Runoff), and with the Ntabelanga Dam only developed at its "minimum" capacity (0.15 MAR) required purely for water supply purposes.
- ii. Using a raised "maximum" capacity Ntabelanga Dam of 1.15 MAR together with a "smallest" Lalini dam (0.15 MAR).

At the Phase 2 stage under the original feasibility study scope, high level cost estimations were undertaken, and the incremental cost of implementing the conjunctive option ii) over and above building the basic Ntabelanga Dam, option i) for water supply only, was allowed for in the overall analysis.

For option ii), the raised Ntabelanga Dam's average supply level provided an increased pressure head at the dam, creating an opportunity to install a small hydropower plant at Ntabelanga Dam itself in addition to the plant at Lalini Dam.

The installed capacities of plant at each dam were determined to be:

Ntabelanga:5 MW, with an average output estimated at approximately 2 MWLalini:30 MW, with an average output estimated at 26 MW

Cost estimates of dam, tunnel, hydropower plant, and transmission lines were built up at high level using a similar database as was used for the Ntabelanga dam, as well as quotations from plant suppliers. However, in the absence of highly accurate survey information, and not having yet undertaken geotechnical investigations for dam foundations, materials, and tunnelling conditions, the confidence levels for such cost estimates for the Lalini scheme were at that stage not considered to be as high as for the Ntabelanga Dam studies.

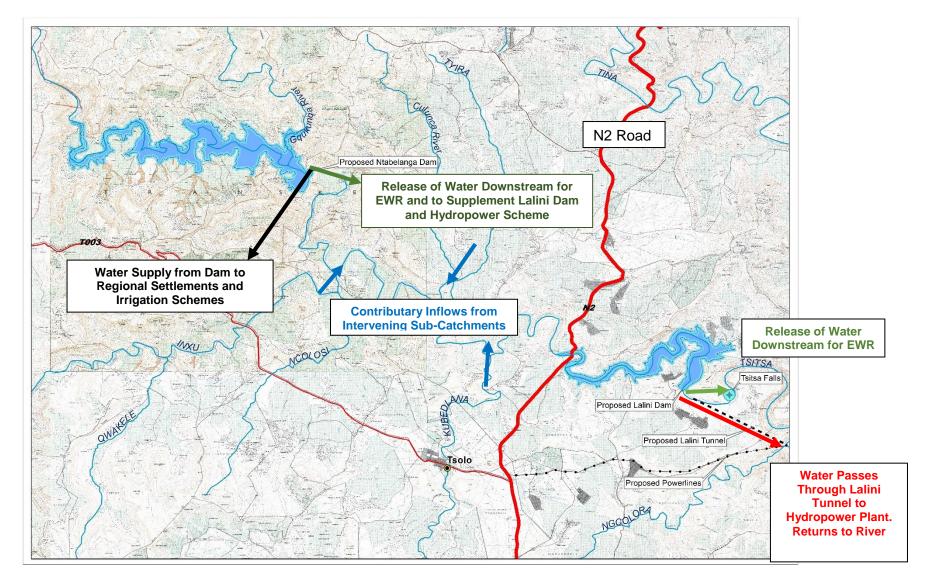


Figure 6-1: Conjunctive Hydropower Scheme

For comparison purposes, the Levelized Cost of Energy produced was calculated at a load factor of 100% (continuous power).

Appendix F shows the models used to calculate the Levelized Cost of Energy produced by the combined Ntabelanga-Lalini Hydropower scheme components, as well as a scenario to test the viability of increasing the minimum size of the Ntabelanga Dam to generate hydropower at this site only.

The analysis was run for the largest capacity Ntabelanga Dam operated in conjunction with the smallest capacity Lalini Dam, as well as the smallest capacity Ntabelanga Dam in conjunction with the largest capacity Lalini Dam.

A further scenario was investigated where the Lalini scheme was not built, but the Ntabelanga Dam hydropower plant was developed alone including the incremental cost of building the maximum capacity Ntabelanga Dam.

The objective of this was to determine whether to proceed with more detailed investigations for the Lalini Dam and Hydropower Scheme.

This is discussed in more detail in the Lalini Hydropower Analysis Report No. P WMA 12/T30/00/5212/18 but, in summary, the results of both conjunctive and single plant hydropower analysis are given in Table 6-1.

					LEVELIZED COST OF POWER (R/kWh) FOR DISCOUNT RATES							
	DAM CAPACITY	(MAR x)	INSTALLE HYDROPOW			I FULL CA		O&M AND REFURB COSTS ONLY				
OPTION	NTABELANGA LALINI		NTABELANGA	LALINI	6%	8%	10%	6%	8%	10%		
NTABELANGA DAM ONLY	1.18	NO DAM	5 MW	NIL	R3.24	R3.60	R3.97	R0.76	R0.67	R0.60		
NTABELANGA DAM PLUS LALINI DAM	1.18	0.15	5 MW	30 MW	R0.82	R0.94	R1.06	R0.11	R0.10	R0.09		
NTABELANGA DAM PLUS LALINI DAM	0.15	0.78	NIL	30 MW	R0.97	R1.11	R1.24	R0.13	R0.11	R0.10		

Table 6-1: Comparison of Levelized (URV) Cost of Power Produced by the Hydropower Options

This shows that developing the Ntabelanga hydropower option only is not viable, having a levelized cost of power ranging from R3.24/kWh to R3.97/kWh, including capital redemption. A benchmark for levelized costs for a viable hydropower scheme is currently in the range of R1.00/kWh to R1.50/kWh. Therefore, only if this option were to be grant funded would it be considered to be viable.

The conjunctive use options, however, showed levelized costs well within the range currently considered to be viable, even allowing for full capital cost ("capex") redemption.

The large Ntabelanga/small Lalini option had the lowest levelized cost of power ranging from R0.82/kWh to R1.06/kWh, including capital redemption, which could drop as low as R0.09/kWh if grant funding can be provided and only operation and maintenance and plant refurbishment costs are considered.

Given this result, a more detailed water resources, dam optimisation and hydropower analysis was undertaken on the Lalini Dam site based upon the large capacity Ntabelanga Dam (1.18 MAR) and for a range of Lalini Dam capacity options.

6.2 Detailed Investigations of Conjunctive Scheme

The process and results of this detailed hydropower potential assessment and the feasibility design of the Lalini Dam and its hydropower scheme are described in Report Nos. P WMA 12/T30/00/5212/18 and 19.

The process of dam type selection and optimisation of the Lalini Dam and associated works followed the same process as was undertaken for the Ntabelanga Dam. The decision-making on the optimum dam type and other infrastructure planning and feasibility design was informed by a topographical survey as well as detailed geotechnical investigations of dam foundations, construction materials availability, and to identify potential tunnelling conditions.

The hydropower analyses took into account the specific environmental water requirements and operating rules that have been established following reserve determination studies on the Tsitsa River at both dam sites.

Various configurations were investigated for Lalini Dam capacity, hydroelectric plant (HEP) locations, and hydropower transfer conduit/tunnel routes. It was determined that the development of a Lalini Dam of capacity greater than 0.6 x the present day mean annual runoff (MAR_{PD}) was not possible due to terrain constraints and overtopping of watersheds, and that a Lalini Dam of capacity greater than 0.28 MAR_{PD} would have a very high social and environmental impact in the area, as well as requiring major resettlement and infrastructure realignments.

Given that the purpose of the study was to maximise the energy output of the conjunctive scheme, the optimum configuration proved to involve the Ntabelanga Dam constructed at its maximum capacity of 1.18 MAR_{PD} , and the Lalini Dam at 0.28 MAR_{PD} .

The proposed layout plan, typical wall and spillway cross-sections, and longitudinal crosssections for the recommended dam type and spillway are shown in Figures 6-2 to 6-5.

The proposed Lalini Dam has the following characteristics:

Full Supply Level (FSL):	765.58 m.a.s.l.
Non-Overspill Crest Level (NOCL):	770.41 m.a.s.l.
Minimum bed level in river at dam:	717.00 m.a.s.l.
Crest width:	6 m
Minimum operating level (MOL):	740.14 m.a.s.l.
Main outlet conduit minimum invert level:	736.14 m.a.s.l.
Maximum dam wall height to NOC:	53.41 m
Wall crest length (incl spillway):	365 m
Spillway crest length:	320 m
Gross stored volume at FSL:	232 million m ³
Mean Annual Runoff (Present Day) at dam:	828 million m ³
Storage below MOL (V_{50} sedimentation):	31.2 million m ³
Surface area of lake behind dam:	31.5 km ²
Backwater reach upstream of dam:	22 km

The dam wall height, impoundment volume, and downstream risk factors for the Lalini Dam put this structure into a Category 3 dam under Gazetted Dam Safety regulation R139 of 2012.

As discussed in Appendix A, and as reviewed and accepted by the DWS Hydrological Services, the flood criteria for design of this dam are as follows:

1 in 200 year return period Design Flood:3 500 m³/sSafety Evaluation Flood (SEF):7 100 m³/s

Further hydropower analysis was undertaken to investigate various HEP installation capacities and modes of operation, from base load (operated 24/7) installations of 37.5 MW and 50 MW, to a peaking arrangement (only operated at peak hours of the day) with 150 MW of installed capacity.

Each of these options required different water transfer conduit and tunnel sizes with consequently different capital costs.

Following the feasibility design of these three options and preparation of capital cost estimates for the dam, conduit, HEP and associated works, cost estimates were prepared for each option and compared with the average energy produced by each option using, as before, the levelized cost of power approach used in the energy industry to indicate viability.

For more details of this process, refer to the Feasibility Design: Lalini Dam and Hydropower Scheme Report No. P WMA 12/T30/00/5212/19, but the results are summarized herein in Table 6-2. As described in that report the peaking option proved non-viable in terms of very high capital cost and in terms of the non-acceptability of discharging very high flows into the river system for short periods each day. The levelized cost analysis of the other two base load options indicated a unit cost of R1.20/kWh for both options.

Given this result, and to minimize capital cost expenditure, it was recommended that the 37.5 MW option be used in the financing impacts analyses. In addition, each dam would also have a mini-HEP constructed just downstream of the dam wall which makes use of the head of water in the dam and the water to be released from the dam. In each case this involves installing HEP capacity of 5MW and these two mini-HEPs would on average produce 1.57 MW and 1.83 MW of power, which can also be sold into the grid.

This does not mean that a 50 MW scheme should be ignored when considering the more detailed design of the scheme, and it is recommended that both 37.5 and 50 MW options be investigated at a more detailed level before finalizing this implementation decision. Such a decision would not affect the Lalini Dam capacity, but would require a larger water transfer conduit and HEP. The final decision would depend upon the actual energy sales feed-in tariff to be negotiated, which will determine the return on the increase investment of a 50 MW scheme over a 37.5 MW scheme.

Figures 6-6 to 6-10 are included to provide an overview of the Lalini scheme and the associated infrastructure required.

Component	Main HEP	Installed Capac	ity Option
	37.5 MW	50 MW	150 MW
kWh Produced per Year	199 421 590	217 561 957	217 561 957
Lalini Dam (0.28 x MAR Capacity)	601.64	601.64	601.64
Associated Works	127.01	127.01	127.01
Mini-Hydropower Plant			
Building Structure incl O/H Crane	11.55	11.55	11.55
Turbines & Generators Electro-Mech	37.00	37.00	37.00
Transformer Station	2.00	2.00	2.00
Power lines (22 kV) to Grid (say 8 km)	6.00	6.00	6.00
Access Roads			
	52.31	52.31	52.31
Lalini Main Road Upgrade Tunnel Entrance Access Road	11.20	11.20	11.20
	11.20	11.20	11.20
Dam & Pipeline Access Road			
HEP Access Road Option 1	173.02	173.02	173.02
Roads and Bridges Realignments			
Mtshazi Main Road Upgrade &			
Realignment	87.36	87.36	87.36
Lalini Bridge Realignment	103.70	103.70	103.70
Hydropower Water Delivery Conduit	2 500 mm dia.	3 000 mm dia.	4 500 mm dia.
Longer tunnel option	687.07	860.88	1 320.68
Main Hydropower Plant			
Building Structure incl O/H Crane	28.80	38.40	42.24
Turbines & Generators Electro-Mech	119.59	163.27	907.50
Switching and Transformer Station	3.00	5.00	incl
Earthworks	7.50	10.00	10.00
Power Lines to Grid 12.7 km (132 kV)	17.50	17.50	17.50
Sub-Total Cost Estimates	2 091.69	2 323.28	3 526.14
Contingencies (10%)	209.17	232.33	352.61
Engineering and EIA Mitigations (12%)	276.10	306.67	465.45
Escalation (averages 18%)	463.85	515.21	781.96
		010121	
VAT (14%)	425.71	472.85	717.66
Grand Total (R'million)	3 466.53	3 850.34	5 843.83

Table 6-2: Summary of Lalini Options Costing Analyses

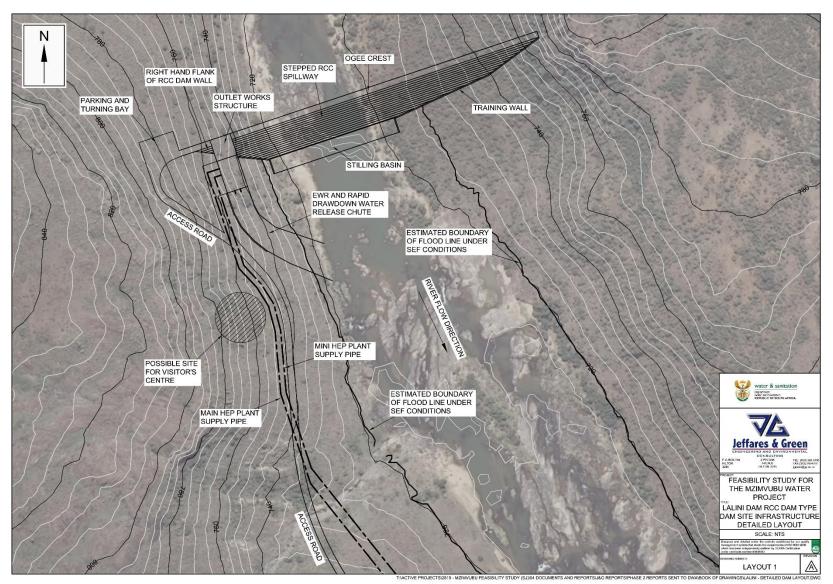


Figure 6-2: General Arrangement of the RCC Dam Option and Associated Infrastructure

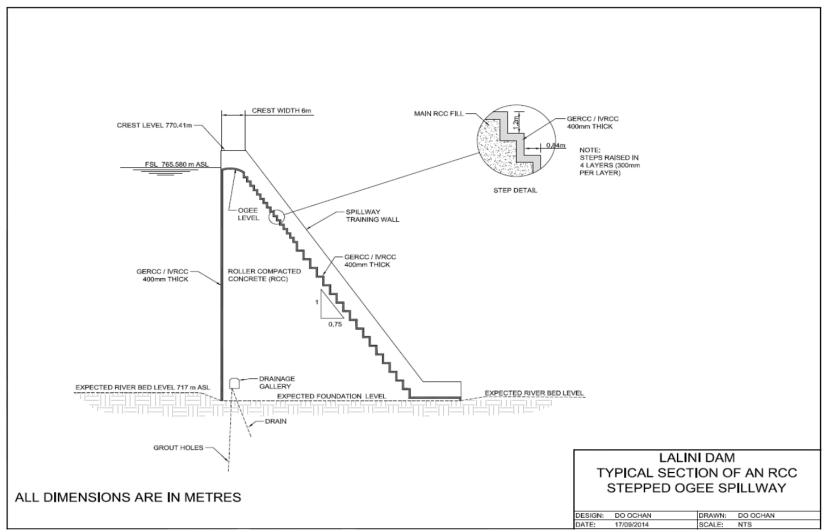
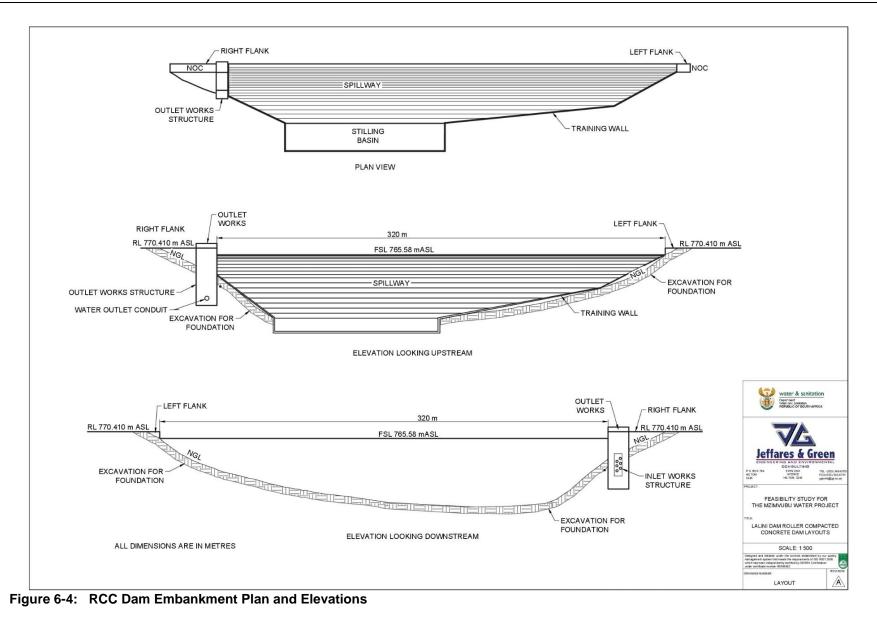


Figure 6-3: RCC Dam Wall and Spillway Typical Cross Section



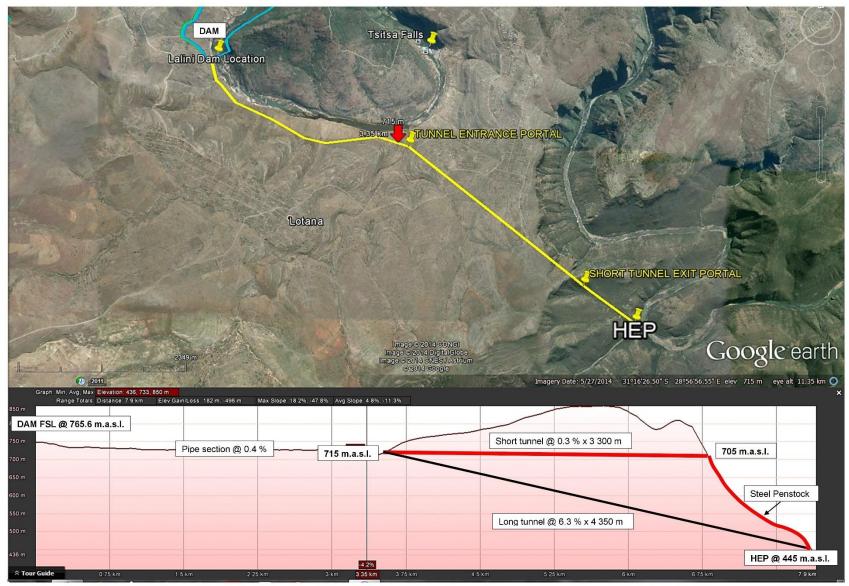


Figure 6-5: Tunnel Horizontal and Vertical Alignment Options

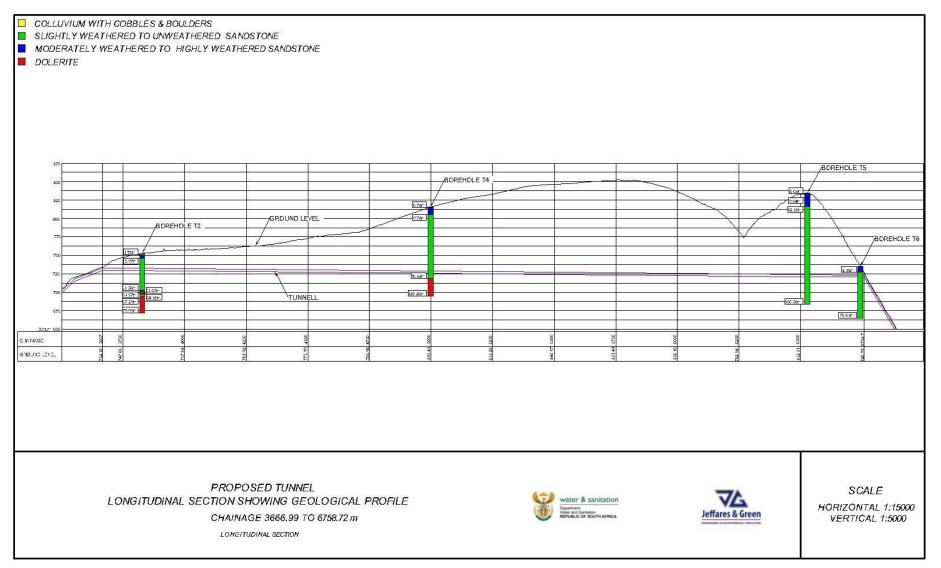


Figure 6-6: Boreholes Drilled along Tunnel Alignment

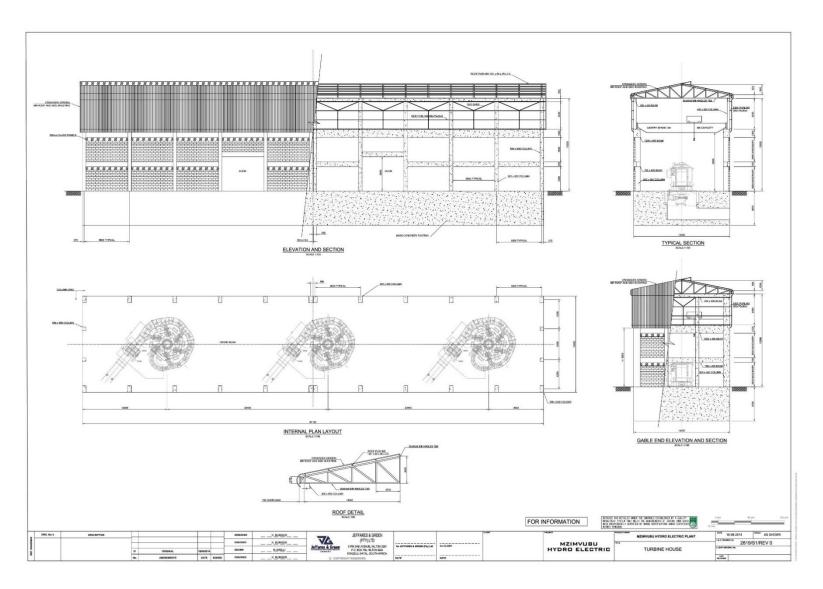


Figure 6-7: Hydroelectric Power Plant Building (3 Turbine Option)

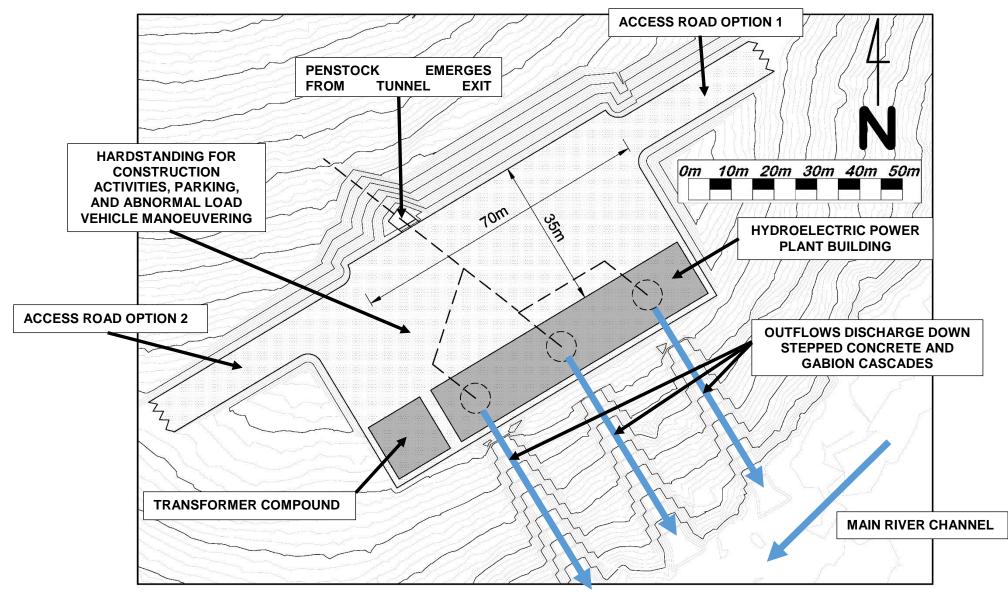


Figure 6-8: Lalini Main Hydropower Plant Site Layout

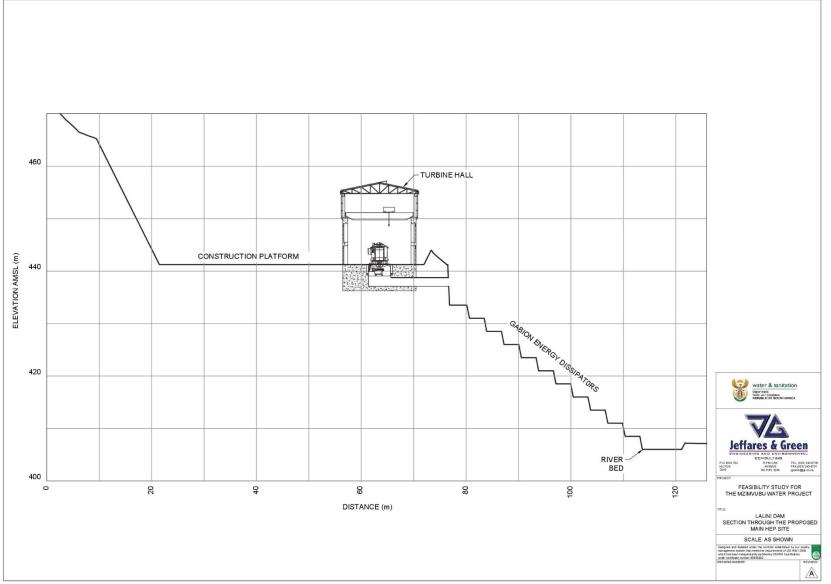


Figure 6-9: Turbine House and Outlet Works Cross-section

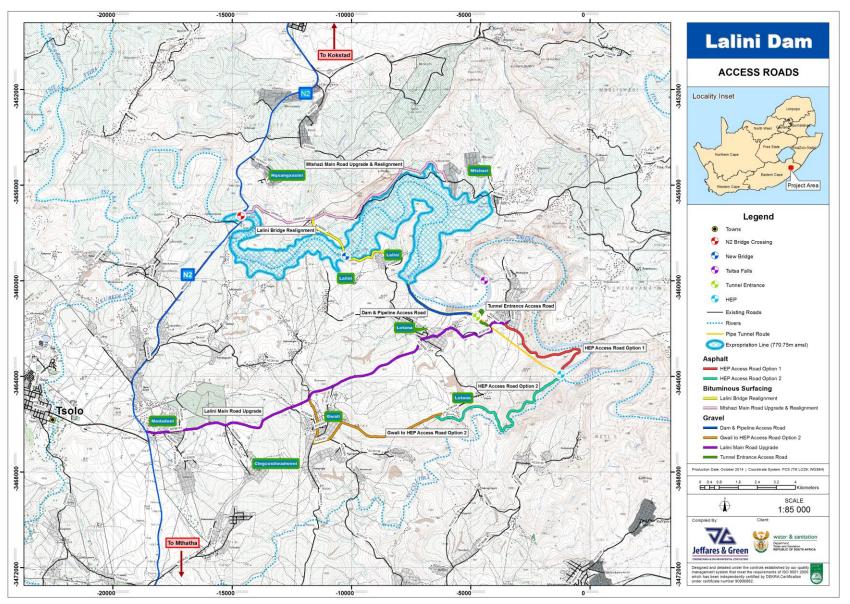


Figure 6-10: Proposed New and Upgraded Access Roads and Bridges

7. ECONOMIC ANALYSIS OF THE NTABELANGA-LALINI CONJUNCTIVE SCHEME

In order to investigate whether the combining of potable water supply, irrigation water supply and hydropower generation as a single multi-purpose project can improve the otherwise marginal viability of the water supply parts of the scheme, economic analyses were run for the scheme components, both as individual components and combined as one scheme.

For the two water supply scheme components, the industry-standard discounted cash flow analysis was undertaken, which produces a unit reference value (URV) of water supplied.

It should be noted that the URV methodology is not an indication of actual tariffs that should be charged for water supplied, but is more a means of options comparison.

This methodology includes:

- Capital cost of implementation, split into the expected annual expenditure;
- Engineering and environmental costs;
- Annual operation and maintenance costs (using percentages of capital costs);
- Water treatment costs (e.g chemicals);
- Recurrent expenditure on periodical (circa 15 years) replacement of plant and equipment; and
- Annual energy costs based upon ESKOM tariffs.

As this method compares net present values, all price levels were set at current day prices without escalation.

7.1 Hydropower Component

The main purpose of the hydroelectric plant (HEP) component of the conjunctive scheme is to generate an income stream through energy sales into the grid, which will be higher than the cost of energy used by the water supply components of the scheme. Such surplus revenue could be used to cross-subsidise the overall scheme, and effectively reduces the net cost of energy. This significantly reduces the unit cost of water supplied for potable and irrigation purposes, greatly improves the viability and sustainability of both water supply components.

Such an option also has the advantage of delivering its surplus energy into the grid, adding to the green energy component of power supply, as well as being able to be bought on line at very short notice to meet peaks, unlike coal-fired stations which require long cold-start and shutdown periods.

The proposed arrangement is for a base load HEP to be developed, which would be able to operate on a constant output 24 hours per day basis, rather than a peaking station only operating for a few hours per day.

Environmental water requirement govern how much water can be released in this way on a seasonal basis, and the recommended configuration will allow for the HEP to be able to produce up to 37.5 MW during the summer wet season months, and not less than 12.5 MW during the winter dry season months.

Such a scheme should therefore not be confused with a pumped storage scheme which only produces peak power output for the few peak hours of each day, and then consumes energy re-pumping the volumes of water utilized back up to the upper dam for the rest of each day.

7.2 Arrangements for Connection to the Grid

Discussions have been held with the regional ESKOM Grid Access Office in East London. They confirmed that energy supplied by the Lalini scheme can be evacuated into the regional grid through interconnector power lines and appropriate transformers, switching systems and metering arrangements.

The same interconnectors can be used at the beginning of the project to provide power for the works construction, as well as the transmission of surplus power generated into the regional grid.

There are several options for receiving revenue for the energy evacuated into the ESKOM grid.

a) Energy Offset with ESKOM

ESKOM allows for energy generators who produce power for their own use to also export surplus generated energy on to ESKOM's network. ESKOM does not buy this energy but a financial credit adjustment is given to the customer (in lieu of purchasing the energy) at the standard tariffs in the time of use period.

In all options, the generator will be required to pay connection fees and use-of-system charges based upon the generator's location and MW generated.

The generator cannot have an account that is a negative Rand value due to large surplus generation, instead the maximum the account can be credited is to take the generator to a zero amount. See Figure 7-1.

The generator would receive credits (not cash) from ESKOM for the energy sold into the grid. Typically this will be credited at the Megaflex tariff, which, for a 24 hr average supply operation is currently averaging R0.48/kWh.

Higher tariffs would be possible if peak period generation is established, but the investigation undertaken for the Lalini scheme concluded that a peaking station is non-viable in terms of the environmental impacts in the river downsteam and the significant increased capital costs.

The cost of energy consumed by the other two components of the scheme, predominantly for water pumping, will be charged at the normal ESKOM tariff applicable. For the purposes of this analysis, the typical tariff used is the Ruraflex tariff, which, on a non-peak 20 hr per day average usage basis, has a current average cost of R0.50/kWh. It should be noted that if pumping is operated on a 24 hrs per day basis, this would increase the average power tariff to some R0.80/kWh.

Given that the average energy consumption for the water supply components of the scheme will range from 8 to 10 MW, and the average output of the hydropower scheme will supply some 24 MW, this produces a net surplus energy that is in excess of the total energy cost. There is no existing mechanism with ESKOM for the value of all the excess energy generated to be credited to the project, thus significantly limiting the ability to subsidise the project, and thus limiting the positive economic benefits from the Lalini hydropower plant.

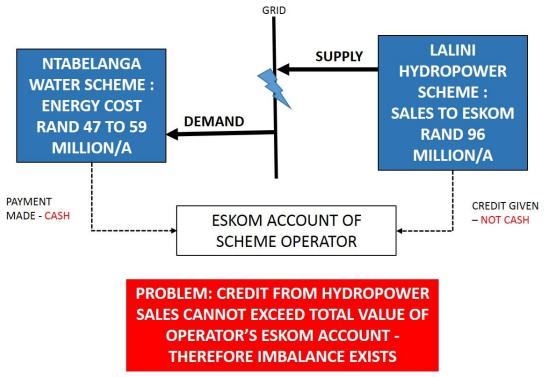


Figure 7-1: Energy offsetting with ESKOM

b) Green Energy Trading with Amatola Green Power

Instead of wheeling power directly with ESKOM, another option is to develop an agreement with Amatola Green Power (AGP), which has a license to trade in green energy anywhere in South Africa.

AGP pays generators in cash for the energy that they supply into the ESKOM grid. The generators pay ESKOM only for the grid access usage charges. In this case AGP would pay the generator between R0.62 and R1.05/kWh at current price levels.

For each 1 000 kWh (1 MWh) purchased by AGP, a number is generated as a credit with ESKOM by an independent auditing body called the "Issuing Body" and kept in a national database. Tradable Renewable Energy Credits / Certificates (TRECS) certificates are sold by AGP to energy consumers to allow them to obtain their energy requirements from their local grid (ESKOM or Municipality), which energy is duly certified to have been generated from renewable sources. See Figures 7-2 and 7-3.

TRECS are traded on the South African market at present, which is an entirely voluntary market. The buyer of TRECS could end up being a different one than the buyer of the Green Power.

With this energy trading option, the full economic benefit of the power generation from Laleni Hydropower plant could be realised, as Amatola Green Power will pay cash to the scheme for every kWh supplied to the power grid.

In this model, not only is the full cost of energy for the conjunctive scheme covered, but very significant additional surplus income is realised to further subsidize the project, operations and maintenance.

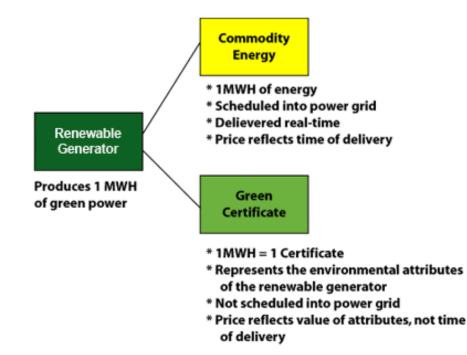


Figure 7-2: Illustration of the Tradable Renewable Energy Credits / Certificates Arrangement

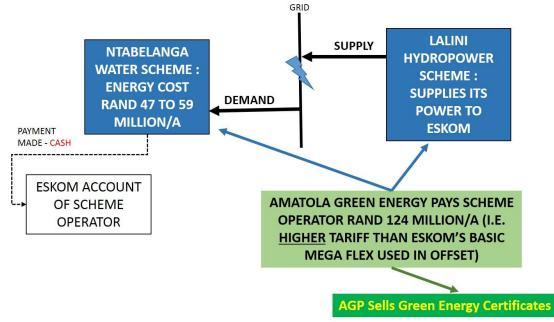


Figure 7-3: Energy Trading with AGP

The cost of energy consumed by the other components of the scheme, predominantly for water pumping, will be charged at the normal ESKOM tariff applicable. For the purposes of this analysis, the typical tariff used is the *Ruraflex* tariff, which, based on a non-peak 20 hrs per day average usage basis, has a current average cost of some R0.50/kWh.

7.3 Economic Analysis of Scheme Configurations and Funding

URV models have been run to take into account either full capital redemption, or for various proportions or components of the works being grant funded. In general, it is normal for water supply systems to scattered rural communities with high indigent populations to require significant or total grant funding, with the revenue from the equitable share and water sales being used to fund operation and maintenance costs only.

Various capital redemption scenarios have been modelled from no grant funding (100 % capital cost taken into account in Net Present Value) to full grant funding of the various system components.

For grant funded options, the full cost of operation, maintenance, staffing and power cost is generally always still included, with the exception of scenarios where the impact of partial or full subsidization of power costs are investigated.

In all cases the unit rate for power consumption is averaged as described above, based on the 20 hours per day operational regime, and on scenarios which include hydropower generation, the revenue stream is based upon the option of the green energy trading, with a current tariff averaging R0.8/kWh.

Appendices G and H, contain the detailed discounted cash flow models for the potable water, and irrigation water components when considered separately, with Appendix I containing the combined models for the conjunctive scheme.

7.4 URV of Ntabelanga Potable Bulk Water System

Appendix G shows the discounted cash flow models used to calculate the URV of potable water supplied, including all costs from the Ntabelanga Dam, water treatment works, pumping stations, primary and secondary bulk water distribution and storage reservoirs, and tertiary lines to local tanks at each of the settlements to be supplied in the three District Municipalities.

For this analysis, no hydropower installations were included, and the dam and associated infrastructure costing has been proportionally allocated to allow for only those elements or share of costs that would be required to supply the potable water requirements to the planning horizon of the 2050 (i.e. not including the irrigation water components).

The analysis was run for the potable scheme including the tertiary lines (Table 7-1 summarises the results) and for the scheme excluding the tertiary lines (Table 7-2).

	URV: POTABLE WATER SCHEME ONLY INCL TERTIARIES									
Scenario	Components Grant Funded	URV OF WATER SUPPLIED (R/m ³)								
		6%	10%							
1	Full Capital Redemption	14.21	15.49	16.71						
2	Fully grant funded	3.22	2.96	2.72						
3	Fully grant funded + 50% Energy Subsidized	2.80	2.57	2.37						
4	Fully grant funded + 100% Energy Subsidized	2.37	2.19	2.01						

Table 7-1: URV for Ntabelanga Potable Water Scheme Alone – Including Tertiary Pipeines

	URV: POTABLE WATER SCHEME ONLY EXCL TERTIARIES									
Scenario	Components Grant Funded	URV OF WATER SUPPLIED (R/m ³)								
		6%	10%							
1	Full Capital Redemption	9.45	10.20	10.92						
2	Fully grant funded	2.47	2.27	2.08						
3	Fully grant funded + 50% Energy Subsidized	2.05	1.88	1.73						
4	Fully grant funded + 100% Energy Subsidized	1.62 1.49 1.38								

The results serve as an illustration of the obvious benefits of grant funding and the impacts of partial or full subsidization of the energy costs.

Whilst a URV value does not relate directly to the tariff requirements for a viable scheme, experience has shown that this value should be below R2.00/m³ on grant funded schemes where operation, maintenance and staffing costs need to be recovered for sustainability.

Financial impact models have been built to test such sustainability and are presented in the next section.

As would be expected, the inclusion of the tertiary pipelines would significantly increase the URV of water, but the analysis is based upon the DWS-developed scheme which includes delivery of potable water in bulk to the primary and secondary system only.

The tertiary pipelines would be the responsibility of the DMs to implement, and these are normally funded via grants under the RBIG and MIG funding process.

7.5 URV of Bulk Irrigation Water System

Appendix H shows the discounted cash flow models used to calculate the URV of bulk irrigation water supplied, including all costs of abstracting raw water from the Ntabelanga Dam, the raw water pumping station, the intermediate bulk storage reservoir, and gravity pipelines to local tanks at each of the proposed farming units.

The delivery of raw water to some of the farm units at higher elevation will also require two small booster pumping stations, which are also included in the analysis. In-field distribution costs and associated equipment are not included, and the URV of water supplied therefore relates to the bulk water to be purchased by the farm unit developers.

Once again, various capital redemption scenarios have been modelled from no grant funding (100 % capital cost taken into account in Net Present Value) to full grant funding of the various system components.

For grant funded options, the full cost of operation, maintenance, staffing and power cost is again included, with the exception of scenarios where the impact of partial or full subsidization of power costs are investigated.

Table 7-3 summarises the results of this analysis.

	URV: IRRIGATION SCHEME COMPONENTS ONLY										
Scenario	Components Grant Funded	URV OF WATER SUPPLIED (R/m ³)									
		6% 8% 10%									
1	Full Capital Redemption	3.94	4.26	4.56							
2	Fully Grant Funded	0.53	0.48	0.44							
3	Grant Funded and 50% Energy Subsidized	0.44	0.40	0.37							
4	Grant Funded and 100% Energy Subsidized	0.35	0.32	0.29							

 Table 7-3:
 Summary of Results of Irrigation Water System URV Analysis

The results again serve as an illustration of the obvious benefits of grant funding and the impacts of partial or full subsidization of the energy costs.

Whilst a URV value does not relate directly to the tariff requirements for a viable scheme, experience has shown that for irrigated agriculture, where low unit cost of water is required for viability, this value should be well below R0.50/m³ on grant funded schemes where operation, maintenance and staffing costs need to be recovered for sustainability.

The above table and figure show the significant impact on the URV of raw water delivered in bulk to the edge of field of the proposed farming units, when capital costs and power costs are subsidized.

This is reflected when taking a straightforward non-discounting approach to the operation and maintenance cost of this component, as is shown in Table 7-4.

OPTIC	ON 3 - IRRIGATION PIPELINE	E DIRECT FI	ROM DAM			
ITEM	DESCRIPTION		AMOUNT	0&N	Л ре	r year
1	Pipelines	R	405 636 748	0.50%	R	2 028 184
2	Abstraction works	R	8 000 000	0.25%	R	20 000
3	Pumpstations	R	23 280 152	4%	R	931 206
4	Reservoirs	R	50 000 000	0.25%	R	125 000
5	Electrical supply	R	10 000 000	4%	R	400 000
6	Contingencies	R	49 691 690	1%	R	496 917
7	Engineering fees	R	32 796 515			
000000000000000000000000000000000000000	Allowance for M&E depre	eciation and	replacement funding	3	R	956 515
	Total 1	R	579 405 105		R	4 957 822
	VAT	R	81 116 715		R	694 095
	Total	R	660 521 820		R	5 651 917
				Tot. Water		
O&M Cost for sup	oply of raw water to edge of	field exclud	ling power	21 240 366		R 0.27
Power Cost per y	ear	R	18 559 958	21 240 366		R 0.87
Cost for s	supply of raw water to edge	of field incl	uding power	R/m ³		R 1.14

Table 7-4: Annual Operation and Maintenance Costs for Irrigation Component

Reduction of this unit cost to around R0.25/m³ by subsidisation of energy (i.e. through the hydropower component), would considerably increase the gross margin produced by each farming unit, and viability of the irrigation component in total.

This is further investigated in the financial impact analyses in the next section.

7.6 Overall URV of Conjunctive Scheme

The above discounted cash flow/URV models have been combined to test the impact of operating the potable water, irrigation water, and hydropower components as an integrated scheme. The combined URV models are given in Appendix I.

Whilst the URV models for the potable and irrigation water were added incrementally together with the capital, operating and maintenance costs of the conjunctive Ntabelanga-Lalini hydropower components, the value of an annual credit from the surplus energy income from the hydropower component over the annual energy costs of the water supply components was made.

This had the effect of significantly reducing the overall URV of water supplied as is shown on Table 7-5 and Figure 7-4.

Again, the impact of various proportions of grant funding of the capital costs of the conjunctive scheme were also considered. Seven scenarios are shown, ranging from no grant funding (full capital redemption) to full grant funding, only operation and maintenance costs redeemed.

URV: ALL WATER SUPPLIED: CONJUNCTIVE SCHEME INCL TERTIARIES									
Scenario	Components Grant Funded	URV OF WATER SUPPLIED (R/m ³)							
		6%	10%						
1	None - Full Capital Redemption	11.47	12.95	14.33					
2	Lalini Scheme Only	7.78	8.78	9.71					
3	Ntabelanga Scheme Only	4.69	5.27	5.81					
4	Lalini + Tertiaries	5.86	6.59	7.26					
5	Lalini + Tertiaries + Irrigation	5.01	5.64	6.23					
6	Lalini + Tertiaries + Irrigation + Prim and Sec Bulk System	3.40	3.80	4.17					
7	All Works Grant Funded	0.77	0.82	0.87					

 Table 7-5:
 URV for Fully Conjunctive Ntabelanga-Lalini Scheme – Incl. Tertiaries

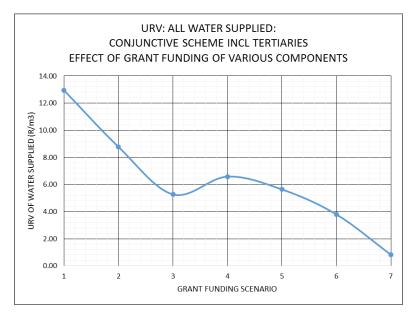


Figure 7-4: Conjunctive Scheme - URVs for Various Grant Funding Scenarios (Incl. Tertiaries)

Alternatives of only grant funding the Ntabelanga scheme or the Lalini scheme components are shown as scenarios 2 and 3. The same analysis was repeated for the fully conjunctive scheme, but without the tertiary pipeline system included. Table 7-6 and Figure 7-5 show the results.

URV: AL	URV: ALL WATER SUPPLIED: CONJUNCTIVE SCHEME EXCL TERTIARIES								
Scenario	Components Grant Funded	URV OF WATER SUPPLIED (R/m ³)							
		6%	10%						
1	None - Full Capital Redemption	9.37	10.60	11.75					
2	Lalini Scheme Only	5.51	6.27	6.98					
3	Ntabelanga Scheme Only	4.29	4.29 4.89 5.45						
4	Lalini	5.47	6.22	6.92					
5	Lalini + Irrigation	4.63	5.28	5.89					
6	Lalini + Irrigation + Prim and Sec Bulk System	3.02	3.44	3.85					
7	All Works Grant Funded	0.41 0.49 0.57							

 Table 7-6:
 URV for Fully Conjunctive Ntabelanga-Lalini Scheme – Excl. Tertiaries

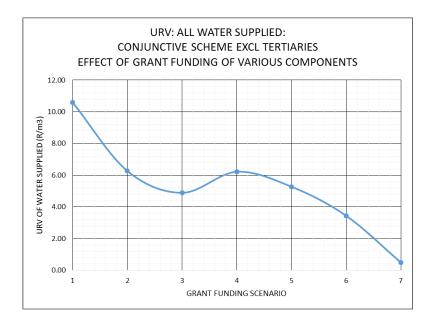


Figure 7-5: Conjunctive Scheme - URVs for Various Grant Funding Scenarios Excl Tertiaries

As can be expected the exclusion of the tertiary pipelines reduces the URV significantly and under the fully grant funded option almost halves the URV of water supplied.

Comparing the URV of water produced for scenario 2 on Table 7-1 (Ntabelanga scheme only – no energy subsidy as no hydropower included) with the URV of water produced in scenario 7 for the full conjunctive scheme on Table 7-5, shows the impact of the cross-subsidization of energy costs, and the benefit of surplus revenue generated by the conjunctive scheme, which produces (at 8% discount rate) a drop in URV value from R2.96/m³ to R0.82/m³. The findings indicated that there could be significant merit in development the conjunctive scheme instead of the Ntabelanga scheme only, and it was agreed that both options would be investigated in terms of financial impact assessment.

This is especially pertinent given the high proportion of operating costs that are due to energy charges, and the likely continuing increase in energy costs in the future at much higher a rate than normal inflation.

8. FINANCIAL IMPACT ASSESSMENT

8.1 Overview

The financial impact models are different from the economic models in that they take into account the escalated costs, tariffs and cash flow year on year using realistic bulk water tariffs and projected escalation rates which take into account current the current and project economy indicators.

As with the URV models, these financial models were run for a 30 year simulation from this current year, and it was assumed that the bulk water supply operations would be undertaken by an implementing agent such as Amatola Water, who currently operate similar schemes in this region.

Water tariffs, costs and revenue streams were escalated to the date of expenditure, as follows:

- Capital and O&M cost are escalated at 5.5 % p.a., and
- Energy costs escalated at 8.5% p.a. for 3 years then at 6.5% p.a.

The scheme components analysed excluded the tertiary pipelines in order to replicate the limits of infrastructure that would be operated by the bulk water supply operator (such as Amatola Water), and it would then be up to the Water Services Providers (DMs) to reticulate and deliver the potable water onwards from this bulk supplier's terminal reservoirs to the customers.

In terms of actual sales quantities, the water requirements projections were used and adjusted for expected unaccounted for water in terms of losses, and deducting water supplied as free basic water (the latter estimated as some 25% of the total potable water produced).

Using Alfred Nzo DM as an example, their water supply tariffs to domestic customers allow for the first 6 m³/month per household free to indigent customers, but they also charge some R1.60/m³ in this lower consumption band if the customer is determined to be "non-indigent". Above 6 m³/month per household consumption, the tariffs increase steeply to R5.5/m³ for up to 21 m³/month/household consumption, and to R10.9/m³ in the next tariff band, and so on up to a maximum of R22/m³.

Commercial/industrial customer tariffs start at R5.7/m³ in the first 10 m³/month band, rising to R11.5/m³ in the next 20 m³/month band and rising steadily to R28.6/m³ for consumption above 120 m³/month.

These tariffs bands are set to ensure that the poorer customers are cross-subsidized. In addition, each DM receives annual subsidies through the Local Government Equitable Share programme. These subsidies are to fund the provision of basic services to indigent households, which is currently of the order of R275 per month per indigent household, and of which some R87 per month (average nationally) is typically allocated for water supply services.

The above information was used as an indicator to try to ascertain what bulk potable water supply tariff could be afforded by the DMs that would be supplied by the proposed bulk water supply scheme.

As described in the Legal Institutional and Financing Arrangement Report No. P WMA 12/T30/00/5212/16, it is recommended that a well-resourced and experience bulk water supply operator be appointed to operate and maintain the bulk water supply system, and sites Amatola Water as a strong possible for this role.

According to Amatola Water's Annual Report 2014, they sell bulk raw water at a tariff of R1.57/m³, and potable water at a tariff of R6.36/m³, with a resulting composite average water sales tariff of R5.39/m³ (2014). This is relatively high when compared with the much larger Water Boards such as Rand Water and Umgeni Water, and reflects the benefits of economies of scale that these larger Water Boards enjoy.

The appointment of Amatola Water to operate and maintain the Ntabelanga bulk water supply scheme would more than double this organisation's annual potable water sales and triple the overall water sales, which would certainly add economies of scale to Amatola's operation, which could mean a lowering of the average bulk water tariff to sustain their business.

8.1.1 Sources of Capital Works Funding

Different sources of capital works funding were investigated:

Grant funding: Interest free and with no repayment requirement. The source of such funding would normally be from the National Treasury, although some international agencies can provide grant funding – normally for social upliftment project which otherwise would not be financially viable.

Loan funding: Borrowing funds at a certain interest rate per annum, with a requirement to repay the loan over a period (tenor) normally of the order of 20 to 25 years. The lender would set terms and conditions which would need to be complied with by the borrower. Loans which do not have an agreed fixed interest rate would have a higher risk than those which have fixed interest rates. If the loan funding is to be sourced and repaid in foreign currency, then there would be an exchange rate risk.

Equity funding: An investor raises funding for the purchase of a share in the works for which the investor receives an agreed annual dividend. The equity investment is not repaid but could be traded to other investors as shares.

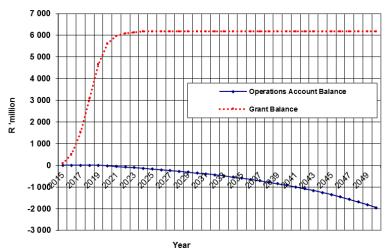
8.1.2 Ntabelanga Bulk Water Supply Scheme

This analysis was based upon the infrastructure illustrated on Figure 5-2, and excludes the tertiary pipeline system to be implemented by the DMs.

Taking the above situation into consideration, and in order to test the financial viability of the study scheme options, the initial potable and irrigation water sales tariffs in year 1 (2015) were set at R5.00/m³ and R0.30/m³ respectively.

Power cost projections were based upon the estimated initial power consumption, and expected power tariff, in the first year of operation (2020), escalated thereafter at 6.5% p.a. Capital works and associated implementation expenditures were escalated from the 2014-based cost estimates at 5.5% p.a. with annual expenditure cash flow estimated from the projected implementation programme timing.

Figure 8-1 shows that even with all capital costs grant funded, the income from water sales would not be sufficient to sustain the management, operation, maintenance and energy costs of the scheme.



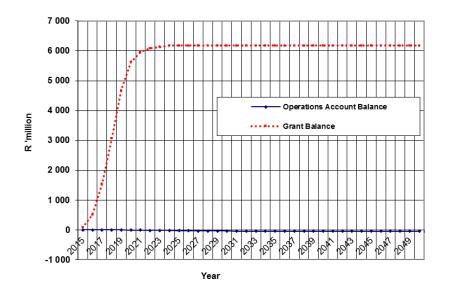
NTABELANGA ONLY SCHEME EXCL TERTIARIES 100% Grant Funded - No Power Costs Subsidized

Year

Figure 8-1: Grant Funded Ntabelanga Water Supply Scheme – R5.00/m³ initial tariff

The operations account balance shows annual operating losses commencing at R25 million per year in the first year of operation rising to R130 million per year in 2050. Thus this scheme would not be financially sustainable in the absence of some subsidy of the management, operation, maintenance and energy costs.

Raising the initial (year 1) bulk water tariff to R6.00/m³ does bring the operating account into balance, but this is likely to be a non-affordable bulk water tariff for the DMs to pay when the additional management, operation and maintenance costs of the tertiary distribution systems are taken into consideration, together with the high proportion of indigent households to be supplied by this scheme. See Figure 8-2.



NTABELANGA ONLY SCHEME EXCL TERTIARIES 100% Grant Funded - No Power Costs Subsidized

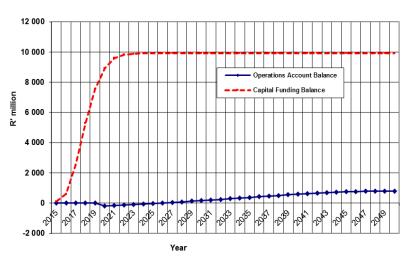
Figure 8-2: Grant Funded Ntabelanga Water Supply Scheme – R6.00/m³ initial tariff

8.1.3 Grant Funded Conjunctive Scheme Excluding Tertiary System

This financial impact model was initially run for a fully grant funded situation, and using the same base data as for the Ntabelanga scheme excluding the tertiary system.

Apart from higher capital, operations and maintenance costs, the model also includes credit for the energy sold into the grid from the hydropower components of the conjunctive scheme. This energy would be sold as green energy trading certificates (as with the AGP example) and the year 1 (2015) tariff allowed for this was R0.80/kWh, which was then escalated at national escalation rate of 5.5% p.a.

As shown in Figure 8-3, even with water sales tariffs set at ZERO for both potable and irrigation water sold, the revenue generated by hydropower sales alone would sufficient to financial sustain management, operation, maintenance and power costs for the conjunctive scheme.



CONJUNCTIVE SCHEME EXCL TERTIARIES 100% Grant Funded - Power Costs 100% Subsidized

Figure 8-3: Grant Funded Conjunctive Water Supply Scheme – R ZERO/m³ initial tariff

It is of course not sensible to deliver bulk water at zero tariff and two more scenarios were explored for the fully grant funded conjunctive scheme, setting the bulk potable water tariff to $R3.00/m^3$ and $R5.00/m^3$ respectively, and setting the initial irrigation water tariff at $R0.30/m^3$ in both cases. The results are shown in Figures 8-4 and 8-5.

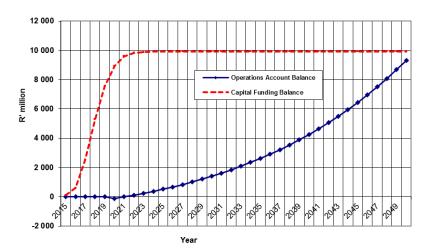
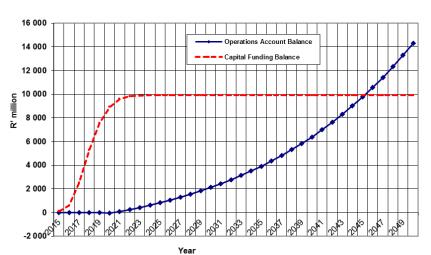




Figure 8-4: Grant Funded Conjunctive Water Supply Scheme – R3.00/m³ initial tariff

This scenario shows that by charging an initial bulk water tariff equivalent to R3.00/m³ for potable water and R0.30/m³ for irrigation water, all recurring costs can be met as well as generating cash surpluses, which over the 30 year period of analysis accumulate to over R9 billion and which could be utilized to either repay the grant funding or put into other social and economic development projects in the region.



CONJUNCTIVE SCHEME EXCL TERTIARIES 100% Grant Funded - Power Costs 100% Subsidized

Figure 8-5: Grant Funded Conjunctive Water Supply Scheme – R5.00/m³ initial tariff

Figure 8-5 shows that increasing the potable bulk water initial tariff to R5.00/m³ produces even more of cash surplus per annum which would accumulate to more than R14 billion over 30 years.

Under both of these circumstances there would be many options available for the utilisation of such surplus, from the above described usage for other development projects to the simpler action of treating the grant funding as an interest free loan from Treasury, which could be repaid over a given period.

8.1.4 Other Conjunctive Scheme Financing Options

The options considered in this respect were as follows:

- Lalini 40% loan funded @ 9% interest p.a. with R3.00/m³ initial tariff
- Lalini 60% loan funded @ 6% interest p.a. with R3.00/m³ initial tariff
- Lalini 60% loan funded @ 9% interest p.a. with R5.00/m³ initial tariff
- Lalini 100% loan funded @ 6% interest p.a. with R5.00/m³ initial tariff
- Lalini 25% equity funded @ 15% return on investment with R5.00/m³ initial tariff

Each of these models was run and percentages of Lalini funded by loans adjusted until a stable operations account balance was maintained after meeting all other costs and debt repayment conditions.

This indicates the effect of different loan interest rates as well as the initial tariff impacts upon the size of loan that could be repaid within a reasonable period (less than 30 years).

The findings are summarized in Figures 8-6 to 8-10.

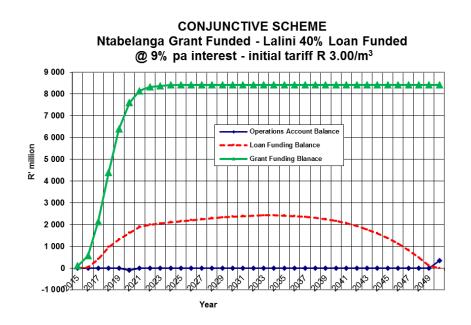


Figure 8-6: Conjunctive Scheme: Lalini 40% Loan Funded @ 9% interest: R3.00/m³ initial tariff

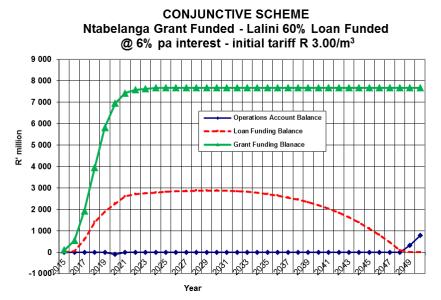


Figure 8-7: Conjunctive Scheme: Lalini 60% Loan Funded @ 6% interest: R3.00/m³ initial tariff

In these two cases it is indicated that from a relatively low bulk water tariff of R3.00/m³, a loan of between 40% and 60% of the Lalini component capital cost could be repaid through revenue generated, depending upon the interest terms of such a loan.

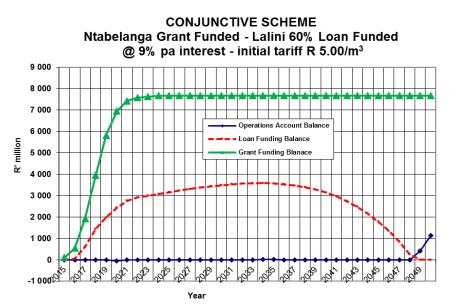


Figure 8-8: Conjunctive Scheme: Lalini 60% Loan Funded @ 9% interest: R5.00/m³ initial tariff

For a loan of 60% of the Lalini scheme cost to be repaid at 9% interest, the initial tariff would need to be increased to $R5.00/m^3$.

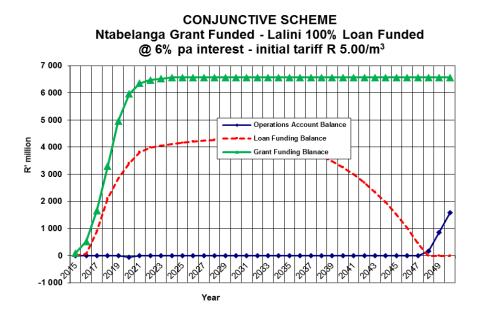
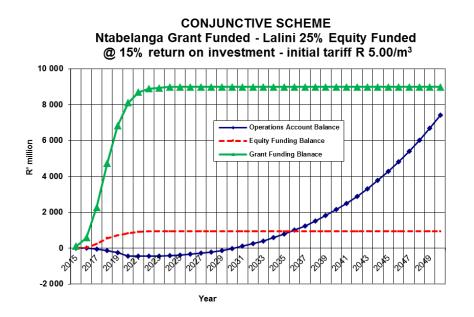


Figure 8-9: Conjunctive Scheme: Lalini 100% Loan Funded @ 6% interest: R5.00/m³ initial tariff

For a 100% loan for the Lalini scheme cost to be repaid at 6% interest, the initial tariff would again need to be set to R5.00/m³.





Equity investments are another option where the principal capital is not repaid, but an annual dividend (the equity investor's expected return on investment – normally of the order of 15% p.a.) must be paid. In this case it might be attractive for such an equity investor to also be involved in the operation and maintenance aspects, and there are certain entities that specialise in such utilities management. The financial impact model for a 25% equity investment of the Lalini components of the conjunctive scheme would be viable if the initial bulk water tariff was set to R5.00/m³.

8.1.5 Summary of Financial Analysis

In summary, the fully grant funded Ntabelanga only scheme would require a high starting base for the bulk potable water tariff in order to be financially sustainable. This being of the order of R6.00/m³ before being further transferred and distributed through a new tertiary pipeline system that would need to be implemented by the DMs. This is therefore not considered a viable solution.

The conjunctive scheme would still require significant grant funding, as is normally the case on regional water supply systems – especially where constructed in mountainous rural areas with a high proportion of indigent households.

Grant funding of the full conjunction scheme including the Lalini hydropower component would allow low bulk water tariffs to be charged (say R3.00/m³) as well as generating cash surpluses, which over the 30 year period of analysis accumulate to over R9 billion and which could be utilized to either repay the grant funding or put into other social and economic development projects in the region.

If Amatola Water were to become the operator of the conjunctive scheme, this could radically improve their economies of scale which could also have the impact of reducing the overall average cost of bulk water to all of their other customers as well, which would widen the benefits to a larger area than just the Ntabelanga-Lalini region.

If it is considered necessary to reduce the amount of grant funding of the project through the sourcing of loans or equity investments, then there is also potential for this to happen at the same time as keeping the required bulk potable and irrigation water tariffs to a financially viable and sustainable level. However, the financial burdens imposed upon the scheme due to the need to repay loans, interest, and or equity shareholders dividends, would absorb the potential surplus revenue that could otherwise be used to repay grants and/or to spend on further social upliftment and economic development programmes in this area.

8.2 Conclusion

Given the above results, there is a business case for the implementation of a conjunctive integrated multi-purpose scheme incorporating potable water supply, irrigated agriculture, and hydropower under a single, ring-fenced institutional entity.

This concept has been discussed at several forums including the Project Steering Committee meetings, the Wildcoast Integrated Development Forum, and at the Eastern Cape Social Economic Consultative Council (ECSECC), who have been tasked with stewardship of the implementation of this project on behalf of the Provincial Government.

A recent critical review of the above study findings was also undertaken by Mr Mike Muller on behalf of ECSECC, who came to similar conclusions.

9. OVERALL COST ESTIMATE AND IMPLEMENTATION CASHFLOW

Table 9-1 shows the overall cost estimate and annual cash flow projection for the Ntabelanga-Lalini Conjunctive Scheme.

9.1 Other Costs

In addition to the capital works costs, additional budgets have be allocated in order to implement:

- Catchment restoration and management above the Ntabelanga and Lalini Dams, and
- other potential environmental and social offset costs as might be identified during the EMP preparation process.

The DEA has already allocated a budget of approximately R450 million to be spent over the next 10 years for the catchment restoration and rehabilitation programme. This has already commenced.

There are other potential offset costs might include:

- Environmental impact offsets including replacement of lost wetlands
- Improvements to other infrastructure in the region for those directly affected by the works including upgrades to schools, clinics, water supplies and sanitation, and other community facilities
- Development of aquaculture
- Development of tourism and recreational infrastructure
- Development of local industries and agri-processing

Each of these aspects will require further studies to determine their specific requirements, viability and cost benefits.

The ongoing EIA study is to investigate the environmental and social impacts, and to determine resettlement, mitigations and compensation requirements, as well as these potential offset requirements.

In the meantime, a provisional budget of R100 million has been allowed for these offsets which has been evenly distributed between the Ntabelanga and Lalini components of the conjunctive scheme.

Table 9-1: Overall Conjunctive Scheme Cost Estimate and Cashflow Projection

COST ESTIMATES			-	A	NNUAL E	EXPENDI	IUKESF		N	-	-
COMPONENT	R'million	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
Ntabelanga dam and associated works	1 075		81	322	215	215	215	27			
Ntabelanga dam hydropower works	88				9	35	35	9			
Ntabelanga land compensation/mitigation costs	18		1	4	4	4	4	1			
Ntabelanga power transmission	29		3	23	3						
Sub-Total Ntabelanga Dam and Associated Works	1 209		85	349	231	254	254	37			
Engineering and EMP Costs (12%)	145		10	42	28	30	30	4			
Sub-Total Ntabelanga Dam and Associated Works incl Eng & EMP	1 354		95	391	259	284	284	41			
Escalation in Each Year @ 5.5% p.a.	265		5	44	45	68	87	16			
Sub-Total Ntabelanga Dam and Associated Works incl Eng, EMP & ESC	1 619		100	435	304	352	371	57			
VAT (14%)	227		14	61	43	49	52	8			
Add in R22 million per year for catchment management (no esc)	220	22	22	22	22	22	22	22	22	22	22
Allowance for other offset activities (50% of R100 million)	50				10	15	15	10			
Total Ntabelanga Dam and Associated Works (incl Esc + VAT)	2 116	22	136	518	378	438	460	97	22	22	22
COMPONENT	R'million	2014	2015	2016	2017	2018	2019	2020	2021	2022	202
Ntabelanga water treatment works	643		32	32	193	193	129	64			
Ntabelanga primary & secondary bulk treated water distribution system	1 234		~~	123	247	370	370	123			<u> </u>
Ntabelanga tertiary bulk treated water distribution system (DM's)	1 425			143	285	428	428	143			
Ntabelanga bulk irrigation water supply system	497				50	149	199	75	25		
Sub-Total Ntabelanga WTW and Bulk Water Systems	3 799		32	298	774	1 140	1 125	405	25		
Engineering and EMP Costs (12%)	456		4	36	93	137	135	49	3		
Sub-Total Ntabelanga WTW and Bulk Water Systems incl Eng & EMP	4 255		36	334	867	1 277	1 260	453	28		
Escalation in Each Year @ 5.5% p.a.	1 067		2	38	151	305	387	172	13		
Sub-Total Ntabelanga WTW and Bulk Water Systems incl Eng, EMP &	5 322		38	372	1 019	1 581	1 647	625	40		
ESC ESC									-		
VAT (14%)	745		5	52	143	221	231	88	6		
Total Ntabelanga WTW and Bulk Water Systems (incl Esc + VAT)	6 068		43	424	1 161	1 803	1 878	713	46		
COMPONENT	R'million	2014	2015	2016	2017	2018	2019	2020	2021	2022	202
In-farm irrigation investment costs	105						53	53			
Engineering and EMP Costs (12%)	13						6	6			
Sub-Total in-farm irrigation investment costs incl Eng & EMP	118						59	59			
Escalation in Each Year @ 5.5% p.a.	40						18	22			
Sub-Total in-farm irrigation investment costs incl Eng, EMP & ESC	158						77	81			
VAT (14%)	22						11	11			
Total in-farm irrigation investment costs (incl Esc + VAT)	180						88	92			
COMPONENT	R'million	2014	2015	2016	2017	2018	2019	2020	2021	2022	202
Lalini dam and associated works	802				267	267	267				
Lalini Access Roads and Bridges	487			73	195	195	24				
Lalini land compensation/mitigation costs	50				17	17	17				
Lalini water delivery tunnel, shafts and penstocks	756				113	302	302	38			
Lalini hydropower E&M equipment	175					26	79	61	9		
Lalini hydropower civil works	49						24	24			
Lalini power transmission lines to grid	29			14	14			10.1			
Sub-Total Lalini Dam and HEP	2 347			87	607	807	714	124	9		
Engineering and EMP Costs (12%)	282			10	73	97	86	15	1		
Sub-Total Lalini Dam and HEP incl Eng and EMP	2 629			98	679	904	799	138	10		
Escalation in Each Year @ 5.5% p.a.	648			11	118	216	245	52	4		
Sub-Total Lalini Dam and HEP incl Eng, EMP and Esc				109	798	1 120	1 045	191	14		
	459		00	15	112	157	146	27	2	00	
	000	23	23	23	23	23	23	23	23	23	23
Add in R22 million per year for catchment management (no esc)	230				4.0	4 =		40			
Add in R22 million per year for catchment management (no esc) Allowance for other offset activities (50% 0f R100 million)	50				10	15	15	10			
VAT (14%) Add in R22 million per year for catchment management (no esc) Allowance for other offset activities (50% 0f R100 million) Total Lalini Dam and HEP (incl Esc + VAT)		23 2014	23 2015	147 2016	10 932 2017	15 1 300 2018	15 1 214 2019	10 241 2020	39 2021	23 2022	23 202

Page | 76

DIRECTORATE: OPTIONS ANALYSIS

OCTOBER 2014

APPENDIX A

BILLS OF QUANTITY AND RATES OF MAJOR QUANTITY ITEMS IN DAM TYPE ANALYSES

 Dam Type Analysis Costings

 DAM TYPE ANALYSIS - BUILD UP OF DAM AND SPILLWAY COST ESTIMATES (RANDS - 2013 PRICE LEVELS)

										AY COST E				24						
			Concrete-faced Left Hand Side (LHS SC Rockfill Dam with Channel Spillway	Concrete faced Right Hand Side		Concrete faced Right Hand Cut	ThroughSpillway	Earth Core Rock Hand Side Ch	RHS SC fill Dam with Right annel Spillway	Earth-Core Rock Hand Cut The	RHS CT fill Dam with Right roughSpillway	Earth-Core (Composite) with Spi) - CCS Rockfill Dam n Central Concrete Ilway	Earth Fill (Earth Right Hand Side	RHS SC Core) Dam with Channel Spillway	Earth Fill (Earth Right Hand Si Spi	RHS CT h Core) Dam with de Cut Through litway	Roller Compacte and Sj	billway
ITEM NO. DESCRIPTION SECTION 1: SITE CLEARING 1.1 Clearing and grubbing 1.2 Topsoil stripping	UNIT ha m ²	RATE 18 000 5	QUANTITY 9 89 000	AMQUNT 162 000 445 000	QUANTITY 10 97 000	180 000 485 000	QUANTITY 15 146 000	AMOUNT 270 000 730 000	QUANTITY 10 97 000	180 000 485 000	QUANTITY 15 146 000	270 000 730 000	QUANTITY 0 6 0 60 000	108 000 300 000	QUANTITY 13 125 000	234 000 625 000	17 170 000	AMOUNT 306 000 850 000	QUANTITY 11	191 89
2.1 Dewatering	% AL CARRIED T Sum	200 000	607 000	30 350 637 350 200 000	665 000	33 250 698 250 200 000	1 000 000	50 000 1 050 000 200 000	665 000	33 250 693 250 200 000	1 000 000	50 000 1 050 000 200 000		20 400 428 400 200 000	859 000	42 950 901 950 200 000	1 156 000	57 800 1 213 800 200 000	191 898	9 59 201 49 200 00
22 Setting pond 23 Poliution control measures 24 Other items SUBTOTA SECTION 3: RIVER DIVERSION CONDUT	Sum Sum % AL CARRIED T	500 000 500 000 5.0% C SUMMARY	1 1 1 200 000	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 000 500 000 60 000 1 260 000	0 1	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 000 500 000 60 000 1 260 000	1 1 1 200 000	500 00 500 00 60 00 1 260 00
3.1 Steel pipe conduit	t	22 000	3 050	67 100 000	3 050	67 100 000	3 050	67 100 000	3 050	67 100 000	3 050	67 100 000	0 3.050	67 100 000	3 560	78 320 000	3 560	78 320 000	Scheduled elsewhere Scheduled	Scheduled elsewhere Scheduled
3.2 Structural concrete 3.3 Reinforcement		3 150 20 000	19 520	61 488 000 39 040 000	19 520 1 952	61 488 000 39 040 000	19 520	61 488 000 39 04 0 000	19 520 1 952	61 488 000 39 040 000	19 520 1 952	61 488 000	0 19520 0 1952	61 488 000 39 040 000	22 784 2 278	71 769 600 45 568 000	22 784	71 769 600 45 568 000	elsewhere Scheduled elsewhere Scheduled	elsewhere Scheduled elsewhere Scheduled
3.4 Other items SUBTOTA SECTION 4: EMBANKMENT EARTHWORK Necessary excavation to fill	% AL CARRIED T	5.0% O SUMMARY	167 628 000	8 381 400 176 009 400	167 628 000	8 381 400 176 909 400	167 628 000	8 381 400 176 009 400	167 628 000	8 381 400 176 009 400	167 628 000	8 381 400 176 909 400	0 167 628 000	8 381 400 176 009 400	195 657 600	9 782 880 205 440 480	195 657 600	9 782 880 205 440 480	elsewhere	elsewhere
4.1 Graded filter 4.2 Soft 4.3 Hard	m ² m ³ m ²	197 41 118	17 620 24 050 450 000	3 462 330 974 025 53 100 000	5 425 24 050 780 400	1 066 013 974 025 92 087 200	9 58 0 24 050 1 186 179	1 882 470 974 025 139 969 122	5 425 24 050 8 15 600	1 066 013 974 025 96 240 800	9 580 24 050 927 600	1 882 470 974 025 109 456 800	0 1 200 5 24 050 0 166 700	235 800 974 025 19 670 600	6 300 0 0	1 237 950 0 0	10 500 0 0	2 063 250 0	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable
Compacted mudstone to 95% 4.4 MOD. AASHTD in coffer dams Compacted mudstone facing in 4.5 coffer dams	m ^a	33 64	14 500 3 500	478 500	0 14 500 3 500	478 500	14 500 3 500	478 500	14 500	478 500	14 500 3 500	478 500	0 14 500	478 500	Not Applicable	Not Applicable	Not Applicable		Scheduled elsewhere Scheduled elsewhere	Scheduled elsewhere Scheduled elsewhere
4.6 Hard excavation to stockpile Necessary excavation to spoil 4.7 Soft 4.8 Hard	m ³ m ³	95 60 125	Not Applicable 187 700	Not Applicable 11 262 000	Not Applicable	Not Applicable 4 740 000	Not Applicable 158 0 00 452 5 00	Not Applicable 9 480 000 56 336 250	Not Applicable 79 000 0	Not Applicable 4 740 000	Not Applicable 158 000 737 300	Not Applicable 9 480 000 91 793 850	Not Applicable	Not Applicable	Not Applicable 119 800 858 400		Not Applicable 198 700 1 716 650	Not Applicable 11 922 000 213 722 925	56 209 Not Applicable	40 070 45 3 221 75 Not Applicable
Borrow excavation to fill 4.9 Graded filter 4.10 Core Zone	m ^s	222 64	182 381 12 600	40 397 392 800 100	194 600 12 600	43 103 900 800 100	190 4 20 12 600	42 178 030 800 100	194 600 271 200	43 103 900 17 221 200	190 450 271 200	42 184 675 17 221 200	5 146 500 0 203 600	32 449 750 12 928 600	93 700 273 000	20 754 550 17 335 500	89 550 273 000	19 835 325 17 335 500	Not Applicable Not Applicable	Not Applicable Not Applicable
4.11 Soft 4.12 Hard 4.13 Riprap Stage 1 diversion works - coffer	m ³ m ³ m ³	91 168 30	736 540 Not Applicable Scheduled	0 123 738 720 Not Applicable Scheduled	0 405 800 Not Applicable Scheduled	0 68 174 400 Not Applicable Scheduled	0 0 Not Applicable Scheduled	0 C Not Applicable Scheduled	0 112 000 Not Applicable Scheduled	0 18 816 000 Not Applicable Scheduled	0 0 Not Applicable Scheduled	0 0 Not Applicable Scheduled	0 0 518 350 Not Applicable Scheduled	0 87 082 800 Not Applicable Scheduled	2 025 450 0 30 103 Scheduled	183 303 225 0 903 090 Scheduled	2 025 425 0 30 103 Scheduled	183 300 963 0 903 090 Scheduled	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable
4.14 dams Stage 2 - permanent works - floor 4.15 channel and berms 4.16 Foundations 5	Sum d Sum	636 000 20 000 000	els ewhere Scheduled els ewhere	els ewhere Scheduled els ewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	els ewhere Scheduled els ewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	elsewhere Scheduled elsewhere	1	700 75
4.17 Foundation Prep for core 4.18 Foundation treatment 4.19 Overbreak	m² m² m²	47 550 50	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable		Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	8 750 Not Applicable Not Applicable	411 250 Not Applicable Not Applicable	8 750 Not Applicable Not Applicable	411 250 Not Applicable Not Applicable	8 750 Not Applicable Not Applicable	411 250 Not Applicable Not Applicable	16 832 Not Applicable Not Applicable	791 086 Not Applicable Not Applicable	16 832 Not Applicable Not Applicable		19 246 1 500	859 45 9 360 46 75 00
4.20 Rock bolts 4.21 Concrete elements 4.22 Other items	Nr m ³	1 000 3 150 5.0%	13 850 278 062 817	43 627 500 13 903 141) 13 850 255 273 888	43 627 500 12 763 694	13 850 295 948 247	43 62 7 500 14 797 412		Not Applicable 9 163 697	Not Applicable 274 105 020	Not Applicable 13 705 251	Not Applicable 1 155 833 575	Not Applicable 7 791 679	Not Applicable 338 384 201	Not Applicable 16 919 210	Not Applicable 449 874 139		100 Scheduled elsewhere 74 387 869	100 00 Scheduled elsewhere 3 719 39
	AL CARRIED T	O SUMMARY	1 300	291 965 957 500 000 375 000	1 300	268 937 582 500 000 375 000	1 300	310 745 659 500 000 375 000	1 300	192 437 634 500 000 375 000	1 300	287 810 271 500 000 375 000		163 625 254 500 000 375 000	1 300	355 303 411 500 000 375 000	1 300	472 367 846 500 000 375 000	1 300	78 107 26 500 00 375 00
5.3 Set ups - control holes 5.4 Drilling grout holes Drilling control holes (with core	Nr m	1 250 1 800	15 9 000	18 750 16 200 000) 15) 9 000	18 750 16 200 000	15 9 00 0	18 750 16 200 000	15 12 000	18 750 21 600 000	15 12 000	18 750 21 600 000	0 15 0 12 000	18 750 21 600 000	15 12 000	18 750 21 600 000	15 12 000	18 750 21 600 000	15 9.000	18 75 16 200 00
5.5 recovery) 5.6 Grouting in stages 5.7 Water testing in stages 5.8 Cement	m Nr Nr t	2 000 1 000 2 000 2 000	450 396 450 250	900 000 396 000 900 000 500 000	450 396 450 250	900 000 396 000 900 000 500 000	450 396 450 250	900 000 396 000 900 000 500 000	450 396 450 250	900 000 396 000 900 000 500 000	450 396 450 250	900 000 396 000 900 000 500 000	0 450 0 396 0 450 0 250	900 000 396 000 900 000 500 000	450 396 450 250	900 000 396 000 900 000 500 000	450 396 450 250	900 000 396 000 900 000 500 000	450 396 450 250	900 00 396 00 900 00 500 00
5.9 Bentonite 5.10 Place drain holes 5.11 Drill drain holes 5.12 Other items	t Nr m %	3 750 1 200 1 250 5.0%	25 100 1 500 21 878 500	93 750 120 000 1 875 000 1 093 925	25 100 1 500 21 878 500	93 750 120 000 1 875 000 1 093 925	25 100 1 500 21 878 500	93 750 120 000 1 875 000 1 093 925	25 100 1 500 27 278 500	93 750 120 000 1 875 000 1 363 925	25 100 1 500 27 278 500	93 750 120 000 1 875 000 1 363 925		93 750 120 000 1 875 000 1 363 925	25 1 00 1 500 27 278 500	93 750 120 000 1 875 000 1 363 925	25 100 1 500	93 750 120 000 1 875 000 1 363 925	25 100 1 500 21 878 500	93 75 120 00 1 875 00 1 093 92
SUBTOTA SECTION 6: INTAKE TOWER AND ACCES 6.1 Mass concrete	S BRIDGE m3	0 SUMMARY	Not Applicable	22 972 425 Not Applicable	Not Applicable	22 972 425 Not Applicable	Not Applicable	22 972 425 Not Applicable	Not Applicable	28 642 425 Not Applicable	Not Applicable	28 642 425 Not Applicable	Not Applicable	28 642 425 Not Applicable	Not Applicable	28 642 425 Not Applicable	Not Applicable	28 642 425 Not Applicable	21010000	22 972 42 9 473 28
6.2 Structural concrete 6.3 Reinforcement 6.4 Rough formwork 6.5 Smooth formwork	m3 t m2 m2	3 465 20 000 500 600	1 750 175 720 4 000	6 063 750 3 500 000 360 000 2 400 000	1 750 175 720 4 000	6 063 750 3 500 000 360 000 2 400 000	1 750 175 720 4 000	6 063 750 3 500 000 360 000 2 400 000	1 750 175 720 4 000	6 063 750 3 500 000 360 000 2 400 000	1 750 175 720 4 000	6 063 750 3 500 000 360 000 2 400 000	0 1 750 0 175 0 720 0 4 000	6 063 750 3 500 000 360 000 2 400 000	2 200 220 1 050 5 750	7 623 000 4 400 000 525 000 3 450 000	2 200 220 1 050 5 750	7 623 000 4 400 000 525 000 3 450 000		10 735 08 12 923 76 2 331 52 2 870 37
6.6 Soffit formwork 6.7 Structural steelwork 6.8 Concrete slide for plant removal	m2 Sum Sum	750 2 000 000 600 000	Not Applicable	Not Applicable 2 000 000 Not Applicable	Not Applicable 1 Not Applicable	2 000 000	Not Applicable	2 000 000	Not Applicable	Not Applicable 2 000 000 Not Applicable	Not Applicable	2 000 000	0 1	Not Applicable 2 000 000 Not Applicable	2	Not Applicable 4 000 000 Not Applicable	Not Applicable 2 Not Applicable	4 000 000	630 Scheduled elsewhere	472 50 Scheduled elsewhere 600 00
6.9 Other items SUBTOTAL CARRIED TO SUMMARY SECTION 7: OUTLET WORKS	%	5.0%	14 323 750	716 188 15 939 938	14 323 750	716 188 15 039 938	14 323 750	716 188 15 039 938			14 323 750	716 188 15 039 938		716 188 15 039 938	19 998 000		19 998 000	999 900 20 997 900	39 406 531	1 970 32 41 376 85
	Sum	50 000 000 5.0% O SUMMARY	1 50 000 000	50 000 000 2 500 000 52 500 000	1 50 000 000	50 000 000 2 500 000 52 500 000	1 50 000 000	50 000 000 2 500 000 52 500 000	1 50 000 000	50 000 000 2 500 000 52 500 000	1 50 000 000	50 000 000 2 500 000 52 500 000	0 1 0 50 000 000	50 000 000 2 500 000 52 500 000	1 50 000 000	50 000 000 2 500 000 52 500 000		50 000 000 2 500 000 52 500 000	1 50 000 000	50 000 00 2 500 00 52 500 00
SECTION 3: HYDROPOWER PLANT Pumping station / hydropower 8.1 generation building Mechanical & Electrical Works -	Sum	10 000 000	1	10 000 000) 1	10 000 000	1	10 000 000	1	10 000 000	-1	10-000-000	0 1	10 000 000	1	10 000 000	- 1	10 000 000		
8.2 Incl Gates and Pipework* 8.3 Other items	Sum % AL CARRIED T	50 000 000 5.0% O SUMMARY	10 000 000	0 500 000 10 500 000	0 10 000 000	0 500 000 10 500 000	10 000 000	6 500 000 1 0 500 000	10 000 000	0 500 000 10 500 000	10 000 000	0 500 000 10 500 000	0 0 10 000 000 0	0 500 000 10 500 000	10 000 000	0 500 000 10 500 000	10 000 000	0 500 000 10 500 000	0	
9.1 RCC Mb. 9.2 IVRCC upstream face 9.3 IVRCC downstream face	m3 m2 m2	650 312 312	Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable	Not Applicable	320 000 4 000 12 000	1 248 000	Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable	Not Applicable		248 547 57 6 173 00 8 257 08
Formwork for IVRCC on 9.4 downstream face 9.5 Reinforcement 9.6 IVRCC to drainage gallery	m2 t m2	400 20 000 312	Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable		Not Applicable Not Applicable Not Applicable	Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable	12 000 1 000 300	4 800 000 20 000 000 93 600	Not Applicable	Not Applicable Not Applicable Not Applicable	Not Applicable Not Applicable Not Applicable			10 586 00 720 72 156 00
9.7 300mm waterstop Drain holes from dam crest to 9.8 gallery - set up Drain holes from dam crest to	m Nr	1 800 2 500	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable	Not Applicable		Not Applicable		1 000	1 800 000	Not Applicable		Not Applicable			2 700 00
9.9 gallery - drilling Precast concrete copings on 9.1 parapet wall	m Nr	3 500 1 000	Not Applicable	Not Applicable	Not Applicable	Not Applicable			Not Applicable	Not Applicable	Not Applicable	Not Applicable	2 000	7 000 000	Not Applicable	Not Applicable	Not Applicable	Not Applicable		13 650 00 880 00
9.11 Dowels into RCC 9.12 Rock anchors 9.13 Reinforced concrete work	Nr Nr m3	1 000 1 500 3 150		Not Applicable Not Applicable 52 605 000	Not Applicable Not Applicable 6 000		Not Applicable Not Applicable 6 000	Not Applicable Not Applicable 18 900 000		Not Applicable Not Applicable 18 900 000	Not Applicable Not Applicable 6 000		250 250 0 1 000	250 000 375 000 3 150 000		Not Applicable Not Applicable 18 900 000		Not Applicable Not Applicable 18 900 000	Scheduled elsewhere	400 00 675 00 Scheduled elsewhere
9.14 Reinforcement 9.15 Rough formwork	t m2	20 000 400	1 670 3 300	33 400 000 1 320 000	0 600 0 3 300	12 000 000	600 3 30 0	12 000 000	600 3 300	12 000 000	600 3 300	12 000 000	0 100 0 1.000	2 000 000 400 000	600 3 300	12 000 000	600 3 3 00	12 000 000	20 Scheduled elsewhere Scheduled	400 00 Scheduled elsewhere Scheduled
	m2 %		3 100 88 875 000	1 550 000 4 443 750 93 318 750	3 100 33 770 000	1 550 000 1 688 500 35 458 500	3 100 33 770 000	1 550 000 1 688 500 35 458 500	3 100 33 770 000	1 550 000 1 688 500 35 458 500	3 100 33 770 000	1 550 000 1 688 500 35 458 500	0 1 000 0 253 985 600 0	500 000 12 699 280 266 684 380	3 100 33 770 000	1 550 000 1 688 500 35 458 500		1 550 000 1 688 500 35 458 500	elsewhere 292 995 383	elsewhere 7 344 88 300 740 26
SECTION 10: OTHER MECHANICAL AND E 30 kVA standby diesel generator 10.1 set 10.2 Full capacity standby generator	r Nr Nr	500 000 15 000 000	1	500 000 15 000 000	1	500 000 15 000 000	1	500 000 15 000 000	1	500 000 15 000 000	1	500 000 15 000 000	0 1	500 000 15 000 000	1	500 000 15 000 000	1	500 000 15 000 000	1	500 00 15 000 00
10.3 High mast tower 10.4 All electrical fittings and wirings 10.5 Instrumentation 10.6 Ventilation system to gallery	Nr Sum Sum Sum	200 000 5 000 000 1 000 000 200 000	2 1 1 Not Applicable	400 000 5 000 000 1 000 000 Not Applicable		400 000 5 000 000 1 000 000 Not Applicable	2 1 1 Not Applicable	400 000 5 000 000 1 000 000 Not Applicable		400 000 5 000 000 1 000 000 Not Applicable	2 1 1 Not Applicable	400 000 5 000 000 1 000 000 Not Applic able	0 2 0 1 0 1 Not Applicable	400 000 5 000 000 1 000 000 Not Applicable	2 1 1 Not Applicable		2 1 1 Not Applicable	400 000 5 000 000 1 000 000 Not Applicable	2 1 1 1	400 00 5 000 00 1 000 00 200 00
10.7 Other items	% AL CARRIED T	5.0% O SUMMARY	21 900 000	1 095 000 22 995 000 30 000 000	21 900 000 40	1 095 000 22 995 000 30 000 000	21 900 000	1 095 000 22 995 000 30 000 000	21 900 000 40	1 095 000 22 995 000 30 000 000	21 900 000	1 095 000 22 995 000 30 000 000	0 21 900 000 0 40	1 095 000 22 995 000 30 000 000	21 900 000		21 900 000	1 095 000 22 995 000 30 000 000	21 100 000	1 055 00 23 155 00 20 000 00
11.2 Temporary haul roads 11.3 Downstream bridge across river Bridge across spillway discharge	km Sum	500 000 25 000 000	10	5 000 000 25 000 000	10 10 1	5 000 000 25 000 000	10	5 000 000 25 000 000	10	5 000 000 25 000 000	10	5 000 000 25 000 000	0 10 0 1	5 000 000 25 000 000 25 000 000	10	5 000 000 25 000 000	10	5 000 000 25 000 000	1	25 000 00
11.4 chute Culvert crossing under discharge 11.5 chute Surfacing access road adjacent t	Sum to	7 500 000	1	7 500 000	1	7 500 000	1	7 500 000	1	7 500 000	1	7 500 000	0 0	0	1	7 500 000	1	7 500 000	Not Applicable	Not Applicable
11.6 dam Administration Buildings & 11.7 Accommodation 11.8 Other items	m²	250	40 000	10 000 000	40.000 1	10 000 000	40 000	10 000 000	40 000 1 107 500 000	10 000 000 20 000 000 5 375 000	40 000 1 107 500 000	10 000 000 20 000 000 5 375 000	0 40 000 0 1 90 000 000	10 000 000 20 000 000 4 500 000	40 000 1 107 500 000	10 000 000 20 000 000 5 375 000	40 000 1 107 500 000	10 000 000 20 000 000 5 3 75 000	40 000 1 75 000 000	10 000 00 20 000 00 3 750 00
SUBTOTA SUMMARY	Sum %	5.0%	107 500 000	5 375 000	107 500 000	5 375 000	107 500 000	5 375 000					0	94 500 000						78 750 00
PRELIMINARY AND GENERAL SECTION 1	% AL CARRIED T	5.0%	107 500 000 800 073 820	112 875 000		112 875 000 143 669 21 9		112 875 000 152 281 184		112 375 000 129 683 229 698 250	744 140 534	112 875 000 148 828 107 1 050 000	7 832 185 296	166 437 059 428 400	846 874 666	112 875 000 169 374 933 901 950	964 250 951	112 875 000 192 850 190 1 213 800	599 063 305	119 812 66
SECTION 1 SECTION 2 SECTION 3 SECTION 4	% AL CARRIED T	5.0% O SUMMARY		112 875 000 160 014 764 637 350 1 260 000 176 009 400 291 965 957		112 875 000 143 669 219 698 250 1 260 000 176 009 400 268 037 582		112 875 000 152 281 184 1 050 000 1 260 000 176 009 400 310 745 659		129 683 229 698 250 1 260 000 176 009 400 192 437 634	744 140 534	148 828 107 1 050 000 1 260 000 176 009 400 287 810 271	7 832 185 296 0 0	428 400 1 260 000 176 009 400 163 625 254	846 874 666	169 374 933 901 950 1 260 000 205 440 480 355 303 411		192 850 190 1 213 800 1 260 000 205 440 480 472 367 846	599 063 305	201 49 1 260 00 78 107 26
SECTION 1 SECTION 2 SECTION 3	% AL CARRIED T	5.0% O SUMMARY		112 875 000 160 014 764 637 350 1 260 000 176 009 400		112 875 000 143 669 21 9 698 25 0 1 260 000 176 009 400		112 875 000 152 281 184 1 050 000 1 260 000 176 009 400 310 745 665 22 972 425 15 039 388 52 500 000 10 500 000		129 683 229 698 250 1 260 000 176 009 400 192 437 634 28 642 425 15 039 938 52 500 000 10 500 000	744 140 534	148 828 107 1 050 000 1 260 000 176 009 400	7 832 185 296 0 0 1 5 8 0 0	428 400 1 260 000 176 009 400	846 874 666	169 374 933 901 950 1 260 000 205 440 480		192 850 190 1 213 800 1 260 000 205 440 480 472 367 846 28 642 425 20 997 900 52 500 000 10 500 000	599 063 305	201 49 1 260 00 78 107 26 22 972 42 41 376 85 52 500 00
SECTION 1 SECTION 2 SECTION 3 SECTION 4 SECTION 5 SECTION 6 SECTION 7	AL CARRIED T %	5.0% O SUMMARY		112 875 000 160 014 764 637 350 1 260 000 176 009 400 291 965 957 22 972 425 15 039 938 52 500 000		112 375 000 143 669 21 9 698 250 1 260 000 176 009 400 288 037 582 22 972 425 15 039 338 52 500 000		112 875 000 152 281 184 1 050 000 1 260 000 176 009 400 310 745 665 22 972 425 15 039 938 52 500 000		129 683 229 698 250 1 260 000 176 009 400 192 437 634 28 642 425 15 039 938 52 500 000	744 140 534	148 828 107 1 050 000 1 260 000 287 810 271 28 642 425 15 039 338 52 500 000	832 185 296 0 0 5 5 8 0 0 0 0 0 0	428 400 1 260 000 176 009 400 163 625 254 28 642 425 15 039 938 52 500 000	846 874 666	169 374 933 901 950 1 280 000 205 440 480 355 303 411 28 642 425 20 997 900 52 500 000		192 850 190 1 213 800 1 260 000 205 440 480 472 367 846 28 642 425 20 997 900 52 500 000	599 063 305	201 49 1 260 00 78 107 26 22 972 42 41 376 85 52 500 00 300 740 26 23 155 00 78 750 00
SECTION 1 SECTION 2 SECTION 3 SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 SECTION 10 SECTION 10 SECTION 11 OTHER COSTS (PRELIM ESTIMATES - SITE Environmental Mitigation	MLAR FOR A Prov Sum Prov Sum	5.0% O SUMMARY 20.0% SUBTOTAL A LL OPTIONS 4 000 000 5 000 000		112 375 000 160 014 764 637 355 1 280 000 178 098 400 291 965 957 22 972 425 15 039 933 52 500 000 10 500 000 93 318 750 12 285 000 112 275 000 112 275 000 4 000 000 5 000 000	718 346 094	112 375 000 143 069 21 9 068 250 1 280 000 176 009 400 268 037 582 22 972 425 15 039 533 52 500 000 10 500 000 35 458 500 112 375 000 862 015 313 4 000 000 5 000 000		112.875.000 152.281.184 1.050.000 1.280.000 178.009.400 310.745.685 22.972.425 15.039.935 25.500.000 15.500.000 15.500.000 12.875.000 913.687.106 913.687.106 913.687.106 910.000.000 5.000.000		129 683 229 688 250 1 290 000 176 009 400 192 437 634 28 642 425 15 039 388 52 500 000 10 500 000 35 458 500 22 995 000 112 2875 600 778 099 376 778 099 370	744 140 534 1 1	148 828 107 1 950 000 1 76 009 400 176 009 400 176 009 400 178 7810 271 28 642 425 15 039 938 52 500 000 15 458 500 22 995 000 112 875 900 122 968 640 14 000 000 5 000 000	0 0 1 5 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	428 400 1 280 000 178 009 400 163 625 254 28 642 425 15 039 528 52 500 000 10 500 000 29 664 880 22 955 000 94 500 000 948 622 356 4 000 000 5 000 000	246 874 666 1 1	168 374 933 901 950 1 260 000 205 440 480 305 300 411 28 042 425 29 997 900 52 500 000 10 500 000 35 458 500 22 995 000 10 500 000 11 28 75 000 1 016 249 600 4 000 000 5 000 000		192 850 190 1 213 800 1 213 800 205 440 480 472 367 844 28 642 422 29 997 900 52 500 000 13 569 000 22 995 000 11 28 75 000 4 157 101 141 4 000 000 5 000 000	599 063 305	201 45 1 260 00 78 107 26 22 972 42 41 376 85 52 500 00 300 740 26 23 155 00 78 750 00 718 875 96 4 000 00 5 000 00
SECTION 1 SECTION 2 SECTION 3 SECTION 4 SECTION 5 SECTION 5 SECTION 6 SECTION 7 SECTION 9 SECTION 9 SECTION 9 SECTION 10 SECTION 10 SECTION 10 SECTION 11 SECTION 10 SECTION 10	% AL CARRIED T % % MLAR FOR A Prov Sum Prov Sum Prov Sum Prov Sum	5.0% O SUMMARY 20.0% SUBTOTAL A LL OPTIONS 4 000 000 5 000 000		112 375 000 160 014 764 637 350 1 260 000 176 009 400 291 965 957 22 972 425 15 039 933 62 500 000 93 318 750 22 955 000 112 275 000 960 088 584 4 000 000	718 346 094 718 346 094	112 875 000 143 689 21 9 688 250 1 280 000 178 009 400 286 037 582 22 977 425 15 039 538 52 500 000 10 500 000 35 458 500 22 985 000 112 875 000 862 015 313 4 000 000	761 405 <u>922</u>	112.875.000 152.281.184 1.050.000 1.260.000 1.76.094.00 310.745.655 22.972.422 15.03.938 52.500.000 35.458.500 22.995.000 112.875.000 913.687.106 913.687.106 4.000.000		129 683 229 698 250 120 000 176 009 400 192 437 634 28 642 425 15 039 388 52 500 000 10 500 000 35 456 500 22 985 000 112 875 900 778 099 376 4 000 000	744 140 534 1 1 1 1 1 1 1	148 828 107 1 050 000 1 260 000 1 76 009 400 287 810 271 28 642 422 15 039 928 52 500 000 10 500 000 10 500 000 112 875 000 892 963 640 128 75 000 892 963 640 4 000 000	2 0 1 5 8 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	428 400 1 280 000 178 009 400 183 625 254 15 039 338 52 500 000 10 500 000 286 684 820 22 986 000 94 500 000 998 622 356 4 000 000	846 874 666 1 1 1 1 1	169 374 933 901 950 1 260 000 205 440 426 355 303 411 28 642 425 29 997 900 52 500 000 10 500 000 10 500 000 13 456 500 22 995 000 112 875 900 1 016 249 600 4 000 000		192 850 190 1 213 800 1 260 000 205 440 420 472 367 846 22 997 900 52 500 000 10 500 000 35 456 500 22 995 000 11 2875 000 11 157 101 141 4 000 000	1	201 49 1 260 00 78 107 26 22 972 42 41 376 355 52 500 00 300 740 26 23 155 00 78 750 00 718 875 96 4 000 00
SECTION 1 SECTION 2 SECTION 3 SECTION 4 SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 7 SECTION 7 SECTION 9 SECTION 10 SECTION 10 SECTION 10 SECTION 11 GTHER COSTS (PRELIM ESTIMATES - SII Environmental Mitigation Servitudes Power lines Gauging Wair OVERALL CONTINGENCIES (% OF SUBTOTAL 8)	% % % % %	5.0% O SUMMARY 20.0% SUBTOTAL A SUBTOTAL A LL OPTIONS 4 000 000 5 000 000 5 000 000 5 000 000 5 000 000		112 875 000 160 014 744 637 350 1 260 000 178 009 400 291 965 957 22 972 425 15 039 938 52 500 000 10 500 000 940 048 544 4 000 000 5 000 000 5 000 000 5 000 000 5 000 000	718 346 094 718 346 094	112 375 000 143 089 219 086 250 1 280 000 176 009 400 280 037 582 22 972 425 15 039 988 52 500 000 10 500 000 35 458 500 22 985 000 12 275 000 862 015 313 4 000 000 5 000 000 5 000 000 5 000 000	761 405 <u>922</u>	112 875 000 152 28 1184 1 050 000 1 2860 000 1 78 005 400 20 972 425 20 972 425 20 972 425 20 972 425 20 000 10 560 000 10 2875 000 913 687 106 4 000 000 5 000 000 5 000 000 5 000 000	648.416.147 648.416.147 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	129 683 229 688 250 176 009 400 182 009 400 182 042 437 634 5 2500 000 10 500 000 35 458 500 22 945 000 112 875 000 112 875 000 112 875 000 778 009 376 4 000 000 5 000 000 5 000 000	744 140 534 1 1 1 1 1 1 1 917 488 640	148 828 107 1 48 828 107 1 260 000 1 78 009 400 287 810 271 28 642 422 15 039 932 52 500 000 10 500 000 35 458 500 22 995 000 112 875 000 112 875 000 112 875 000 112 875 000 112 000 000 5 000 000 5 000 000	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	428 400 1 280 000 176 009 400 186 625 254 16 039 420 10 500 600 10 500 600 22 995 000 996 622 356 4 000 000 5 000 000 5 000 000 5 000 000 5 000 000	846 874 996 1 1 1 1 1 1 1 1 1 040 749 600	1 168 374 933 961 955 1 280 000 205 440 480 3355 303 411 28 642 422 20 997 900 13 550 000 13 550 000 13 285 500 14 2875 000 14 000 000 5 000 000 5 000 000 5 000 000 5 000 000	1 1 1 1 1 1	192 850 190 121 800 1260 000 1260 000 1260 400 482 472 367 844 482 472 367 844 482 20 997 900 15 50 000 15 50 000 112 875 000 112 875 000 112 875 000 112 875 000 112 875 000 112 875 000 110 000 000 5 000 000 5 000 000	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	201 49 1 260 00 78 107 26 22 972 42 41 376 35 52 500 00 78 750 00 718 875 96 4 000 00 5 000 00 500 00 500 00 5 000 00
SECTION 1 SECTION 2 SECTION 3 SECTION 4 SECTION 4 SECTION 6 SECTION 7 SECTION 7 SECTION 9 SECTION 9 SECTION 10 SECTION 10 SECTION 10 SECTION 11 OTHER COSTS (PRELIM ESTIMATES - Sift Environmental Milgation Servitudes Power lines Gauging Weir	% % ML CARRIED T % % MLAR FOR A Pay Sum Ya Ya	5.0% SUMMARY 20.0% 20.0% 20.0% SUBTOTAL A SUBTOTAL A 4.000,000 5.000,000 10.000,000 10.000,000 10.000,000 10.000,000 10.000,000 10.000,000 SUBTOTAL A 5.0%	800 073 820 1 1 1 1 1 1	112 875 000 1100 014 724 637 350 1280 001 176 009 400 176 009 400 176 009 400 281 965 957 22 972 425 15 039 938 52 500 010 10 500 000 930 3318 750 12 295 000 112 275 000 112 275 000 112 875 000 112 875 000 110 050 000 500 5	718.346.094 718.346	112 375 609 143 699 219 143 699 219 1280 000 176 009 400 266 037 582 22 972 425 15 039 503 52 500 000 10 500 000 35 458 500 112 375 600 500 000 500 000	761 405 922 761 405 922 1 1 1 1 1 1 1 1 938 187 106	112 875 000 152 28 1124 1 65 0 000 1 260 000 1 76 009 400 3 10 745 655 22 972 425 15 053 932 52 500 000 10 500 000 33 455 500 913 687 100 913 687 100 500 000 500 000 50	648.416.147 648.416.147 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	129 683 229 688 250 1 260 000 176 009 400 192 437 634 15 039 938 5 2500 000 10 500 900 35 458 500 22 985 000 112 2875 000 5 000 000 5 0000 5 000 000 5 00000 5 0000000 5 000000000 5 0000000000	1 1 1 1 1 917 488 640	148 228 107 1 050 000 1 260 000 178 009 400 287 810 271 28 642 422 15 039 932 52 500 000 15 500 000 35 458 500 32 946 444 4 000 000 5 0000 5 0000 5 000000 5 00000000 5 0000000000	9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9 9	428 400 1 200 000 178 009 400 178 025 254 28 042 425 15 059 958 55 500 000 10 500 000 296 654 850 996 622 356 4 000 000 5 000 000 10 000 000 5 000 000 10 023 122 356 51 156 118 1 074 278 473	1 1 1 1 1 1	1 168 374 933 901 950 1 280 000 205 440 480 3355 303 411 28 642 422 20 997 900 25 2500 000 25 2500 000 22 995 000 22 995 000 22 995 000 1 016 249 600 1 016 249 600 1 040 749 600 5 000 000 1 040 749 600 5 2 037 480 1 092 787 030	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	192 250 190 1 213 800 1 213 800 1 246 000 205 440 485 472 367 846 485 472 367 846 485 472 367 846 485 20 997 900 15 50 000 15 55 500 000 15 55 500 000 1 557 101 141 4 000 000 5 0000 5 0000 5 0000 5 0000 5 00000 5 00000 5 00000 5 00000 5 00000 5 00000 5 0000000 5 0000000000	1 1 1 1 1 1 743 375 996	201 48 1 260 00 78 107 28 22 972 42 41 376 85 55 500 00 300 740 28 23 155 00 718 375 90 4 000 00 5 000 00 5 000 00 5 000 00 743 375 96 37 168 79

Sensitive rates table (/m ³ unless stated)			Adopted Rates Range	
Item	Unit	Low	Medium	High
Necessary soft excavation to graded filter	m ³	R 93.00	R 196.50	R 300.00
Necessary soft excavation to fill	m ³	R 35.00	R 40.50	R 46.00
Necessary hard excavation to fill	m ³	R 96.00	R 118.00	R 140.00
Necessary soft excavation to spoil	m ³	R 55.00	R 60.00	R 65.00
Necessary hard excavation to spoil	m ³	R 119.00	R 124.50	R 130.00
Necessary hard excavation to stockpile	m ³	R 90.00	R 95.00	R 100.00
Borrow soft excavation to graded filter	m ³	R 118.00	R 221.50	R 325.00
Borrow soft excavation to clay core	m ³	R 45.00	R 63.50	R 82.00
Borrow soft excavation to fill	m ³	R 85.00	R 90.50	R 96.00
Borrow hard excavation to fill	m ³	R 146.00	R 168.00	R 190.00
Structural concrete	m ³	R 2 500.00	R 3 150.00	R 3 800.00
RCC	m ³	R 400.00	R 650.00	R 900.00
IVRCC rate/m ²	m ²	R 192.00	R 312.00	R 432.00
GERCC rate/m ²	m ²	R 650.00	R 825.00	R 1 000.00

Table A.2 – Range of Rates Used for Major Cost Items Sensitivity Analysis

APPENDIX B

COST ESTIMATE FOR TWO RCC DAM WALL OPTIONS

Tables B.1: Revised Cost Estimates for the Maximum Sized Ntabelanga Dam

	ables B.1: Revised Cost Esti					"5	
SECTION 1	DESCRIPTION	UNIT		RATE	QUANTITY		AMOUNT
	L: SITE CLEARING	1					
1.1	Clearing and grubbing	ha	R	18 000.00	9	R	162 000.00
1.2	Topsoil stripping	m²	R	5.00	90000	R	450 000.00
1.3	Other items	%		5%	R 612 000.00	R	30 600.00
	SUBTO	TAL CARRII	EDT	FO SUMMARY		R	642 600.00
SECTION 2	2: DEALING WITH WATER						
2.1	Dewatering	Sum	R	200 000.00	1	R	200 000.00
2.2	Settling pond	Sum	R	500 000.00	1	R	500 000.00
2.3	Pollution control measures	Sum	R	500 000.00	1	R	500 000.00
2.4	Other items	%		5%	R 1 200 000.00	R	60 000.00
				O SUMMARY		R	1 260 000.00
SECTION ?	3: RIVER DIVERSION						1 100 000100
Jeenon	Stage 1 diversion works - coffer						
3.1	dams	Sum	R	5 000 000.00	1	R	5 000 000.00
5.1	Stage 2 - permanent works -	Sum		5 000 000.00	1		5 000 000.00
2 2	flood culverts and berms	Sum	Б	41 168 000 00	1	Р	41 169 000 00
3.2				41 168 000.00	1	R R	41 168 000.00 46 168 000.00
CECTION		TAL CARRI	וש	O SUIVIIVIART		ĸ	46 168 000.00
SECTION 4	4: EARTHWORKS	1					
	Necessary excavation to fill						
4.1	Graded filter	m³	R	196.50	Not Applicable		Not Applicable
4.2	Soft	m³	R	40.50	Not Applicable		Not Applicable
4.3	Hard	m³	R	118.00	Not Applicable	Ν	Not Applicable
	Compacted mudstone to 95%		1				
4.4	MOD. AASHTO in coffer dams	m³	R	40.50	See Section 3		See Section 3
	Compacted mudstone facing in		1				
4.5	coffer dams	m³	R	40.50	See Section 3		See Section 3
4.6	Hard excavation to stockpile	m³	R	95.00	248305	R	23 588 975.00
	Necessary excavation to spoil						
4.7	Soft	m³	R	60.00	34473	R	2 068 380.00
4.8	Hard	m³	R	124.50	Not Applicable	N	Not Applicable
	Borrow excavation to fill					-	
4.9	Graded filter	m³	R	221.50	Not Applicable	N	Not Applicable
4.10	Core Zone	m³	R	63.50	Not Applicable		Not Applicable
4.11	Soft	m³	R	90.50	Not Applicable		Not Applicable
4.11	Hard	m ³	R	168.00			
	1	m³	R		Not Applicable		Not Applicable
4.13	Riprap	rn-	к	30.00	Not Applicable		Not Applicable
4.14	Foundations	2	_			_	
4.15	Foundation Prep for core	m³	R	47.00	16440	R	772 680.00
4.16	Foundation treatment	m²	R	550.00	15473	R	8 510 150.00
4.17	Overbreak	m²	R	50.00	1500	R	75 000.00
4.18	Rock bolts	Nr	R	1 000.00	100	R	100 000.00
					Scheduled		Scheduled
4.19	Concrete elements	m³	R	3 150.00	elsewhere		elsewhere
4.20	Other items	%		5%	R 35 115 185.00	R	1 755 759.25
				O SUMMARY		R	36 870 944.25
SECTION 5	5: DRILLING, GROUTING, AND ASSO	CIATED W	ORK	s			
5.1	Mobilisation of plant	Sum	R	500 000.00	1	R	500 000.00
5.2	Set ups - grouting	Nr		4 350 00			275 000 00
5.2	Set ups - grouting		R	1 250.00	300	R	375 000.00
5.2	Set ups - control holes	Nr	R R	1 250.00	300 15		
	a		-			R	18 750.00
5.3	Set ups - control holes Drilling grout holes	Nr	R	1 250.00	15	R R	18 750.00
5.3	Set ups - control holes	Nr	R	1 250.00	15	R R	18 750.00 16 200 000.00
5.3 5.4 5.5	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery)	Nr m	R R	1 250.00 1 800.00 2 000.00	15 9000 450	R R R	18 750.00 16 200 000.00 900 000.00
5.3 5.4 5.5 5.6	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages	Nr m Mr	R R R R	1 250.00 1 800.00 2 000.00 1 000.00	15 9000 450 396	R R R R	18 750.00 16 200 000.00 900 000.00 396 000.00
5.3 5.4 5.5 5.6 5.7	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages	Nr m Mr Nr	R R R R R	1 250.00 1 800.00 2 000.00 1 000.00 2 000.00	15 9000 450 396 450	R R R R R	375 000.00 18 750.00 16 200 000.00 900 000.00 396 000.00 900 000.00 500 000.00
5.3 5.4 5.5 5.6 5.7 5.8	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement	Nr m Nr Nr t	R R R R R R	1 250.00 1 800.00 2 000.00 1 000.00 2 000.00 2 000.00	15 9000 450 396 450 250	R R R R R R	18 750.00 16 200 000.00 900 000.00 396 000.00 900 000.00 500 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite	Nr m Nr Nr t t	R R R R R R R	1 250.00 1 800.00 2 000.00 1 000.00 2 000.00 2 000.00 3 750.00	15 9000 450 396 450 250 25	R R R R R R R R	18 750.00 16 200 000.00 900 000.00 396 000.00 900 000.00 500 000.00 93 750.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes	Nr m Nr Nr t t Nr	R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00	15 9000 450 396 450 250 25 100	R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 396 000.00 900 000.00 500 000.00 93 750.00 120 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes	Nr m Nr t t Nr m	R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00	15 9000 450 396 450 250 25 25 100 1500	R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 396 000.00 900 000.00 500 000.00 93 750.00 120 000.00 1 875 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items	Nr m Nr t t Nr m %	R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5%	15 9000 450 396 450 250 25 100	R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 500 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO	Nr m Nr Nr t t Nr m % TAL CARRII	R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00	15 9000 450 396 450 250 25 25 100 1500	R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 396 000.00 900 000.00 500 000.00 93 750.00 120 000.00 1 875 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU	Nr m Nr t t Nr m % TAL CARRII	R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5%	15 9000 450 396 450 250 25 100 1500 R 21 878 500.00	R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 500 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 5.12 6.1	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete	Nr m Nr t t Nr m % TAL CARRII RE m3	R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 5% TO SUMMARY 1 200.00	15 9000 450 396 450 250 25 100 1500 R 21 878 500.00 0	R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 396 000.00 900 000.00 500 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete	Nr m Nr t t t TAL CARRII RE m3 m3	R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 5% TO SUMMARY 1 200.00 3 150.00	15 9000 450 396 450 250 25 100 1500 R 21 878 500.00 0 18655	R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 900 000.00 900 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00 58 763 250.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 5.12 5.12 6.1 6.2 6.3	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO Driber items SUBTO Star Concrete Structural concrete Reinforcement	Nr m Nr t t Nr TAL CARRII RE m3 t	R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% FO SUMMARY 1 200.00 3 150.00 20 000.00	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 900 000.00 900 000.00 93 750.00 120 000.00 1875 000.00 1 875 000.00 22 972 425.00 58 763 250.00 55 960 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2 6.3 6.4	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork	Nr m Nr t t Nr TAL CARRII RE m3 m3 t m2	R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 5% TO SUMMARY 1 200.00 3 150.00 20 000.00	15 9000 450 396 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 900 000.00 900 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00 58 763 250.00 55 960 000.00 2 456 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 5.12 5.12 6.1 6.2 6.3	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork	Nr m Nr t t Nr TAL CARRII RE m3 t	R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% FO SUMMARY 1 200.00 3 150.00 20 000.00	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 500 000.00 93 750.00 120 000.00 1 875 000.00 1 93 925.00 22 972 425.00 58 763 250.00 55 960 000.00 2 456 000.00 9 165 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2 6.3 6.4	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork	Nr m Nr t t Nr TAL CARRII RE m3 m3 t m2	R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 5% TO SUMMARY 1 200.00 3 150.00 20 000.00	15 9000 450 396 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 900 000.00 900 000.00 93 750.00 120 000.00 1875 000.00 1 093 925.00 22 972 425.00 55 960 000.00 2 456 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2 6.3 6.4 6.5	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork	Nr m Nr t t Nr TAL CARRII RE m3 t m3 t m2 m2	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 5% TO SUMIMARY 1 200.00 3 150.00 20 000.00 500.00	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 396 000.00 900 000.00 500 000.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00 55 960 000.00 2 456 000.00 9 165 000.00 527 250.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2 6.3 6.4 6.5 6.6	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO S: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork	Nr m Nr t t Nr TAL CARRII RE m3 m3 t m2 m2 m2	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% TO SUMMARY 1 200.00 3 150.00 20 000.00 500.00 600.00	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 396 000.00 900 000.00 500 000.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00 58 763 250.00 55 960 000.00 2 456 000.00 527 250.00 2 000 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2 6.3 6.4 6.5 6.6 6.7	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork Soffit formwork	Nr m Nr t t Nr TAL CARRII RE m3 m3 t m2 m2 m2 Sum	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% FO SUMMARY 1 200.00 3 150.00 20 000.00 500.00 600.00 750.00 2 000 000.00	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703 1	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 396 000.00 900 000.00 900 000.00 900 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00 58 763 250.00 55 960 000.00 2 456 000.00 9 165 000.00 527 250.00 2 000 000.00 600 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork Soffit formwork Structural steelwork Concrete slide for plant removal Other items	Nr m Nr t t Nr m m TAL CARRII RE m3 m3 t t m2 m2 m2 sum Sum	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% FO SUMMARY 1 200.00 3 150.00 20 000.00 500.00 750.00 2 000 000.00 600.00	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703 1 1	R R R R R R R R R R R R R R R R R R R	$\begin{array}{c} 18\ 750.00\\ \hline 16\ 200\ 000.00\\ \hline 900\ 000.00\\ \hline 396\ 000.00\\ \hline 900\ 000.00\\ \hline 900\ 000.00\\ \hline 900\ 000.00\\ \hline 120\ 000.00\\ \hline 120\ 000.00\\ \hline 120\ 000.00\\ \hline 22\ 972\ 425.00\\ \hline 55\ 960\ 000.00\\ \hline 55\ 960\ 000.00\\ \hline 527\ 250.00\\ \hline 527\ 250.00\\ \hline 600\ 000.00\\ \hline 6\ 473\ 575.00\\ \hline \end{array}$
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 5.12 5.12 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 5UBTOTA	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Sonoth formwork Soffit formwork Structural steelwork Concrete slide for plant removal Other items L CARRIED TO SUMMARY	Nr m Nr t t Nr TAL CARRII RE m3 t t m2 m2 m2 Sum Sum Sum	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% TO SUMMARY 1 200.00 3 150.00 20 000.00 500.00 600.00 750.00 2 000 000.00 600 000.00 5%	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703 1 1 R 129 471 500.00	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 396 000.00 900 000.00 900 000.00 900 000.00 93 750.00 120 000.00 1 875 000.00 1 093 925.00 22 972 425.00 58 763 250.00 55 960 000.00 2 456 000.00 9 165 000.00 527 250.00 2 000 000.00 600 000.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 5.12 5.12 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 5UBTOTA	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork Structural steelwork Structural steelwork Concrete slide for plant removal Other items L CARRIED TO SUMMARY 7: DRAWOFF AND OUTLET CONDUIT	Nr m Nr t t Nr TAL CARRII RE m3 t t m2 m2 m2 Sum Sum Sum	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% TO SUMMARY 1 200.00 3 150.00 20 000.00 500.00 600.00 750.00 2 000 000.00 600 000.00 5%	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703 1 1 R 129 471 500.00	R R R R R R R R R R R R R R R R R R R	$\begin{array}{c} 18\ 750.00\\ \hline 16\ 200\ 000.00\\ \hline 900\ 000.00\\ \hline 396\ 000.00\\ \hline 900\ 000.00\\ \hline 900\ 000.00\\ \hline 900\ 000.00\\ \hline 120\ 000.00\\ \hline 120\ 000.00\\ \hline 120\ 000.00\\ \hline 22\ 972\ 425.00\\ \hline 55\ 960\ 000.00\\ \hline 55\ 960\ 000.00\\ \hline 527\ 250.00\\ \hline 527\ 250.00\\ \hline 600\ 000.00\\ \hline 6\ 473\ 575.00\\ \hline \end{array}$
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 SECTION 6 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 SUBTOTAI	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork Smooth formwork Soffit formwork Structural steelwork Concrete slide for plant removal Other items LCARRIED TO SUMMARY 7: DRAWOFF AND OUTLET CONDUIT	Nr m Nr t t Nr TAL CARRII RE m3 m3 t m2 m2 m2 m2 m2 sum Sum %	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 5% TO SUMIMARY 1 200.00 3 150.00 2 0 000.00 500.00 500.00 2 000 000.00 600 000.00 5% PELINES TO W	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703 1 1 R 129 471 500.00 TW	R R R R R R R R R R R R R R R R R R R	18 750.00 16 200 000.00 900 000.00 900 000.00 900 000.00 900 000.00 120 000.00 120 000.00 120 000.00 120 972 425.00 22 972 425.00 55 960 000.00 55 960 000.00 527 250.00 2 000 000.00 600 000.00 6473 575.00 135 945 075.00
5.3 5.4 5.5 5.6 5.7 5.8 5.9 5.10 5.11 5.12 5.12 5.12 5.12 6.1 6.2 6.3 6.4 6.5 6.6 6.7 6.8 6.9 5UBTOTA	Set ups - control holes Drilling grout holes Drilling control holes (with core recovery) Grouting in stages Water testing in stages Cement Bentonite Place drain holes Drill drain holes Other items SUBTO 5: DRAWOFF AND OUTLET STRUCTU Mass concrete Structural concrete Reinforcement Rough formwork Smooth formwork Structural steelwork Structural steelwork Concrete slide for plant removal Other items L CARRIED TO SUMMARY 7: DRAWOFF AND OUTLET CONDUIT	Nr m Nr t t Nr TAL CARRII RE m3 t t m2 m2 m2 Sum Sum Sum	R R R R R R R R R R R R R R R R R R R	1 250.00 1 800.00 2 000.00 2 000.00 2 000.00 3 750.00 1 200.00 1 250.00 5% TO SUMMARY 1 200.00 3 150.00 20 000.00 500.00 600.00 750.00 2 000 000.00 600 000.00 5%	15 9000 450 250 25 100 1500 R 21 878 500.00 0 18655 2798 4912 15275 703 1 1 R 129 471 500.00	R R R R R R R R R R R R R R R R R R R	$\begin{array}{c} 18\ 750.00\\ \hline 16\ 200\ 000.00\\ \hline 900\ 000.00\\ \hline 396\ 000.00\\ \hline 900\ 000.00\\ \hline 900\ 000.00\\ \hline 900\ 000.00\\ \hline 120\ 000.00\\ \hline 120\ 000.00\\ \hline 120\ 000.00\\ \hline 22\ 972\ 425.00\\ \hline 55\ 960\ 000.00\\ \hline 55\ 960\ 000.00\\ \hline 527\ 250.00\\ \hline 527\ 250.00\\ \hline 600\ 000.00\\ \hline 6\ 473\ 575.00\\ \hline \end{array}$

TENINO.	DESCRIPTION	UNIT		RATE		QUANTITY		AMOUNT
SECTION	8: DAM WALL AND SPILLWAY							
8.1	RCC Mix	m3	R	650.00		361000	R	234 650 000.00
8.2	IVRCC upstream face	m2	R	312.00		15200	R	4 742 400.00
8.3	IVRCC downstream face	m2	R	312.00		17000	R	5 304 000.00
	Formwork for IVRCC on							
8.4	downstream face	m2	R	400.00		17000	R	6 800 000.00
8.5	Reinforcement	t	R	20 000.00		31	R	620 000.00
8.6	IVRCC to drainage gallery	m2	R	312.00		500	R	156 000.00
8.7	300mm waterstop	m	R	1 800.00		1500	R	2 700 000.00
	Drain holes from dam crest to							
8.8	gallery - set up	Nr	R	2 500.00		100	R	250 000.00
	Drain holes from dam crest to							
8.9	gallery - drilling	m	R	3 500.00		3900	R	13 650 000.00
	Precast concrete copings on							
8.10	parapet wall	Nr	R	1 000.00		800	R	800 000.00
8.11	Dowels into RCC	Nr	R	1 000.00		400	R	400 000.00
8.12	Rock anchors	Nr	R	1 500.00		450	R	675 000.00
						Scheduled		Scheduled
8.13	Reinforced concrete work	m3	R	3 150.00		elsewhere		elsewhere
8.14	Reinforcement	t	R	20 000.00		20	R	400 000.00
0.14				20 000.00		Scheduled		Scheduled
8.15	Rough formwork	m2	R	400.00		elsewhere		elsewhere
8.15	Kough totti work	1112		400.00		Scheduled		Scheduled
8.16	Smooth formwork	m2	R	500.00		elsewhere		elsewhere
8.10	Other items	%	R.	5%	R	270 747 400.00	R	13 537 370.00
0.17		· · · · ·			ĸ	270 747 400.00		
SECTION (9: OTHER MECHANICAL AND ELECTR			O SUMMARY			R	284 684 770.00
9.1	Standby generator set	Nr	R	500 000.00		1	R	500 000.00
9.1	Other mechniacal equipment	Sum	R	2 000 000.00		1	R	2 000 000.00
9.2		Nr	R	200 000.00		2	R	
9.5	High mast tower All electrical fittings and wirings	Sum	R			1	R	400 000.00 5 000 000.00
		Sum	R	5 000 000.00 2 000 000.00			R	
9.5	Instrumentation		-			1	R	2 000 000.00 200 000.00
9.6	Ventilation system to gallery	Sum %	R	200 000.00	R			
9.7	Other items			5% O SUMMARY	ĸ	10 100 000.00	R R	505 000.00
SUMMAR		TAL CARRI	EDI	U SUIVIIVIART			ĸ	10 605 000.00
SUIVIIVIAN	PRELIMINARY AND GENERAL	%	T	20%	R	627 972 914 25	R	125 574 762 95
	SECTION 1	%	-	20%	ĸ	627 873 814.25	R	125 574 762.85 642 600.00
			-					
	SECTION 2						R	1 260 000.00
							Р	
	SECTION 3						R	46 168 000.00
	SECTION 4						R	36 870 944.25
	SECTION 4 SECTION 5						R R	36 870 944.25 22 972 425.00
	SECTION 4 SECTION 5 SECTION 6						R R R	36 870 944.25 22 972 425.00 135 945 075.00
	SECTION 4 SECTION 5 SECTION 6 SECTION 7						R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8						R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00
	SECTION 4 SECTION 5 SECTION 6 SECTION 7						R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9			SUBTOTAL A			R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF						R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9	%		5%	R	753 448 577.10	R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A)	%				753 448 577.10	R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS	%		5%		753 448 577.10	R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN	%		5%		753 448 577.10	R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS			5%			R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN	%		5%		753 448 577.10	R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86 791 121 005.96
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN & MONITORING) Fees and disbursements	%		5% SUBTOTAL B	R		R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00
	SECTION 4 SECTION 5 SECTION 6 SECTION 7 SECTION 8 SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN & MONITORING) Fees and disbursements	%		5% SUBTOTAL B 12.5%	R		R R R R R R R R R R R	36 870 944.25 22 972 425.00 135 945 075.00 88 725 000.00 284 684 770.00 10 605 000.00 753 448 577.10 37 672 428.86 791 121 005.96 98 890 125.74

Tables B.2: Revised Cost Estimates for the Minimum Sized Ntabelanga Dam

	Tables B.2: Revised Cost Esti					
		UNIT		RATE	QUANTITY	AMOUNT
	1: SITE CLEARING	h -		18,000,00	~	P 120.000.00
1.1	Clearing and grubbing	ha ?	R	18 000.00	7	R 126 000.00
1.2	Topsoil stripping	m²	R	5.00	70000	R 350 000.00
1.3	Other items	%		5%	R 476 000.00	R 23 800.00
CECTION .		IAL CARRIE	:D I	O SUMMARY		R 499 800.00
	2: DEALING WITH WATER	Curre	Б	200,000,00	1	R 200 000.00
2.1	Dewatering Sattling nand	Sum	R	200 000.00	1	
2.2	Settling pond	Sum Sum	R R	500 000.00	1	R 500 000.00 R 500 000.00
2.3	Pollution control measures Other items	%	ĸ	5%	R 1 200 000.00	R 60 000.00
2.4				O SUMMARY	R 1200000.00	R 1260 000.00
SECTION	3: RIVER DIVERSION			O SOIVIIVIARI		K 1200 000.00
SECTION	Stage 1 diversion works - coffer					
3.1	dams	Sum	R	5 000 000.00	1	R 5 000 000.00
5.1	Stage 2 - permanent works -	Sam		5 000 000.00		1 5 000 000.00
3.2	flood culverts and berms	Sum	R	33 725 000.00	1	R 33 725 000.00
-				O SUMMARY		R 38 725 000.00
SECTION	4: EARTHWORKS					
	Necessary excavation to fill		Ι			
4.1	Graded filter	m³	R	196.50	Not Applicable	Not Applicable
4.2	Soft	m ³	R	40.50	Not Applicable	Not Applicable
4.3	Hard	m³	R	118.00	Not Applicable	Not Applicable
	Compacted mudstone to 95%		<u> </u>			
4.4	MOD. AASHTO in coffer dams	m³	R	40.50	See Section 3	See Section 3
	Compacted mudstone facing in					
4.5	coffer dams	m³	R	40.50	See Section 3	See Section 3
4.6	Hard excavation to stockpile	m³	R	95.00	223704	R 21 251 880.00
	Necessary excavation to spoil			55.00	223701	
4.7	Soft	m³	R	60.00	28539	R 1 712 340.00
4.8	Hard	m ³	R	124.50	Not Applicable	Not Applicable
	Borrow excavation to fill					
4.9	Graded filter	m³	R	221.50	Not Applicable	Not Applicable
4.10	Core Zone	m ³	R	63.50	Not Applicable	Not Applicable
4.11	Soft	m ³	R	90.50	Not Applicable	Not Applicable
4.12	Hard	m³	R	168.00	Not Applicable	Not Applicable
4.13	Riprap	m³	R	30.00	Not Applicable	Not Applicable
4.14	Foundations			50.00	Hoertppheable	Hotrippileable
4.15	Foundation Prep for core	m³	R	47.00	10641	R 500 127.00
4.16	Foundation treatment	m²	R	550.00	9374	R 5 155 700.00
4.17	Overbreak	m²	R	50.00	1500	R 75 000.00
4.18	Rock bolts	Nr	R	1 000.00	100	R 100 000.00
4.10			I.	1000.00	Scheduled	Scheduled
4.19	Concrete elements	m³	R	3 150.00	elsewhere	elsewhere
4.20	Other items	%		5%	R 28 795 047.00	R 1 439 752.35
		TAL CARRIE	ED T	O SUMMARY		R 30 234 799.35
SECTION	5: DRILLING, GROUTING, AND ASSO					
5.1	Mobilisation of plant	Sum	R	500 000.00	1	R 500 000.00
5.2	Set ups - grouting	Nr	R	1 250.00	220	R 275 000.00
5.3	Set ups - control holes	Nr	R	1 250.00	10	R 12 500.00
5.4	Drilling grout holes	m	R	1 800.00	6600	R 11 880 000.00
	Drilling control holes (with core		Ē			
5.5	recovery)	m	R	2 000.00	300	R 600 000.00
5.6	Grouting in stages	Nr	R	1 000.00	300	R 300 000.00
5.7	Water testing in stages	Nr	R	2 000.00	325	R 650 000.00
5.8	Cement	t	R	2 000.00	180	R 360 000.00
5.9	Bentonite	t	R	3 750.00	20	R 75 000.00
5.10	Place drain holes	Nr	R	1 200.00	75	R 90 000.00
5.11	Drill drain holes	m	R	1 250.00	1100	R 1375 000.00
5.12	Other items	%	<u> </u>	5%	R 16 117 500.00	R 805 875.00
			DT		000.00	R 16 923 375.00
SECTION	6: DRAWOFF AND OUTLET STRUCTU					
6.1	Mass concrete	m3	R	1 200.00	0	R -
6.2	Structural concrete	m3	R	3 150.00	12872	R 40 546 800.00
6.3	Reinforcement	t	R	20 000.00	1931	R 38 620 000.00
6.4	Rough formwork	m2	R	500.00	2945	R 1 472 500.00
6.5	Smooth formwork	m2	R	600.00	10970	R 6 582 000.00
6.6	Soffit formwork	m2	R	750.00	703	R 527 250.00
6.7	Structural steelwork	Sum	R	2 000 000.00	1	R 2 000 000.00
6.8	Concrete slide for plant removal	Sum	R	600 000.00	1	R 600 000.00
6.9	Other items	%	<u> </u>	5%	R 90 348 550.00	R 4 517 427.50
	AL CARRIED TO SUMMARY	/0	-	370	50 540 550.00	R 94 865 977.50
	7: DRAWOFF AND OUTLET CONDUIT	S FTC (INC			TW)	
	Mechanical & Electrical Works -			IO W	· -• ,	
7.1	Incl Gates and Pipework*	Sum	R	55 000 000.00	1	R 55 000 000.00
7.1	Other items	%	<u> </u>	5%	R 55 000 000.00	R 2 750 000.00
1.2					n 35.000.000.00	
	SUBIO	IAL CAKKIL	ויי	O SUMMARY	1	R 57 750 000.00

B - 4

ITEM NO.	DESCRIPTION	UNIT		RATE		QUANTITY		AMOUNT
SECTION 8	3: DAM WALL AND SPILLWAY							
8.1	RCC Mix	m3	R	650.00		141000	R	91 650 000.00
8.2	IVRCC upstream face	m2	R	312.00		6916	R	2 157 792.00
8.3	IVRCC downstream face	m2	R	312.00		12036	R	3 755 232.00
	Formwork for IVRCC on							
8.4	downstream face	m2	R	400.00		12036	R	4 814 400.00
8.5	Reinforcement	t	R	20 000.00		31	R	620 000.00
8.6	IVRCC to drainage gallery	m2	R	312.00		500	R	156 000.00
8.7	300mm waterstop	m	R	1 800.00		1500	R	2 700 000.00
	Drain holes from dam crest to							
8.8	gallery - set up	Nr	R	2 500.00		100	R	250 000.00
	Drain holes from dam crest to							
8.9	gallery - drilling	m	R	3 500.00		3900	R	13 650 000.00
	Precast concrete copings on							
8.10	parapet wall	Nr	R	1 000.00		880	R	880 000.00
8.11	Dowels into RCC	Nr	R	1 000.00		400	R	400 000.00
8.12	Rock anchors	Nr	R	1 500.00		450	R	675 000.00
						Scheduled		Scheduled
8.13	Reinforced concrete work	m3	R	3 150.00		elsewhere		elsewhere
8.14	Reinforcement	t	R	20 000.00		20	R	400 000.00
						Scheduled		Scheduled
8.15	Rough formwork	m2	R	400.00		elsewhere		elsewhere
						Scheduled		Scheduled
8.16	Smooth formwork	m2	R	500.00		elsewhere		elsewhere
8.17	Other items	%		5%	R	121 708 424.00	R	6 085 421.20
			ED T	O SUMMARY			R	128 193 845.20
SECTION	: OTHER MECHANICAL AND ELECTR							
9.1	Standby generator set	Nr	R	500 000.00		1	R	500 000.00
9.2	Other mechniacal equipment	Sum	R	2 000 000.00		1	R	2 000 000.00
9.3	High mast tower	Nr	R	200 000.00		2	R	400 000.00
9.4	All electrical fittings and wirings	Sum	R	5 000 000.00		1	R	5 000 000.00
9.5	Instrumentation	Sum	R	2 000 000.00		1	R	2 000 000.00
9.6	Ventilation system to gallery	Sum	R	200 000.00		1	R	200 000.00
9.7	Other items	%		5%	R	10 100 000.00	R	505 000.00
-		TAL CARRI	ED T	O SUMMARY			R	10 605 000.00
SUMMAR		-						
	PRELIMINARY AND GENERAL	%		20%	R	379 057 797.05	R	75 811 559.41
	SECTION 1						R	499 800.00
	SECTION 2						R	1 260 000.00
	SECTION 3						R	38 725 000.00
	SECTION 4		1				R	30 234 799.35
	SECTION 5		1				R	16 923 375.00
	SECTION 6						R	94 865 977.50
			1		<u> </u>			57 750 000.00
	SECTION 7						R	2. 750 000.00
	SECTION 7						R R	128 193 845 20
	SECTION 8						R	
							R R	128 193 845.20 10 605 000.00 454 869 356.46
	SECTION 8 SECTION 9			SUBTOTAL A			R	10 605 000.00
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF	%				454 860 356 46	R R R	10 605 000.00 454 869 356.46
	SECTION 8 SECTION 9	%		5%	R	454 869 356.46	R R R	10 605 000.00 454 869 356.46 22 743 467.82
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A)	%			R	454 869 356.46	R R R	10 605 000.00 454 869 356.46 22 743 467.82
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS	%		5%	R	454 869 356.46	R R R	10 605 000.00 454 869 356.46 22 743 467.82
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN	%		5%	R	454 869 356.46	R R R	10 605 000.00 454 869 356.46 22 743 467.82
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN & MONITORING)			5% SUBTOTAL B	R		R R R R	10 605 000.00 454 869 356.46 22 743 467.82 477 612 824.28
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN & MONITORING) Fees and disbursements	%		5% SUBTOTAL B 12.5%	R	454 869 356.46 477 612 824.28	R R R R	10 605 000.00 454 869 356.46 22 743 467.82 477 612 824.28 59 701 603.04
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN & MONITORING) Fees and disbursements SUBTO	% TAL CARRI		5% SUBTOTAL B 12.5% O SUMMARY	R	477 612 824.28	R R R R R R	10 605 000.00 454 869 356.46 22 743 467.82 477 612 824.28 59 701 603.04 537 314 427.32
	SECTION 8 SECTION 9 OVERALL CONTINGENCIES (% OF SUBTOTAL A) EIA, AND ENGINEERING COSTS (FOR DESIGN, CONTRACT ADMIN & MONITORING) Fees and disbursements	%		5% SUBTOTAL B 12.5%	R		R R R R	10 605 000.00

OTHER I	NFRASTRUCTU			
Upgrading surfaced main access roads	km	R 4 000 000.00	14	R 56 000 000.00
Upgrading gravel main access roads	km	R 2 000 000.00	20	R 40 000 000.00
Upgrade and realignment of villages				
access roads	km	R 750 000.00	33	R 24 750 000.00
Temporary haul roads	km	R 500 000.00	10	R 5 000 000.00
Downstream bridge across river	Sum	R 25 000 000.00	1	R 25 000 000.00
Operator Housing Complex	Sum	R 26 000 000.00	1	R 26 000 000.00
Visitors Centre	Sum	R 15 000 000.00	1	R 15 000 000.00
Temporary water supply, abstraction, treatment and supply	Sum	R 1 500 000.00	1	R 1 500 000.00
	Sum	R 1500000.00	1	R 15 000 000.00
Wastewater treatment plant Power lines & Transformers (2 x 11	Sum	K 15000000.00	L	R 15 000 000.00
kVA)	km	R 1 000 000.00	26	R 26 000 000.00
Gauging Weir	Prov Sum	R 3 000 000.00	1	R 3 000 000.00
Other items	%	10%	R 208 250 000.00	R 20 825 000.00
		SUB-TOTAL A		R 258 075 000.00
OTHE	R PROVISIONA	AL SUMS		
Expropriation Costs	Prov Sum	R 5 000 000.00	1	R 5 000 000.00
Environmental Mitigation	Prov Sum	R 5 000 000.00	1	R 5 000 000.00
Resettlement	Prov Sum	R 5 000 000.00	1	R 5 000 000.00
Servitudes	Prov Sum	R 1000000.00	1	R 1000000.00
		SUBTOTAL B		R 16 000 000.00
		SUBTOTAL A + B		R 274 075 000.00
Engineering and EMP Services	%	12.5%	R 274 075 000.00	R 34 259 375.00
		SUB-TOTAL C		R 308 334 375.00
PLUS VAT	%	14%	R 308 334 375.00	R 43 166 812.50
GRAND TOTAL INFRASTRU	CTURE AND PE	ROVSIONAL SUMS		R 351 501 187.50

Table B.3: Cost Estimates of Associated and Appurtenant Works

Table B.4: Basis of Estimation for Some Key Items

Cost Estimates	Unit	Qty	Rate		Amount	Remarks
Roads						
Surfaced	km	20	R 4 000 000.00	R	80 000 000.00	All-in rates obtained from J&G's Roads Division
Good quality gravel	km	20	R 2 000 000.00	R	40 000 000.00	All-in rates obtained from J&G's Roads Division
Gravel	km	33	R 750 000.00	R	24 750 000.00	All-in rates obtained from J&G's Roads Division
Temp haul roads	km	10	R 500 000.00	R	5 000 000.00	All-in rates obtained from J&G's Roads Division
River Bridge	m²	1110	R 14 000.00	R	15 540 000.00	Confirmed m ² rate from J&G Bridges Experts
Hydropower building at Ntabelanga	m²	550	R 10 000.00	R	5 500 000.00	Estimated m ² rate based on buildings with basement and requiring overhead crane facilities
Admin block	m²	35	R 6 000.00	R	210 000.00	Rate for admin buildings from building estimation handbook
Outlet works						
Pipework	t	1400	R 36 000.00	R	50 400 000.00	Escalated Dikgatlong dam rate x steel volume in pipes
Large Valves						
3000mm diameter butterfly valves	no.	9	R 3 000 000.00	R	27 000 000.00	R2 600 000 per valve with 15% markup for transport handling (quotation from supplier)
2200mm diameter butterfly valves	no.	1	R 1 320 000.00	R	1 320 000.00	R1 100 000 per valve with 20% markup for transport handling (quotation from supplier)
1600mm diameter butterfly valves	no.	1	R 775 000.00	R	775 000.00	R620 000 per valve with 25% markup for transport handling (quotation from supplier)
1600mm sleeve valve	no.	1	R 3 330 000.00	R	3 330 000.00	R2 775 000 per valve with 20% markup for transport handling (quotation from supplier)
			Sub-Total	R	32 425 000.00	
Allowance for electronic/hydraulic						
valve actuation equipment	%	5%	R 32 425 000.00	R	1 621 250.00	
Temporary Water Supply	Sum	1	R 400 000.00	R	400 000.00	Quotation from <i>GR Solutios</i> for 6m ³ /hr plant)
Temporary water abstraction	Sum	1	R 500 000.00	R	500 000.00	Provisional sum based on similar projects
Temporary water transfer	Sum	1	R 500 000.00	R	500 000.00	Provisional sum based on similar projects
Wastewater treatment plant	Sum	1	R 15 000 000.00	R	15 000 000.00	Escalated cost from Metolong dam advance works schedules
Housing	Sum	1	R 26 000 000.00	R	26 000 000.00	Escalated cost from Metolong schedules (includes limited units - see email 9/01/2014)

APPENDIX C

COST ESTIMATE FOR WATER TREATMENT WORKS

NTABELANG	A WTW - C	OST	ESTIMATE	- F	ULL CAPA	CITY	
Capacity	85	MI/d	av	1			
		MI/d	peak				
							-
DESCRIPTION	Civil		Mechanical		Electrical		Sub-total
MAIN WORKS	2 400 000	sum	300 000		55 000		2 755 000
Aeration	4 000 000	sum	2 500 000		250 000		6 750 000
Sedimentation basins (coag & floc)	55 000 000	sum	42 000 000		25 000 000		122 000 000
Rapid sand filtration	30 000 000	sum	20 000 000		9 000 000		59 000 000
Backwash storage	1 250 000	sum	75 000		75 000		1 400 000
Chlorine dosing	350 000	sum	1 000 000		500 000		1 850 000
Sludge thickeners	8 000 000	sum	1 500 000		500 000		10 000 000
Sub-Total	101 000 000	50%	67 375 000	#	35 380 000	17%	203 755 000
Factor: Rural area	10 100 000		6 737 500		3 538 000	10%	20 375 500
Factor: Rock excavation	20 200 000		13 475 000		7 076 000	20%	40 751 000
Sub-total 1- Main Works							264 881 500
OTHER WORKS	Quant	Unit	Rate Rand	an	d		Total Rand
Clear water reservoir	25 000	m3	1 500				37 500 000
	Civil		Mechanical		Electrical		
	31 875 000		3 750 000		1 875 000		
Sludge lagoons							33 700 000
Lagoons	3 000	m3	10 800				33 700 000
Chlorination	1	Sum	150 000				
Stormwater Berms	1	Sum	1 000 000				
	Civil		Mechanical		Electrical		
	28 645 000		3 370 000		1 685 000		
Telemetry/control							3 350 000
Telemetry							
Cabling	4 000	m	100				
Other							
	Civil		Mechanical		Electrical		
	167 500		335 000		2 847 500		
Buildings							30 500 000
Admin	900	m2	20 000				
First Aid Room	100	m2	20 000	\Box			
Lab	150	m2	20 000	Ш			
Mechanical workshop	150	m2	15 000	Щ			
Electrical workshop	150	m2	15 000				
Sub-station Stores	200	m2 m2	10 000 10 000				
310165	Civil	111Z	Mechanical		Electrical		
	25 925 000		1 525 000		3 050 000		
Electrical infrastructure from Su					0 000 000		2 475 000
11 kV cable	400	m	2 000	\mathbb{H}			2 4/3 000
Switchgear	1	-	100 000	\square			
Sub-station/transformer	1	sum	500 000	П			
low voltage	150	m	1 500				
Meter	1	sum	200 000				
Connection fee	1	sum	400 000	Ц			
Breaker at sub-station	1	sum	250 000				
	Civil		Mechanical		Electrical		
	123 750		247 500		2 103 750		

Table C.1: Cost Estimate for the Ntabelanga WTW – Full Capacity – 85 000 m³/day

....(cont)

Standby Gen Sets at WTW				1		17 100 000	
Gensets - 2 X 2000 kVA sets							
Small genset - 100 kVA							
Change-over panel							
Synchronisation panel Storage tank/bunding/lining							
Diesel							
Building for gensets 80 m2@R 1	0000/m2						
Transport to site							
	Civil		Mechanical		Electrical		
	855 000		1 710 000		14 535 000		
Spares						10 000 000	
oparoo						10 000 000	
· · · •							
Internal Roads	00.000		000			7 000 000	
Paving Kerbs	20 000 5 000	m2	300 200				
Reibs	Civil	m	Mechanical		Electrical		
	7 000 000		-		-		
						4 070 000	
Site lighting, security and fencing	ng 4	No	200 000	\vdash		1 870 000	
Site lighting Street lighting	600	No. No.	200 000	⊢			
Security fencing	1 500	m	300	\vdash			
Security gate	2	No.	20 000				
Gate house	2	No.	20 000				
Temporary fencing security	600	m	300				
	Civil		Mechanical		Electrical		
	710 000		-		1 160 000		
Landscaping						1 000 000	
	Civil		Mechanical		Electrical		
	1 000 000		-		-		
Assisted operation (6 months)	m3/d	R/m3	days			35 872 656	
Human resources	85 000	0.25	183			33 872 030	
Power costs incl pumping	85 000		183				
Chemicals	85 000		183				
Maintenance costs	85 000	0.20	183				
Other costs	85 000	0.15	183				
H/O overheads & profits (25%)		0.25					
Sub-Total 2 - Other Works						180 367 656	
Sub-Total 1 + Sub-Total 2							
						445 249 156	
P&Gs						111 312 289	
Sub-total 3						556 561 445	
Contingencies						83 484 217	
Sub-total 4						640 045 662	
Detail Design fees						80 005 708	
			TOTAL CO)))	T RAND (excl va	t) 720 051 370	
			TOTAL CO		· · · · · ·	1 120 031 370	
				V	AT 14%	100 807 192	
			TOTAL C	os	T RAND (incl vat) 820 858 562	
	Civil		Mechanical		Electrical	Non-Works	Total
Component Cost Estimates	239 009 024		103 463 246		76 921 681	48 171 874	467 565 825
P&Gs 25%	59 752 256		25 865 811	\vdash	19 230 420	12 042 969	116 891 456
Sub-total	298 761 280		129 329 057	_	96 152 101	60 214 843	584 457 281
Contingencies 10%	29 876 128		12 932 906		9 615 210	6 021 484	58 445 728
Sub-total	328 637 408		142 261 963		105 767 311	66 236 327	642 903 009
Detail Design fees 12%	39 436 489	 	17 071 436	⊢	12 692 077	7 948 359	77 148 361
¥		<u> </u>		⊢			
Sub-Total (Excl VAT)	368 073 896		159 333 398	<u> </u>	118 459 389	74 184 686	720 051 370
VAT 14%	51 530 346	L	22 306 676	L	16 584 314	10 385 856	100 807 192
TOTAL COST RAND (incl vat)	419 604 242		181 640 074		135 043 703	84 570 542	820 858 562
	110 004 242		101 040 014	-	100 040 700	57 010 072	020 000 002
			TOTAL	co	ST RAND	820 858 562	

Capacity	43	MI/d	av				
	51	MI/d	peak				
DESCRIPTION	Civil		Mechanical		Electrical		Sub-total
MAIN WORKS							
Inlet works	2 400 000	sum	300 000		55 000		2 755 000
Aeration	4 000 000	sum	2 500 000		250 000		6 750 000
Sedimentation basins (coag & floc)	33 000 000	sum	25 200 000		15 000 000		73 200 000
Rapid sand filtration	18 000 000	sum	12 000 000		5 400 000		35 400 000
Backwash storage	1 250 000	sum	75 000		75 000		1 400 000
Chlorine dosing	350 000	sum	1 000 000		500 000		1 850 000
Sludge thickeners	8 000 000	sum	1 500 000		500 000		10 000 000
Sub-Total	67 000 000	51%	42 575 000	32%	21 780 000	17%	131 355 000
Factor: Rural area	6 700 000		4 257 500		2 178 000	10%	13 135 500
Factor: Rock excavation	13 400 000		8 515 000		4 356 000	20%	26 271 000
Sub-total 1- Main Works							170 761 500
OTHER WORKS	Quant	Unit	Rate Rand	Rand	Ĩ		Total Rand
Clear water reservoir	25 000	m3	1 500				37 500 000
olear water reservoir	Civil	1110	Mechanical		Electrical		37 300 000
	31 875 000	_	3 750 000		1 875 000		
	31 013 000		3730 000		1010000		
Sludge lagoons							33 700 000
Lagoons	3 000	m3	10 800	32 400 000			
Chlorination	1	Sum	150 000	300 000			
Stormwater Berms	1	Sum	1 000 000	1 000 000			
	Civil		Mechanical		Electrical		
	28 645 000		3 370 000		1 685 000		
Telemetry/control							3 350 000
Telemetry				2 500 000			
Cabling	4 000	m	100	400 000			
Other				450 000			
	Civil		Mechanical		Electrical		
	167 500		335 000		2 847 500		
Buildings							30 500 000
Admin	900	m2	20 000	18 000 000			
First Aid Room	100	m2	20 000	2 000 000			
Lab	150	m2	20 000	3 000 000			
Mechanical workshop	150	m2	15 000	2 250 000			
Electrical workshop	150	m2	15 000	2 250 000			
Sub-station	100	m2	10 000	1 000 000			
Stores	200	m2	10 000	2 000 000			
	Civil		Mechanical		Electrical		
	25 925 000		1 525 000		3 050 000		
Electrical infrastructure from Sul	b-station						2 475 000
11 kV cable	400	m	2 000	800 000			
Switchgear	1	sum	100 000	100 000			
Sub-station/transformer	1	sum	500 000	500 000			
low voltage	150	m	1 500	225 000			
Meter	1	sum	200 000	200 000			
Connection fee	1	sum	400 000	400 000			
Breaker at sub-station	1	sum	250 000	250 000			
	Civil		Mechanical		Electrical		
	123 750		247 500		2 103 750		

Table C.2: Cost Estimate for the Ntabelanga WTW – Phase 1 Capacity – 43 500 m³/day

..../(cont)

Standby Gen Sets at WTW Gensets - 2 X 2000 kVA sets				15 000 000			17 100 000
Small genset - 100 kVA				200 000			
Change-over panel				200 000			
Synchronisation panel				200 000			
Storage tank/bunding/lining Diesel				250 000 150 000			
Building for gensets 80 m2@R 1	0000/m2			800 000			
Transport to site				300 000			
	Civil		Mechanical		Electrical		
	855 000		1 710 000		14 535 000		
Spares							10 000 000
				10 000 000			
Internal Roads							7 000 000
Paving	20 000	m2	300	6 000 000			7 000 000
Kerbs	5 000	m	200	1 000 000			
	Civil		Mechanical		Electrical		
	7 000 000		-		-		
Site lighting, security and fenci	ng						1 870 000
Site lighting	4	No.	200 000	800 000			
Street lighting	600	No.	600	360 000			
Security fencing	1 500	m	300	450 000			
Security gate Gate house	2	No. No.	20 000 20 000	40 000 40 000			
Temporary fencing security	600	m	300	180 000			
	Civil		Mechanical		Electrical		
	710 000		-		1 160 000		
Landscaping							1 000 000
	Civil		Mechanical		Electrical		
	1 000 000		-		-		
Assisted operation (6 months)	m3/d	R/m3	days				18 147 344
Human resources	43 000	0.25	183	1 961 875			
Power costs incl pumping	43 000	1.00	183	7 847 500			
Chemicals	43 000	0.25	183	1 961 875			
Maintenance costs	43 000	0.20	183	1 569 500			
Other costs H/O overheads & profits (25%)	43 000	0.15	183	1 177 125 3 629 469			
		0.25		3 029 409			
Sub-Total 2 - Other Works							162 642 34
Sub-Total 1 + Sub-Total 2							333 403 84
P&Gs					25%		83 350 96
Sub total 2							446 7E 4 90
Sub-total 3							416 754 80
Contingencies					15%		62 513 22
Sub-total 4							479 268 02
Detail Design fees					12.5%		59 908 50
				TOTAL CO	OST RAND	Excl VAT	539 176 529
						VAT 14%	75 484 714
				TOTAL CO	OST RAND	Incl VAT	614 661 243
BREAKDOWN:					Electrical		Non-Works
BREAKDOWN:	Civil		Mechanical		Eleculcal		
	Civil 183 401 250		Mechanical 66 285 000		55 570 250		28 147 344
Sub-Total 1 + Sub-Total 2	183 401 250		66 285 000		55 570 250		
Sub-Total 1 + Sub-Total 2							28 147 344 7 036 836
Sub-Total 1 + Sub-Total 2 P&Gs 25%	183 401 250		66 285 000		55 570 250		
Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total	183 401 250 45 850 313		66 285 000 16 571 250		55 570 250 13 892 563		7 036 836
Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total Contingencies 15%	183 401 250 45 850 313 229 251 563 34 387 734		66 285 000 16 571 250 82 856 250 12 428 438		55 570 250 13 892 563 69 462 813 10 419 422		7 036 836 35 184 180 5 277 627
Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total Contingencies 15% Sub-total	183 401 250 45 850 313 229 251 563 34 387 734 263 639 297		66 285 000 16 571 250 82 856 250 12 428 438 95 284 688		55 570 250 13 892 563 69 462 813 10 419 422 79 882 234		7 036 836 35 184 180 5 277 627 40 461 807
Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total Contingencies 15% Sub-total Detail Design fees 12.5%	183 401 250 45 850 313 229 251 563 34 387 734 263 639 297 32 954 912		66 285 000 16 571 250 82 856 250 12 428 438 95 284 688 11 910 586		55 570 250 13 892 563 69 462 813 10 419 422 79 882 234 9 985 279		7 036 836 35 184 180 5 277 627 40 461 807 5 057 726
BREAKDOWN: Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total Contingencies 15% Sub-total Detail Design fees 12.5% TOTAL COST RAND (EXCL VAT	183 401 250 45 850 313 229 251 563 34 387 734 263 639 297 32 954 912		66 285 000 16 571 250 82 856 250 12 428 438 95 284 688		55 570 250 13 892 563 69 462 813 10 419 422 79 882 234		7 036 836 35 184 180 5 277 627 40 461 807
Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total Contingencies 15% Sub-total Detail Design fees 12.5%	183 401 250 45 850 313 229 251 563 34 387 734 263 639 297 32 954 912		66 285 000 16 571 250 82 856 250 12 428 438 95 284 688 11 910 586		55 570 250 13 892 563 69 462 813 10 419 422 79 882 234 9 985 279		7 036 836 35 184 180 5 277 627 40 461 807 5 057 726
Sub-Total 1 + Sub-Total 2 P&Gs 25% Sub-total Contingencies 15% Sub-total Detail Design fees 12.5% TOTAL COST RAND (EXCL VAT	183 401 250 45 850 313 229 251 563 34 387 734 263 639 297 32 954 912 296 594 209		66 285 000 16 571 250 82 856 250 12 428 438 95 284 688 11 910 586 107 195 273		55 570 250 13 892 563 69 462 813 10 419 422 79 882 234 9 985 279 89 867 514		7 036 836 35 184 180 5 277 627 40 461 807 5 057 726 45 519 532

C - 5

APPENDIX D

COST ESTIMATE FOR BULK POTABLE WATER DISTRIBUTION INFRASTRUCTURE

ITEM	DESCRIPTION		QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m		32	
113	63 uPVC Class 12	m		49	
1.1.4	75 uPVC Class 12	m		68	
1.1.5	90 uPVC Class 12	m		97	
11.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12	m		249	
1.1.8	200 uPVC Class 12	m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 steel	m		2 124	
1.1.13	450 STEEL	m		2 500	
1.1.14	500 steel	m		2 736	
1.1.15	550 steel	m		2100	
1.1.16	600 steel	m		3 564	
1.1.10	700 steel	m		4 601	
1.1.17	800 steel	m		5 732	
1.1.19	900 steel		5 920	7 020	41 558 40
1.1.20	1000 steel	m	3 5 20	8 383	4100040
1.1.20	1200 steel	m		8 674	
1.1.22	1400 steel	m		12 759	
		m			
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
1.2	Bulk connectors				
121	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
127	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.12	600 steel			3 564	
1.2.14		m		4 601	
1.2.14	700 steel 800 steel	m		5 732	
	900 steel	m		7 020	
1.2.16	1000 steel	m		8 383	
1.2.17				0.303	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m		43	
1.3.1	0-2m		5 920	71	419 13
1.3.3	0-3 m	m	5 820	191	413 1
1.3.4	Extra over for :				
1.3.4.1	Soft Class 3	m3	651	20	13 0
1.3.4.1	Intermediate	m3	6 512	80	520 9
1.3.4.2	Hard rock	m3	4 558	350	1 595 4
1.3.4.3	Boulder	m3	1 302	172	223 4
1.4	Bedding		577	20	17.0
1.4.1	From trench	m3	577	30	17 3
142	From borrow pit	m3	3 463	60	207 7
1.4.3	Borrow pit haul	m3km	34 632	10	346 3
1.4.4	Commercial sources	m3	7 504	350	2 6 2 6 2

Table D.1: Cost Estimate Build-up for Bulk Potable Water Distribution Infrastructure

1.5	Backfill				
1.5.1	From trench	m3	740	25	18 50
1.5.2	Import from borrow	m3	740	40	29 60
1.5.3	Borrow haul	mЗkm	7 400	10	74 00
1.6	Allowance for fittings	%	41 558 400	15	6 233 76
1.7	Allowance for sundries	%	41 558 400	15	6 233 76
2	Abstraction & Treatment Works				
2.1	Up to 30 MI/d	sum		30 000 000	
2.2	Up to 40 MI/d	sum		40 000 000	
2.3	Up to 4 MI/d	sum		5 000 000	
2.4	Up to 80 MI/d	sum		560 000 000	
2.5	Up to 120 MI/d	sum		840 000 000	
2.6	Up to 140 MI/d	sum		120 000 000	
3.1	Pumpstations 20 l/s @ 15m	sum		780 000	
3.2	30 l/s @ 105m	sum		1 404 000	
3.3	50 l/s @175m			2 639 000	
	100 l/s @100m	sum		2 834 000	
3.4		sum			
3.5	1300 l/s @ 260m	sum		25 000 000	
3.6	120 l/s @100m	sum		3 250 000	
3.7	120 l/s@ 200 m	sum		5 720 000	
3.8	150 l/s @ 150m	sum		5 304 000	
3.9	200 l/s @ 200m	sum		8 814 000	
3.10	92 l/s @ 30m	sum		13 546 000	
3.11	300 l/s @ 200 m	sum		12 935 000	
3.12	400 l/s @ 200 m	sum		16 718 000	
3.13	500 l/s @ 200m	sum		20 644 000	
3.14	600 l/s @ 150 m	sum		18 785 000	
3.15	700 l/s @150 m	sum		21 190 000	
3.16	950 l/s @ 260 m	sum	1	20 000 000	20 000 00
3.17	1000 l/s @ 200m	sum		28 743 000	
3.18	2000l/s @ 150m	sum		34 892 000	
4	Reservoirs				
4.1	500 k	sum		1 000 000	
4.2	1 MI	sum		3 000 000	
4.3	2 MI	sum		4 500 000	
4.4	2.5 MI	sum		5 000 000	
4.5	3 MI	sum	1	6 500 000	6 500 00
4.6	4 MI	sum		8 000 000	
4.7	5 MI	sum		11 000 000	
4.8	10 M	sum		25 000 000	
4.9	20 MI	sum		33 000 000	
4.10	25 M	sum		45 000 000	
4.11	40 M	sum		65 000 000	
5	Electrical supply	sum	4	2 500 000	10 000 00
	Teteld				00 047 700
	Total 1				96 617 760
	Contingencies	%	96 617 760	15	14 492 66
	Total 2				111 110 424
	Engineering fees	%	111 110 424	15	16 666 56
	Total 3				127 776 987
	VAT	%	127 776 987	14	17 888 77

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
11.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m		32	
1.1.3	63 uPVC Class 12	m		49	
11.4	75 uPVC Class 12	m		68	
1.1.5	90 uPVC Class 12	m		97	
11.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12	m		249	
1.1.8	200 uPVC Class 12	m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 steel	m		2 124	
1.1.13	450 STEEL	m		2 500	
1.1.14	500 steel	m		2 736	
1.1.15	550 steel	m		2730	
1.1.16	600 steel	i sveno		3 564	
1.1.10	700 steel	m		4 601	
1.1.17	800 steel	m		5732	
	900 steel	m	0.771		68 592 4
1.1.19		m	9 771	7 020	08 992 4
1.1.20	1000 steel	m		8 383	
1.1.21	1200 steel	m		8 674	
1.1.22	1400 steel	m		12 759	
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
				0	
1.2	Bulk connectors			0	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
12.3	75 uPVC Class 12	m		68	
12.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m	2	647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
				0	
1.3	Excavation in all materials			0	
1.3.1	0 - 1.5m	m	0	43	
1.3.2	0-2m	m	9771	71	691 7
1.3.3	0-3 m	m	0	191 0	0011
1.3.4	Extra over for :			0	
1.3.4.1	Soft Class 3		1 075	20	21.4
1.3.4.1	Intermediate	m3 m3	1075	20 80	859.8
1.3.4.3	Hard rock	m3	7 524	350	2 633 2
1.3.4.4	Boulder	m3	2 150	172	368 8
	De della d			0	
1.4	Bedding	1100		0	
1.4.1	From trench	m3	953	30	28 5
1.4.2	From borrow pit	m3	5 7 1 6	60	342 9
1.4.3	Borrow pit haul	m3km	57 160	10	571 6
1.4.4	Commercial sources	m3	12 385	350	4 334 6

	Total				302 622 698
	VAT	%	265 458 507	14	37 164 19
	Total 3				265 458 507
	Total 2 Engineering fees	%	230 833 484	15	230 833 484 34 625 02
	Contingencies	%	200 724 769	15	30 108 71
	Total 1				200 724 769
5	Electrical supply	sum	4	2 500 000	10 000 00
		Gain	1.	000000000000000000000000000000000000000	00 000 00
4.11	40 MI	sum	1	65 000 000	65 000 00
4.10	25 M	sum		45 000 000	
4.9	20 MI	sum		33 000 000	
4.8	10 MI	sum		25 000 000	
4.7	5 MI	sum		11 000 000	
4.6	4 MI	sum		8 000 000	
4.5	3 MI	sum	1	6 500 000	6 500 00
4.4	2.5 MI	sum		5 000 000	
4.3	2 MI	sum		4 500 000	
4.2	1 MI	sum		3 000 000	
4.1	500 k	sum		1 000 000	
4	Reservoirs			0	
		Juin		01002000	
3.18	2000l/s @ 150m	sum		34 892 000	
3.17	1000 l/s @ 200 m	sum	1	28 743 000	20 000 00
3.16	950 l/s @ 260 m	sum	1	20 000 000	20 000 00
3.14	700 l/s @150 m	sum		21 190 000	
3.13 3.14	600 l/s @ 150 m	sum		18 785 000	
3.12	500 l/s @ 200 m	sum		20 644 000	
3.12	400 l/s @ 200 m	sum		16 718 000	
3.11	300 l/s @ 200 m	sum		12 935 000	
3.10	92 l/s @ 30m	sum		13 546 000	
3.9	200 l/s @ 200m	sum		8 814 000	
3.8	150 l/s @ 150m	sum		5 304 000	
3.7	120 l/s@ 200 m	sum		5 720 000	
3.6	120 l/s @100m	sum		3 250 000	
3.5	1300 l/s @ 260m	sum		25 000 000	
3.4	100 l/s @100m	sum	1	2 834 000	
3.3	50 l/s @175m	sum		2 639 000	
3.2	30 l/s @ 105m	sum		1 404 000	
3.1	20 l/s @ 15m	sum		780 000	
3	Pumpstations			0	
2.0		Sum		0	
2.6	Up to 140 MI/d	sum		120 000 000	
2.4	Up to 120 MI/d	sum		840 000 000	
2.3	Up to 80 MI/d	sum		560 000 000	
2.2	Up to 40 MI/d Up to 4 MI/d	sum		5 000 000	
2.1 2.2		sum		30 000 000 40 000 000	
2	Abstraction & Treatment Works Up to 30 MI/d	0.100		20,000,000	
1.7	Allowance for sundries	%	68 592 420	15	10 288 86
1.6	Allowance for fittings	%	68 592 420	15	10 288 86
	Borrow haul	m3km	12 214	10	122 13
1.5.3				40	48 85
1.5.2	Import from borrow	ms			
1 5. 1 1 5.2 1 5.3	From trench Import from borrow	m3 m3	1 221 1 221	25	30 53

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines	-			
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	The second se		32	
1.1.2	63 uPVC Class 12	m		49	
	75 uPVC Class 12	m		68	
1.1.4	90 uPVC Class 12	m		97	
1.1.5	110 uPVC Class 12	m		119	
		m		and the second se	
1.1.7	160 uPVC Class 12	m		249	
1.1.8	200 uPVC Class 12 250 uPVC Class 12	m		388	
		m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 steel	m		2 124	
1.1.13	450 STEEL	m		2 500	
1.1.14	500 steel	m		2 7 3 6	
1.1.15	550 steel	m			
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m	11 692	4 601	53 794 8
1.1.18	800 steel	m		5732	
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m		8 383	
1.1.21	1200 steel	m		8 674	
1.1.22	1400 steel	m		12 759	
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
				0	
1.2	Bulk connectors			0	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
12.3	75 uPVC Class 12	m		68	
12.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
12.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.12	600 steel	m		3 564	
1.2.14	700 steel	-		4 601	
1.2.14	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.10	1000 steel	m		8 383	
1.4.17	1000 31661	m			
10	Excavation in all materials			0	
1.3	0 - 1.5m		0	0 43	
		m			007 7
1.3.2	0-2m	m	11 692	71	827 7
13.3	0- 3 m	m	0	191	
101	F the second second			0	
1.3.4	Extra over for :	-		0	
1.3.4.1	Soft Class 3	m3	1 286	20	25 7
1.3.4.2	Intermediate	m3	12 861	80	1 028 8
1.3.4.3	Hard rock	m3	9 003	350	3 150 9
1.3.4.4	Boulder	m3	2 572	172	441 3
				0	
1.4	Bedding			0	
1.4.1	From trench	m3	836	30	25 0
1.4.2	From borrow pit	m3	5 016	60	300 9
1.4.3	Borrow pit haul	m3km	50 159	10	501 5
1.4.4	Commercial sources	m3	10 868	350	3 803 7

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1.5	Backfill			0	
1.5.1	From trench	m3	4 501	25	112 53
1.5.2	Import from borrow	m3	4 501	40	180 05
1.5.3	Borrow haul	m3km	45 014	10	450 14
1.6	Allowance for fittings	%	53 794 892	15	8 069 23
1.7	Allowance for sundries	%	53 794 892	15	8 069 23
2	Abstraction & Treatment Works				
2.1	Up to 30 MI/d	sum		30 000 000	
2.2	Up to 40 MI/d	sum		40 000 000	
2.3	Up to 4 MI/d	sum		5 000 000	
2.4	Up to 80 MI/d	sum		560 000 000	
2.5	Up to 120 MI/d	sum		840 000 000	
2.6	Up to 140 MI/d	sum		120 000 000	
2.0		Sum		0	
3	Pumpstations			0	
		01.000		780 000	
3.1	20 l/s @ 15m	sum		1 404 000	
3.2	30 l/s @ 105m	sum		and the second	
3.3	50 l/s @175m	sum		2 639 000	
3.4	100 l/s @100m	sum		2 834 000	
3.5	1300 l/s @ 260m	sum		25 000 000	
3.6	120 l/s @100m	sum		3 250 000	
3.7	120 l/s@ 200 m	sum		5 720 000	
3.8	150 l/s @ 150m	sum		5 304 000	
3.9	200 l/s @ 200m	sum		8 814 000	
3.10	92 l/s @ 30m	sum	1	13 546 000	
3.11	300 l/s @ 200 m	sum		12 935 000	
3.12	400 l/s @ 200 m	sum		16 718 000	
3.13	500 l/s @ 200m	sum	1	20 644 000	20 644 0
3.14	600 l/s @ 150 m	sum		18 785 000	
3.15	700 l/s @150 m	sum		21 190 000	
3.16	950 l/s @ 260 m	sum		20 000 000	
3.17	1000 l/s @ 200m	sum		28 743 000	
3.18	2000l/s @ 150m	sum		34 892 000	
				0	
4	Reservoirs	1	· · · · · · · · · · · · · · · · · · ·	0	
4.1	500 k	sum		1 000 000	
4.2	1 MI	sum		3 000 000	
4.3	2 MI	sum		4 500 000	
4.4	2.5 MI	sum		5 000 000	
4.5	3 MI			6 500 000	
4.6	4 MI	sum		8 000 000	
4.7	5 MI	sum		11 000 000	
		sum	4.0		20.000.0
4.8	10 M	sum	1.2	25 000 000	30 000 0
4.9	20 MI	sum		33 000 000	
4.10	25 M	sum		45 000 000	
4.11	40 MI	sum		65 000 000	
-		an an an an an an		0	
5	Electrical supply	sum	3	2 500 000	7 500 0
	Total 1				138 926 21
	Contingencies	%	138 926 214	15	20 838 9
	Total 2				159 765 14
	I GIUT E				100 100 14
	Engineering fees	%	159 765 147	15	23 964 7
	Total 3				183 729 91
	VAT	%	183 729 919	14	25 722 1

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
				1011	7111000111
1	Pipelines - supply, lay, joint, test, disinfect	-			
1.1	Bulk Pipelines	-			
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m		32	
1.1.2	63 uPVC Class 12			49	
	Contract Contract Contract Contract Contract	m			
11.4	75 uPVC Class 12	m		68	
1.1.5	90 uPVC Class 12	m		97	
1.1.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12	m		249	
1.1.8	200 uPVC Class 12	m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	350 STEEL	m	14 413	1 950	28 105 3
1.1.13	450 STEEL	m		2 500	
1.1.14	500 steel	m		2736	
1.1.15	550 steel	m			
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m		4 601	
1.1.18	800 steel	m		5732	
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m		8 383	
1.1.20	1200 steel	m		8 674	
1.1.21				12 759	
	1400 steel	m			
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
				0	
1.2	Bulk connectors			0	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
12.4	90 uPVC Class 12	m		97	
12.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.12				3 564	
	600 steel	m			
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
				0	
1.3	Excavation in all materials			0	
1.3.1	0 - 1.5m	m	14 413	43	618 3
1.3.2	0-2 m	m	0	71	
1.3.3	0-3 m	m	0	191 0	
1.3.4	Extra over for :			0	
1.3.4.1	Soft Class 3	m3	919	20	18 3
1.3.4.2	Intermediate	m3	9 188	80	735 0
1.3.4.3	Hard rock	m3	6 432	350	2 251 1
1.3.4.4	Boulder	m3	1 838	172	315 3
		mo	1 000	0	0100
1.4	Bedding			0	
			E77		47 0
1.4.1	From trench	m3	577	30	17 2
1.4.2	From borrow pit	m3	3 459	60	207 5
1.4.3	Borrow pit haul	m3km	34 591	10	345 9
1.4.4	Commercial sources	m3	7 495	350	2 623 1

1.5	Backfill			0	
1.5.1	From trench	m3	3 423	25	85 57
1.5.2	Import from borrow	m3	3 423		136 92
1.5.3	Borrow haul	m3km	34 231	10	342 30
1.6	Allowance for fittings	%	28 105 350	15	4 215 80
1.7	Allowance for sundries	%	28 105 350	15	4 215 80
		~~~~	20 100 000		421000
2	Abstraction & Treatment Works Up to 30 MI/d	01100		30 000 000	
		sum		server was a reacted production of the server of the serve	
2.2	Up to 40 MI/d	sum		40 000 000 5 000 000	
2.3	Up to 4 MI/d	sum			
2.4	Up to 80 MI/d	sum		560 000 000	
2.5	Up to 120 MI/d	sum		840 000 000	
2.6	Up to 140 MI/d	sum		120 000 000 0	
3	Pumpstations			0	
3.1	20 l/s @ 15m	sum		780 000	
3.2	30 l/s @ 105m	sum		1 404 000	
3.3	50 l/s @175m	sum		2 639 000	
3.4	100 l/s @100m	sum		2 834 000	
3.5	1300 l/s @ 260m	sum		25 000 000	
3.6	120 l/s @100m	sum		3 250 000	
3.7	120 l/s@ 200 m	sum	-	5 720 000	
3.8	150 l/s @ 150m	sum		5 304 000	
3.9	200 l/s @ 200m	sum		8 814 000	
3.10	92 l/s @ 330m		1	16 500 000	16 500 0
3.11	300 l/s @ 200 m	sum		12 935 000	10 000 0
3.12	400 l/s @ 200 m	sum		16 718 000	
3.12		sum			
	500 l/s @ 200m	sum		20 644 000	
3.14	600 l/s @ 150 m	sum		18 785 000	
3.15	700 l/s @150 m	sum		21 190 000	
3.16	950 l/s @ 260 m	sum		20 000 000	
3.17	1000 l/s @ 200m	sum		28 743 000	
3.18	2000l/s @ 150m	sum		34 892 000	
4	Deservice			0	
4	Reservoirs				
4.1	500 kl	sum		1 000 000	
4.2	1 MI	sum		3 000 000	
4.3	2 MI	sum		4 500 000	
4.4	2.5 MI	sum		5 000 000	
4.5	3 MI	sum		6 500 000	
4.6	4 MI	sum		8 000 000	
4.7	5 MI	sum	1	11 000 000	11 000 0
4.8	10 M	sum		25 000 000	
4.9	20 MI	sum		33 000 000	
4.10	25 MI	sum		45 000 000	
4.11	40 MI	sum		65 000 000	
5	Electrical supply	sum	2	0 2 500 000	5 000 0
	Total 1				76 733 915
	Contingencies	%	76 733 915	15	11 510 0
	Total 2				88 244 002
	Engineering fees	%	88 244 002	15	13 236 6
	Total 3				101 480 603
	VAT	%	101 480 603	14	14 207 2

1.5 1.5. <b>1</b>	Backfill From trench	m3	3 423	0 0 25	85 57
1.5.2	Import from borrow	m3	3 423	40	136 92
1.5.3	Borrow haul	m3km	3423	10	342 30
1.0.0	Derformation	monun	01201		01200
1.6	Allowance for fittings	%	28 105 350	15	4 215 80
1.7	Allowance for sundries	%	28 105 350	15	4 215 80
2	Abstraction & Treatment Works				
2.1	Up to 30 MI/d	sum		30 000 000	
2.2	Up to 40 MI/d	sum		40 000 000	
2.3	Up to 4 MI/d	sum		5 000 000	
2.4	Up to 80 MI/d	sum		560 000 000	
2.5	Up to 120 MI/d	sum		840 000 000	
2.6	Up to 140 MI/d	sum		120 000 000	
2.0				0	
3	Pumostations			0	
3.1	20 l/s @ 15m	sum		780 000	
3.2	30 l/s @ 105m	sum		1 404 000	
3.3	50 l/s @175m	sum		2 639 000	
3.4	100 l/s @100m			2 834 000	
3.5	1300 l/s @ 260m	sum		25 000 000	
		sum			
3.6	120 l/s @100m	sum		3 250 000	
3.7	120 l/s@ 200 m	sum		5 720 000	
3.8	150 l/s @ 150m	sum		5 304 000	
3.9	200 l/s @ 200m	sum		8 814 000	
3.10	92 l/s @ 330m	sum	1	16 500 000	16 <b>500 0</b>
3.11	300 l/s @ 200 m	sum		12 935 000	
3.12	400 l/s @ 200 m	sum		16 718 000	
3.13	500 l/s @ 200m	sum		20 644 000	
3.14	600 l/s @ 150 m	sum		18 785 000	
3.15	700 l/s @150 m	sum		21 190 000	
3.16	950 l/s @ 260 m	sum		20 000 000	
3.17	1000 l/s @ 200m	sum		28 743 000	
3.18	2000l/s @ 150m	sum		34 892 000	
				0	
4	Reservoirs			0	
4.1	500 k	sum		1 000 000	
4.2	1 MI	sum		3 000 000	
4.3	2 MI	sum		4 500 000	
4.4	2.5 MI	sum		5 000 000	
4.5	3 MI	sum		6 500 000	
4.6	4 MI	sum		8 000 000	
4.7	5 MI	sum	1	11 000 000	11 000 0
4.8	10 M	sum		25 000 000	110000
4.9	20 M	sum		33 000 000	
4.9	25 MI	sum		45 000 000	
4.11	40 MI	sum		65 000 000	
5	Electrical supply	sum	2	0 2 500 000	5 000 0
	Total 1				76 733 915
	101111				10133973
	Contingencies	%	76 733 915	15	11 510 0
	Total 2				88 244 002
	Engineering fees	%	88 244 002	15	13 236 6
	Total 3				101 480 603
	VAT	%	101 480 603	14	14 207 2

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		20	
1.1.2	50 HDPE Class 12	m	110	32	3 571
1.1.3	63 uPVC Class 12	m	110	49	0.01
1.1.4	75 uPVC Class 12	m	28	68	1 893
1.1.5	90 uPVC Class 12	m	20	97	1 000
1.1.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12			249	
1.1.7	200 uPVC Class 12	m m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12			1 019	
	355 uPVC Class 12	m	E 000		7 400 00
1.1.11		m	5 863	1 228	7 199 82
1.1.12	400 uPVC Class 12	m	6 894	1 648	11 360 76
1.1.13	450 uPVC Class 12	m	45.044	2 1 9 2	40 700 77
1.1.14	500 steel	m	15 641	2736	42 793 77
1.1.15	550 steel	m		315	
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m		4 601	
1.1.18	800 steel	m		5 7 3 2	
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m		8 383	
1.1.21	1200 steel	m		8 674	
1.1.22	1400 steel	m		12 759	
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
1.2	Bulk connectors				
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	1020		683	
1.2.12	500 steel	m		2 7 3 6	
1.2.12	600 steel	m		3 564	
		m			
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m	12 895	43	553 19
1.3.2	0 - 2 m	m	15 641	71	1 107 38
1.3.3	0- 3 m	m		191	
1.3.4	Extra over for :				
10.00 M 100 M	Soft Class 3	m3	2 543	20	50 85
1.3.4.1					
	Intermediate	m3	25 426	80	2 034 05
1.3.4.1 1.3.4.2 1.3.4.3	Intermediate Hard rock	m3 m3	25 426 17 798	80 350	2 034 05 6 229 28

	Total				147 025 256
	VAT	%	128 969 522	14	18 055 73
	Total 3				128 969 522
	Engineering fees	%	112 147 411	15	16 822 1
	Total 2				112 147 411
	Contingencies	%	97 519 488	15	14 627 93
	Total 1				97 519 488
3	Electrical supply	sum		2 500 000	
2.11	40 MI	sum		65 000 000	
2.1	25 MI	sum		45 000 000	
2.9	15 MI	sum		33 000 000	
2.8	10 MI	sum		25 000 000	
100.00 B000000	5 MI	sum		11 000 000	
	4 MI	sum		8 000 000	
2.5	3 MI	sum		6 500 000	
2.4	2.5 MI	sum		5 000 000	
2.3	2 MI	sum		4 500 000	
	1.5 MI	sum		4 000 000	
	1.25 MI	sum		3 500 000	
2.2	1 MI	sum		3 000 000	
	850 kl	sum		2 500 000	
	750 kl	sum		2 000 000	
	600 kl	sum		1 500 000	
2.1	500 kl	sum		1 000 000	
	350 kl	sum		500 000	
1.5.2 1.5.3 1.6 1.7 2 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.1 2.11	300 kl	sum		450 000	
	250 kl	sum		400 000	
	200 kl	sum		350 000	
	150 kl	sum		300 000	
	100 kl	sum		250 000	
.5.1 .5.2 .5.3 1.6 1.7 2 2.1 2.1 2.2 2.3 2.4 2.5 2.6 2.7 2.8 2.9 2.1 2.1 2.1	Reservoirs				
1.1	Allowance for sundries	70	61 359 823	15	9 203 9
	Allowance for fittings	%			9 203 9
		%	61 359 823	10	
	Borrow haul	m3km	76 749	10	767 4
	Import from borrow	m3	7 675	40	306 9
1.5	Backfill From trench	m3	17 908	25	447 7
1.4.4	Commercial sources	m3	11 371	350	3 979 7
1.4.3	Borrow pit haul	m3km	75 805	10	758 0
1.4.2	From borrow pit	m3	7 580	60	454 8
1.4.1	From trench	m3	6 317	30	189 5
1.4	Bedding	sciller its		(Parolan)	0.000.0000.0000

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
				Labor Arte	
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		20	
1.1.2	50 HDPE Class 12	m	12 890	32	418 4
1.1.3	63 uPVC Class 12	m	63	49	30
1.1.4	75 uPVC Class 12	m	976	68	65 9
1.1.5	90 uPVC Class 12	m	86	97	83
1.1.6	110 uPVC Class 12	m	7 759	119	926 8
1.1.7	160 uPVC Class 12	m	5 564	249	1 383 3
1.1.8	200 uPVC Class 12	m	926	388	359 1
119	250 uPVC Class 12	m	6 091	611	3 721 6
1.1.10	315 uPVC Class 12	m	9 297	1 019	9 471 7
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 uPVC Class 12	m		1 648	
1.1.13	450 uPVC Class 12	m			
1.1.14	500 steel	m	22 599	2 736	61 830 8
1.1.15	550 steel	m			
1.1.16	600 steel	m	9 054	3 564	32 268 4
1.1.17	700 steel	m	0.004	4 601	02 200 M
1.1.18	800 steel	m		5 732	
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m		8 383	
1.1.20	1200 steel	m		8 674	
1.1.21	1400 steel			12 759	
		m	7.040		5 000 0
1.1.23	200 steel 50 STEEL	m	7 816 3 435	750 200	5 862 0 687 0
1.1.24	SUSTEEL	m	3 430	200	087 0
1.2	Bulk connectors				
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.2.17		1.11		0.000	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m	43 652	43	1 872 6
1.3.2	0 - 2 m	m	31 653	71	2 241 0
1.3.3	0-3 m	m	11 251	191	2 153 1
1.3.4	Extra over for :				
1.3.4.1	Soft Class 3	m3	8 965	20	179 2
1.3.4.2	Intermediate	m3	89 649	80	7 171 9
1.3.4.3	Hard rock	m3	62 754	350	21 963 9
1.3.4.4	Boulder	m3	17 930	172	3 076 7
1.4	Bedding			59.5 M	1 Agencia - In
1.4.1	From trench	m3	2 860	30	85 7
1.4.2	From borrow pit	m3	17 159	60	1 029 5
1.4.3	Borrow pit haul	m3km	171 587	10	1 715 8
1.4.4	Commercial sources	m3	37 177	350	13 011 9
	Destrout				
1.5	Backfill From trench	m3	61 051	25	1 526 2
	1 SHILLSHOT	110	01001	20	1 020 2

1.5.3 Bo	prrow haul	m3km	610 511	10	6 105 107
1.6 All	owance for fittings	%	117 006 866	15	17 551 030
1.7 All	owance for sundries	%	117 006 866	15	17 551 030
2 Bo	oster Pumps				
1. 1977 State 1. 1977 State	I/s @ 15m	sum		780 000	
222253 C	I/s @ 10m	sum		1 404 000	
	I/s @175m			2 639 000	
	0 l/s @100m	sum		2 834 000	
		sum			
	0 l/s @200m	sum		4 901 000	
	0 l/s @100m	sum		3 250 000	
	0 l/s@ 200 m	sum		5 720 000	
	0 l/s @ 150m	sum		5 304 000	
	4 l/s @ 164m	sum		8 814 000	
	0 l/s @ 532m	sum		13 546 000	
	3 l/s @ 211 m	sum		12 935 000	
	0 l/s @ 315 m	sum		16718 000	
	0 l/s @ 129m	sum		20 644 000	
	0 l/s @ 150 m	sum		18 785 000	
	0 l/s @150 m	sum		21 190 000	
2.16 95	0 l/s @ 200 m	sum		43 459 000	
	00 l/s @ 200m	sum		28743 000	
	00l/s @ 150m	sum		34 892 000	
	servoirs				
3.1 11	kl	sum		50 000	
3.2 10	0 kl	sum		250 000	
3.3 15	0 KI	sum		300 000	
	0 KI	sum		350 000	
3.5 25	0 KI	sum		400 000	
	0 KI	sum		450 000	
	0 KI	sum		500 000	
	0 KI	sum		600 000	
	0 KI	sum		750 000	
0.000	o KI	sum		1 000 000	
		sum		1 250 000	
				1 500 000	1
		sum			
	0 KI	sum		2 000 000	
3.14 11		sum		3 000 000	
	25 MI	sum		3 500 000	
and the second	5 MI	sum		4 000 000	
3.17 21		sum	1	4 500 000	4 500 00
Contract of a local second sec	5 MI	sum		5 000 000	
3.19 31		sum		6 500 000	
3.2 41	MI	sum	1	8 000 000	8 000 00
3.21 51	MI	sum	1	11 000 000	11 000 00
	MI	sum		25 000 000	
	MI	sum		33 000 000	
	MI	sum		45 000 000	
and the second	MI	sum		65 000 000	
4 El	ectrical supply	sum		2 500 000	
	Total 1				240 184 252
1110					
Co	ontingencies	%	240 184 252	15	36 027 63
	Total 2				276 211 890
Er	igineering fees	%	276 211 890	15	41 431 78
	Total 3				317 643 673
VA		%	317 643 673	14	
V/		70	317 043 073	14	<b>4</b> 4 470 11
	Total				362 113 787

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		20	
1.1.2	50 HDPE Class 12	m	17 668	32	573 50
1.1.3	63 uPVC Class 12	m	2 570	49	125 28
1.1.4	75 uPVC Class 12	m	5 721	68	386 74
1.1.5	90 uPVC Class 12	m	0121	97	00074
1.1.6	110 uPVC Class 12	m	1 166	119	139 29
1.1.7	160 uPVC Class 12	m	4 762	249	1 183 92
1.1.8	200 uPVC Class 12	m	4102	388	1100 02
1.1.9	250 uPVC Class 12	m	6 009	611	3 671 55
1.1.10	315 uPVC Class 12	m	0 000	1 019	0 071 00
1.1.11	355 uPVC Class 12	m	6 222	1 228	7 640 67
1.1.12	400 uPVC Class 12	m	6 737	1 648	11 102 03
1.1.13	400 steel	m	4 917	2 000	9 834 00
1.1.13	500 steel		7 197	2 736	19 690 99
1.1.14	550 steel	m	7 197	2700	19 090 99
1.1.15	600 steel	m	20 207	3 564	72 017 74
1.1.10	700 steel	m	20 207	4 601	1201/14
1.1.18	750 steel	m		4 00 1	
1.1.19	800 steel			5 7 3 2	
1.1.19		m		(1.5Min. 1. 1.570000.1.	
	900 steel	m		7 020	
1.1.21	1000 steel	m		8 383	
	1200 steel	m		8 674	
1.1.23	1400 steel	m		12 759	
1.1.24 1.125	1600 steel 300 steel	m	8 268	15 647 1 050	8 681 40
10	Dully connectors	1988			
1.2	Bulk connectors			20	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12 90 uPVC Class 12	m		6 <b>8</b> 97	
1.2.4		m			
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m	62 969	43	2 701 37
1.3.2	0 - 2 m	m	28 475	71	2 016 03
1.3.4	Extra over for :				
1.3.4.1	Soft Class 3	m3	9 131	20	182 61
1.3.4.2	Intermediate	m3	91 308	80	7 304 67
1.3.4.3	Hard rock	m3	63 916	350	22 370 56
1.3.4.4	Boulder	m3	18 262	172	3 1 3 3 7 0

1.4.4	Commercial sources	m3	41 569	350	14 549 005
1.5 1.5.1	Backfill	2	50 000	05	4 400 045
1.5.1	From trench	m3 m3	59 333 59 333	25 40	1 483 315
	Import from borrow				
1.5.3	Borrow haul	m3km	593 326	10	5 933 260
1.6	Allowance for fittings	%	135 047 164	15	20 257 075
1.7	Allowance for sundries	%	135 047 164	15	20 257 075
2	Pumpstations				
2.9	170 l/s @ 100m	sum	1	8 814 000	8 814 000
5	Electrical supply	sum	1.0	2 500 000	2 500 000
	Total 1				253 671 017
	Contingencies	%	253 671 017	15	38 050 653
	Total 2				291 721 669
	Engineering fees	%	291 721 669	15	43 758 250
	Total 3				335 479 920
	VAT	%	335 479 920	14	46 967 189
	Total				382 447 109

ITEM	DESCRIPTION	VY ZONE 4	QUANTITY	RATE	AMOUN
	DESCRIPTION	UNIT	QUANTIT	NATE	AWOUN
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		20	
1.1.2	50 HDPE Class 12	m		32	
1.1.3	63 uPVC Class 12	m		49	
1.1.4	75 uPVC Class 12	m		68	
1.1.5	90 uPVC Class 12	m		97	
1.1.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12	m		249	
1.1.8	200 uPVC Class 12	m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 uPVC Class 12	m		1 648	
1.1.13	450 uPVC Class 12	m			
1.1.14	500 steel	m		2 7 3 6	
1.1.15	550 steel	m		2,00	
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m		4 601	
1.1.18	800 steel	m		5 732	
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m		8 383	
1.1.20	1200 steel	-	-	8 674	
1.1.21	1400 steel	m		12 759	
1.1.22	1600 steel	m		15 647	
1.1.23	1800 steel	m			
1.1.24	Tood steel	m		20 000	
1.2	Bulk connectors				
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.12	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.14	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.4.14				0 000	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m		43	
1.3.4	Extra over for :				
1.3.4.1	Soft Class 3	m3		20	
1.3.4.2		m3		80	
1.3.4.2		m3		350	
1.3.4.3		m3		172	
1.0.4.4	Douidei	110		172	

1.4	Bedding		
1.4.1	From trench	m3	30
1.4.2	From borrow pit	m3	60
1.4.3	Borrow pit haul	m3km	10
1.4.4	Commercial sources	m3	350
1.5	Backfill		
1.5.1	From trench	m3	25
1.5.2	Import from borrow	m3	40
1.5.3	Borrow haul	m3km	10
1.6	Allowance for fittings	%	15
1.7	Allowance for sundries	%	15
	Total 1		
	Contingencies	%	15
	Total 2		
	Engineering fees	%	15
	Total 3		
	VAT	%	14
	Total		

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1 1.1	Pipelines - supply, lay, joint, test, disinfect				
1.1.1	Bulk Pipelines 40 HDPE Class 12	-		20	
1.1.2		m	19 400	32	800.70
1.1.2	50 HDPE Class 12 63 uPVC Class 12	m	329	49	629 72 16 03
1.1.3	75 uPVC Class 12	m	699	49 68	47 25
1.1.4	90 uPVC Class 12	m	3 304	97	319 23
1.1.6	110 uPVC Class 12	m	6 876	119	821 40
1.1.7	160 uPVC Class 12	m m	414	249	102 92
1.1.8	200 uPVC Class 12	m	1 878	388	728 32
1.1.9	250 uPVC Class 12	m	10/0	611	120 02
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m	5 878	1 228	7 218 24
1.1.12	400 uPVC Class 12	m	0010	1 648	12102-
1.1.13	450 uPVC Class 12	m		1040	
1.1.14	500 steel	m		2 7 3 6	
1.1.15	550 steel	m		2100	
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m		4 601	
1.1.18	800 steel	m		5 732	
1.1.19	250 steel	m	6 610	1 025	6 775 25
1.1.20	200 steel	m	8 839	750	6 629 25
1.1.21	150 steel	m	4 429	550	2 435 95
1.1.22	100 steel	m	13 420	400	5 368 00
1.1.23	80 steel	m	1 273	300	381 90
1.1.24	50 steel	m	29 330	200	5 866 00
1.2	Bulk connectors				
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials				
1.3. <b>1</b>	0 - 1.5m	m	38 778	43	1 663 57
1.3.4	Extra over for :		(5.00.4		
1.3.4.1	Soft Class 3	m3	15 224	20	304 48
1.3.4.2	Intermediate	m3	152 242	80	12 179 35
1.3.4.3	Hard rock	m3	106 569	350	37 299 28
1.3.4.4	Boulder	m3	30 448	172	5 224 94

1.4	Bedding				
1.4.1	From trench	m3	6 1 4 3	30	184 288
1.4.2	From borrow pit	m3	36 858	60	2 211 461
1.4.3	Borrow pit haul	m3km	368 577	10	3 685 768
1.4.4	Commercial sources	m3	79 858	350	27 950 404
1.5	Backfill				
1.5. <b>1</b>	From trench	m3	90 813	25	2 270 313
1.5.2	Import from borrow	m3	90 813	40	3 632 501
1.5.3	Borrow haul	m3km	908 125	10	9 081 251
1.6	Allowance for fittings	%	37 339 502	15	5 600 920
1.7	Allowance for sundries	%	37 339 502	15	5 600 928
3 3.1	Reservoirs				
3.2	300 KI	sum	4	600 000	2 400 000
3.3	450 KI	sum	2	750 000	1 500 000
3.4	500 KI	sum	-	1 000 000	1 000 000
3.5	550 KI	sum		1 250 000	
3.6	750 KI	sum		2 000 000	
3.7	850 KI	sum		2 500 000	
3.8	10 kl	sum	7	50 000	350 000
3.9	20 kl	sum	5	75 000	375 000
3.10	30 kl	sum	3	100 000	300 000
3.11	40 kl	sum	4	120 000	480 000
3.12	50 kl	sum	3	200 000	600 000
3.13	75 kl	sum	7	300 000	2 100 000
3.14	100 kl	sum	2	350 000	700 000
3.15	150 kl	sum	1	400 000	400 000
3.16	200 kl	sum	5	450 000	2 250 000
3.17	250 kl	sum	4	500 000	2 000 000
4	Electrical supply	sum		2 500 000	
	Total 1				177 516 029
-	Contingencies	%	177 516 029	15	26 627 404
-	Total 2				204 143 433
	101212				204 143 433
	Engineering & EMP fees	%	204 143 433	15	30 621 516
	Total 3				234 764 948
	VAT	%	234 764 948	14	32 867 093
	Total				267 632 041

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
11	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		20	
1.1.2	50 HDPE Class 12	m	154 546	32	5 016 563
1.1.3	63 uPVC Class 12	m	49 826	49	2 429 018
1.1.4	75 uPVC Class 12	m	50 442	68	3 409 879
1.1.5	90 uPVC Class 12	m	12 533	97	1 210 938
1.1.6	110 uPVC Class 12	m	42 481	119	5 074 780
1.1.7	160 uPVC Class 12	m	39 931	249	9 927 645
1.1.8	200 uPVC Class 12	m	19 005	388	7 370 519
1.1.9	250 uPVC Class 12	m	33 1 45	611	20 251 920
1.1.10	315 uPVC Class 12	m	22 013	1 019	22 426 844
1.1.11	355 uPVC Class 12	m	5 926	1 228	7 277 18
1.1.12	400 uPVC Class 12	m		1 648	
1.1.13	450 uPVC Class 12	m			
1.1.14	500 steel	m		2 736	
1.1.15	550 steel	m			
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m		4 601	
1.1.18	800 steel	m		5 732	
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m	2 112	8 383	17 704 896
1.1.21	150 steel	m	1 504	550	827 200
1.1.22	100 steel	m	6 856	400	2 742 400
1.1.23	80 steel	m	13 847	300	4 154 10
1.1.24	50 steel	m	29 190	200	5 838 000
1.2	Bulk connectors				
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 7 3 6	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials				
1.3. <b>1</b>	0 - 1.5m	m	429 848	43	18 440 47
1.3.2	0 - 2 m	m	3 616	71	256 013
1.3.4	Extra over for :				
1.3.4.1	Soft Class 3	m3	39 775	20	795 498
1.3.4.2	Intermediate	m3	397 749	80	31 819 91:
1.3.4.3	Hard rock	m3	278 424	350	97 448 48
1.3.4.4	Boulder	m3	79 550	172	13 650 74

1.4	Bedding				
1.4.1	From trench	m3	13 130	30	393 90
1.4.2	From borrow pit	m3	78 782	60	4 726 89
1.4.3	Borrow pit haul	m3km	787 816	10	7 878 15
1.4.4	Commercial sources	m3	170 693	350	59 742 69
1.5	Backfill				
1.5.1	From trench	m3	266 446	25	6 661 15
1.5.2	Import from borrow	m3	266 446	40	10 657 85
1.5.3	Borrow haul	m3km	2 664 463	10	26 644 62
1.6	Allowance for fittings	%	115 661 897	15	17 349 28
1.7	Allowance for sundries	%	115 661 897	15	17 349 28
3	Reservoirs				
3.1					
3.2	300 KI	sum	2	600 000	1 200 00
3.3	450 KI	sum	4	750 000	3 000 00
3.4	500 KI	sum	3	1 000 000	3 000 00
3.5	550 KI	sum		1 250 000	
3.6	750 KI	sum	2	2 000 000	4 000 00
3.7	850 KI	sum		2 500 000	
3.8	10 kl	sum	21	50 000	1 050 00
3.9	20 kl	sum	21	75 000	1 575 00
3.10	30 kl	sum	27	100 000	2 700 00
3.11	40 KI	sum	18	120 000	2 160 00
3,12	50 kl	sum	19	200 000	3 800 00
3.13	75 kl	sum	29	300 000	8 700 00
3.14	100 kl	sum	6	350 000	2 100 00
3.15	150 kl	sum	10	400 000	4 000 00
3.16	200 kl	sum	13	450 000	5 850 00
3.17	250 kl	sum	6	500 000	3 000 00
4	Electrical supply	sum		2 500 000	
	Total 1				485 159 90
	Contingencies	%	485 159 905	15	72 773 98
	Total 2				557 933 89
	Engineering fees	%	557 933 891	15	83 690 08
	Total 3				641 623 97
	VAT	%	641 623 974	14	89 827 35
	Total				731 451 33

D - 22

ITEM	DESCRIPTION	Y ZONE 3 UNIT	QUANTITY	RATE	AMOUNT
1 1.1	Pipelines - supply, lay, joint, test, disinfect Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		20	
1.1.2	50 HDPE Class 12		62 501	32	2 028 782
1.1.2	63 uPVC Class 12	m	7 257	49	353 779
1.1.4	75 uPVC Class 12	m	31 416	68	2 123 722
1.1.5	90 uPVC Class 12	m	10 989	97	1 061 757
1.1.6	110 uPVC Class 12	m	18 887	119	2 256 241
1.1.7	160 uPVC Class 12	m	38 333	249	9 530 350
1.1.8	200 uPVC Class 12	m	9 430	388	3 657 143
1.1.9	250 uPVC Class 12	m	6 916	611	4 225 745
1.1.10	315 uPVC Class 12	m	16 925	1 019	17 243 190
1.1.11	355 uPVC Class 12	m	2 053	1 228	2 521 105
1.1.12	400 uPVC Class 12	m		1 648	
1.1.13	450 uPVC Class 12	m			
1.1.14	500 steel	m		2 736	
1.1.15	550 steel	m			
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m		4 601	
1.1.18	300 steel	m	8 555	1 050	8 982 750
1.1.19	250 steel	m	8 832	1 025	9 052 800
1.1.20	200 steel	m	3 139	750	2 354 250
1.1.21	150 steel	m	15 740	550	8 657 000
1.1.22	100 steel	m	18 228	400	7 291 200
1.1.23	80 steel	m	31 733	300	9 519 900
1.1.24	50 steel	m	28 074	200	5 614 800
1.2	Bulk connectors				
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m	204 707	43	8 781 930
1.3.2	0 - 2 m 0- 3 m	m m	36 266 78 035	71 191	2 567 633 14 933 558
1.3.4	Extra over for :	and the second sec			
1.3.4.1	Soft Class 3	m3	35 768	20	715 356
1.3.4.2	Intermediate	m3	357 677	80	28 614 18
1.3.4.3	Hard rock	m3	250 374	350	87 630 942

ITEM	TERTIAR' DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines 40 HDPE Class 12	-		20	
1.1.1	50 HDPE Class 12	m	42 878	32	1 391 82
1.1.3	63 uPVC Class 12	m	8 967	49	437 14
1.1.4	75 uPVC Class 12	m	14 547	68	983 37
1.1.5	90 uPVC Class 12	m	11 627	97	1 123 40
1.1.6	110 uPVC Class 12	m	4 332	119	517 50
1.1.7	160 uPVC Class 12	m	46 470	249	11 553 37
118	200 uPVC Class 12	m	3 083	388	1 195 64
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m	470	1 019	478 83
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 uPVC Class 12	m		1 648	
1.1.13	450 uPVC Class 12	m		0.700	
1.1.14	500 steel	m		2 736	
1.1.15	550 steel	m		0.501	
1.1.16	600 steel	m		3 564	
1.1.17	700 steel 800 steel	m		4 601	
1.1.18	900 steel	m		5 732 7 020	
1.1.19	1000 steel	m		8 383	
1.1.20	1200 steel	m		8 674	
1.1.22	1400 steel	m		12 759	
1.1.23	1600 steel	m		15 647	
1.1.24	150 steel	m	950	20 000	19 000 00
1.2	Bulk connectors 50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m		683	
1.2.12	500 steel	m		2 7 3 6	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials				
1.3.1	0 - 1.5m	m	132 374	43	5 678 8
1.3.4	Extra over for :				
1.3.4.1	Soft Class 3	m3	8 667	20	173 33
1.3.4.2	Intermediate	m3	86 668	80	6 933 47
1.3.4.3	Hard rock	m3	60 668	350	21 233 76
1.3.4.4	Boulder	m3	17 334	172	2 974 4
1.4	Bedding				
1.4.1	From trench	m3	2 371	30	71 1-
1.4.2	From borrow pit	m3	14 228	60	853 69
1.4.3	Borrow pit haul	m3km	142 283	10	1 422 82
1.4.4	Commercial sources	m3	30 828	350	10 789 70

1.5	Backfill				
1.5.1	From trench	m3	62 955	25	1 573 86
1.5.2	Import from borrow	m3	62 955	40	2 518 18
1.5.3	Borrow haul	m3km	629 547	10	6 295 46
1.6	Allowance for fittings	%	36 681 096	15	5 502 16
1.7	Allowance for sundries	%	36 681 096	15	5 502 16
2	Pumpstations		-	700.000	700.00
2.1	20 l/s @ 70m	sum	1	780 000	780 00
22	4 l/s @ 186m	sum	1	1 404 000	1 404 00
2.3	50 l/s @175m	sum		2 639 000	
2.4	100 l/s @100m	sum		2 834 000	
2.5	100 l/s @534m	sum		4 901 000	
2.6	121 l/s @134m	sum		3 250 000	
2.7	120 l/s@ 200 m	sum		5 720 000	
2.8	161 l/s @ 165m	sum		5 304 000	
2.9	200 l/s @ 200m	sum		8 81 4 000	
2.1	250 l/s @ 250m	sum		13 546 000	
2.11	300 l/s @ 200 m	sum		12 935 000	
2.12	400 l/s @ 315 m	sum		16 718 000	
2.13	539 l/s @ 65m	sum		20 644 000	
2.14	600 l/s @ 150 m	sum		18 785 000	
2.15	700 l/s @150 m	sum		21 190 000	
2.16	950 l/s @ 200 m	sum		43 459 000	
2.17	1000 l/s @ 38m	sum		28 743 000	
2.18	2000l/s @ 230m	sum		34 892 000	
3	Reservoirs				
3.1					
3.2	300 KI	sum		600 000	
3.3	450 KI	sum	1	750 000	750 00
3.4	500 KI	sum		1 000 000	
3.5	550 KI	sum		1 250 000	
3.6	750 KI	sum		2 000 000	
3.7	850 KI	sum		2 500 000	
3.8	10 kl	sum	3	50 000	150 00
3.9	20 kl	sum	9	75 000	675 00
3.10	30 kl	sum	6	100 000	600 00
3.11	40 kl	HERALDO F 120 MARKS	5	120 000	600 00
3.12	50 kl	sum	4	200 000	800 00
3.13	75 kl	sum	1	300 000	300 00
		sum	1		300.00
3.14 3.15	100 ki 150 ki	sum	0	350 000 400 000	2 000 00
		sum	8		3 200 00
3.16 3.17	200 kl 250 kl	sum	2	450 000 500 000	900 00 5 000 00
4	Electrical supply	0.100	0.5	2 500 000	1 250 00
-4	Electrical supply	sum	0.0	2 000 000	
	Total 1				124 795 05
	Contingencies	%	124 795 050	15	18 719 25
	Total 2				143 514 30
	Engineering fees	%	143 514 307	15	21 527 14
		70	145 5 14 307	10	2102/14
	Total 3				165 041 45
	VAT	%	165 041 453	14	23 105 80
	Total				188 147 25

# **APPENDIX E**

# COST ESTIMATES FOR BULK IRRIGATION WATER SYSTEMS

E - 1

ITEAA		FROM DAM	OUANTITY	DATE	AMOUNT
ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m		32	
1.1.3	63 uPVC Class 12	m		49	
1.1.4	75 uPVC Class 12	m		68	
1.1.5	90 uPVC Class 12	m		97	
1.1.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12	m		249	
1.1.8	200 uPVC Class 12	m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.10	355 uPVC Class 12			1 228	
Gallane (L. Sallera)		m		88 / SOUTH / SOUTH	
1.1.12	400 steel	m		2 124	
1.1.13	450 uPVC Class 12	m		2 726	
1.1.14	500 steel	m		2 736	
1.1.15	550 steel	m			
1.1.16	600 steel	m		3 564	
1.1.17	700 steel	m	solorist of vehicles	4 601	10270000 - 10027200 - 100
1.1.18	800 steel	m	3 920	5 732	22 469 4
1.1.19	900 steel	m		7 020	
1.1.20	1000 steel	m	28 980	8 383	242 939 3
1.1.21	1200 steel	m		8 674	
1.1.22	1400 steel	m		12 759	
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
1.2	Bulk connectors			0	
1.2.1				32	
	50 HDPE Class 12	m		49	
1.2.2	63 uPVC Class 12	m		10010	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m	30 000	683	20 490 0
1.2.12	500 steel	m		2 736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials			0	
1.3.1	0 - 1.5m	m	0	43	
1.3.2	0 - 2 m	m	62 900	71	4 453 3
1.3.3	0- 3 m	m	0	191	
1.3.4	Extra over for :			0	
1.3.4.1	Soft Class 3	m3	6 919	20	138 3
1.3.4.2	Intermediate	m3	69 190	80	5 535 2
1.3.4.3	Hard rock	m3	48 433	350	16 951 5
1.3.4.4	Boulder	m3	13 838	172	2 374 6
		1115	13 838	1/1%	2 3/4 6
1.4	Bedding			0	
1.4.1	From trench	m3	4 775	30	143 2
1.4.2	From borrow pit	m3	28 650	60	1 719 0
1.4.3	Borrow pit haul	m3km	286 502	10	2 865 0
1.4.4	Commercial sources	m3	62 076	350	21 726 4
15071-1509/00		0000800	and the second state of th		weather statistics and

### Table E.1: Cost Estimate Build-up for Irrigation Water Distribution Infrastructure

	Total				642 351 057
	VAT	%	563 465 839	14	78 885 217
	Total 3				563 465 839
	Engineering fees	%	531 571 546	6	31 894 293
	Total 2				531 571 546
	Contingencies	%	483 246 860	10	48 324 686
	Total 1				483 246 860
5	Electrical supply	KM	15	2 000 000	30 000 000
		sum			
4.10	40 MI	sum	1	45 000 000 65 000 000	45 000 000
4.9	20 MI 25 MI	sum		45 000 000	45 000 000
4.8	10 MI 20 MI	sum		25 000 000 33 000 000	(
		sum		25 000 000	(
4.6	4 MI 5 MI	sum		8 000 000 11 000 000	
4.5	3 MI 4 MI	sum		6 500 000	
	2.5 MI	sum		5 000 000	
4.3	2 MI	sum		4 500 000	(
4.2	1 MI	sum		3 000 000	(
4.1	500 kl	sum		1 000 000	
4	Reservoirs			0	
	Decementar			0	
3.17	1000 l/s @ 200m	MW	6.4	3 000 000	19 313 896
3.16	950 l/s @ 500 m	sum	~ .	43 459 000	10 212 200
3.15	700 l/s @150 m	sum		21 190 000	(
3.14	600 l/s @ 150 m	sum		18 785 000	(
3.13	500 l/s @ 200m	sum		20 644 000	(
3.12	400 l/s @ 200 m	sum		16 718 000	(
3.11	300 l/s @ 200 m	sum		12 935 000	(
3.10	250 l/s @ 250m	sum		13 546 000	(
3.9	200 l/s @ 200m	sum		8 814 000	(
3.8	150 l/s @ 150m	sum		5 304 000	(
3.7	120 l/s@ 200 m	sum		5 720 000	(
3.6	120 l/s @100m	sum		3 250 000	(
3.5	100 l/s @200m	sum		4 901 000	(
3.4	100 l/s @100m	sum		2 834 000	(
3.3	50 l/s @175m	sum		2 639 000	(
3.2	30 l/s @ 105m	sum		1 404 000	(
3.1	20 l/s @ 15m	sum		780 000	(
3	Pumpstations				
2.6	Up to 140 MI/d	sum		120 000 000	
2.5	Up to 10 MI/d	sum		12 000 000	(
2.4	Up to 80 MI/d	sum			15 000 000
2.3	Up to 4 MI/d	sum		5 000 000	(
2.2	Up to 40 MI/d	sum		40 000 000	(
2.1	Up to 30 MI/d	sum		30 000 000	(
2	Pumphouse				
1.7	Allowance for sundries	%	285 898 780	5	14 294 939
10.0000		167.365		10.04)	CONTRACTOR CONTRACTOR
1.6	Allowance for fittings	%	285 898 780	5	14 294 939
1.5.3	Borrow haul	m3km	214 396	10	2 143 960
1.5.2	From trench Import from borrow	m3	21 440	40	857 584
		m3	21 440	25	535 99

ITEM	IRRIGATION OPTION 2 DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines			1	
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m		32	
1.1.3	63 uPVC Class 12	m		49	
1.1.4	75 uPVC Class 12	m		68	(
1.1.5	90 uPVC Class 12	m		97	
1.1.6	110 uPVC Class 12	m		119	
1.1.7	160 uPVC Class 12	m		249	(
1.1.8	200 uPVC Class 12	m		388	
1.1.9	250 uPVC Class 12	m		611	
1.1.10	315 uPVC Class 12	m		1 019	
1.1.11	355 uPVC Class 12	m		1 228	
1.1.12	400 steel	m		2 124	
1.1.13	450 uPVC Class 12	m		2 12 1	
1.1.14	500 steel	m		2 736	
1.1.14	550 steel	m		2750	
1.1.16	600 steel	m		3 564	3
1.1.17	700 steel	m		4 601	
1.1.17	800 steel	m	3 920	5 732	22 469 44
1.1.19	900 steel	m	5 520	7 020	22 405 44
1.1.20	1000 steel	m	13 280	8 383	111 326 24
1.1.20	1200 steel		13 200	8 674	111 520 24
1.1.21	1400 steel	m		12 759	3
1.1.22	1600 steel	m		15 647	3
1.1.23	1800 steel			20 000	
1.1.24		m		20 000	
1.2	Bulk connectors			0	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	(
1.2.4	90 uPVC Class 12	m		97	(
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	1
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	-
1.2.11	400 uPVC Class 12	m	30 000	683	20 490 00
1.2.12	500 steel	m		2 736	1
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials	-	2	0	
1.3.1	0 - 1.5m	m	0	43	0.044.76
1.3.2	0 - 2 m	m	47 200	71	3 341 76
1.3.3	0- 3 m	m	0	191	
1.3.4	Extra over for :			0	
1.3.4.1	Soft Class 3	m3	5 192	20	103 84
1.3.4.2	Intermediate	m3	51 920	80	4 153 60
1.3.4.3	Hard rock	m3	36 344	350	12 720 40
1.3.4.4	Boulder	m3	10 384	172	1 781 89
1.4	Bedding	878-897533		0	
1.4	From trench	m3	3 017	30	90 49
			0.00	12.726	
1.4.2	From borrow pit	m3	18 100	60	1 085 99
1.4.3	Borrow pit haul	m3km	180 998	10	1 809 98
1.4.4	Commercial sources	m3	39 216	350	13 725 71
1.5	Backfill			0	

1.5.1	From trench	m3	21 754	25	543 840
1.5.2	Import from borrow	m3	21 754	40	870 14
1.5.3	Borrow haul	m3km	217 536	10	2 175 36
1.6	Allowance for fittings	%	154 285 680	5	7 714 284
1.7	Allowance for sundries	%	154 285 680	5	7 714 284
2	Pumphouse				
2.1	Up to 30 MI/d	sum		30 000 000	(
2.2	Up to 40 MI/d	sum		40 000 000	(
2.3	Up to 4 MI/d	sum		5 000 000	(
2.4	Up to 80 MI/d	sum			25 000 000
2.5	Up to 10 MI/d	sum		12 000 000	(
2.6	Up to 140 MI/d	sum		120 000 000	
3	Pumpstations				
3.1	20 l/s @ 15m	sum		780 000	(
3.2	30 l/s @ 105m	sum		1 404 000	(
3.3	50 l/s @175m	sum		2 639 000	(
3.4	100 l/s @100m	sum		2 834 000	(
3.5	100 l/s @200m	sum		4 901 000	(
3.6	120 l/s @100m	sum		3 250 000	(
3.7	120 l/s@ 200 m	sum		5 720 000	(
3.8	150 l/s @ 150m	sum		5 304 000	(
3.9	200 l/s @ 200m	sum		8 814 000	(
3.10	250 l/s @ 250m	sum		13 546 000	(
3.11	300 l/s @ 200 m	sum		12 935 000	(
3.12	400 l/s @ 200 m	sum		16 718 000	(
3.13	500 l/s @ 200m	sum		20 644 000	(
3.14	600 l/s @ 150 m	sum		18 785 000	(
3.15	700 l/s @150 m	sum		21 190 000	(
3.16	950 l/s @ 500 m	sum		43 459 000	(
3.17	1000 l/s @ 200m	MW	7.3	3 000 000	21 910 063
4	Reservoirs			0	(
4.1	500 kl	sum		1 000 000	(
4.2	1 MI	sum		3 000 000	
4.3	2 MI	sum		4 500 000	(
4.4	2.5 MI	sum		5 000 000	
4.5	3 MI	sum		6 500 000	
4.6	4 MI	sum		8 000 000	
4.7	5 MI	sum		11 000 000	(
4.8	10 MI	sum		25 000 000	(
4.9	20 MI	sum		33 000 000	(
4.10	25 MI	sum		45 000 000	45 000 000
4.11	40 MI	sum	1	65 000 000	
5	Electrical supply	KM	15	2 000 000	30 000 000
	Total 1				334 027 333
	Contingencies	%	334 027 333	10	33 402 733
	Total 2				367 430 066
	Engineering fees	%	367 430 066	6	22 045 804
	Total 3				389 475 870
	VAT	%	389 475 870	14	54 526 622

ITEM	DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m	0	32	
1.1.2	63 uPVC Class 12	101802	0	49	
1.1.3	75 uPVC Class 12	m	0	68	
100A000/040/040		m		00605	2
1.1.5	90 uPVC Class 12	m	0	97	
1.1.6	110 uPVC Class 12	m	0	119	
1.1.7	160 uPVC Class 12	m	0	249	
1.1.8	200 uPVC Class 12	m	2 143	388	831 09
1.1.9	250 uPVC Class 12	m	0	611	
1.1.10	315 uPVC Class 12	m	9 970	1 019	10 157 43
1.1.11	355 uPVC Class 12	m	1 770	1 228	2 173 57
1.1.12	400 steel	m		2 124	
1.1.13	450 uPVC Class 12	m			
1.1.14	500 steel	m	3 100	2 736	8 481 60
1.1.15	550 steel	m	0		
1.1.16	600 steel	m		3 564	1
1.1.17	700 steel	m		4 601	
1.1.18	800 steel	m	9 660	5 732	55 371 12
1.1.19	900 steel	m	2 000	7 020	14 040 00
1.1.20	1000 steel	m	16 400	8 383	137 481 20
1.1.20	1200 steel	m	9 780	8 674	84 831 72
1.1.21	1400 steel	1753564	5780	12 759	04 051 72
		m			
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
1.2	Bulk connectors			0	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12			535	
		m		53.53	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m	5 900	683	4 029 70
1.2.12	500 steel	m		2 736	
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials			0	
1.3.1	0 - 1.5m	m	13 883	43	595 58
1.3.1	0 - 2 m	m	46 840	43 71	3 316 27
		m			5 510 27
1.3.3	0- 3 m	m	0	191	
1.3.4	Extra over for :			0	
1.3.4.1	Soft Class 3	m3	6 037	20	120 74
1.3.4.2	Intermediate	m3	60 374	80	4 829 95
1.3.4.3	Hard rock	m3	42 262	350	14 791 73
1.3.4.4	Boulder	m3	12 075	172	2 072 05
		(MARTER)			
1.4	Bedding		E AEA	0	100 50
1.4.1	From trench	m3	5 350	30	160 50
1.4.2	From borrow pit	m3	32 100	60	1 925 99
1.4.3	Borrow pit haul	m3km	320 999	10	3 209 99
1.4.4	Commercial sources	m3	69 550	350	24 342 42
1.5	Backfill			0	

### IRRIGATION OPTION 3 FROM DAM WITH INTERMEDIATE STORAGE

171 864	25	6 875	m3	From trench	1.5.1
274 98	40	6 875	m3	Import from borrow	1.5.2
687 45	10	68 746	m3km	Borrow haul	1.5.3
15 869 87	5	317 397 452	%	Allowance for fittings	1.6
15 869 87	5	317 397 452	%	Allowance for sundries	1.7
				Pumphouse	2
	30 000 000		sum	Up to 30 MI/d	2.1
	40 000 000		sum	Up to 40 MI/d	2.2
	5 000 000		sum	Up to 4 MI/d	2.3
8 000 000			sum	Up to 80 MI/d	2.4
3	12 000 000		sum	Up to 10 MI/d	2.5
	120 000 000		sum	Up to 140 MI/d	2.6
	57			Pumpstations	3
(	780 000		sum	20 l/s @ 15m	3.1
(	1 404 000		sum	30 l/s @ 105m	3.2
(	2 639 000		sum	50 l/s @175m	3.3
(	2 834 000		sum	100 l/s @100m	3.4
4 901 000	4 901 000	1	sum	100 l/s @200m	3.5
(	3 250 000		sum	120 l/s @100m	3.6
(	5 720 000		sum	120 l/s@ 200 m	3.7
(	5 304 000		sum	150 l/s @ 150m	3.8
8 814 000	8 814 000	1	sum	200 l/s @ 200m	3.9
(	13 546 000		sum	250 l/s @ 250m	3.10
	12 935 000		sum	300 l/s @ 200 m	3.11
20	16 718 000		sum	400 l/s @ 200 m	3.12
	20 644 000		sum	500 l/s @ 200m	3.13
(	18 785 000		sum	600 l/s @ 150 m	3.14
	21 190 000	-	sum	700 l/s @150 m	3.15
(	43 459 000		sum	950 l/s @ 500 m	3.16
9 565 152	3 000 000	3.2	MW	1000 l/s @ 200m	3.17
(	0			Reservoirs	4
(	1 000 000		sum	500 kl	4.1
15 000 000	3 000 000	5	sum	1 MI	4.2
9 000 000	4 500 000	2	sum	2 MI	4.3
	5 000 000		sum	2.5 MI	4.4
	6 500 000		sum	3 MI	4.5
	8 000 000		sum	4 MI	4.6
11 000 000	11 000 000	1	sum	5 MI	4.7
(	25 000 000		sum	10 MI	4.8
(	33 000 000		sum	20 MI	4.9
	45 000 000		sum	25 MI	4.10
15 000 000	15 000 000	1	sum	40 Ml - Earth Bund	4.11
10 000 000	2 000 000	5	KM	Electrical supply	5
496 916 900				Total 1	
49 691 690	10	496 916 900	%	Contingencies	
546 608 590				Total 2	
32 796 51	6	546 608 590	%	Engineering fees	
579 405 105				Total 3	
81 116 71	14	579 405 105	%	VAT	
660 521 820				Total	

ITEM	IRRIGATION OPTION 4 FROM RIVER WI DESCRIPTION	UNIT	QUANTITY	RATE	AMOUNT
1	Pipelines - supply, lay, joint, test, disinfect				
1.1	Bulk Pipelines				
1.1.1	40 HDPE Class 12	m		25	
1.1.2	50 HDPE Class 12	m	0	32	
1.1.2	63 uPVC Class 12	m	0	49	
1.1.4	75 uPVC Class 12	m	0	68	
1.1.4	90 uPVC Class 12	m	0	97	
1.1.5	110 uPVC Class 12	m	0	119	
1.1.7	160 uPVC Class 12	m	0	249	
1.1.7	200 uPVC Class 12	m	2 143	388	831 09
1.1.9	250 uPVC Class 12	m	0	611	051 0.
1.1.10	315 uPVC Class 12	m	9 970	1 019	10 157 43
1.1.10	355 uPVC Class 12	m	1 770	1 228	2 173 57
1.1.12	400 steel	m	1770	2 124	2 173 5
1.1.12	450 uPVC Class 12	m		2 124	
1.1.13	500 steel	10000	3 100	2 736	8 481 60
1.1.14	550 steel	m	0	2730	0 401 00
DELTRI AND CONS.		m	0	2 5 6 4	
1.1.16	600 steel 700 steel	m		3 564 4 601	
1.1.17		m	9 660	5 732	55 371 12
1017 Not A Sty Dorma	800 steel	m	1000000000000	101 00.000000	
1.1.19	900 steel	m	2 000	7 020	14 040 00
1.1.20	1000 steel	m	4 340	8 383	36 382 22
1.1.21	1200 steel	m	9 780	8 674	84 831 72
1.1.22	1400 steel	m		12 759	
1.1.23	1600 steel	m		15 647	
1.1.24	1800 steel	m		20 000	
1.2	Bulk connectors			0	
1.2.1	50 HDPE Class 12	m		32	
1.2.2	63 uPVC Class 12	m		49	
1.2.3	75 uPVC Class 12	m		68	
1.2.4	90 uPVC Class 12	m		97	
1.2.5	110 uPVC Class 12	m		44	
1.2.6	160 uPVC Class 12	m		249	
1.2.7	200 uPVC Class 12	m		388	
1.2.8	250 uPVC Class 12	m		611	
1.2.9	315 uPVC Class 12	m		535	
1.2.10	355 uPVC Class 12	m		647	
1.2.11	400 uPVC Class 12	m	5 900	683	4 029 70
1.2.12	500 steel	m		2 736	1.00-00 A. 199
1.2.13	600 steel	m		3 564	
1.2.14	700 steel	m		4 601	
1.2.15	800 steel	m		5 732	
1.2.16	900 steel	m		7 020	
1.2.17	1000 steel	m		8 383	
1.3	Excavation in all materials			0	
1.3.1	0 - 1.5m	m	13 883	43	595 58
1.3.2	0 - 2 m	m	34 780	71	2 462 42
1.3.3	0- 3 m	m	0	191	
1.3.4	Extra over for :			0	
1.3.4.1	Soft Class 3	m3	4 711	20	94 2
1.3.4.2	Intermediate	m3	47 108	80	3 768 6
1.3.4.3	Hard rock	m3	32 976	350	11 541 5
1.3.4.4	Boulder	m3	9 422	172	1 616 7
				And Andrewson and	- 510 /
1.4	Bedding		2.000	0	110.0
1.4.1	From trench	m3	3 999	30	119 9
1.4.2	From borrow pit	m3	23 996	60	1 439 73
1.4.3	Borrow pit haul	m3km	239 956	10	2 399 5
1.4.4	Commercial sources	m3	51 990	350	18 196 6
1.5	Backfill			0	

	Contingencies	%	419 382 511	10	41 938 2
	Total 1	202007			419 382 511
5	Electrical supply	КM	15	2 000 000	30 000 00
4.11	40 Ml - Earth Bund	sum	1	15 000 000	15 000 00
4.10	25 MI	sum		45 000 000	15 000 0
4.9	20 MI	sum		33 000 000	
4.8	10 MI	sum		25 000 000	
4.7	5 MI	sum	1	11 000 000	11 000 0
4.6	4 MI	sum		8 000 000	14 000 0
4.5	3 MI	sum		6 500 000	
4.4	2.5 MI	sum		5 000 000	
4.3	2 MI	sum	2	4 500 000	9 000 0
4.2	1 MI	sum	5	3 000 000	15 000 0
4.1	500 kl	sum		1 000 000	
4	Reservoirs			0	
3.17	1000 l/s @ 200m	MW	3.8	3 000 000	11 329 9
3.16	950 l/s @ 500 m	sum		43 459 000	Martan Scattering
3.15	700 l/s @150 m	sum		21 190 000	
3.14	600 l/s @ 150 m	sum		18 785 000	
3.13	500 l/s @ 200m	sum		20 644 000	
3.12	400 l/s @ 200 m	sum		16 718 000	
3.11	300 l/s @ 200 m	sum		12 935 000	
3.10	250 l/s @ 250m	sum		13 546 000	
3.9	200 l/s @ 200m	sum	1	8 814 000	8 814 C
3.8	150 l/s @ 150m	sum		5 304 000	
3.7	120 l/s@ 200 m	sum		5 720 000	
3.6	120 l/s @100m	sum	11.1°.	3 250 000	
3.5	100 l/s @200m	sum	1	4 901 000	4 901 0
3.4	100 l/s @100m	sum		2 834 000	
3.3	50 l/s @175m	sum		2 639 000	
3.2	30 l/s @ 105m	sum		1 404 000	
3	Pumpstations 20 l/s @ 15m	sum		780 000	
34.5887.2		Jan		120 000 000	
2.5	Up to 140 MI/d	sum		120 000 000	23 000 0
2.4	RIVER INTAKE WORKS & settlement basin	sum		25 000 000	25 000 0
2.3	Up to 4 MI/d Up to 80 MI/d	sum		5 000 000	8 000 0
2.2	Up to 40 MI/d	sum		40 000 000	
2.1	Up to 30 MI/d	sum		30 000 000	
2	Pumphouse	sentintes			
		70	210 298 472	5	10 814 3
1.7	Allowance for sundries	%	216 298 472	5	10 814 9
1.6	Allowance for fittings	%	216 298 472	5	10 814 9
1.5.3	Borrow haul	m3km	71 158	10	711 5
1.5.2	Import from borrow	m3	7 116	40	284 6

ITEM	DESCRIPTION		AMOUNT	0&1	V pe	r year
1	Pipelines	R	373 932 964	0.50%	R	1 869 665
2	Abstraction works	R	15 000 000	0.25%	R	37 500
3	Pumpstations	R	19 313 896	4%	R	772 556
4	Reservoirs	R	45 000 000	0.25%	R	112 500
5	Electrical supply	R	30 000 000	4%	R	1 200 000
6	Contingencies	R	48 324 686	1%	R	483 247
7	Engineering fees	R	31 894 293			
	Allowance for M&E depreci	ation and repl	acement funding		R	1 931 390
	Total 1	R	563 465 839		R	6 406 857
	VAT	R	78 885 217		R	896 960
	Total	R	642 351 057		R	7 303 817
				Tot. Water		
	oply of raw water to edge of fiel	d excluding po		21 240 366		R 0.34
ower Cost per y	ear	R	20 063 277	21 240 366		R 0.94

### Table E.2: Capital and Operating Costs Summary for Irrigation Water Distribution Infrastructure

Cost for supply of raw water to edge of field including power

R 1.29

R/m°

ITEM	DESCRIPTION	AMOUNT		O&M per year			
1	Pipelines	R	212 117 272	0.50%	R	1 060 586	
2	Abstraction works	R	25 000 000	0.25%	R	62 500	
3	Pumpstations	R	21 910 061	4%	R	876 402	
4	Reservoirs	R	45 000 000	0.25%	R	112 500	
5	Electrical supply	R	30 000 000	4%	R	1 200 000	
6	Contingencies	R	33 402 733	1%	R	334 027	
7	Engineering fees	R	22 045 804				
	Allowance for M&E deprecia	ation and re	placement funding		R	2 191 000	
	Total 1	R	389 475 870		R	5 837 022	
	VAT	R	54 526 622		R	817 183	
	Total	R	444 002 492		R	6 654 205	
				Tot. Water			
	oply of raw water to edge of field	excluding p	N REAL SHARE	21 240 366		R 0.3	
er Cost per ye	ear	R	22 760 173	21 240 366		R 1.0	

ITEM	DESCRIPTION		AMOUNT	0&1	VI pe	r year
1	Pipelines	R	405 636 748	0.50%	R	2 028 184
2	Abstraction works	R	8 000 000	0.25%	R	20 000
3	Pumpstations	R	23 280 152	4%	R	931 206
4	Reservoirs	R	50 000 000	0.25%	R	125 000
5	Electrical supply	R	10 000 000	4%	R	400 000
6	Contingencies	R	49 691 690	1%	R	496 917
7	Engineering fees	R	32 796 515			
	Allowance for M&E deprecia	ation and repl	acement funding		R	956 515
	Total 1	R	579 405 105		R	4 957 822
	VAT	R	81 116 715		R	694 095
	Total	R	660 521 820		R	5 651 917
				Tot. Water		
A Cost for sup	oply of raw water to edge of field	d excluding po	wer	21 240 366		R 0.27
er Cost per y	ear	R	18 559 958	21 240 366		R 0.87

Cost for supply of raw water to edge of field including power R/m R1.14

ITEM	DESCRIPTION		AMOUNT	0&1	∕l pe	r year
1	Pipelines	R	281 337 560	0.50%	R	1 406 688
2	Abstraction works	R	33 000 000	0.25%	R	82 500
3	Pumpstations	R	25 044 951	4%	R	1 001 798
4	Reservoirs	R	50 000 000	0.25%	R	125 000
5	Electrical supply	R	30 000 000	4%	R	1 200 000
6	Contingencies	R	41 938 251	1%	R	419 383
7	Engineering fees	R	27 679 246			
	Allowance for M&E deprecia	ation and rep	lacement funding		R	1 132 995
	Total 1	R	489 000 008		R	5 368 364
	VAT	R	68 460 001		R	751 571
	Total	R	557 460 010	Tot. Water	R	6 119 934
M Cost for sur	pply of raw water to edge of field	excluding no	nwer	21 240 366	_	R 0.29
ver Cost per ye		R		21 240 366		R 1.00

# **APPENDIX F**

# LEVELIZED COST OF ENERGY MODELS FOR HYDROPOWER COMPONENTS

F - 1

EM	3	30		CAPITALCOST	COMPONENTS (	R*10^6)	2	a	84		38	22	CAPITAL	COST COMPONEN	TS (R*10^6)	11		a							
	TOTAL	DAM	PIPELINES TUNNEL	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER	TOTAL	DAM	PIPELINES	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER							
	PHASE 1		TOTALLE	ð.		Inorate	-		1 001121	PHASE 2				1 Honato	Horato			00.121							
ni & Ntabelanga Dam	s 1315.6	920.9				263.1	131.6			0.0	0.0				0.0										
lines/Tunnel	1026.0		872.1			102.6	51.3			0.0		0.0													
ervoirs	0.0			0.0			0.0	182.4		0.0			0.0			0.0									
stromechanical atment Works	442				0.0	-	0.0	182.4	+	0.0				0.0		0.0	0.0		1						
traction Works	0.0				0.0	0.0	0.0			0.0				1	0.0										
er	126.6		1				1	1	126.6	0.0		1	1	1		1		0.0	1						
ineering & EMP	363.8									0.0															
AL	3274.3	920.9	872.1	0.0	0.0	365.7	442.8	182.4	126.6	0.0	0.0	0.0	0.0	0.0 OPERATIONAL	0.0	0.0	0.0	0.0							
8	0.0	0.0		8	1	0.0		r	-	MAINTENAN	ICE COSTS			OPERATIONAL	COSTS (R-10	~6)	TREATMENT CO	Nete							
lines	0.0	0.0	0.0			0.0			+	RATE	CE COSIS	ITEM		COST	COST	COST	Using cost Rand		N/A						
arvoirs	0.0			0.0		1	1	100000000000000000000000000000000000000	1	1	-			PH. 1	PH.2	PH. 3									
iping Stations	0.0			00000			0.0	0.0		0.25%	Dam			2.30	0.00	0.00	PUMPING COST	rs	-						
itment Works	0.0				0.0		1			0.50%	Pipelines, R			4.36	0.00	0.00	Max.Demand Ch		N/A						
raction Works	0.0					0.0	ļ		+	1.00%		Vorks, Civil Works,	Buildings	5.48	0.00	0.00	Energy Cost : Ra	ind/ kWHr	N/A						
er	0.0					+			0.0		M & E			17.71	0.00	0.00	1								
er FAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		Power Total			0.00 29.85	0.00	0.00	1								
AR	NO.					0.0	0.0							1 20.00	0.00							1			
R	YEAR		PPLIED		HIS SECTION NOT USED			CAP		RBISHMENT	COSTS						NANCE COSTS R*10^6)			Discou	INTED ENERGY S	OPPLIED		RAND millio	
	NO.		h/YEAR		NOTUSED	1	Dams	Pipelines	Electro	Civil	Power	ENG & EMP		T	Dam	Pipelines	Treatment,	M&E	1	2	DISCOUNT RATE	s		SCOUNT RAT	
						1		8	Mech	Works						+ Reservoirs	Civil Works+			6%	8%	10%	6%	8%	10%
								Tunnels		Builds							Buildings								
201							230.2	218.0	110.7	137.0	31.7	91.0											818.59	818.59	818.
201							230.2	218.0	110.7	137.0	31.7	91.0											818.59	818.59	818.5
201 201							230.2	218.0 218.0	110.7	137.0 137.0	31.7 31.7	91.0 91.0				+				-			818.59 818.59	818.59 818.59	818.5
201			281 896 513	0.00	0.00	0.00	230.2	218.0	110.7	137.0	31.7	91.0	-		2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202			281 896 513	0.00	0.00	0.00			-		-	-		-	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202	1 6		281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202			281 896 513	0.00	0.00	0.00					3				2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202			281 896 513	0.00	0.00	0.00			-			-		-	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202			281 896 513 281 896 513	0.00	0.00	0.00	L			-		-		-	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513 281 896 513	29.85 29.85	29.85 29.85	29.8
202 202			281 896 513	0.00	0.00	0.00	L		-	-	3	-			2.30 2.30	4.36	5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513	29.85	29.85	29.6
202			281 896 513	0.00	0.00	0.00	-		-	-					2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202			281 896 513	0.00	0.00	0.00				The second se					2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
202	9 14		281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
203			281 896 513	0.00	0.00	0.00					3			3	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
203			281 896 513	0.00	0.00	0.00				-		-			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
203 203	2 17		281 896 513 281 896 513	0.00	0.00	0.00		-	221.4	-	-	-		-	2.30	4.36	5.48 5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85 251.24	29.85 251.24	29.8
203			281 896 513	0.00	0.00	0.00	1		221.4	-		+			2.30	4.30	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	201
203			281 896 513	0.00	0.00	0.00			1			1			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.
203			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.
203			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29
203			281 896 513	0.00	0.00	0.00	L		-	-	1	1			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
203			281 896 513	0.00	0.00	0.00	<u> </u>		-		-	+		-	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
204 204			281 896 513 281 896 513	0.00	0.00	0.00	L	+	-	-	-	+			2.30	4.36	5.48 5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85 29.85	29.85 29.85	29.8
204			281 896 513	0.00	0.00	0.00	1		1	-		1			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29
204	3 28		281 896 513	0.00	0.00	0.00							1		2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29
204			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29
204			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.0
204			281 896 513	0.00	0.00	0.00		-	-	-	3	1			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.
204			281 896 513 281 896 513	0.00	0.00	0.00	0.0	0.0	001.4	0.0		+			2.30	4.36	5.48 5.48	17.71	0.00	281 896 513	281 896 513	281 896 513 281 896 513	29.85	29.85	29
204 204			281 896 513 281 896 513	0.00	0.00	0.00	0.0	0.0	221.4	0.0	-	-		-	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	251.24 29.85	251.24 29.85	251
205			281 896 513	0.00	0.00	0.00				-		1		1	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.8
200			201 000 0 10	0.00	0.00	0.00	-			4		-			2.00	1 1.00		0.0.0			1 201 000 010	1 201000010		NPV	+

M				CAPITALCOST	COMPONENTS (	R*10^6)							CAPITAL C	OST COMPONEN	TS (R*10^6)										
	TOTAL	DAM	PIPELINES TUNNEL	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER	TOTAL	DAM	PIPELINES	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER							
	PHASE 1		TORALL		Workto	HORICO			JOUTEI	PHASE 2	1			1 WORRD	WORRD			301711							
ni & Ntabelanga Dam		920.9				263.1	131.6			0.0	0.0				0.0										
alines/Tunnel	1026.0		872.1			102.6	51.3			0.0		0.0													
servoirs ctromechanical	0.0 442			0.0	CONTRACT NOT CONTRACT NO		0.0 259.9	182.4		0.0	2.26.2623.362.662		0.0	13-024/03/ND-024/201-N		0.0	0.0								
atment Works	0.0				0.0		0.0	162.4		0.0				0.0		0.0	0.0								
straction Works	0.0				0.0	0.0				0.0	+			0.0	0.0										
wer	126.6								126.6	0.0								0.0							
ineering & EMP	363.8									0.0															
AL	3274.3	920.9	872.1	0.0	0.0	365.7	442.8	182.4	126.6	0.0	0.0	0.0	0.0	0.0 OPERATIONAL	0.0	0.0	0.0	0.0							
n	0.0	0.0	1		1	0.0		1	1	MAINTENA	NCE COSTS			OFERATIONAL	COSIS(K IU	.0)	TREATMENT C	PETE	1						
lines	0.0	0.0	0.0			0.0			-	RATE		ITEM		COST	COST	COST	Using cost Rand		N/A						
ervoirs	0.0			0.0		1		1	1	1				PH. 1	PH. 2	PH. 3		0.200000							
nping Stations	0.0						0.0	0.0		0.25%	Dam			2.30	0.00	0.00	PUMPINGCOS								
atment Works	0.0				0.0					0.50%	Pipelines, Re			4.36	0.00	0.00	Max.Demand Ch		N/A						
traction Works	0.0					0.0			1	1.00%		vorks, Civil Works,	Buildings	5.48	0.00	0.00	Energy Cost : Ra	and/ kWHr	N/A						
ver	0.0					+			0.0	4.00%	M & E			17.71	0.00	0.00									
TAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00%	Power Total			29.85	0.00	0.00	1								
AR						0.0	0.0							20.00	0.00		1			-			-		
AR	YEAR		PPLIED	т	HIS SECTION NOT USED			CAPI		RBISHMENT 10^6)	COSTS						NANCE COSTS R*10^6)			DISCOL	JNTED ENERGY S	UPPLIED		TOTAL COST RAND millio	
	NO.		h/YEAR		NOT USED		Dams	Pipelines	Electro	Civil	Power	ENG & EMP	-		Dam	Pipelines	Treatment,	M&E			DISCOUNT RATE	s		ISCOUNT RAT	
					-	1	Dunis	8	Mech	Works	, one.	Litea Lini			- Dann	+ Reservoirs		mar		6%	8%	10%	6%	8%	10%
								Tunnels	1228003	Builds							Buildings			-	0.00				
201																							0.00	0.00	0.00
20*							) <u> </u>				-	1	-										0.00	0.00	0.00
20* 20*									-	-				-								-	0.00	0.00	0.00
201			281 896 513	0.00	0.00	0.00	-		-	-	-	-			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202			281 896 513	0.00	0.00	0.00						1			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202			281 896 513	0.00	0.00	0.00						1			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202 202			281 896 513 281 896 513	0.00	0.00	0.00	2			-	-				2.30	4.36	5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85 29.85	29.85 29.85	29.85 29.85
202			281 896 513	0.00	0.00	0.00					-	-			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202			281 896 513	0.00	0.00	0.00	-		-	-	1	-	-		2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202	8 13		281 896 513	0.00	0.00	0.00	5 - B					2			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
202			281 896 513	0.00	0.00	0.00				_					2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203			281 896 513	0.00	0.00	0.00			-						2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203			281 896 513 281 896 513	0.00	0.00	0.00	8 8		221.4	-	-				2.30	4.36 4.36	5.48 5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85 251.24	29.85 251.24	29.85 251.24
203			281 896 513	0.00	0.00	0.00	-		221.4	-	1	-			2.30	4.30	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203			281 896 513	0.00	0.00	0.00	-		-		1				2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203	6 21		281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203			281 896 513	0.00	0.00	0.00						-			2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
203 204			281 896 513 281 896 513	0.00	0.00	0.00						-	-		2.30 2.30	4.36 4.36	5.48 5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85 29.85	29.85 29.85	29.85 29.85
204			281 896 513 281 896 513	0.00	0.00	0.00	-			-	-	-			2.30	4.36	5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85	29.85	29.85
204			281 896 513	0.00	0.00	0.00			-	-	1				2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
204			281 896 513	0.00	0.00	0.00					1				2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
204	4 29		281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
204			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
204			281 896 513	0.00	0.00	0.00									2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
204			281 896 513	0.00	0.00	0.00	0.0	0.0	201.4	0.0			-		2.30	4.36	5.48	17.71	0.00	281 896 513 281 896 513	281 896 513 281 896 513	281 896 513 281 896 513	29.85	29.85	29.85
204			281 896 513 281 896 513	0.00	0.00	0.00	0.0	0.0	221.4	0.0	-	-		-	2.30	4.36 4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513 281 896 513	251.24 29.85	251.24 29.85	251.24
205			281 896 513	0.00	0.00	0.00					1	-		1	2.30	4.36	5.48	17.71	0.00	281 896 513	281 896 513	281 896 513	29.85	29.85	29.85
200			201 000 0 10	0.00	0.00	0.00	-		<u>.</u>	-		L	L		1 2.00	1.00	0.10	LIZED COST Rar	0.00		101000010	201000010	20.00	NPV	

EM		0	2. · · · · ·	CAPITALCOS	T COMPONENTS (	R*10^6)	2	25	2	1 - s	Q	<u>20.</u>	CAPITAL C	COST COMPONEN	TS (R*10^6)		28. – S	18							
	TOTAL	DAM	PIPELINES	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER	TOTAL	DAM	PIPELINES	RESERVOIRS	TREATMENT	CIVIL	M & E	BUILDING	POWER							
	PHASE 1		TONNEL		WORKS	WORKS			JOFFLI	PHASE 2		1		WORKS	WORKS			SUFFLI							
ni &Laleni Dam	1641.0	1148.7				328.2	164.1			0.0	0.0				0.0										
elines/Tunnel	1026.0	ļ	872.1			102.6	51.3			0.0	ļ	0.0													
servoirs	0.0			0.0			0.0			0.0			0.0												
ctromechanical atment Works	342 0.0				0.0		259.9	182.4		0.0				0.0		0.0	0.0								
straction Works	0.0				0.0	0.0	0.0			0.0				0.0	0.0										
wer	97.0		1						97.0	0.0		1			0.0		1	0.0							
gineering & EMP	388.3									0.0	1														
TAL	3494.3	1148.7	872.1	0.0	0.0	430.8	475.3	182.4	97.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							
	PHASE 3			-	-	1 00		ř		MAINTENAN				OPERATIONAL	COSTS (R°10	°6)	TREATMENT C			1					
m elines	0.0	0.0	0.0			0.0		+	+	RATE	CE COSTS	ITEM		COST	COST	COST	Using cost Rand		N/A						
servoirs	0.0		0.0	0.0						NATE		TIEM		PH. 1	PH.2	PH.3	Using COSL Rand	per mo -	N/R						
mping Stations	0.0			0.0			0.0	0.0		0.25%	Dam			2.87	0.00	0.00	PUMPING COS	rs		1					
atment Works	0.0		1		0.0			1	1	0.50%	Pipelines, R	leservoirs		4.36	0.00	0.00	Max.Demand Ch	arge / Kw	N/A						
straction Works	0.0					0.0				1.00%		Vorks, Civil Works,	Buildings	6.13	0.00	0.00	Energy Cost : Ra	and/ kWHr	N/A	1					
ower	0.0								0.0	4.00%	M & E			19.01	0.00	0.00	-			·					
ther DTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00%	Power Total			0.00	0.00	0.00	4								
				1		0.0	0.0							32.30	0.00	1									
EAR	YEAR		NERGY	I I	THIS SECTION NOT USED			CAPI		RBISHMENT ( 10^6)	COSTS						NANCE COSTS R*10/6)			DISCO	UNTED ENERGY	UPPLIED		RAND millio	
	NO.		Vh/YEAR			1	Dams	Pipelines	Electro	Civil	Power	ENG & EMP		1	Dam	Pipelines	Treatment.	M&E			DISCOUNT RATE	s		SCOUNT RA	
			1					8	Mech	Works						+ Reservoirs	Civil Works+			6%	8%	10%	6%	8%	10%
								Tunnels		Builds				0			Buildings	v							
201							287.2	218.0	118.8	153.3	243	97.1								-			898.65	898.65	898.6
201							287.2 287.2	218.0 218.0	118.8	153.3 153.3	243 243	97.1 97.1								-			898.65 898.65	898.65 898.65	898.65
201		+				-	287.2	218.0	118.8	153.3	24.3	97.1			-								898.65	898.65	898.6
201			262 800 000	0.00	0.00	0.00	LOTE	10.0	110.0	100.0	110				2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202			262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202			262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202			262 800 000	0.00	0.00	0.00		Q 3	-	1					2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202			262 800 000 262 800 000	0.00	0.00	0.00									2.87	4.36 4.36	6.13	19.01	0.00	262 800 000 262 800 000	262 800 000 262 800 000	262 800 000	32.38	32.38 32.38	32.38
202			262 800 000	0.00	0.00	0.00			<u> </u>	-					2.87	4.36	6.13 6.13	19.01 19.01	0.00	262 800 000	262 800 000	262 800 000 262 800 000	32.38	32.38	32.38
202			262 800 000	0.00	0.00	0.00				3				8	2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202			262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202		1	262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
202			262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
203			262 800 000	0.00	0.00	0.00			-	3 8	-	-			2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
203			262 800 000 262 800 000	0.00	0.00	0.00		-				-		-	2.87	4.36	6.13	19.01 19.01	0.00	262 800 000 262 800 000	262 800 000 262 800 000	262 800 000 262 800 000	32.38	32.38 32.38	32.38
203		+	262 800 000	0.00	0.00	0.00			237.7	-	-	-		-	2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	270.04	270.04	270.0
203		1	262 800 000	0.00	0.00	0.00				0 8					2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
203	6 20	T	262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
203		ļ	262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
203		<b>.</b>	262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
203			262 800 000	0.00	0.00	0.00				0 - 2		-			2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.38
203		+	262 800 000 262 800 000	0.00	0.00	0.00		1	-	F		+		+	2.87 2.87	4.36 4.36	6.13 6.13	19.01 19.01	0.00	262 800 000 262 800 000	262 800 000 262 800 000	262 800 000 262 800 000	32.38	32.38 32.38	32.38
204			262 800 000	0.00	0.00	0.00			-	-	-			+	2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
204		1	262 800 000	0.00	0.00	0.00				6 8					2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
204		I	262 800 000	0.00	0.00	0.00		0							2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
204			262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
204			262 800 000	0.00	0.00	0.00					L				2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
204			262 800 000 262 800 000	0.00	0.00	0.00		-) (	-	0		-		-	2.87 2.87	4.36 4.36	6.13 6.13	19.01 19.01	0.00	262 800 000 262 800 000	262 800 000 262 800 000	262 800 000 262 800 000	32.38 32.38	32.38 32.38	32.3
204		+	262 800 000	0.00	0.00	0.00	0.0	0.0	237.7	0.0		+	-		2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	270.04	270.04	270.0
204		1	262 800 000	0.00	0.00	0.00		0.0	a.u.	0.0		-		-	2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
205		1	262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	32.3
				10000000													15/5	LIZED COST Rai	nd/ kWh	i —	NPV - Energy			NPV	1
																	6%	8%	10%	6%	8%	10%	6%	8%	10%
																	0.97	1.11				2 503 531 506	3586.46	3321.02	

other	L.				CAPITALCOST	COMPONENTS (F	R*10^6)							CAPITAL	COST COMPONEN	TS (R*10^6)										
		TOTAL	DAM		RESERVOIRS			M&E	BUILDING		TOTAL	DAM	PIPELINES	RESERVOIRS			M&E	BUILDING								
		PHASE 1		TORREL		Workto	Tiona			JOULTEL	PHASE 2	-			Workto	Workto			JOITE							
	&Laleni Dam		1148.7									0.0				0.0										
nerver i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i         i<				872.1	0.0		102.6						0.0	0.0	+											
mm         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m					0.0				182.4					0.0			0.0	0.0								
	nent Works	0.0				0.0					0.0				0.0											
markmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkmarkma	ction Works						0.0			07.0						0.0										
BAIL         DT         BAIL         DT         DT        DT         DT	ering & FMP									97.0									0.0							
No.       Obj       Obj<		3494.3	1148.7	872.1	0.0	0.0	430.8	475.3	182.4	97.0		0.0	0.0	0.0				0.0	0.0							
m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m         m					84		-	-	1				-		OPERATIONAL	COSTS (R*10	^6)	(								
min         00         min         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         00         0			0.0	0.0			0.0					ICE COSTS			COST	COST	COST			NIA						
Autom of the property				0.0	0.0						MATE		TEM					Using COst Rails	per ma =	1905						
Control         Control </th <th>ng Stations</th> <th>0.0</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>0.0</th> <th>0.0</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th>0.00</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	ng Stations	0.0						0.0	0.0								0.00									
01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01       01 <th< th=""><th></th><th></th><th></th><th></th><th></th><th>0.0</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></th<>						0.0																				
0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0							0.0			0.0			Vorks, Civil Works,	Buildings				Energy Cost : Ra	and/ kWHr	N/A						
Net of or	[									0.0								-								
Prod         Unit         Unit </th <th>AL.</th> <th></th> <th>0.0</th> <th>0.0</th> <th>0.0</th> <th>0.0</th> <th>0.0</th> <th>0.0</th> <th>0.0</th> <th>0.0</th> <th></th> <th></th> <th></th> <th></th> <th>32.38</th> <th>0.00</th> <th>0.00</th> <th>1</th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th> <th></th>	AL.		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0					32.38	0.00	0.00	1								
Normal         Norma	i	YEAR							CAPI			COSTS									DISCOL	INTED ENERGY S	UPPLIED			
Image       Image <th< th=""><th></th><th>NO.</th><th></th><th></th><th></th><th>NOT USED</th><th>1</th><th>Dams</th><th>Pipelines</th><th></th><th></th><th>Power</th><th>ENG &amp; EMP</th><th></th><th></th><th>Dam</th><th></th><th></th><th>M&amp;E</th><th></th><th></th><th>DISCOUNT RATE</th><th>s</th><th></th><th></th><th></th></th<>		NO.				NOT USED	1	Dams	Pipelines			Power	ENG & EMP			Dam			M&E			DISCOUNT RATE	s			
00       0       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1		10249.049						12352040250		Mech						1. 2020.2000.000	+ Reservoirs				6%	8%	10%	6%	8%	1
2       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m					ä				Tunners		Dunds					-		Duitungs								0
No.       N											1 C - 0		-													-
1       200 M       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00								<u> </u>	-				-													
0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0				262 800 000	0.00	0.00	0.00				1					2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000			1
1       202       7       202 000       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00 <th< td=""><td></td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1000</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>3</td></th<>			1								1000															3
222       8       226 000       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00									-																	3
900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900       900			+					<u> </u>																		3
1       228       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.									1		1									0.00						3
2027       12       288 0000       0.00       0.00       0.00       0.00       0.00       0.00       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000			Ι																							3
13       928       13       928       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0										-					-											3
2028       14       2028       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00											-	-			-											3
2000       16       222 00000       000       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00       0.00									1	-	1		1													3
233       17       262 800 00       0.00       0.00       237       18       262 800 00       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000       262 800 000 </td <td>20</td> <td>15</td> <td></td> <td>6.13</td> <td></td> <td></td> <td>262 800 000</td> <td>262 800 000</td> <td>262 800 000</td> <td></td> <td></td> <td>3</td>	20	15																6.13			262 800 000	262 800 000	262 800 000			3
303       16       262 00 00       0.00       0.00       237.7       Image: Constraint of the constraint o											1															3
2034       19       202 00 00       0.00       0.00       0.00       0.00       0.00       2287       4.36       6.13       19.01       0.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00										007.7	-		-		-											3
000       20       262 80000       000       000       000       000       000       000       228       000       228       000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000       228 0000 <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>+</td> <td>231.1</td> <td>-</td> <td></td> <td>27</td>									+	231.1	-															27
2337       22       262 80000       0.00       0.00       0.00       0.00       0.00       2.28       2.28       0.33       19.01       0.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00			t								1 8															3
303       23       262 80000       0.00       0.00       0.00       0.00       0.00       248       6.13       19.01       0.00       228 90.00       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90.000       228 90											1 1															3
2338       24       262 80000       0.00       0.00       0.00       0.00       0.00       228       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238       238			ļ								-															3
204       25       262 80000       000       000       000       000       000       28       1911       000       282 80000       2028 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000       228 90000											-			-												3
204       26       202 00 00       0.00       0.00       0.00       0.00       0.00       0.00       228       0.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00			t																							3
298       262 200 000       000       000       000       000       000       000       2287       4.38       6.13       1901       0.00       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       2280 000       22800 00       228	20	1 26		262 800 000	0.00	0.00	0.00									2.87	4.36	6.13	19.01	0.00	262 800 000	262 800 000	262 800 000	32.38	32.38	3
204       29       282 80000       0.00       0.00       0.00       0.00       0.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228 00.00       228			L																							3
206       30       262 800 00       0.00       0.00       0.00       0.00       0.00       287       4.86       6.13       19.01       0.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00       228 800.00																										3
204       31       262,800,00       0.00       0.00       0.00       0.00       0.00       228,900,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,800,00       282,80								-	1		4															3
2047       32       262 800 00       0.00       0.00       0.00       0.00       237       0.0       247       4,36       6,13       19.01       0.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.00       228.00.0									1		-															3
2049       3.4       262 200 000       0.00       0.00       0.00       0.00       0.00       22.87       4.36       6.13       19.01       0.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2262 000.00       2260 000       2260 000       2260 000       2260 000       2260 000       22.87       32.88       32.88       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38       32.38 </td <td></td> <td>1</td> <td></td> <td>1 3</td>											1															1 3
266       35       262 600 000       0.00       0.00       0.00       0.00       32.38       32.38         LEVELIZED COST Rand/ KWh       NPV - Energy								0.0	0.0	237.7	0.0															2
LEVELIZED COST Rand/ KWh NPV - Energy NPV			ļ																							3
	20	50 35		262 800 000	0.00	0.00	0.00			1						2.87	4.36				262 800 000		262 800 000	32.38		3
																		LEVE	LIZED COST Rai	nd/ kWh		NPV - Energy			NPV	-

OTAL         0.0           EAR         YEAI           2015         0           2016         0           2016         0           2016         0           2017         2           2018         3           2019         3           2019         4           2021         6           2022         7           2023         6           2024         9           2025         10           2026         11           2027         12           2028         13           2029         14           2030         16           2032         17           2033         16           2033         16           2034         19           2034         19           2034         19           2034         19           2034         19           2034         19           2034         19           2034         19           2034         19	ASE 1 57.4 57.4 57.4 57.4 57.4 57.4 57.4 58.5 59.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5 50.5	2602	209 882 0.0 209 882 0.0 209 882 0.0 209 882 0.0 209 882 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	WORK: 715 00 00 715 00 00 00 00 00	M & E 35.7 9.0 0.0 259.9 0.0 295.7 295.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	182.4	SUPPLY 296 296 296 00 00	RATE 0.25% 0.50% 1.00% 4.00% 0.00%	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	ITEM	RESERVOIRS 00 00 00 00 00 00 00 00 00 00 00 00 00	TREATMENT           WORKS           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0           0.0 </th <th>COST PH.2 0.00 0.00 0.00 0.00 0.00 0.00 Dam Dam</th> <th>COST PH. 3 0.00 0.00 0.00 0.00 0.00 0.00 MAINTE ( Pipelines + Reservoirs</th> <th>Buildings 254</th> <th>per m3 = rs arge / Kw nd/ KWHr M &amp; E 11.83</th> <th>N/A N/A N/A</th> <th>05.000.000</th> <th>INTED ENERGY S DISCOUNT RATE 8%</th> <th>4000.000.000.000.000.000.000.000.0000.0000</th> <th></th> <th>TOTAL COSTS RAND million 20010T RATE 22454 22454 22454 22454</th> <th>10% 2245 2245 2245 2245 2245</th>	COST PH.2 0.00 0.00 0.00 0.00 0.00 0.00 Dam Dam	COST PH. 3 0.00 0.00 0.00 0.00 0.00 0.00 MAINTE ( Pipelines + Reservoirs	Buildings 254	per m3 = rs arge / Kw nd/ KWHr M & E 11.83	N/A N/A N/A	05.000.000	INTED ENERGY S DISCOUNT RATE 8%	4000.000.000.000.000.000.000.000.0000.0000		TOTAL COSTS RAND million 20010T RATE 22454 22454 22454 22454	10% 2245 2245 2245 2245 2245
ten BALen Dam         367.           genters/Turnel         0.0           searcora         0.0           pelines         0.0           pelines         0.0           pelines         0.0           pelines         0.0           pelines         0.0           pelines         0.0           cora         0.0           cora <th>37.4         57.4           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0</th> <th>250.2 250.2 250.2 0.0 0.0 ENERGY SUPPLIE KWNYEAT 222 222 222 222 222 222 222 2</th> <th>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th> <th>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th> <th>715 0.0 0.0 715 0.0 0.0 0.0 0.0 0.0 0.00</th> <th>35.7 0.0 259.9 0.0 295.7 295.7 295.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th> <th>182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0</th> <th>296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</th> <th>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th> <th>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th> <th>0.0 TEM Reservoin Norks Cvil Works BNG &amp; EMP 17.2 17.2 17.2</th> <th>0.0</th> <th>0.0 0.0 0PERATIONAL 0.03 0.00 2.54 11.83 0.00</th> <th>0.0 0.0 0.0 0.0 0.0 0.0 0.00 0.00 0.00</th> <th>00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs</th> <th>0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. Energy Cost : Ra NANCE COSTS Treatment, Cost Works- Buildings</th> <th>00 00 00 0575 957 958 959 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 75 75 75 75 75 75 75 75 75 75 75 75</th> <th>N/A N/A</th> <th>6%</th> <th>DISCOUNT RATE</th> <th>S</th> <th>0% 6% 22454 22454 22454 22454 22454</th> <th>RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454</th> <th>10% 2245 2245 2245 2245 2245</th>	37.4         57.4           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0         0.0           0.0	250.2 250.2 250.2 0.0 0.0 ENERGY SUPPLIE KWNYEAT 222 222 222 222 222 222 222 2	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	715 0.0 0.0 715 0.0 0.0 0.0 0.0 0.0 0.00	35.7 0.0 259.9 0.0 295.7 295.7 295.7 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0	296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 TEM Reservoin Norks Cvil Works BNG & EMP 17.2 17.2 17.2	0.0	0.0 0.0 0PERATIONAL 0.03 0.00 2.54 11.83 0.00	0.0 0.0 0.0 0.0 0.0 0.0 0.00 0.00 0.00	00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs	0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. Energy Cost : Ra NANCE COSTS Treatment, Cost Works- Buildings	00 00 00 0575 957 958 959 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 8759 75 75 75 75 75 75 75 75 75 75 75 75 75	N/A N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 2245 2245 2245 2245 2245
pelnes/funnel         0.0           pelnes/funnel         0.0           betromechancal         163           setromechancal         163           sethent Works         0.0           betromechancal         163           sethent Works         0.0           betromechancal         163           sethent Works         0.0           betromechancal         163           pelnes         0.0           betromechancal         619           DTAL         619           betromechancal         0.0           betromechancal <t< th=""><th>2.0</th><th>2502 00 00 ENERGY SUPPLEE MWNYEAT 222 22 22 22 22 22 22 22 22 22 22 22 2</th><th>0.0 0.0 0.0 0.0</th><th>0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0</th><th>00</th><th>00, 00, 259,9, 00, 296,7 296,7 00, 00, 00, 00, 00, 00, 00, 00, 00, 0</th><th>182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0</th><th>296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</th><th>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</th><th>0.0 Dam Poplines, F Poplines, F Treatment 1 M &amp; E Power Total FCOSTS Power 7.4 7.4 7.4 7.4</th><th>0.0 TEM Reservoin Norks Cvil Works BNG &amp; EMP 17.2 17.2 17.2</th><th>0.0</th><th>0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00</th><th>0.0 0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.000 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00</th><th>00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs</th><th>0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. Energy Cost : Ra NANCE COSTS Treatment, Cost Works- Buildings</th><th>0.0 DSTS per m3 = TS argp / Kw md/KWH/ M&amp; E 11.83</th><th>N/A N/A</th><th>6%</th><th>DISCOUNT RATE</th><th>S</th><th>0% 6% 22454 22454 22454 22454 22454</th><th>RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454</th><th>10% 224.5 224.5 224.5 224.5 224.5</th></t<>	2.0	2502 00 00 ENERGY SUPPLEE MWNYEAT 222 22 22 22 22 22 22 22 22 22 22 22 2	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0	00	00, 00, 259,9, 00, 296,7 296,7 00, 00, 00, 00, 00, 00, 00, 00, 00, 0	182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0	296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 Dam Poplines, F Poplines, F Treatment 1 M & E Power Total FCOSTS Power 7.4 7.4 7.4 7.4	0.0 TEM Reservoin Norks Cvil Works BNG & EMP 17.2 17.2 17.2	0.0	0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00	0.0 0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.000 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.00	00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs	0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. Energy Cost : Ra NANCE COSTS Treatment, Cost Works- Buildings	0.0 DSTS per m3 = TS argp / Kw md/KWH/ M& E 11.83	N/A N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 224.5 224.5 224.5 224.5 224.5
see voirs         0.0           set ment Works         103           set ment Works         0.0           set ment Morks         0.0           set ment of set works         0.0           m         0.0           prines 5         0.0           set works         0.0           work         0.0           with other         0.0           other         0.0           other         0.0           set addition         0.0           work         0.0           set addition         0.0           other         0.0           set addition         0.0           set addition         0.0      <	20 63 20 20 20 88 88 10 20 20 20 20 20 20 20 20 20 2	2602 0.0 ENERGY SUPPLIE MVNYEA 222 22 22 22 22 22 22 22 22 22 22 22 2	0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0	0.0 715 0.0 0.0 0.0 0.0 0.0 0.00 0.00	00 259.9 00 235.7 236.7 0.0 00 00 Dams 62.5 62.5	182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0	296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Dam Dam Pipelines, F Treatment M & E Power Total Total Total Total Total Total Total 7.4 7.4 7.4	0.0 TEM Reservoin Norks Cvil Works BNG & EMP 17.2 17.2 17.2	0.0	0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00	0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs	0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. Energy Cost : Ra NANCE COSTS Treatment, Cost Works- Buildings	0.0 DSTS per m3 = TS argp / Kw md/KWH/ M& E 11.83	N/A N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 224.5 224.5 224.5 224.5 224.5
ectomechanical         163           extenditor Works         0.0           setimet Works         0.0           verif action Works         0.0           setimet Works         0.0           primesting & EMP         688           DTAL         619           setivaction Works         0.0           painesting & EMP         688           DTAL         619           setivaction Works         0.0           astraction Works         0.0           astraction Works         0.0           setivaction Works         0.0<	63 63 63 64 64 65 65 65 65 65 65 65 65 65 65 65 65 65	00 00 ENERGY SUPPLIES WWWYEAT 22 22 22 22 22 22 22 22 22 22 22 22 22	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	259.9 0.0 296.7 0.0 0.0 0.0 0.0 Dams 62.5 62.5 62.5	182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0	296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Dam Dam Pipelines, F Treatment M & E Power Total Total Total Total Total Total Total 7.4 7.4 7.4	ITEM Reservoirs Norks, Civil Works, ENG & EMP 17.2 17.2 17.2	0.0	0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00	0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs	0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. Energy Cost : Ra NANCE COSTS Treatment, Cost Works- Buildings	0.0 DSTS per m3 = TS argp / Kw md/KWH/ M& E 11.83	N/A N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 224.5 224.5 224.5 224.5 224.5
seatment Works         0.0           settraction Works         0.0           settraction Works         0.0           settraction Works         0.0           organization         0.9           PHASAS         0.0           pelnes         0.0           settractor Works         0.0           optines         0.0           settractors Works         0.0           DTAL         0.0           DTAL         0.0           2016         0           2015         0           2016         0           2017         2020           2021         0           2022         7           2023         6           2024         9           2025         11           2026         11           2023         16           2033         16           2033         16           2033	20.0 9.0 9.6 8.8 19.3 ASE 3 3.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.0 10.	00 00 ENERGY SUPPLIES WWWYEAT 22 22 22 22 22 22 22 22 22 22 22 22 22	0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	00 296.7 00 00 Dams 62.5 62.5 62.5	182.4 0.0 0.0 CAR Pipelines 8 Tunnels 0.0 0.0 0.0	296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	Dam Dam Pipelines, F Treatment M & E Power Total Total Total Total Total Total Total 7.4 7.4 7.4	ITEM Reservoirs Norks, Civil Works, ENG & EMP 17.2 17.2 17.2		0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00	0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	00 6) COST PH.3 0.00 0.00 0.00 0.00 0.00 MAINTE Pipelines + Reservoirs	0.0 TREATMENT CC Using cost Rand PUMPHIC COST Max.Demand Ch. 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Detractor Works         0.0           wer         26.0           OTAL         619.           PHASI         619.           amn         0.0           oppleneng & EMP         68.0           phase         0.0           pplenes         0.0           opsines         0.0           atmost         0.0           otractor         0.0           2016         0           2017         0.0           2016         0           2017         0.0           2021         6           2022         7           2023         11           2024         12           2025         13 <td>20</td> <td>00 00 ENERGY SUPPLIES WWWYEAT 22 22 22 22 22 22 22 22 22 22 22 22 22</td> <td>0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0</td> <td>0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0</td> <td>0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0</td> <td>295.7 0.0 0.0 Dams 62.5 62.5 62.5</td> <td>0.0 0.0 CAF Pipelines &amp; Tunnels 0.0 0.0 0.0</td> <td>296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>Dam Dam Pipelines, F Treatment M &amp; E Power Total Total Total Total Total Total Total 7.4 7.4 7.4</td> <td>ITEM Reservoirs Norks, Civil Works, ENG &amp; EMP 17.2 17.2 17.2</td> <td></td> <td>0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00</td> <td>0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0</td> <td>6) COST PH. 3 0 00 0 00 0</td> <td>TREATMENT CC Using cost Rand PUMPING COST Max Demand Ch Energy Cost: Ra NANCE COSTS R10*6) Treatment, Civil Works+ Buildings</td> <td>0.0 DSTS per m3 = TS argp / Kw md/KWH/ M&amp; E 11.83</td> <td>N/A N/A</td> <td>6%</td> <td>DISCOUNT RATE</td> <td>S</td> <td>0% 6% 22454 22454 22454 22454 22454</td> <td>RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454</td> <td>10% 2245 2245 2245 2245 2245</td>	20	00 00 ENERGY SUPPLIES WWWYEAT 22 22 22 22 22 22 22 22 22 22 22 22 22	0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0 0.0 0.0 0.0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0 0 0.0	0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.0	295.7 0.0 0.0 Dams 62.5 62.5 62.5	0.0 0.0 CAF Pipelines & Tunnels 0.0 0.0 0.0	296 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	Dam Dam Pipelines, F Treatment M & E Power Total Total Total Total Total Total Total 7.4 7.4 7.4	ITEM Reservoirs Norks, Civil Works, ENG & EMP 17.2 17.2 17.2		0.0 OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00	0.0 COSTS (R*10 PH.2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0	6) COST PH. 3 0 00 0	TREATMENT CC Using cost Rand PUMPING COST Max Demand Ch Energy Cost: Ra NANCE COSTS R10*6) Treatment, Civil Works+ Buildings	0.0 DSTS per m3 = TS argp / Kw md/KWH/ M& E 11.83	N/A N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 2245 2245 2245 2245 2245
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PHAS           wm         0.0           pelines         0.0           servors         0.0           servors         0.0           servors         0.0           servors         0.0           stations         0.0           stations         0.0           stations         0.0           stations         0.0           stations         0.0           stations         0.0           way         0.0           program         0.0           oright         0.0           2016         0           2016         0           2016         1           2016         1           2016         2           2020         6           2021         6           2022         3           2023         11           2023         11           2023         14           2030         16           2032         17           2033         16           2033         16           2033         16           2034         19	ASE 3 20 20 20 20 20 20 20 2	00 00 ENERGY SUPPLIES WWWYEAT 22 22 22 22 22 22 22 22 22 22 22 22 22	0.0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	0.0 0.0 THIS SECTON NOT USED 0.00 0.00 0.00 0.00 0.00	0.0	0.0 0.0 Dams 62.5 62.5 62.5	0.0 0.0 CAF Pipelines & Tunnels 0.0 0.0 0.0	0,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0 0,0	MAINTENA           RATE           0.25%           0.50%           1.00%           4.00%           0.00%           URBISHMENT           "10%           Civil           Works           Builds           63.5           63.5	Dam Dam Pipelines, F Treatment M & E Power Total Total Total Total Total Total Total 7.4 7.4 7.4	ITEM Reservoirs Norks, Civil Works, ENG & EMP 17.2 17.2 17.2		OPERATIONAL COST PH.1 0.63 0.00 2.54 11.83 0.00	COSTS (R*10 PH, 2 0.00 0.00 0.00 0.00 0.00 0.00 0.00 0.	6) COST PH. 3 0 00 0	TREATMENT CC Using cost Rand PUMPING COST Max Demand Ch Energy Cost: Ra NANCE COSTS R10*6) Treatment, Civil Works+ Buildings	DSTS per m3 = rS arge / Kw md/ KWHr M&E 11.83	N/A N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 2245 2245 2245 2245 2245
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Detractor Works         0.0           Other         0.0           OTAL         0.0           DTAL         0.0 </td <td>00 00 00 00 00 00 00 1 2 2 3 4 4 5 6 6 7 7 8 8 9 9</td> <td>ENERGY SUPPLIEL KWNYEAI 222 222 222 222 222 222 222 222 222</td> <td>209 862 0.00 209 862 0.00 209 862 0.00 209 862 0.00 209 862 0.00 209 862 0.00</td> <td>0.0 THIS SECTON NOT USED</td> <td>0.0</td> <td>Dams 625 625 625</td> <td>CAF Pipelines &amp; Tunnels 0.0 0.0 0.0</td> <td>0.0 PITAL &amp; REFL (R Electro Mech 73.9 73.9 73.9 73.9</td> <td>1.00% 4.00% 0.00% URB ISHMEN1 "10^6) Civil Works Builds 63.5 63.5 63.5</td> <td>Treatment V           M &amp; E           Power           Total           TCOSTS           Power           7.4           7.4           7.4</td> <td>ENG &amp; EMP 17.2 17.2</td> <td>Buildings</td> <td>2.54 11.83 0.00</td> <td>0.00 0.00 0.00 Dam 0.63</td> <td>0.00 0.00 0.00 MAINTE Pipelines + Reservoirs</td> <td>Energy Cost: Ra NANCE COSTS R*10*6) Treatment, Civil Works+ Buildings</td> <td>M&amp; E</td> <td>N/A</td> <td>6%</td> <td>DISCOUNT RATE</td> <td>S</td> <td>0% 6% 22454 22454 22454 22454 22454</td> <td>RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454</td> <td>10% 22454 22454 22454 22454 22454</td>	00 00 00 00 00 00 00 1 2 2 3 4 4 5 6 6 7 7 8 8 9 9	ENERGY SUPPLIEL KWNYEAI 222 222 222 222 222 222 222 222 222	209 862 0.00 209 862 0.00 209 862 0.00 209 862 0.00 209 862 0.00 209 862 0.00	0.0 THIS SECTON NOT USED	0.0	Dams 625 625 625	CAF Pipelines & Tunnels 0.0 0.0 0.0	0.0 PITAL & REFL (R Electro Mech 73.9 73.9 73.9 73.9	1.00% 4.00% 0.00% URB ISHMEN1 "10^6) Civil Works Builds 63.5 63.5 63.5	Treatment V           M & E           Power           Total           TCOSTS           Power           7.4           7.4           7.4	ENG & EMP 17.2 17.2	Buildings	2.54 11.83 0.00	0.00 0.00 0.00 Dam 0.63	0.00 0.00 0.00 MAINTE Pipelines + Reservoirs	Energy Cost: Ra NANCE COSTS R*10*6) Treatment, Civil Works+ Buildings	M& E	N/A	6%	DISCOUNT RATE	S	0% 6% 22454 22454 22454 22454 22454	RAND million SCOUNT RATE 8% 22454 22454 22454 22454 22454	10% 22454 22454 22454 22454 22454
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0000         6           2021         6           2022         7           2023         9           2026         10           2027         12           2028         13           2029         14           2029         14           2029         14           2029         14           2030         16           2031         16           2032         17           2033         18           2034         19           2035         2036	5 6 7 8 9	222 222 222 222 222	209 862 0.0 209 862 0.0 209 862 0.0 209 862 0.0 209 862 0.0	0.00 0.00 0.00	0.00 0.00				-		-								22,209,882	00.000.000	20 200 862	4400	4400	
2021 6 2022 7 2023 6 2024 9 2025 10 2025 10 2025 11 2027 12 2028 11 2029 14 2020 14 2020 14 2020 14 2020 14 2030 16 2031 16 2033 16 2033 19 2033 19	6 7 8 9 10	22 : 22 : 22 :	209 862 0.0 209 862 0.0 209 862 0.0	0.00	0.00		-													22 209 862			14.99	14.99
3022         7           3023         8           3024         9           3025         10           3026         10           3027         12           3028         13           3029         14           3030         16           3031         16           3032         14           3030         16           3032         14           3030         16           3032         14           3033         16           3033         16           3034         19           3035         20	7 8 9 10	22 22 22 22 22 22 22 22 22 22 22 22 22	209 862 0.0 209 862 0.0	0.00		20 B					-	-		0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2023 9 2024 9 2026 10 2026 11 2027 12 2026 11 2027 12 2026 11 2020 14 2020 15 2020 14 2020 15 2020 16 2021 17 2023 16 2023 16 2023 17 2023 19 2023 19	9 10	223	209 862 0.0				24	-		-	1			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2024 9 2025 10 2028 11 2027 12 2028 11 2028 11 2028 11 2028 11 2028 11 2029 14 2030 15 2030 15 2031 16 2032 17 2033 18 2034 19 2035 20	9 10			0.00	0.00				-	-	-		-	0.63	0.00	2.54 2.54	11.83 11.83	0.00	22 209 862 22 209 862	22 209 862	22 209 862	14.99	14.99	14.99 14.99
2025 100 2028 101 2028 11 2029 12 2028 13 2029 14 2030 15 2031 16 2032 17 2033 16 2033 16 2033 19 2033 19 2035 20	10		209 862 0.0	0.00	0.00			-		-	-	-	-	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99	14.99	14.99
2027 12 2028 13 2029 14 2030 15 2031 16 2031 16 2032 17 2033 18 2033 18 2033 19 2034 19 2035 20			209 862 0.0	0.00	0.00						2		1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2028 13 2029 14 2030 16 2031 16 2032 17 2033 18 2034 19 2036 20	11	223	209 862 0.0	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2029 14 2030 15 2031 16 2032 17 2033 18 2033 18 2034 19 2036 20	12		209 862 0.0	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2030 15 2031 16 2032 17 2033 18 2034 19 2035 20			209 862 0.0	0.00	0.00			-	1	-			1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2031 16 2032 17 2033 18 2034 19 2035 20			209 862 0.0	0.00	0.00		8	-	-		-			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2032 17 2033 18 2034 19 2035 20			209 862 0.0 209 862 0.0	0.00	0.00		-	-	-	-	+		+	0.63	0.00	2.54 2.54	11.83 11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99	14.99 14.99	14.99 14.99
2033 18 2034 19 2035 20			209 862 0.0	0.00	0.00		2	-	-	-	-			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2035 20			209 862 0.0	0.00	0.00			147.8						0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	162.82	162.82	162.82
			209 862 0.0	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
			209 862 0.0	0.00	0.00						-		-	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2036 21			209 862 0.0	0.00	0.00			-		-	-		-	0.63	0.00	2.54	11.83 11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99 14.99
2037 22 2038 23			209 862 0.0 209 862 0.0	0.00	0.00		10	-	-	-	-		-	0.63	0.00	2.54 2.54	11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99	14.99 14.99	14.99
2038 23			209 862 0.0	0.00	0.00		-	-	-	-		-	1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2040 25			209 862 0.0	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
20.41 26			209 862 0.0	0.00	0.00						12			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2042 27			209 862 0.0	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2043 28 2044 29			209 862 0.0	0.00	0.00	-	-		-					0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99 14.99
2044 29 2045 30			209 862 0.0 209 862 0.0	0.00	0.00			-		-	-		-	0.63	0.00	2.54 2.54	11.83 11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99	14.99 14.99	14.99
2046 31			209 862 0.0	0.00	0.00			-	1	1	-		1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2040 31			209 862 0.0	0.00	0.00					1	1		1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2048 33			209 862 0.0	0.00	0.00	0.0	0.0	147.8	0.0	1			1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	162.82	162.82	162.82
2049 34			209 862 0.0	0.00	0.00						1			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
2050 35	35	223	209 862 0.0	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.99
																LEVE	LIZED COST Rai	nd/ kWh		NPV - Energy	1		NPV	
																6%	8%					6%	8%	10%

EM				CAPITALCOST	COMPONENTS (F	R*10^6)							CAPITAL C	COST COMPONEN	TS (R*10^6)				1						
	TOTAL	DAM	PIPELINES TUNNEL	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER	TOTAL	DAM	PIPELINES	RESERVOIRS	TREATMENT	CIVIL	M&E	BUILDING	POWER							
	PHASE 1					1			1	PHASE 2															
ni &Laleni Dam	357.4	250.2				71.5	35.7			0.0	0.0				0.0										
elines/Tunnel	0.0		0.0			0.0	0.0		+	0.0		0.0							2						
servoirs stromechanical	0.0			0.0			0.0	182.4		0.0			0.0			0.0	0.0								
atment Works	0.0				0.0		0.0	102.4		0.0				0.0		0.0	0.0		÷						
traction Works	0.0					0.0				0.0					0.0		1		S						
/er	29.6								29.6	0.0								0.0							
neering & EMP	68.8					-				0.0					-										
AL	619.3 PHASE 3	250.2	0.0	0.0	0.0	71.5	295.7	182.4	29.6	0.0	0.0	0.0	0.0	0.0 OPERATIONAL	0.0	0.0	0.0	0.0							
1	0.0	0.0				0.0				MAINTENA	ICE COSTS			OFERATIONAL	COSIS(K IU	-0)	TREATMENT CO	OSTS							
lines	0.0		0.0						1	RATE	T	ITEM		COST	COST	COST	Using cost Rand		N/A						
arvoirs	0.0			0.0			1		1					PH. 1	PH. 2	PH. 3		ALCONTROL .							
ping Stations	0.0						0.0	0.0			Dam			0.63	0.00	0.00	PUMPING COST								
itment Works	0.0				0.0					0.50%	Pipelines, R			0.00	0.00	0.00	Max.Demand Ch		N/A						
traction Works	0.0					0.0		+		1.00%		/orks, Civil Works,	Buildings	2.54	0.00	0.00	Energy Cost : Ra	ina/ kWHr	N/A						
ver er	0.0				+	+			0.0	4.00%	M & E Power			11.83	0.00	0.00									
TAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.00/6	Total			14.99	0.00	0.00	1								
AR	YEAR		NERGY		HIS SECTION		1		TAL & REFU	RBISHMENT					1		NANCECOSTS			DISCOL	NTED ENERGY S	UPPLIED	то	OTAL COSTS	rs
	NO.		/PPLIED		NOT USED	1	Dams	Pipelines	(R*	10^6) Civil	Power	ENG & EMP		1	Dam	( Pipelines	R*10^6) Treatment.	M&E			DISCOUNT RATE	.		RAND million	
	NO.	KV				1	Dams	&	Mech	Works	Power	ENGGEMP			Dam	+ Reservoirs	Civil Works+	MAE		6%	8%	10%	6%	8%	10%
2016	5 0	<u> </u>				-		Tunnels		Builds	-						Buildings			o			0.00	0.00	0.0
2016						a conserver a						1											0.00	0.00	0.0
201									-														0.00	0.00	0.0
2018								-															0.00	0.00	0.0
2019 2020			22 209 862 22 209 862	0.00	0.00	0.00			-						0.63	0.00	254 254	11.83 11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99 14.99	14.99 14.99	14.9
202			22 209 862	0.00	0.00	0.00		-			-	-		-	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
202			22 209 862	0.00	0.00	0.00		-	-		1			-	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
202			22 209 862	0.00	0.00	0.00						1			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
202			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
202 202			22 209 862 22 209 862	0.00	0.00	0.00			-						0.63	0.00	2.54 2.54	11.83 11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
202			22 209 862	0.00	0.00	0.00								-	0.63	0.00	254	11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99	14.99	14.9
202			22 209 862	0.00	0.00	0.00						-			0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.0
202			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
2030	15		22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
203	16		22 209 862	0.00	0.00	0.00		-						-	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
203 203			22 209 862 22 209 862	0.00	0.00	0.00			147.8	-	-	-		-	0.63	0.00	2.54	11.83 11.83	0.00	22 209 862	22 209 862	22 209 862 22 209 862	14.99	14.99 162.82	14.9
203			22 209 862 22 209 862	0.00	0.00	0.00	<u> </u>		14/.8		-			-	0.63	0.00	254	11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862	162.82 14.99	162.82	162.
203		<b> </b>	22 209 862	0.00	0.00	0.00	-	1	-	1	-			1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
203			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
203			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
203			22 209 862	0.00	0.00	0.00		-							0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
203		ļ	22 209 862	0.00	0.00	0.00					-				0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
204 204			22 209 862 22 209 862	0.00	0.00	0.00	-			-					0.63	0.00	2.54 2.54	11.83 11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	14.99 14.99	14.99 14.99	14.9
204			22 209 862	0.00	0.00	0.00		-	-	-	-			-	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
204		1	22 209 862	0.00	0.00	0.00								1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
204			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
204			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
204			22 209 862	0.00	0.00	0.00									0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14.9
204 204			22 209 862	0.00	0.00	0.00	0.0	0.0	4.67.0	0.0					0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	14
204			22 209 862 22 209 862	0.00	0.00	0.00	0.0	0.0	147.8	0.0				-	0.63	0.00	2.54 2.54	11.83 11.83	0.00	22 209 862 22 209 862	22 209 862 22 209 862	22 209 862 22 209 862	162.82	162.82 14.99	162
204		<b> </b>	22 209 862	0.00	0.00	0.00	t	1		-	1			1	0.63	0.00	2.54	11.83	0.00	22 209 862	22 209 862	22 209 862	14.99	14.99	143
200	00		12 200 002	0.00	0.00	1 0.00					<u>.</u>			<u></u>	0.00	0.00	-			11 200 002		1 22 200 002		S	+
																	LEVE	LIZED COST Rai	na/ KWN		NPV - Energy		1	NPV	

F - 7

RESULTS SUMMARY:					LEVELI	ZED COST	OF POWER	(R/kWh) FO		T RATES
		(MAR x)	INSTALLED HYDR	OPOWER	WITH FUL	L CAPEX II	NCLUDED	O&M AND	REFURB CC	STS ONLY
OPTION	NTABELANGA	LALINI	NTABELANGA	LALINI	6%	8%	10%	6%	8%	10%
NTABELANGA DAM ONLY	1.18	NO DAM	5 MW	NIL	R 3.24	R 3.60	R 3.97	R 0.76	R 0.67	R 0.60
NTABELANGA DAM PLUS LALINI DAM	1.18	0.15	5 MW	30 MW	R 0.82	R 0.94	R 1.06	R 0.11	R 0.10	R 0.09
NTABELANGA DAM PLUS LALINI DAM	0.15	0.78	NIL	30 MW	R 0.97	R 1.11	R 1.24	R 0.13	R 0.11	R 0.10

# **APPENDIX G**

# MODEL USED TO CALCULATE THE URV OF POTABLE WATER SUPPLIED

URV: POTABL	LEWA	TER SC	HEME ON	LYEXC	L TERTI	ARIES						100%	Grant Fi	unded			No po	ower cro	ss-sub	sidize	d							
ГЕМ		DAM		CAPITAL COST	COMPONENT	S (R'million)					HEP							IMP	LEMENTAT	ION EXPE	NDITURE	TIMING						
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL WORKS	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	OUTPUT kWh		100%	100%	100%	100%	100%	100%	GE OF CAPITA 100%	100%	100% (i.e. 0%	= grant fundin 0%	g) 0%	0%	0%	0%	0%	0%
Ntabelanga Dam		12											Proj. mangt	Ntab Dam	Ntab Advance	Ntab WTW	Ntab Ops Village	Prim & Sec Lines	Tertiary Lines	Ntab Irrigation	Eng & Other	Lalini Dam	Lalini Advance	Lalini Ops Village	Lalini Condu	HEP uit Plants	Eng & Other	DEA TO
Water Supply Only Increment for HEP	285.2 187.2	242.4 159.1					42.8 28.1			4.2		Year 2015	66.4 9.5	472.4	156.7	716.6	0.0	1360.2	0.0	0.0	548.5 27.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0 33
Small HEP	107.4	100.1					60.1			7.6		2016 2017	9.5	47.2	74.4 74.4		0.0				82.3						0.0	0.0 2
Pipelines												2018	9.5 9.5	100.4 100.4	74.4	143.3 250.8	0.0	272.0 544.1	0.0	0.0	82.3 82.3	0.0	0.0	0.0	0.0	0.0	0.0 0.0	0.0 6
Primary & Secondary	1060.6		901.5			53.0	106.1			4.1		2019 2020	9.5 9.5	100.4 100.4		250.8 71.7		408.0 68.0	0.0 0.0	0.0 0.0	82.3 82.3	0.0 0.0	0.0	0.0	0.0 0.0	0.0 0.0	0.0 0.0	0.0 8
Reservoirs Primary & Secondary	186.8			149.5		18.7	18.7					2021 2022	9.5	23.6			1	68.0	0.0	0.0	54.9 54.9	0.0			-	0.0	0.0 0.0	0.0 1
Pumping Stations												2023 2024																0.0
Primary & Secondary	112.7						95.8	16.9				2024																0.0
Power supplies																												
Primary & Secondary	45.9								45.9					-														
Treatment Works Irrigation Supply	716.6				75.2	359.9	281.5			12.3																		
ncl bulk and farms dev																												
Roads Other Items and Mitigations	94.5 259.1				259.1	94.5																						
Power lines Engineering & EMP	16.3 355.8				355.8				16.3																			
SUB-TOTAL	3320.8	401.6	901.5	149.5	690.1	526.1	572.9	16.9	62.2	20.6		Check>	66.4	472.4	156.7	716.6	0.0	1360.2	0.0	0.0	548.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0 3
		-								1																		
	-					-																						
SUB-TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0											<u> </u>				<u> </u>	-		
GRAND TOTAL		401.6	901.5	149.5			572.9		62.2	20.6					0050478	ONS COSTS								-	-	-		
	ļ									MAINTENANCE	COSTS				OPERAID		1 Č		TREATMEN					1				
										0.25%	Dam		ITEM			COST/A 1.00	-		Using cost Ra POWER				0.25					
										0.50%	Pipelines, Reservoirs Treatment Works, Ci	vil Works, Bui	ldings			5.25 6.17			Energy Cost : Energy Cost :	R/ kWHr R/ kWHr		Pumping Sales	0.50					
	-									2.00%	M & E Total					11.46 23.88												
	YEAR	İ ,	WATER	Î	CAPITAL		HMENT EXPE	NDITURE			OWER INCOME		ING COSTS	Ť	OPE		COSTS (R'mil	lion)		1	DISCOL	JNTED WATER	SUPPLIED	ĩ		т	TAL COSTS	
YEAR	NO.		UPPLIED Ilion m ³ /a)	Dam &	Pipelines	(R'm HEPs	illion) WTW	Proj Mant	Eng	(R Power Output	"million) Energy	Power	'million) Energy	Dams	Pipelines	WTW	M&E	STAFF	Treatment			(million m ³ ) DISCOUNT RA	TES			DIS	R'million	s
		POTABLE	IRRIGATION	Ass. Inf.	& Reservoirs		0.000		EMP & Other	kWh/a	Income	MW	Charge		Reservoirs	Civil & Buildings					6%	8%	10%	2%		6%	8%	10% 2
2015 2016	0			0.0	0.0	0.0	0.0	9.5 9.5	0.0			-													1	9 131	9 131	9 9 131 13
2017	2			174.8	272.0	0.0	143.3	9.5	0.0			Q														600	600	600 59
2018 2019	3 4			108.2	544.1 408.0	0.0	250.8 250.8	9.5	0.0																1	913 769	913 769	913 91 769 76
2020 2021	5	20.63 20.87		100.4 23.6	68.0 68.0	0.0	71.7	9.5 9.5	0.0			7.05	23.18 23.46	1.00	5.25 5.25	6.17	11.46	20.60	5.16 5.22		20.63	20.63 20.87	20.63	20.63 20.87	-	322	322 174	322 32 174 17
2022	7	21.11		0.0	0.0	0.0	0.0	0.0	0.0			7.21	23.75	1.00	5.25	6.17	11.46	20.60	5.28		21.11	21.11	21.11	21.11		74	74	74 73
2023 2024	8	21.34 21.58		0.0	0.0	0.0	0.0	0.0	0.0	-		7.29	24.04 24.33	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.34 5.40		21.34 21.58	21.34 21.58	21.34 21.58	21.34 21.58	-	74	74 74	74 73
2025	10	21.82		0.0	0.0	0.0	0.0	0.0	0.0			7.45	24.62	1.00	5.25	6.17	11.46	20.60	5.45		21.82	21.82	21.82	21.82		75	75	75 74
2026 2027	11 12	22.06 22.29										7.52 7.60	24.91 25.20	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.51 5.57		22.06 22.29	22.06 22.29	22.06 22.29	22.06	1	75 75	75 75	75 74
2028	13	22.53				2						7.68	25.49	1.00	5.25	6.17	11.46	20.60	5.63		22.53	22.53	22.53	22.53	1	76	76	76 75
	14 15	22.77 23.01										7.76 7.84	25.77 26.06	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.69 5.75		22.77 23.01	22.77 23.01	22.77 23.01	22.77 23.01	-	76	76 76	76 75
2029	16	23.24				8						7.92	26.35	1.00	5.25	6.17	11.46	20.60	5.81		23.24	23.24	23.24	23.24		77	77	77 76
2030 2031		23.48 23.72								-	-	8.00 8.07	26.64 26.93	1.00	5.25 5.25	6.17	11.46	20.60 20.60	5.87 5.93		23.48 23.72	23.48 23.72	23.48 23.72	23.48 23.72	-	77	77	77 76
2030 2031 2032	17					0.0	179.1	<:Refurbish	ment funding			8.15	27.22	1.00	5.25	6.17	11.46	20.60	5.99		23.96	23.96	23.96	23.96	1	257	257	257 25
2030 2031 2032 2033 2033 2034	18 19	23.96	1									8.23 8.31	27.51 27.80	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.05 6.11		24.19 24.43	24.19 24.43	24.19 24.43	24.19 24.43	-	78 78	78 78	78 78 78 78
2030 2031 2032 2033 2034 2035	18 19 20	23.96 24.19		-								8.39	28.08	1.00	5.25	6.17	11.46	20.60	6.17		24.67	24.67	24.67	24.67		79	79	79 78
2030 2031 2032 2033 2034 2035 2036 2036	18 19 20 21 22	23.96 24.19 24.43 24.67											28.37	1.00	5.25	6.17	11.46 11.46	20.60 20.60	6.23		24.91	24.91	24.91			79		
2030 2031 2032 2033 2034 2035 2036 2036 2037 2038	18 19 20 21 22 23	23.96 24.19 24.43 24.67 24.91										8.47		1.00	5 25									24.91	1	79	79	79 79
2030 2031 2032 2033 2034 2035 2036 2036 2037 2038 2039 2039 2040	18 19 20 21 22 23 24 25	23.96 24.19 24.43 24.67 24.91 25.14 25.38										8.54 8.62	28.66 28.95	1.00	5.25 5.25	6.17	11.46	20.60	6.29 6.35		25.14 25.38	25.14 25.38	25.14 25.38	25.14 25.38		79 80	79 80	79 79 80 79
2030 2031 2032 2033 2034 2035 2036 2036 2037 2038 2038 2039 2040 2041	18 19 20 21 22 23 24 25	23.96 24.19 24.43 24.67 24.91 25.14 25.38 25.62										8.54 8.62 8.70	28.66 28.95 29.24	1.00 1.00 1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.35 6.40		25.14 25.38 25.62	25.14 25.38 25.62	25.14 25.38 25.62	25.14 25.38 25.62		79 80 80	79 80 80	79 79 80 79 80 80
2000 2013 2012 2003 2004 2005 2006 2006 2006 2006 2008 2009 2009 2040 2041 2042 2043	18 19 20 21 22 23 24 25 26 27	23.96 24.19 24.43 24.67 24.91 25.14 25.38 25.62 25.86 26.09										8.54 8.62 8.70 8.78 8.86	28.66 28.95 29.24 29.53 29.82	1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60	6.35 6.40 6.46 6.52		25.14 25.38 25.62 25.86 26.09	25.14 25.38 25.62 25.86 26.09	25.14 25.38 25.62 25.86 26.09	25.14 25.38 25.62 25.86 26.09		79 80 80 80 81	79 80 80 80 80 81	79 79 80 79 80 80 80 80 80 80 81 80
2009 2001 2003 2003 2003 2004 2005 2006 2006 2006 2008 2009 2040 2040 2044 2042 2044	18 19 20 21 22 23 24 25 26 26 27 28 29	23.96 24.19 24.43 24.67 24.91 25.14 25.38 25.62 25.86 26.09 26.33										8.54 8.62 8.70 8.78 8.86 8.94	28.66 28.95 29.24 29.53 29.82 30.11	1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60	6.35 6.40 6.46 6.52 6.58		25.14 25.38 25.62 25.86 26.09 26.33	25.14 25.38 25.62 25.86 26.09 26.33	25.14 25.38 25.62 25.86 26.09 26.33	25.14 25.38 25.62 25.86 26.09 26.33		79 80 80 80 81 81	79 80 80 80 81 81	79         79           80         79           80         80           80         80           81         81
2009 2001 2002 2003 2003 2004 2005 2005 2005 2006 2009 2040 2040 2041 2042 2043 2044 2045 2046	18 19 20 21 22 23 24 25 26 27 28 29 30 31	23.96 24.49 24.43 24.67 24.91 25.14 25.38 25.56 26.09 26.33 26.57 26.81										8.54 8.62 8.70 8.78 8.86 8.94 9.01 9.09	28.66 28.95 29.24 29.53 29.82 30.11 30.39 30.68	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60 20.60 20.60	6.35 6.40 6.52 6.58 6.64 6.70		25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81		79 80 80 81 81 81 82 82	79 80 80 81 81 81 82 82	79         79           80         79           80         80           80         80           81         80           81         81           82         81
2000 2001 2002 2003 2005 2005 2005 2005 2005 2009 2009 2004 2004 2004 2004 2004 2004	18 19 20 21 22 23 24 25 26 27 28 29 30 31 32	23.96 24.19 24.43 24.67 24.91 25.14 25.58 25.62 25.66 26.09 26.33 26.57 26.81 27.05										8.54 8.62 8.70 8.78 8.86 8.94 9.01 9.09 9.17	28.66 28.95 29.24 29.53 29.82 30.11 30.39 30.68 30.97	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60	6.35 6.40 6.46 6.52 6.58 6.64 6.70 6.76		25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05	-	79 80 80 81 81 81 82 82 82 82	79 80 80 81 81 82 82 82 82	79         79           80         79           80         80           80         80           81         80           81         81           82         81           82         81
2000 2001 2002 2003 2005 2005 2005 2005 2005 2006 2006 2004 2004 2004 2004 2004 2004	18 19 20 21 22 23 24 25 26 27 28 29 30 31	23,96 24,19 24,43 24,67 24,91 25,38 25,62 25,68 26,09 26,33 26,57 26,68 26,57 26,68 27,05 27,05 27,52		0.0	0.0	0.0	179.1	<:Refurbis!	ment funding			8.54 8.62 8.70 8.78 8.86 8.94 9.01 9.09 9.09 9.17 9.25 9.33	28.66 29.24 29.53 29.82 30.11 30.39 30.68 30.97 31.26 31.55	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60	6.35 6.40 6.46 6.52 6.58 6.64 6.70 6.76 6.82 6.88		25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28 27.52	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28 27.52	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28 27.52	25.14 25.38 25.62 26.09 26.33 26.57 26.81 27.05 27.28 27.52		79 80 80 81 81 82 82 82 83 262	79 80 80 81 81 82 82 82 82 83 262	79         79           80         75           80         80           81         80           81         81           82         81           82         81           82         81           82         81           82         81           82         81           82         81           82         81           83         82           262         26
2030 2031 2032 2033 2034 2035 2035 2035 2035 2035 2035 2035 2035	18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33	23.96 24.19 24.43 24.67 24.91 25.14 25.58 25.62 25.65 26.09 26.53 26.57 26.81 27.05 27.28		0.0	0.0	0.0	179.1	<:Refurbist	ment funding			8.54 8.62 8.70 8.78 8.86 8.94 9.01 9.09 9.17 9.25	28.66 28.95 29.24 29.53 29.82 30.11 30.39 30.68 30.97 31.26	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60 20.60	6.35 6.40 6.46 6.52 6.58 6.64 6.70 6.76 6.82 6.88 6.88 6.94		25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28 27.52 27.76	25.14 25.38 25.62 26.09 26.33 26.57 26.81 27.05 27.28	25.14 25.38 25.62 26.86 26.09 26.33 26.57 26.81 27.05 27.28 27.52 27.76	25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28		79 80 80 81 81 82 82 82 82 83 262 83	79 80 80 81 81 82 82 82 82 83	79         79           80         75           80         80           81         80           81         81           82         81           82         81           82         81           82         83

JRV: POTABI	LE WAT	ER SC	HEME ON	LY EXCL	_ TERTI	ARIES						100%	Grant F	unded			No po	wer cro	ss-sub	sidize	d							
м		NI.		CAPITAL COST															LEMENTAT									
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh		0%	0%	0%	0%	0%		DE OF CAPITA				g) 0%	0%	0%	0%	0%	0%
		-					1										Ntab Ops	Prim & Sec	Tertiary	Ntab				Lalini Ops		HEP	Eng &	
ibelanga Dam Vater Supply Only	285.2	242.4					42.8					Year	Proj. mangt 0.0	Ntab Dam 0.0	Ntab Advance 0.0	Ntab WTW 0.0	Village 0.0	Lines 0.0	Lines 0.0	Irrigation 0.0	Eng & Other 614.9	Lalini Dam 0.0	Lalini Advance 0.0	Village 0.0	Lalini Condui 0.0	it Plants 0.0	Other 0.0	DEA TO 0.0 6
crement for HEP	187.2	159.1					28.1			4.2		2015	0.0			0.0		0.0	0.0	0.0	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0
nall HEP												2016 2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0		92.2 92.2	0.0	0.0	0.0	0.0		0.0	0.0
pelines												2018	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0
rimary & Secondary	1060.6		901.5			53.0	106.1			4.1		2019 2020	0.0 0.0			0.0		0.0		0.0 0.0	92.2 92.2	0.0	0.0	0.0	0.0	0.0	0.0 0.0	0.0
eservoirs	186.8					18.7	18.7					2021	0.0	0.0				0.0	0.0	0.0	61.5	0.0				0.0	0.0	0.0
Primary & Secondary	186.8			149.5		18.7	18.7					2022 2023									61.5	0.0					0.0	0.0
mping Stations	112.7						95.8	16.9				2024 2025																0.0
rimary & Secondary	112.7						95.8	16.9				2025																
wer supplies rimary & Secondary	45.9								45.9																			
	1000000000								40.8																			
eatment Works igation Supply	716.6				75.2	359.9	281.5			12.3																		
I bulk and farms dev																												
ads her items and Mitigations	94.5 259.1				259.1	94.5								•												*******		
wer lines gineering & EMP	16.3 355.8				355.8				16.3		1						1											
B-TOTAL	3320.8	401.6	901.5	149.5	690.1	526.1	572.9	16.9	62.2	20.6		Check:>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	614.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0 €
										-		1																
														1	1								1			1		
	-					-	-																					
							-																					
IB-TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		-						-					2		-	-		
AND TOTAL	3320.8	401.6	901.5	149.5	690.1	526.1	572.9	16.9	62.2	20.6												1						
	-				1			-		MAINTENANCE	COSTS				OPERATIO	ONS COSTS	(R'million)		TREATMENT	r costs								
										RATE			ITEM			COST/A	-		Using cost Ra			-	0.25					
										0.25%	Dam Pipelines, Reservoirs	6				1.00			POWER Energy Cost :	R/kWHr		Pumping	0.50					
										0.50%	Treatment Works, C M & E		ldings			6.17 11.46			Energy Cost :			Sales	0.8					
							2			2.0076	Total					23.88	2											
	YEAR		VATER		CAPITAL	& REFURBISH		NDITURE			OWER INCOME		ING COSTS		OPE	RATIONAL C	OSTS (R'mill	lion)			DISCO	UNTED WATER	SUPPLIED	1		т	TAL COSTS	S
YEAR	NO.		IPPLIED lion m ³ /a)	Dam &	Pipelines	(R'mi HEPs	llion) WTW	Proj Mant	Eng	(F Power Output	'million) Energy	(I Power	('million) Energy	Dams	Pipelines	WTW	M&E	STAFF	Treatment			(million m ³ ) DISCOUNT RA	TES			DIS	R'million	ES
		POTABLE	IRRIGATION	Ass.	8				EMP	kWh/a	Income	MW	Charge		Reservoirs	Civil & Buildings					6%	8%	10%	2%	1	6%	8%	10% 3
2015	0	POTABLE	INNIGATION	0.0	Reservoirs 0.0	0.0	0.0	0.0	& Other 0.0			-				Buildings	-							-	1	0	0	0 0
2016 2017	1 2			0.0	0.0	0.0	0.0	0.0	0.0																	0	0	0 0
2018	3			0.0	0.0	0.0	0.0	0.0	0.0				-													0	0	0 0
2019 2020	4	20.63		0.0	0.0	0.0	0.0	0.0	0.0	-		7.05	23.18	1.00	5.25	6.17	11.46	20.60	5.16		20.63	20.63	20.63	20.63	-	73	0 73	0 0
2021	6	20.87		0.0	0.0	0.0	0.0	0.0	0.0			7.13	23.46	1.00	5.25	6.17	11,46	20.60	5.22		20.87	20.87	20.87	20.87	1	73	73	73 73
2022 2023	7	21.11 21.34		0.0	0.0	0.0	0.0	0.0	0.0			7.21 7.29	23.75 24.04	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.28 5.34		21.11 21.34	21.11 21.34	21.11 21.34	21.11 21.34	-	74	74	74 73
2024	9	21.58		0.0	0.0	0.0	0.0	0.0	0.0			7.37	24.33	1.00	5.25	6.17	11.46	20.60	5.40		21.58	21.58	21.58	21.58	1	74	74	74 74
2025 2026	10	21.82 22.06		0.0	0.0	0.0	0.0	0.0	0.0		-	7.45	24.62 24.91	1.00	5.25 5.25	6.17 6.17	11.46	20.60 20.60	5.45 5.51		21.82 22.06	21.82 22.06	21.82 22.06	21.82 22.06	-	75 75	75 75	75 74
2027	12	22.29										7.60	25.20	1.00	5.25	6.17	11.46	20.60	5.57		22.29	22.29	22.29	22.29	1	75	75	75 75
2028 2029	13 14	22.53										7.68	25.49 25.77	1.00	5.25 5.25	6.17	11.46 11.46	20.60 20.60	5.63 5.69		22.53 22.77	22.53 22.77	22.53 22.77	22.53 22.77	-	76	76	76 75
2030	15	23.01										7.84	26.06	1.00	5.25	6.17	11.46	20.60	5.75		23.01	23.01	23.01	23.01		76	76	76 70
2031 2032	16 17	23.24 23.48										7.92	26.35 26.64	1.00	5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.81		23.24 23.48	23.24 23.48	23.24 23.48	23.24 23.48		77	77	77 70
2033	18	23.72										8.00 8.07	26.93	1.00	5.25 5.25	6.17	11.46	20.60	5.87 5.93		23.72	23.72	23.72	23.72		77 77	77 77	77 7
2034 2035	19	23.96 24.19				0.0	0.0	<:Refurbish	ment funding	-		8.15	27.22	1.00	5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.99		23.96 24.19	23.96 24.19	23.96	23.96 24.19		78	78	78 7
2036	20 21	24.43										8.23 8.31	27.51 27.80	1.00	5.25 5.25	6.17	11.46	20.60	6.05 6.11		24.43	24.43	24.19 24.43	24.43	1	78 78	78 78	78 78
2037	22 23	24.67 24.91										8.39 8.47	28.08 28.37	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.17 6.23		24.67 24.91	24.67 24.91	24.67 24.91	24.67 24.91	-	79 79	79 79	79 70 79 71
2028	24	25.14										8.54	28.66	1.00	5.25	6.17	11.46	20.60	6.29		25.14	25.14	25.14	25.14		79	79	79 79
2038 2039	25	25.38 25.62			-							8.62 8.70	28.95 29.24	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.35 6.40		25.38 25.62	25.38 25.62	25.38 25.62	25.38 25.62	-	80 80	80 80	80 71 80 81
2039 2040		25.86										8.78	29.53	1.00	5.25	6.17	11.46	20.60	6.46		25.86	25.86	25.86	25.86	1	80	80	80 80
2039 2040 2041 2042	26 27						-					8.86	29.82	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.52 6.58		26.09	26.09	26.09	26.09	-	81	81	81 80
2039 2040 2041 2042 2043	27 28	26.09			1	+		-				8.94 9.01	30.11 30.39	1.00	5.25	6.17	11.46	20.60	6.64		26.33 26.57	26.33 26.57	26.33 26.57	26.33 26.57	1	81 82	81 82	81 8 82 8
2039 2040 2041 2042 2043 2044 2045	27 28 29 30	26.33 26.57										9.09	30.68	1.00	5.25	6.17	11.46	20.60	6.70		26.81	26.81	26.81	00.01	1	82		
2039 2040 2041 2042 2043 2044 2044 2045 2046	27 28 29 30 31	26.33 26.57 26.81													5.05	6 47			6 70					26.81	-		82	82 8
2039 2040 2041 2042 2043 2044 2044 2045 2046 2047 2048	27 28 29 30 31 32 33	26.33 26.57 26.81 27.05 27.28										9.17 9.25	30.97 31.26	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.76 6.82		27.05 27.28	27.05 27.28	27.05 27.28	27.05 27.28		82 83	82 83	82 83 83 83
2039 2040 2041 2042 2043 2044 2044 2045 2046 2047 2046 2047 2048 2049	27 28 29 30 31 32	26.33 26.57 26.81 27.05 27.28 27.52		0.0	0.0	0.0	0.0	<:Refurbish	ment funding			9.17 9.25 9.33	30.97 31.26 31.55	1.00 1.00 1.00	5.25 5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.82 6.88		27.05 27.28 27.52	27.05 27.28 27.52	27.05 27.28 27.52	27.05 27.28 27.52		82 83 83	82 83 83	82 83 83 83 83 83
2039 2040 2041 2042 2043 2044 2044 2045 2046 2047 2048	27 28 29 30 31 32 33	26.33 26.57 26.81 27.05 27.28		0.0	0.0	0.0	0.0	<:Refurbish	ment funding			9.17 9.25	30.97 31.26	1.00	5.25 5.25	6.17	11.46 11.46 11.46	20.60	6.82 6.88 6.94		27.05 27.28 27.52 27.76	27.05 27.28	27.05 27.28 27.52 27.76	27.05 27.28	-	82 83 83 83	82 83	82 8 83 8

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URV: POTAB	LE WAT	ER SC	HEME ON	LY EXCI	_ TERTI	ARIES						100%	Grant Fu	inded			50% p	ower cr	oss-sub	bsidiz	ed							
ТЕМ				CAPITAL COST									0						LEMENTATI			TIMING						1.45
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh		0%	0%	0%	0%	0%	PERCENTAL 0%	GE OF CAPITAL			= grant fundin	g) 0%	0%	0%	0%	0%	0%
																	Ntab Ops	Prim & Sec	Tertiary	Ntab				Lalini Ops		HEP	Eng &	
Itabelanga Dam Water Supply Only	285.2	242.4					42.8					Year	Proj. mangt 0.0	Ntab Dam 0.0	Ntab Advance 0.0	Ntab WTW 0.0	/ Village 0.0	Lines 0.0	Lines 0.0	Irrigation 0.0	Eng & Other 614.9	Lalini Dam 0.0	Lalini Advance	Village	Lalini Condui 0.0	it Plants 0.0	Other 0.0	DEA TOTA 0.0 615
Increment for HEP	187.2	159.1					28.1			4.2		2015	0.0	0.0	0.0		0.0				30.7						0.0	0.0 31 0.0 92
imall HEP												2016 2017	0.0 0.0	0.0	0.0	0.0	0.0	0.0	0.0		92.2 92.2	0.0	0.0	0.0	0.0		0.0	0.0 92
Pipelines Primary & Secondary	1060.6		901.5			53.0	106.1			4.1		2018	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	92.2 92.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0 92
	1000.0		901.5			53.0	106.1			2.1		2020	0.0	0.0		0.0		0.0	0.0	0.0	92.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0 92
Reservoirs Primary & Secondary	186.8			149.5		18.7	18.7					2021 2022	0.0	0.0				0.0	0.0	0.0	61.5 61.5	0.0				0.0	0.0	0.0 61 0.0 61
												2023										613) 						0.0 0
Pumping Stations Primary & Secondary	112.7						95.8	16.9				2024 2025																0.0 0
ower supplies																												
Primary & Secondary	45.9								45.9																			
reatment Works	716.6				75.2	359.9	281.5			12.3																		
rrigation Supply					1077																							
ncl bulk and farms dev Roads	94.5					94.5																						
Other Items and Mitigations Power lines	259.1 16.3			+	259.1				16.3																			
ingineering & EMP	355.8				355.8				1.080000																			
UB-TOTAL	3320.8	401.6	901.5	149.5	690.1	526.1	572.9	16.9	62.2	20.6		Check>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	614.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0 615
										1																		
				-				-																				
						0	1																					
	-							-		-																		
BUB-TOTAL	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0							6						-					
SHAND TOTAL	3320.0	401.6	901.5	149.5	690.1	520.1	572.9	10.9	02.2		-				OPERATIO	ONS COSTS	(R'million)											
										RATE	COSTS		ITEM			COST/A		1	TREATMENT Using cost Rai		1		0.25					
										0.25%	Dam					1.00			POWER	0.50-00.55								
										0.50%	Pipelines, Reservoirs Treatment Works, Ci	i vil Works, Bu	idings			6.17			Energy Cost : Energy Cost :	B/ KWHr		Pumping Sales	0.50					
			2							2.00%	M & E Total		1992			11.46 23.88	-											
	YEAR	,	WATER	1	CAPITAL	& REFURBISH	MENT EXPE	NDITURE		HYDROP	OWER INCOME	PUM	PING COSTS	1	0.05	100 A 740 M	COSTS (R'mil	lien	-	36	DISCOL	JNTED WATER	SUPPLIED	ī		T	DTAL COST	3
YEAR	NO.		JPPLIED Ilion m ³ /a)	Dam &	Pipelines	(R'mi HEPs	llion) WTW	Proj Mant	Eng	(R Power Output	'million) Energy	Power	Tmillion) Energy	Dams	Pipelines	WTW	M&E	STAFF	Treatment			(million m ³ ) DISCOUNT RA	TES			DIS	R'million COUNT RAT	FS
		POTABLE	IRRIGATION	Ass.	8			1.1	EMP & Other	kWh/a	Income	MW	Charge		Reservoirs	Civil &					6%	8%	10%	2%	1		8%	
2015	0	POTABLE	IRRIGATION	0.0	Reservoirs 0.0	0.0	0.0	0.0	0.0	1		-			-	Buildings									1	0	0	0 0.00
2016 2017	1			0.0	0.0	0.0	0.0	0.0	0.0	-				1										8	1	0	0	0 0.00
2018	3			0.0	0.0	0.0	0.0	0.0	0.0				1													0	0	0 0.00
2019 2020	4	20.63		0.0	0.0	0.0	0.0	0.0	0.0	-		7.05	11.59	1.00	5.25	6.17	11.46	20.60	5.16		20.63	20.63	20.63	20.63		0	0 61	0 0.00 61 61.2
2021	6	20.87		0.0	0.0	0.0	0.0	0.0	0.0	-		7.13	11.73	1.00	5.25	6.17	11.46	20.60	5.22		20.87	20.87	20.87	20.87	1	61	61	61 61.4
2022 2023	7 8	21.11 21.34		0.0	0.0	0.0	0.0	0.0	0.0			7.21 7.29	11.88 12.02	1.00	5.25 5.25	6.17 6.17	11.46	20.60 20.60	5.28 5.34		21.11 21.34	21.11 21.34	21.11 21.34	21.11 21.34	1	62 62	62 62	62 61.6 62 61.8
2024	9	21.58		0.0	0.0	0.0	0.0	0.0	0.0			7.37	12.17	1.00	5.25	6.17	11.46	20.60	5.40		21.58	21.58	21.58	21.58	1	62	62	62 62.0
2025 2026	10	21.82 22.06		0.0	0.0	0.0	0.0	0.0	0.0			7.45 7.52	12.31 12.45	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.45 5.51		21.82 22.06	21.82 22.06	21.82 22.06	21.82 22.06		62 62	62 62	62 62.2 62 62.4
2027 2028	12	22.29 22.53								-		7.60	12.60 12.74	1.00	5.25 5.25	6.17 6.17	11.46	20.60 20.60	5.57 5.63		22.29 22.53	22.29 22.53	22.29 22.53	22.29 22.53		63 63	63 63	63 62.6 63 62.8
2029	14	22.77					2					7.76	12.89	1.00	5.25	6.17	11.46	20.60	5.69		22.77	22.77	22.77	22.77	1	63	63	63 63.0
2030 2031	15	23.01 23.24										7.84	13.03 13.18	1.00	5.25 5.25	6.17 6.17	11.46	20.60 20.60	5.75 5.81		23.01 23.24	23.01 23.24	23.01 23.24	23.01 23.24	1	63 63	63 63	63 63.2 63 63.4
2032 2033	17	23.48								-		8.00	13.32	1.00	5.25	6.17	11.46	20.60	5.87		23.48	23.48	23.48	23.48	1	64	64	64 63.6
	18	23.72 23.96		-		0.0	0.0	<:Refurbish	ment funding			8.07 8.15	13.46 13.61	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	5.93 5.99		23.72 23.96	23.72 23.96	23.72 23.96	23.72 23.96		64 64	64 64	64 63.8 64 64.0
2034		24.19										8.23	13.75 13.90	1.00	5.25 5.25	6.17 6.17	11.46 11.46	20.60 20.60	6.05		24.19 24.43	24.19 24.43	24.19 24.43	24.19 24.43	-	64 64	64 64	64 64.2 64 64.4
2034 2035	20		1							-		8.39	14.04	1.00	5.25	6.17	11.46	20.60	6.17		24.67	24.67	24.67	24.67	1	65	65	65 64.6
2034 2035 2036 2037	21 22	24.43 24.67						-		-		8.47 8.54	14.19 14.33	1.00	5.25 5.25	6.17 6.17	11.46	20.60 20.60	6.23		24.91 25.14	24.91 25.14	24.91 25.14	24.91 25.14	-	65 65	65 65	65 64.9 65 65.1
2034 2035 2036 2037 2038	21 22 23	24.67 24.91								1	1	8.62	14.48	1.00	5.25	6.17	11.46	20.60	6.35		25.38	25.38	25.38	25.38	1	65	65	65 65.3
2034 2035 2036 2037 2038 2039 2040	21 22 23 24 25	24.67 24.91 25.14 25.38												1.00	5.25	6.17	11.46	20.60	6.40		25.62							
2034 2035 2036 2037 2038 2039	21 22 23 24 25	24.67 24.91 25.14										8.70 8.78	14.62	1.00	5.25	6.17	11.46	20.60	6.46		25.86	25.62 25.86	25.62	25.62	1	66 66	66	66 65.5 66 65.7
2034 2035 2036 2037 2038 2039 2040 2041 2041 2042 2043	21 22 23 24 25 26 27 28	24.67 24.91 25.14 25.38 25.62 25.86 26.09										8.78 8.86	14.76 14.91	1.00 1.00	5.25	6.17	11.46	20.60	6.52		25.86 26.09	25.86 26.09	25.86 26.09	25.86 26.09		66 66	66 66	66 65.7 66 65.9
2034 2035 2036 2037 2038 2039 2040 2041 2041 2042	21 22 23 24 25 26 27	24.67 24.91 25.14 25.38 25.62 25.86										8.78	14.76	1.00							25.86	25.86	25.86	25.86		66 66 66	66 66 66	66 65.7
2004 2005 2006 2007 2008 2009 2040 2041 2042 2043 2044 2043 2044 2045 2046	21 22 23 24 25 26 27 28 29 30 31	24.67 24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81										8.78 8.86 8.94 9.01 9.09	14.76 14.91 15.05 15.20 15.34	1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60	6.52 6.58 6.64 6.70		25.86 26.09 26.33 26.57 26.81	25.86 26.09 26.33 26.57 26.81	25.86 26.09 26.33 26.57 26.81	25.86 26.09 26.33 26.57 26.81		66 66 66 67	66 66 66 66 67	66 65.7 66 65.9 66 66.1 66 66.3 67 66.5
2004 2005 2005 2007 2008 2040 2040 2041 2042 2043 2043 2044 2045 2045 2046 2046 2048	21 22 23 24 25 26 27 28 29 30 31 31 32 33	24.67 24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.28										8.78 8.86 8.94 9.01 9.09 9.17 9.25	14.76 14.91 15.05 15.20 15.34 15.49 15.63	1.00 1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60 20.60 20.60	6.52 6.58 6.64 6.70 6.76 6.82		25.86 26.09 26.33 26.57 26.81 27.05 27.28	25.86 26.09 26.33 26.57 26.81 27.05 27.28	25.86 26.09 26.33 26.57 26.81 27.05 27.28	25.86 26.09 26.33 26.57 26.81 27.05 27.28		66 66 66 67 67 67	66 66 66 66 67 67 67	66 65.7 66 65.9 66 66.1 66 66.3 67 66.5 67 66.5 67 66.7 67 66.9
2004 2005 2008 2008 2008 2009 2040 2044 2042 2042 2042 2043 2044 2044	21 22 23 24 25 26 27 28 29 30 31 32	24.67 24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05		0.0	0.0	0.0	0.0	<:Refurbish	ment funding			8.78 8.86 8.94 9.01 9.09 9.17	14.76 14.91 15.05 15.20 15.34 15.49	1.00 1.00 1.00 1.00 1.00 1.00	5.25 5.25 5.25 5.25 5.25 5.25	6.17 6.17 6.17 6.17 6.17	11.46 11.46 11.46 11.46 11.46	20.60 20.60 20.60 20.60 20.60	6.52 6.58 6.64 6.70 6.76		25.86 26.09 26.33 26.57 26.81 27.05	25.86 26.09 26.33 26.57 26.81 27.05	25.86 26.09 26.33 26.57 26.81 27.05	25.86 26.09 26.33 26.57 26.81 27.05		66 66 66 67	66 66 66 66 67 67	66 65.7 66 65.9 66 66.1 66 66.3 67 66.5 67 66.5

Image: Image	URV: POTAB	LEWA	ER SC	HEME ON	LY EXCL	. TERT	ARIES						100%	Grant F	unded			100%	power o	cross-su	ubsidi	zed								
Image: proper termImage: propertermImage: proper termImage:	EM																													
Part of the pa		TOTAL	DAM	PIPELINES	TANKS			M&E	BUILDING				-	0%	0%	0%	0%	0%	PERCENTAG	GE OF CAPITAL	L REDEMPT	10N (i.e. 0%	= grant fundin	g) 0%	0%	0%	0%	0%	0%	
Image: state s				1	Ì	1	1									1		Ntab Ops	Prim & Sec		Ntab				Lalini Ops		HEP			
constrained         constrained <thconstrained< th=""> <thconstrained< th=""></thconstrained<></thconstrained<>		285.2	242.4					42.8					Vear							Lines								Other		TOT 61
											4.2		2015	0.0			0.0		0.0	0.0	0.0	30.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3
	nall HEP																0.0		0.0	0.0			0.0	0.0	0.0	0.0				5
	pelines												2018	0.0	0.0						0.0	92.2					0.0		0.0	5
max         max <td>Primary &amp; Secondary</td> <td>1060.6</td> <td></td> <td>901.5</td> <td></td> <td></td> <td>53.0</td> <td>106.1</td> <td></td> <td></td> <td>4.1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.0</td> <td>0.0</td> <td></td> <td></td> <td>0.0</td> <td>0.0</td> <td></td> <td>0.0</td> <td></td> <td>0.0</td> <td>5</td>	Primary & Secondary	1060.6		901.5			53.0	106.1			4.1									0.0	0.0			0.0	0.0		0.0		0.0	5
	eservoirs Dimens & Conservation	100.0			140.5		10.7	10.7						0.0	0.0			1	0.0	0.0	0.0		0.0				0.0	0.0	0.0	966
The province of the pr		100.0			149.5		10.7	10.7					2023									61.5	0.0					0.0	0.0	0
		112.7						95.8	16.9																				0.0	0
Normal Note       Normal Note       Normal Note       Normal No		45.9								45.9																				
				1		75.0	250.0	201.5	1		10.0							1						1						
m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m       m	rigation Supply	/10.0				75.2	309.9	281.5			12.3																			
	cl bulk and farms dev bads	94.5					94.5																							
	ther Items and Mitigations	259.1				259.1																								
	ngineering & EMP	355.8				355.8																								1
No. 00. 00. 00. 00. 00. 00. 00. 00. 00. 0	UB-TOTAL	3320.8	401.6	901.5	149.5	690.1	526.1	572.9	16.9	62.2	20.6		Check>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	614.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	61
No. 00. 00. 00. 00. 00. 00. 00. 00. 00. 0																														
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No. 00. 00. 00. 00. 00. 00. 00. 00. 00. 0					-			-																1						
Number of the second	UB-TOTAL					0.0	0.0	0.0	0.0	0.0		-				1			5						5					
N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N         N	RAND TOTAL	3320.8	401.6	901.5	149.5	690.1	526.1	572.9	16.9	62.2	20.6					OPERATI	IONS COSTS	(R'million)		12					1					_
Image: 1												COSTS							-					0.05						
Image:											0.25%	Dam		TIEM			1.00	1		POWER				0.25						
				1					1					ilifinae			5.25			Energy Cost :	R/ kWHr R/ kWHr	_								
Vari         vier#         Central information         remains												M&E	Trong, D	nonga			11.46			chorgy coart.	10 1011		Outra							
Prime       structure       structure <trul>        10000000000000000000</trul>					-										-					<u> </u>					-					í.
viri			S	UPPLIED		070000000	(R'mi	illion)			(F	('million)	PUM	R'million)									(million m ³ )					R'million		í –
Image: Partial problem         Partial problem         Partial problem	YEAR	NO.	(mi	llion m ³ /a)		Pipelines	HEPs	WTW	Proj Mant	Eng			Power	Energy Charge	Dams			M&E	STAFF	Treatment					2%	1	DISC	OUNT RAT	10%	2%
1       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00			POTABLE	IRRIGATION	Inf.	Reservoirs				& Other							Buildings						400			1				
non-	2015	1											-		-										-	1		0	0	0.0
1       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00	2017	2				0.0			0.0	0.0		-										Q								0.0
1       6       0.01       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0<		4			0.0	0.0				0.0					1							1					0	0		0.0
1       0       0       0       0       0       0       7       10       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       53       6,7       11,4       00       63       6,7       11,4       00       63       6,7       11,4       00       63       11,4       00       63 <td></td> <td></td> <td>20.63</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>7.05</td> <td></td> <td></td> <td></td> <td>6.17</td> <td>11.46</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td>50</td> <td></td> <td></td> <td>49.</td>			20.63										7.05				6.17	11.46								-	50			49.
9       2.59       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00 <t< td=""><td>2022</td><td>S</td><td>21.11</td><td></td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td></td><td>7.21</td><td></td><td>1.00</td><td></td><td>6.17</td><td>11.46</td><td>20.60</td><td>5.28</td><td></td><td>21.11</td><td>21.11</td><td>21.11</td><td>21.11</td><td>1</td><td>50</td><td>50</td><td>50</td><td>49</td></t<>	2022	S	21.11		0.0	0.0	0.0	0.0	0.0	0.0			7.21		1.00		6.17	11.46	20.60	5.28		21.11	21.11	21.11	21.11	1	50	50	50	49
mos       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n       n		8														5.25 5.25										-	50			49.
10       2253       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td>2025</td> <td></td> <td>21.82</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>7.45</td> <td>-</td> <td>1.00</td> <td>5.25</td> <td>6.17</td> <td>11.46</td> <td>20.60</td> <td>5.45</td> <td></td> <td>21.82</td> <td>21.82</td> <td>21.82</td> <td>21.82</td> <td></td> <td>50</td> <td>50</td> <td>50</td> <td>49.</td>	2025		21.82										7.45	-	1.00	5.25	6.17	11.46	20.60	5.45		21.82	21.82	21.82	21.82		50	50	50	49.
10       2253       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 <td></td> <td>5.25</td> <td></td> <td></td> <td></td> <td>5.57</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>50</td> <td></td> <td></td> <td>50.</td>																5.25				5.57							50			50.
15       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       201       20								<i></i>																			50			50. 50.
11       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       24.4       <	2030		23.01					5	ð 5				7.84		1.00			11.46	20.60			23.01	23.01	23.01	23.01		50	50	50	50
2034       19       2440       0       0.0       < Reductationed fundament fundament       0.0       8.15       100       5.25       6.17       11.46       20.00       6.95       21.10       23.95       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96       23.96 <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td>-</td> <td>-</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>5.25</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td>50</td>					-		-	-	-							5.25										-				50
203       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410       2410      <	2033	18	23.72										8.07		1.00	5.25		11.46	20.60	5.93		23.72	23.72	23.72	23.72		50	50	50	50
2037       22       24.47       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -							0.0	0.0	<:Refurbish	ment funding																-				50
2039       2.49		21	24.43						2				8.31		1.00	5.25	6.17	11.46		6.11		24.43	24.43	24.43	24.43		51	51	51	50
2039       254       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514       2514      <					-		-									5.25 5.25										-	51	51		50
2041       266       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2562       2563       2563       2563	2039	24	25.14		-			-					8.54		1.00	5.25	6.17	11.46	20.60	6.29		25.14	25.14	25.14	25.14	1	51	51	51	50
2024       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       25 86       26 87       26 86       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87       26 87		25	25.38										8.62		1.00	5.25	6.17	11.46	20.60	6.35		25.38	25.38	25.38	25.38	1	51	51	51	50
2044       9       2637       Image: Section of the sectin of the sectin of the sectin of the section of the sect	2042	27	25.86				-		-				8.78		1.00	5.25	6.17	11.46	20.60	6.46		25.86	25.86	25.86	25.86	-	51	51	51	50
2045       30       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       2657       <	2044	29	26.33										8.94		1.00	5.25	6.17	11.46	20.60	6.58		26.33	26.33	26.33	26.33		51	51	51	51
2047       32       27.05       27.05       27.05       27.05       27.05       27.05       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       51       <	2045	30	26.57										9.01		1.00	5.25	6.17	11.46	20.60	6.64		26.57	26.57	26.57	26.57	-	51	51	51	5
2049     33     2728		32	27.05										9.17		1.00	5.25	6.17	11.46	20.60	6.76		27.05	27.05	27.05	27.05	1	51	51	51	51
2050     35     27.76     27.76     27.76     27.76     27.76     27.76     27.76       URV OF WATER SUPPLIED	2047	33	27.28		0.0	0.0	0.0	0.0	<:Refurbish	ment funding		-	9.25		1.00	5.25 5.25	6.17	11.46	20.60	6.82		27.28	27.28	27.28	27.28	-	51	51	51	51
	2047 2048	34	27.52																				and indicate							
	2047 2048 2049	34 35	27.52 27.76		0.0								9.41		1.00	5.25	6.17	11.46	20.60	6.94		27.76	27.76	27.76	27.76	1	51	51	51	51

# **APPENDIX H**

# MODELS USED TO CALCULATE THE URV OF IRRIGATION WATER SUPPLIED

H - 1

JRV: IRRIGAT	ION SC	HEME	COMPON	ENISON	NLY							100%	Capital I	Redemp	lion		No po	wer cro	ss-subs	sidized	1							
1					COMPONENTS														LEMENTAT									
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh	1	100%	100%	100%	100%	100%		GE OF CAPITA			grant funding) 0%	0%	0%	0%	0%	0%	0%
				1		á		1	1			-				1	Ntab Ons	Prim & Sec	Tertiary	Ntab				Lalini Ops			Eng & Other	
langa Dam	285.2	242.4					42.8						Proj. mangt 36.8	Ntab Dam 472.4	Ntab Advance	Ntab WTW	Village 51.7	Lines 0.0	Lines 0.0	Irrigation	Eng & Other 419.6	Lalini Dam	Lalini Advance	Village 0.0	Lalini Condu 0.0	it HEP Plants 0.0	Other 0.0	DEA T 0.0
er Supply Only ment for HEP	187.2	159.1					28.1			4.2		Year 2015	5.3	4/2.4	110.0	0.0	01.7	0.0	0.0	750.2	21.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ated Dam Works	51.7					12.9	12.9	25.9				2016	5.3	47.2	52.6		24.6				62.9						0.0	0.0
1EP Ies												2017 2018	5.3 5.3	100.4 100.4	52.6 5.5	0.0 0.0	24.6 2.6	0.0 0.0	0.0 0.0	150.0	62.9 62.9	0.0 0.0	0.0 0.0	0.0 0.0	0.0	0.0	0.0 0.0	0.0 0.0
ry & Secondary						********						2019	5.3	100.4	0.0	0.0	6.0	0.0	0.0	300.1	62.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0
ary											1	2020	5.3	100.4		0.0		0.0	0.0	262.6	62.9	0.0			0.0	0.0	0.0	0.0
voirs ary & Secondary						-						2021 2022	5.3	23.6				0.0	0.0	37.5	42.0 42.0	0.0				0.0	0.0	0.0
ary												2023																0.0
ing Stations iry & Secondary												2024 2025														••••••		0.0
iry a decondary iry												2025								2000.00000000								
supplies										1	1																	
ry & Secondary ary																												
nent Works							**********																				*******	
ion Supply																												
lk and farms dev	750.2 94.5		519.2	62.7		75.9 94.5	59.9	20.0	12.5	2.5																		
Items and Mitigations	259.1				259.1																							
r lines eering & EMP	16.3 197.3				197.3				16.3		1																	
TOTAL	1841.6	401.6	519.2	62.7	456.4	183.4	143.7	45.8	28.8	6.7		Check:>	36.8	472.4	110.8	0.0	51.7	0.0	0.0	750.2	419.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
i Dam																												
ciated Dam Works luit/Tunnel			-		-	-		-	-				+								+							
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r Items & Mitigations				-																								
neering & EMP	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	-		-					-						-				
ND TOTAL	1841.6	401.6	519.2	62.7	456.4	183.4		45.8	28.8	6.7				1.1	-		-						1	-		-		-
		(		1 11		2.10400	(******	_	0.00	MAINTENANCE	0.0.070				OPERATI	IONS COSTS	(R'million)		TREATMENT	00070				-				
										RATE	COSIS		ITEM			COST/A		1	Using cost Ra		6		0.25					
										0.25%	Dam					1.00	1		POWER									
										0.50%	Pipelines, Reservoirs Treatment Works, Cir	vil Works Buil	idinas			2.91 3.43			Energy Cost : Energy Cost :	R/ kWHr		Pumping Sales	0.50					
										2.00%	M&E	in Works, car	onga			2.87			Energy cost .			Guida	0.0					
											Total					10.21										2.2		
	YEAR		WATER		CAPITA	AL & REFURBISI (R'mi		DITURE			OWER INCOME		IPING COSTS B'million)		OP	ERATIONAL C	COSTS (R'milli	on)			DISCO	(million m ³ )	SUPPLIED			т	OTAL COSTS R'million	5
YEAR	NO.	(mi	llion m ³ /a)	Dam &	Pipelines	HEPS	wtw	Proj Mant	Eng	Power Output	Energy	Power	Energy	Dams	Pipelines	WTW	M&E	STAFF	Treatment			DISCOUNT RAT	TES		201	DIS	COUNT RATI	ES
		POTABLE	IRRIGATION	Ass. Inf.	& Reservoirs				EMP & Other	kWh/a	Income	MW	Charge		Reservoirs	Civil & Buildings					6%	8%	10%	2%	-	6%	8%	10%
2015	0	POTABLE	INNIGATION	0.0	0.0	0.0	0.0	5.3	0.0			8				bununga					5					5	5	5
2016	1			124.5	0.0	0.0	0.0	5.3	0.0			-											_	-		130	130	130 1 183 1
2017	2			177.6	0.0	0.0	0.0	5.3	0.0			0.											-	-	-	183 264	183 264	183 264
2019	4			100.4	300.1	0.0	0.0	5.3	0.0						10.000	000000	Long Street		112010							406	406	406
2020	5		25.24 25.24	100.4	262.6	0.0	0.0	5.3	0.0			3.81	11.47	1.00	2.91	3.43 3.43	2.87	6.70 6.70	0.00		25.24	25.24	25.24	25.24		397	397	397 95
2021	7		25.24	23.6	37.5	0.0	0.0	5.3	0.0	-	-	3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24 25.24	25.24 25.24	25.24	25.24 25.24	-	95 28	95 28	28
2023	8		25.24	0.0	0.0	0.0	0.0	0.0	0.0			3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24		28	28	28
2024 2025	9		25.24 25.24	0.0	0.0	0.0	0.0	0.0	0.0		-	3.81 3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87 2.87	6.70 6.70	0.00 0.00		25.24	25.24	25.24 25.24	25.24 25.24	-	28	28	28 28
2026	10 11		25.24	0.0	0.0	0.0	0.0	0.0	0.0			3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24 25.24	25.24 25.24	25.24	25.24		28 28	28 28	28
2027	12		25.24									3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24	-	28	28	28
2028 2029	13 14		25.24 25.24			-		-				3.81 3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87	6.70 6.70	0.00		25.24 25.24	25.24 25.24	25.24 25.24	25.24 25.24		28 28	28 28	28 28
2030	15		25.24									3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24	1	28	28	28
2031	16		25.24		-		-	-				3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24	-	28	28	28
2032 2033	17 18		25.24 25.24	<u> </u>	-	-		-		-		3.81 3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87 2.87	6.70 6.70	0.00 0.00		25.24 25.24	25.24 25.24	25.24 25.24	25.24 25.24	1	28 28	28 28	28
2034	19		25.24			0.0	0.0	<:Refurbish	ment funding			3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24		28	28	28
2035	20		25.24		-							3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24		28	28	28
2036 2037	21 22		25.24 25.24		-						-	3.81 3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87	6.70 6.70	0.00		25.24 25.24	25.24 25.24	25.24	25.24 25.24		28 28	28 28	28 28
2038	23		25.24									3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24	1	28	28	28
	24 25		25.24 25.24			-		-				3.81 3.81	11.47	1.00	2.91	3.43 3.43	2.87 2.87	6.70 6.70	0.00		25.24 25.24	25.24	25.24	25.24 25.24	-	28 28	28 28	28 28
2039	25		25.24									3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24 25.24	25.24	25.24		28	28	28
2039 2040 2041			25.24									3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24		28	28	28
2039 2040 2041 2042	27		25.24 25.24			-					-	3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87 2.87	6.70 6.70	0.00		25.24	25.24	25.24	25.24	-	28	28	28
2039 2040 2041 2042 2043	27 28			-		+				1	-	3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24 25.24	1	28	28	28
2039 2040 2041 2042	27		25.24	1								3.81	11,47	1.00	2.91	3.43	2.87	6.70	0.00									
2039 2040 2041 2042 2043 2043 2044 2045 2045	27 28 29 30 31		25.24 25.24	-																	25.24	25.24	25.24	25.24	-	28	28	28
2039 2040 2041 2042 2043 2044 2045 2044 2045 2046	27 28 29 30 31		25.24 25.24 25.24									3.81	11.47	1.00	2.91	3.43	2.87	6.70	0.00		25.24	25.24	25.24	25.24	-	28	28	28
2039 2040 2041 2042 2043 2043 2044 2045 2045	27 28 29 30 31 32 33		25.24 25.24	0.0	0.0	0.0	0.0	<:Refurbish	ment funding			3.81 3.81 3.81	11.47 11.47 11.47	1.00 1.00 1.00			2.87 2.87 2.87		0.00 0.00 0.00						_			28 28
2039 2040 2041 2042 2043 2044 2045 2046 2046 2047 2048	27 28 29 30 31		25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	<:Refurbish	ment funding			3.81 3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87 2.87	6.70 6.70	0.00		25.24 25.24	25.24 25.24	25.24 25.24	25.24 25.24	-	28 28	28 28	28 28

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Image: problem into a state inteteta state into a state into a state into a s	тем				CAPITAL COST	COMPONENT	S (R'million)						6										TIMING						
NormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormalNormal		TOTAL	DAM	PIPELINES	TANKS			M & E	BUILDING					0%	0%	0%	0%	0%	PERCENTA	GE OF CAPITA	AL REDEMPT	10N (i.e. 0%=	grant funding)	0%	0%	0%	0%	T 0%	0%
matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix matrix				1			1	1	1						1				Prim & Sec			-							
Image: state       Image: state <th< td=""><td>abelanga Dam</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Lines</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>Other</td><td></td></th<>	abelanga Dam																		Lines									Other	
math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math math <td>vater Supply Only comment for HEP</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>4.2</td> <td></td> <td></td> <td></td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td></td>	vater Supply Only comment for HEP										4.2				0.0	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0		
martial state in the state i	sociated Dam Works	51.7					12.9		25.9					0.0				0.0				68.5						0.0	0.0
No.         No. <td>nall HEP</td> <td></td> <td>0.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.0</td> <td></td> <td>0.0</td> <td>0.0</td>	nall HEP																	0.0								0.0		0.0	0.0
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Norm         Image         Image <th< td=""><td>ertiary</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>1</td><td>   </td><td></td><td>2020</td><td></td><td></td><td></td><td>0.0</td><td></td><td></td><td>0.0</td><td>0.0</td><td></td><td>0.0</td><td></td><td></td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td></th<>	ertiary									1			2020				0.0			0.0	0.0		0.0			0.0	0.0	0.0	0.0
	rimary & Secondary													0.0	0.0				0.0	0.0	0.0		0.0				0.0	0.0	0.0
Name         Name </td <td>ertiary</td> <td></td> <td>2023</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>40.0</td> <td>0.0</td> <td></td> <td></td> <td></td> <td></td> <td>0.0</td> <td>0.0</td>	ertiary												2023									40.0	0.0					0.0	0.0
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cond         cond <th< td=""><td>er items and Mitigations</td><td>259.1</td><td></td><td></td><td></td><td>259.1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	er items and Mitigations	259.1				259.1																							
Open         Open <th< td=""><td>wer lines</td><td></td><td></td><td></td><td></td><td>107.2</td><td></td><td></td><td></td><td>16.3</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	wer lines					107.2				16.3																			
	B-TOTAL		401.6	519.2	62.7		183.4	143.7	45.8	28.8	6.7		Check>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	456.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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YPM       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40       40 <t< td=""><td>her Items &amp; Mitigations</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	her Items & Mitigations																												
		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	-		<u> </u>													-		
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Image: propriot in the		1	1	11-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1-1	1	2	-	-	-		MANYTENANCE OF	0.070				OPERATI	ONS COSTS (	R'million)		TOFATAFAC	00000								
								*******				515		ITEM			COST/A							0.25					
										1							1.00			POWER									
Image: 1													il Works, Build	linas			2.91			Energy Cost Energy Cost	: R/ kWHr : R/ kWHr		Pumping Sales	0.50					
Vir.         Vir. </td <td></td> <td>2.00%</td> <td>M &amp; E</td> <td></td> <td></td> <td></td> <td></td> <td>2.87</td> <td></td>											2.00%	M & E					2.87												
Prime Unit Uni							1	1			52 ST						10.21				_				1		2		
Prime         Prim         Prime         Prime <t< th=""><th></th><th>YEAR</th><th></th><th></th><th></th><th>CAPITA</th><th></th><th></th><th>DITURE</th><th></th><th></th><th></th><th></th><th></th><th></th><th>OP</th><th>RATIONAL C</th><th>OSTS (R'millio</th><th>n)</th><th></th><th></th><th>DISCO</th><th></th><th>SUPPLIED</th><th></th><th></th><th></th><th></th><th>3</th></t<>		YEAR				CAPITA			DITURE							OP	RATIONAL C	OSTS (R'millio	n)			DISCO		SUPPLIED					3
Note         Protect         P	YEAR	NO.	(m						Proj Mant				Power	Energy	Dams			M & E	STAFF	Treatment	1		DISCOUNT RA			-		SCOUNT RAT	
Description       Description <thdescription< th=""> <thdescription< th=""></thdescription<></thdescription<>			POTABLE	IBBIGATION							kWh/a	Income	MW	Charge		Reservoirs						6%	8%	10%	2%	4	6%	8%	10%
1        00       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0<						0.0	0.0	0.0	0.0								buildinga					-				1	0	0	0 0
Control       Contro       Control       Control		0			0.0		0.0	0.0	0.0	0.0				i								-		_		-		0	0 0
1       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	2016	0			0.0	0.0		0.0	0.0	0.0			+										-	-					0
1       2       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	2016 2017	1 2			0.0	0.0	0.0			0.0					100000000000000000000000000000000000000														
No.       Y       111       020       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0	2016 2017 2018 2019	1 2 3 4			0.0 0.0 0.0 0.0	0.0 0.0 0.0	0.0	0.0	0.0	0.0				1			5255	22622								-	0	0	0 (
1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	2016 2017 2018 2019 2020	1 2 3 4	20.63	25.24	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0	0.0 0.0 0.0	0.0	0.0	0.0			3.81	11.47	1.00	2.91	3.43		6.70			45.87	45.87		45.87	-	0 34	0 34	34 3
10       2.82       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       9.24       <	2016 2017 2018 2019 2020 2021	1 2 3 4	20.87	25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0			3.81	11.47	1.00	2.91 2.91	3.43 3.43	2.87 2.87	6.70 6.70	5.22 5.28	-	46.11 46.34	46.11	46.11	46.11	-	0 34 34 34	0 34 34 34	34 3 34 3 34 3
11       200       204       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       - <td>2016 2017 2018 2019 2020 2021 2022 2022 2023</td> <td>1 2 3 4</td> <td>20.87 21.11 21.34</td> <td>25.24 25.24 25.24</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81</td> <td>11.47 11.47 11.47</td> <td>1.00 1.00 1.00</td> <td>2.91 2.91 2.91</td> <td>3.43 3.43 3.43</td> <td>2.87 2.87 2.87</td> <td>6.70 6.70 6.70</td> <td>5.22 5.28 5.34</td> <td>-</td> <td>46.11 46.34 46.58</td> <td>46.11 46.34 46.58</td> <td>46.11 46.34 46.58</td> <td>46.11 46.34 46.58</td> <td>-</td> <td>0 34 34 34 34</td> <td>0 34 34 34 34 34</td> <td>34 3 34 3 34 3 34 3 34 3</td>	2016 2017 2018 2019 2020 2021 2022 2022 2023	1 2 3 4	20.87 21.11 21.34	25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81	11.47 11.47 11.47	1.00 1.00 1.00	2.91 2.91 2.91	3.43 3.43 3.43	2.87 2.87 2.87	6.70 6.70 6.70	5.22 5.28 5.34	-	46.11 46.34 46.58	46.11 46.34 46.58	46.11 46.34 46.58	46.11 46.34 46.58	-	0 34 34 34 34	0 34 34 34 34 34	34 3 34 3 34 3 34 3 34 3
13       223       354       -       -       -       38       147       100       297       670       580       570       580         2020       15       2011       354       -       -       -       381       1147       100       291       343       247       670       580         2020       15       2011       354       -       -       -       381       1147       100       291       343       247       670       581         2020       16       2344       244       -       -       -       281       1147       100       291       343       247       670       581         2021       16       2344       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       244       2	2016 2017 2018 2019 2020 2021 2022 2023 2023 2024	1 2 3 4 5 6 7 8 9	20.87 21.11 21.34 21.58	25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40	-	46.11 46.34 46.58 46.82	46.11 46.34 46.58 46.82	46.11 46.34 46.58 46.82	46.11 46.34 46.58 46.82	-	0 34 34 34 34 34 34	0 34 34 34 34 34 34	34 3 34 3 34 3 34 3 34 3 34 3
10       207       25.4       10       10       10       251       1.47       1.00       291       3.43       297       6.70       5.75         2031       15       22.24       25.44       10       10       2.91       3.41       291       3.44       287       6.70       5.87         2031       16       22.24       25.44       10       10       2.91       3.41       2.91       3.44       2.87       6.70       5.87         2033       18       22.24       10       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0 </td <td>2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026</td> <td>1 2 3 4 5 6 7 8 9 10 11</td> <td>20.87 21.11 21.34 21.58 21.82 22.06</td> <td>25.24 25.24 25.24 25.24 25.24 25.24 25.24</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81 3.81 3.81 3.81 3.81</td> <td>11.47 11.47 11.47 11.47 11.47 11.47 11.47</td> <td>1.00 1.00 1.00 1.00 1.00 1.00</td> <td>2.91 2.91 2.91 2.91 2.91 2.91</td> <td>3.43 3.43 3.43 3.43 3.43 3.43 3.43</td> <td>2.87 2.87 2.87 2.87 2.87 2.87 2.87</td> <td>6.70 6.70 6.70 6.70 6.70 6.70</td> <td>5.22 5.28 5.34 5.40 5.45 5.51</td> <td>-</td> <td>46.11 46.34 46.58 46.82 47.06 47.29</td> <td>46.11 46.34 46.58 46.82 47.06 47.29</td> <td>46.11 46.34 46.58 46.82 47.06 47.29</td> <td>46.11 46.34 46.58 46.82 47.06 47.29</td> <td></td> <td>0 34 34 34 34 34 34 34 34 34</td> <td>0 34 34 34 34 34 34 34 34</td> <td>34 3 34 3 34 3 34 3 34 3 34 3 34 3 34 3</td>	2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026	1 2 3 4 5 6 7 8 9 10 11	20.87 21.11 21.34 21.58 21.82 22.06	25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.51	-	46.11 46.34 46.58 46.82 47.06 47.29	46.11 46.34 46.58 46.82 47.06 47.29	46.11 46.34 46.58 46.82 47.06 47.29	46.11 46.34 46.58 46.82 47.06 47.29		0 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34	34 3 34 3 34 3 34 3 34 3 34 3 34 3 34 3
1.5       2.01       6.54       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75       6.75      <	2016 2017 2018 2020 2021 2022 2022 2022 2023 2024 2024 2025 2026 2027	1 2 3 4 5 6 7 7 8 9 10 11 11 12	20.87 21.11 21.34 21.58 21.82 22.06 22.29	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.51 5.57		46.11 46.34 46.58 46.82 47.06 47.29 47.53	46.11 46.34 46.58 46.82 47.06 47.29 47.53	46.11 46.34 46.58 46.82 47.06 47.29 47.53	46.11 46.34 46.58 46.82 47.06 47.29 47.53		0 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
10       2.4.6       5.4       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1<	2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2025 2025 2026 2027 2028	1 2 3 4 5 6 7 8 9 10 11 11 12 13	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.51 5.57 5.63	-	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77		0 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
11 12.7 25.4 1 1 1 1 1.147 1.00 2.1 3.40 2.7 6.70 5.93 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95 4.95<	2016 2017 2018 2019 2020 2022 2022 2022 2022 2023 2024 2025 2026 2025 2026 2027 2028 2029 2028 2029 2030	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 23.01	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.51 5.57 5.63 5.69 5.75		46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24		0 34 34 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
201       2419       25.4       C       C       C       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S       S	2016 2017 2018 2019 2020 2021 2022 2023 2024 2024 2025 2026 2026 2026 2027 2028 2028 2029 2029 2030	1 2 3 4 5 6 7 8 9 10 11 11 12 13 14 15 16	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.53 22.77 23.01 23.24	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.51 5.57 5.63 5.69 5.69 5.75 5.81		46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.48	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.48	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.24	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.48		0 34 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
1       2443       3544       1       1       2       1       2       1       2       1       2       1       2       1       2       1       2       1       2       1       2       1       2       1       2       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1 </td <td>2016 2017 2018 2019 2020 2022 2022 2022 2024 2025 2026 2026 2026 2026 2027 2028 2029 2030 2030 2031 2032</td> <td>1 2 3 4 5 6 7 7 8 9 9 10 11 11 12 13 14 15 16 17 18</td> <td>20.87 21.11 21.34 21.58 21.58 22.06 22.29 22.53 22.77 22.77 23.01 23.24 23.48</td> <td>25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81</td> <td>11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47</td> <td>1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00</td> <td>2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91</td> <td>3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43</td> <td>2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87</td> <td>6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70</td> <td>5.22 5.28 5.34 5.40 5.51 5.57 5.63 5.69 5.75 5.81 5.87 5.83</td> <td></td> <td>46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.48</td> <td>46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72</td> <td>46.11 46.34 46.68 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.84 48.84</td> <td>46.11 46.54 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.48</td> <td></td> <td>0 34 34 34 34 34 34 34 34 34 34 34 34 34</td> <td>0 34 34 34 34 34 34 34 34 34 34 34 34 34</td> <td>34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3</td>	2016 2017 2018 2019 2020 2022 2022 2022 2024 2025 2026 2026 2026 2026 2027 2028 2029 2030 2030 2031 2032	1 2 3 4 5 6 7 7 8 9 9 10 11 11 12 13 14 15 16 17 18	20.87 21.11 21.34 21.58 21.58 22.06 22.29 22.53 22.77 22.77 23.01 23.24 23.48	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.51 5.57 5.63 5.69 5.75 5.81 5.87 5.83		46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.48	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72	46.11 46.34 46.68 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.84 48.84	46.11 46.54 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.48		0 34 34 34 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
207       22       2467       524       524	2016 2017 2019 2020 2020 2020 2022 2022 2022 2022	1 2 3 4 5 6 7 7 8 9 9 10 11 11 12 13 14 14 15 16 16 17 17 18 19	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.72 23.96	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.51 5.57 5.63 5.69 5.75 5.81 5.87 5.89 5.99 5.99		46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72 48.72 48.96 49.19	46.11 46.54 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19	46.11 46.54 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.84 48.72 48.96 49.19	46.11 46.54 46.58 46.62 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19		0 34 34 34 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
1008       23       24.91       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.44       26.	2016 2017 2019 2020 2020 2021 2022 2022 2024 2024 2025 2026 2026 2026 2026 2027 2028 2026 2029 2020 2030 2030 2031 2032 2033 2034 2034 2035	1 2 3 4 5 6 7 7 8 9 9 10 11 12 13 14 15 16 16 11 14 16 19 19 9 20	20.87 21.11 21.34 21.59 21.82 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.72 23.79 23.96 24.19	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.51 5.57 5.63 5.69 5.75 5.81 5.87 5.81 5.87 5.93 5.99 6.05		46.11 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72 48.86 49.19 49.43	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.82 48.82 48.82 48.96 49.19 49.43	46.11 46.58 46.62 47.06 47.29 47.53 47.77 48.01 48.24 48.84 48.82 48.82 48.82 49.919 49.43	46.11 46.54 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.82 48.82 48.82 48.86 49.19 49.43		0 34 34 34 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3
204       25       25.8       25.4       -       -       -       -       3.81       1.47       1.00       2.91       3.40       2.87       6.70       6.35       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       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23.24 23.48 23.72 23.96 24.19 24.43</td> <td>25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81</td> <td>11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47</td> <td>1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00</td> <td>2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91</td> <td>3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43</td> <td>2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87</td> <td>6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70</td> <td>5.22 5.28 5.34 5.40 5.45 5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.99 6.05 6.11</td> <td></td> <td>46.11 46.58 46.58 47.06 47.29 47.53 47.77 48.01 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261       262       25.4       1       1       1       1       1       1       1       1       1       1       2       1       3.43       2.47       6.70       6.40       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86       50.86	0016 2017 2018 2019 2020 2022 2022 2022 2022 2022 2022	1 2 3 4 5 6 7 7 8 8 9 9 9 10 11 11 12 12 13 14 14 15 16 17 18 19 20 21 22 22	20.87 21.11 21.53 21.58 21.82 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.72 23.96 24.49 24.67 24.67	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.34 5.40 5.45 5.57 5.69 5.75 5.81 5.87 5.93 5.99 6.05 6.11 6.17 6.23		46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.67 49.91 50.15	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.86 48.72 48.96 49.19 49.67 49.91 50.15	46.11 46.34 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.28 48.72 48.96 49.19 49.43 49.67 49.91 50.15		0 34 34 34 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           35         3
204       26       26.09       25.44       (m)       (m)       (m)       2.11       3.43       2.47       6.70       6.52       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33       51.33	2016         2017           2018         2018           2020         2021           2022         2022           2024         2025           2025         2026           2026         2027           2028         2029           2030         2031           2031         2032           2032         2034           2035         2036           2038         2039	1 2 3 4 5 6 7 7 8 9 0 10 11 12 13 14 15 15 15 17 18 19 20 21 22 22 24	20.87 21.11 21.34 21.58 22.29 22.55 22.77 23.01 23.24 23.48 23.72 23.96 24.43 24.67 24.67 24.91 25.14	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 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100       100       100       100       100       201       3.40       2.47       6.70       6.58       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57       51.57	2016         2017           2018         2019           2020         2021           2022         2022           2023         2024           2024         2025           2025         2026           2026         2026           2026         2026           2028         2030           2030         2031           2033         2033           2036         2036           2037         2038           2038         2039           2039         2040           2040         2041	1 2 3 4 5 5 6 7 8 9 9 9 10 11 11 12 13 13 14 14 15 16 17 17 18 19 20 21 22 22 22 25	20.87 21.11 21.34 21.58 22.06 22.20 22.53 22.77 23.01 23.24 23.42 23.96 24.43 24.43 24.45 24.43 24.467 24.91 25.14 25.54 25.62	25, 24 25, 24	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47 11.47	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.51 5.57 5.63 5.75 5.81 5.87 5.83 5.93 5.93 5.93 5.93 5.93 6.05 6.11 6.17 6.23 6.29 6.35 6.40		46.11 46.54 46.58 46.58 47.06 47.29 47.53 47.77 48.01 47.77 48.24 48.24 48.48 48.72 48.24 48.48 48.72 49.91 9.015 50.38 50.02 50.86	46.11 46.34 46.58 46.58 47.06 47.29 47.73 47.77 48.01 48.24 48.48 48.72 48.24 48.48 48.72 49.91 9.05 75 0.50 50.38 50.62 50.86	46.11 46.54 46.62 47.06 47.79 47.73 47.75 48.01 48.24 48.80 48.84 48.86 48.87 49.91 49.43 49.93 49.67 49.91 50.15 50.68	46.11 46.34 46.58 46.58 47.66 47.29 47.29 47.73 47.77 48.21 47.77 48.21 48.24 48.48 48.72 48.24 48.48 48.72 49.91 9.057 49.91 50.15 50.38 50.62 50.86		0 34 34 34 34 34 34 34 34 34 34	0 34 34 34 34 34 34 34 34 34 34	34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           34         3           35         3           35         3           35         3           35         3           35         3           35         3           35         3           35         3
2045       30       25.7       25.4 <th< td=""><td>0016         2017           2018         2019           2020         2021           2021         2022           2022         2023           2024         2026           2025         2026           2026         2027           2028         2029           2029         2020           2030         2032           2031         2032           2035         2036           2036         2037           2038         2039           2039         2034           2034         2046           2041         2044</td><td>1 2 3 4 5 5 6 7 7 8 9 9 0 10 11 11 12 12 13 14 14 15 15 15 16 15 16 20 21 22 23 24 25 25 27</td><td>20.87 21.11 21.34 21.58 21.82 22.06 22.53 22.77 23.01 23.24 23.46 23.72 23.04 23.72 23.04 23.72 23.04 23.72 23.04 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.06 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.07 23.77 23.77 23.07 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.06 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.66 23.72 23.72 23.66 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 23.72 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207       32       2705       6524       Image: Constraint of the const	0016         2017           2018         2019           2020         2022           2021         2022           2022         2022           2023         2026           2026         2027           2028         2029           2020         2026           2020         2030           2030         2031           2032         2033           2035         2035           2036         2039           2038         2039           2039         2040           2041         2042           2043         2043	1 2 3 4 5 6 7 7 8 9 9 0 11 12 12 13 14 14 15 16 16 17 8 19 20 21 22 22 22 24 22 24 22 25 22 28	20.87 21.11 21.34 21.58 22.06 22.20 22.53 22.77 23.01 23.24 23.42 23.42 23.42 23.46 23.72 23.96 24.19 24.43 24.67 24.67 24.67 25.14 25.54 25.62 25.62 25.62 25.62 25.69 9	25, 24 25, 24 25	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 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image	м				CAPITAL COST	T COMPONENT	S (R'million)												IMP	LEMENTAT	ION EXPE	NDITURE	TIMING						
Summe		TOTAL	DAM	PIPELINES	TANKS			M&E	BUILDING				-	0%	0%	0%	0%	0%		GE OF CAPITA	L REDEMPTI			0%	0%	0%	0%	0%	0%
Summe								0										Ntab Ops	Prim & Sec	Tertiary	Ntab				Lalini Ops			Eng &	
mark	elanga Dam ter Supply Only	285.2	242.4					42.8					Year																
m     b     b     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m     m </td <td>ement for HEP</td> <td></td> <td>159.1</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>4.2</td> <td></td> <td>2015</td> <td>0.0</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>22.8</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0.0</td> <td>0.0</td>	ement for HEP		159.1								4.2		2015	0.0								22.8						0.0	0.0
matrix         image         <	lated Dam Works	51.7					12.9	12.9	25.9				2016	0.0	0.0	0.0						68.5						0.0	0.0
shore         shore <th< td=""><td>INEP</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2017 2018</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td>0.0</td><td>0.0</td><td>68.5</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td>0.0</td><td>0.0</td><td>0.0</td></th<>	INEP												2017 2018	0.0	0.0	0.0	0.0	0.0		0.0	0.0	68.5	0.0	0.0	0.0		0.0	0.0	0.0
Processor         rocessor         Processor <t< td=""><td>ary &amp; Secondary</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2019</td><td>0.0</td><td>0.0</td><td></td><td>0.0</td><td></td><td>0.0</td><td>0.0</td><td>0.0</td><td>68.5</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td></t<>	ary & Secondary												2019	0.0	0.0		0.0		0.0	0.0	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
characterization         constrained         constrained <thconstrained< th=""></thconstrained<>	iary																0.0			0.0	0.0					0.0	0.0	0.0	0.0
	ary & Secondary													0.0	0.0				0.0	0.0	0.0		0.0				0.0	0.0	0.0
inversion         inversion <t< td=""><td>ary</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>2023</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.0</td></t<>	ary												2023																0.0
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chance         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r         r        r         r         r <td>ry</td> <td></td> <td>RORD</td> <td></td>	ry												RORD																
	r supplies																												
Image: state st	ary & Secondary ary																												
norm         norm <th< td=""><td>nent Works</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>*********</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	nent Works									*********																			
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martial         <	ik and farms dev			519.2	62.7		94.5	59.9	20.0	12.5	2.5																		
important         <	Items and Mitigations					259.1																							
Math         Math </td <td>lines</td> <td></td> <td></td> <td></td> <td></td> <td>107.2</td> <td></td> <td></td> <td></td> <td>16.3</td> <td></td>	lines					107.2				16.3																			
intervise         intervise <t< td=""><td>OTAL</td><td></td><td>401.6</td><td>519.2</td><td>62.7</td><td></td><td>183.4</td><td>143.7</td><td>45.8</td><td>28.8</td><td>6.7</td><td></td><td>Check&gt;</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>456.4</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td></t<>	OTAL		401.6	519.2	62.7		183.4	143.7	45.8	28.8	6.7		Check>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	456.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Image         Image <th< td=""><td>Dam</td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>	Dam						-				_																		
Image         Image <th< td=""><td>iated Dam Works</td><td>-</td><td></td><td></td><td>-</td><td></td><td>-</td><td></td><td>-</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>-</td><td></td><td></td></th<>	iated Dam Works	-			-		-		-	-																	-		
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Image         Image <t< td=""><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.25%</td><td>Dam</td><td></td><td></td><td></td><td></td><td>1.00</td><td>1</td><td></td><td>POWER</td><td></td><td></td><td></td><td>110</td><td></td><td></td><td></td><td></td><td></td></t<>											0.25%	Dam					1.00	1		POWER				110					
Image:														Press						Energy Cost :	R/ kWHr		Pumping	0.50					
Image: problem in the state of th											2.00%	M & E	VII WORKS, BUI	aings			2.87			Energy Cost :	H/ KWH		58105	0.8					
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<table-container>        Phy       Phy</table-container>		YEAR				CAPIT			DITURE							OP	ERATIONAL C	OSTS (R'milli	on)			DISCO		SUPPLIED	1		1		
Image: marrier back Imag	YEAR	NO.			Dam &	Pipelines			Proj Mant	Eng					Dams	Pipelines	WTW	M&E	STAFF	Treatment				TES			DI		ES
ON     O     Description     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O     O				10010 1001							kWh/a	Income	MW	Charge		Reservoirs						6%	8%	10%	2%	-	6%	8%	10%
1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1	2015	0	POTABLE	IRRIGATION			0.0	0.0	0.0				-				Buildings										0	0	0
bit     bit </td <td>2016</td> <td>1</td> <td></td> <td></td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td>1</td> <td></td> <td></td> <td></td>	2016	1			0.0	0.0	0.0	0.0	0.0	0.0																1			
100       1       0       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00       00					0.0	0.0	0.0		0.0	0.0	-			<u>.</u>											-	-			
nome					0.0	0.0	0.0	0.0	0.0	0.0			-	-0											-	1			
1 1 1 1 1 1 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 <td< td=""><td>2020</td><td></td><td>20.63</td><td>25.24</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td>0.0</td><td></td><td></td><td>3.81</td><td>5.74</td><td></td><td></td><td>3.43</td><td></td><td></td><td>5.16</td><td></td><td></td><td>45.87</td><td>45.87</td><td>45.87</td><td></td><td>28</td><td>28</td><td>28</td></td<>	2020		20.63	25.24	0.0	0.0	0.0	0.0	0.0	0.0			3.81	5.74			3.43			5.16			45.87	45.87	45.87		28	28	28
100       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0       0	EVEN	5		25.24	0.0	0.0	0.0						3.81	5.74	1.00	2.91	3.43	2.87	6.70	5.22		46.11	46.11	46.11	46.11	-	28		
9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 21.9 <td>2021</td> <td>6</td> <td>20.87</td> <td>05.04</td> <td>0.0</td> <td></td> <td>0.0</td> <td></td> <td>0.0</td> <td>0.0</td> <td>-</td> <td></td> <td>3.81</td> <td>5.74</td> <td>1.00</td> <td>2.91</td> <td>3.43</td> <td>2.87</td> <td>6.70</td> <td>5.28</td> <td></td> <td>46.58</td> <td></td> <td></td> <td>46.58</td> <td>1</td> <td>28</td> <td>28</td> <td>28</td>	2021	6	20.87	05.04	0.0		0.0		0.0	0.0	-		3.81	5.74	1.00	2.91	3.43	2.87	6.70	5.28		46.58			46.58	1	28	28	28
11       22.0       8.54       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -       -<	2021 2022	6 7	20.87 21.11	25.24	0.0	0.0			0.0	0.0			3.81	5.74	1.00	2.91	3.43	2.87	6.70	5.40		46.82	46.82	46.82	46.82	1	28	28	28
12       22.9       83.4	2021 2022 2023 2024	6 7 8 9	20.87 21.11 21.34 21.58	25.24 25.24 25.24	0.0	0.0	0.0						3.81					2.87	6.70	5.45		47.06	47.06	47.06	47.06	-	28		
13       25.0       25.4       10.0       25.4       10.0       29.1       3.4       28.7       6.70       5.87       4.87       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77       4.77      4.77	2021 2022 2023 2024 2025	6 7 8 9 10	20.87 21.11 21.34 21.58 21.82	25.24 25.24 25.24 25.24	0.0	0.0	0.0			0.0			2.01	E 74	1.00	2.01	2.42		6.70						47.63	-			
10       10       10       10       10       10       20       3.4       20       6.70       5.75       42.7       6.70       5.75         2031       11       2.44       2.54       10       2.47       5.74       100       2.91       3.43       2.27       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.70       5.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       4.75       <	2021 2022 2023 2024 2025 2026	6 7 8 9 10 11	20.87 21.11 21.34 21.58 21.82 22.06	25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0			0.0			3.81	5.74	1.00	2.91	3.43 3.43	2.87	6.70 6.70	5.51 5.57		47.29	47.53	47.53	47.53		28	28	28
11 12.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 52.4 <td>2021 2022 2023 2024 2025 2026 2026 2027 2028</td> <td>6 7 9 10 11 12 13</td> <td>20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53</td> <td>25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td></td> <td>0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81</td> <td>5.74 5.74 5.74</td> <td>1.00 1.00 1.00</td> <td>2.91 2.91 2.91</td> <td>3.43 3.43</td> <td>2.87 2.87</td> <td>6.70 6.70</td> <td>5.57 5.63</td> <td></td> <td>47.53 47.77</td> <td>47.53 47.77</td> <td>47.53 47.77</td> <td>47.77</td> <td></td> <td>28 28</td> <td>28</td> <td>28</td>	2021 2022 2023 2024 2025 2026 2026 2027 2028	6 7 9 10 11 12 13	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0			0.0			3.81 3.81 3.81	5.74 5.74 5.74	1.00 1.00 1.00	2.91 2.91 2.91	3.43 3.43	2.87 2.87	6.70 6.70	5.57 5.63		47.53 47.77	47.53 47.77	47.53 47.77	47.77		28 28	28	28
18 2.72 2.524 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.54 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 5.55 </td <td>2021 2022 2023 2024 2025 2026 2027 2028 2027 2028</td> <td>6 7 9 10 11 12 13 14</td> <td>20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77</td> <td>25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td></td> <td>0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81 3.81</td> <td>5.74 5.74 5.74 5.74 5.74</td> <td>1.00 1.00 1.00 1.00</td> <td>2.91 2.91 2.91 2.91</td> <td>3.43 3.43 3.43</td> <td>2.87 2.87 2.87</td> <td>6.70 6.70 6.70</td> <td>5.57 5.63 5.69</td> <td></td> <td>47.53 47.77 48.01</td> <td>47.53 47.77 48.01</td> <td>47.53 47.77 48.01</td> <td>47.77 48.01</td> <td></td> <td>28 28 28</td> <td>28 28</td> <td>28 28</td>	2021 2022 2023 2024 2025 2026 2027 2028 2027 2028	6 7 9 10 11 12 13 14	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0			0.0			3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91	3.43 3.43 3.43	2.87 2.87 2.87	6.70 6.70 6.70	5.57 5.63 5.69		47.53 47.77 48.01	47.53 47.77 48.01	47.53 47.77 48.01	47.77 48.01		28 28 28	28 28	28 28
101       101       101       0.0       0.0       -Perturner funder       100       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01      2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01       2.01	2021 2022 2023 2024 2025 2026 2027 2028 2027 2028 2029 2030	6 7 8 9 10 11 12 13 14 15 16	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 23.01	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0			0.0			3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75		47.53 47.77 48.01 48.24	47.53 47.77 48.01 48.24	47.53 47.77 48.01 48.24	47.77 48.01 48.24	-	28 28 28 28	28 28 28	28 28 28
203       24.19       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       2	2021 2022 2023 2024 2025 2026 2026 2027 2028 2029 2030 2031 2031 2032	6 7 8 9 10 11 12 13 14 15 16 17	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 22.73 01 23.01 23.24 23.48	2524 2524 2524 2524 2524 2524 2524 2524	0.0	0.0	0.0			0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87		47.53 47.77 48.01 48.24 48.48 48.72	47.53 47.77 48.01 48.24 48.48 48.72	47.53 47.77 48.01 48.24 48.48 48.72	47.77 48.01 48.24 48.48 48.48 48.72		28 28 28 28 28 28 29	28 28 28 28 28 29	28 28 28 28 28 29
201       24.43       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       25.44       2	2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2031 2032 2033	6 7 8 9 10 11 12 13 14 15 16 17 18	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.72	2524 2524 2524 2524 2524 2524 2524 2524	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93		47.53 47.77 48.01 48.24 48.48 48.72 48.96	47.53 47.77 48.01 48.24 48.48 48.72 48.96	47.53 47.77 48.01 48.24 48.48 48.72 48.96	47.77 48.01 48.24 48.48 48.72 48.96		28 28 28 28 28 29 29 29	28 28 28 28 29 29	28 28 28 28 29 29 29
203       24.91       25.44       Cond	2021 2022 2023 2024 2025 2026 2026 2027 2028 2029 2030 2031 2032 2033 2032 2033 2034	6 7 9 10 11 12 13 14 15 16 17 18 19	20.87 21.11 21.34 21.58 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.72 23.96	2524 2524 2524 2524 2524 2524 2524 2524	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.99		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19	47.77 48.01 48.24 48.48 48.72 48.96 49.19		28 28 28 28 28 29 29 29 29 29	28 28 28 28 29 29 29 29	28 28 28 29 29 29 29
2040       25       25.14       65.24       65.24       65.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.24       55.	2021 2022 2023 2024 2025 2026 2026 2026 2028 2028 2029 2030 2030 2031 2032 2031 2032 2033 2033	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21	20.87 21.11 21.34 21.58 21.62 22.06 22.29 22.53 22.53 22.77 23.01 23.24 23.48 23.72 23.96 24.19 24.43	25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24 25,24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.93 5.99 6.05 6.11		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67	47,77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67		28 28 28 28 28 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29
2040       25       25.39       25.24       100       29.1       3.41       297       6.70       6.45       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62       50.62	2021 2022 2022 2024 2025 2026 2026 2027 2028 2029 2030 2031 2031 2031 2032 2033 2034 2035 2035 2036 2037	6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22	20.87 21.11 21.58 21.82 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.48 23.72 23.96 24.19 24.43 24.67	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.99 6.05 6.11 6.17		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91	47.53 47.77 48.01 48.24 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91	47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91		28 28 28 28 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29
2042       27       28.86       65.4	2021 2022 2023 2024 2025 2026 2027 2028 2029 2029 2030 2031 2031 2033 2033 2033 2033 2034 2035 2036 2037 2038	6 7 8 9 10 11 12 12 13 14 15 16 17 18 19 20 21 22 22 23	20.87 21.11 21.34 21.58 22.66 22.29 22.53 22.77 23.01 23.24 23.48 23.72 23.96 24.19 24.43 24.67 24.61	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.99 6.05 6.11 6.17 6.23		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15	47.53 47.77 48.01 48.24 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15	47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29
28       26.09       55.24       Image: State stat	2021 2022 2023 2025 2025 2026 2026 2027 2028 2029 2030 2030 2031 2032 2033 2033 2034 2033 2035 2035 2035 2036 2035 2036 2037 2038 2039 2039 2039 2039	6 7 8 9 10 11 12 13 14 15 16 16 17 17 19 20 21 22 23 24 25	20.87 21.11 21.34 21.58 21.58 22.06 22.29 22.53 22.77 23.01 22.24 23.48 23.48 23.48 23.48 23.48 23.96 24.19 24.19 24.43 24.67 24.91 25.14 25.38	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.99 6.05 6.11 6.17 6.23 6.29 6.35		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62	47.53 47.77 48.01 48.24 48.28 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62	47.77 48.01 48.24 48.24 48.95 49.19 49.43 49.67 49.91 50.15 50.38 50.62		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
2044       39       28.33       25.44       Image: constraint of the state of the	2021 2022 2023 2024 2025 2026 2027 2028 2027 2028 2029 2029 2029 2029 2030 2030 2030 2030	6 7 8 9 10 11 12 13 14 15 16 16 17 17 19 20 21 22 23 24 25	20.87 21.11 21.54 21.58 22.06 22.29 22.53 22.77 23.01 23.24 23.46 23.72 23.96 24.13 24.43 24.43 24.43 24.49 25.14 25.14 25.62	25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.99 6.05 6.11 6.17 6.23 6.29 6.35 6.40		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86	47:53 47:77 48:01 48:24 48:48 48:72 48:96 49:19 49:43 49:67 49:91 50:15 50:38 50:62 50:86	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.67 49.91 50.15 50.38 50.62 50.62	47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
2046       30       26.57       25.24       -       -       -       -       -       3.81       5.74       1.00       2.91       3.43       2.47       6.70       6.64       51.81       51.81       51.81       51.81       51.81       52.05       20.47       20.47       20.47       20.47       1.00       2.91       3.43       2.47       6.70       6.64       51.81       51.81       51.81       51.81       50.45       20.47       20.47       20.47       20.47       20.47       1.00       2.91       3.43       2.47       6.70       6.67       52.05       52.05       52.05       52.05       20.47       20.47       20.47       20.47       20.47       20.47       1.00       2.91       3.43       2.47       6.70       6.67       62.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05       52.05 </td <td>2021 2022 2023 2024 2025 2026 2026 2027 2028 2029 2030 2031 2031 2033 2033 2034 2035 2035 2035 2035 2035 2035 2035 2035</td> <td>6 7 8 9 10 11 12 12 13 14 15 15 15 16 17 17 18 19 20 20 21 22 22 22 22 22 24 25 26 26 27</td> <td>20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.07 23.07 23.07 23.07 23.24 23.72 23.94 23.72 23.94 23.72 23.94 23.72 23.96 24.19 24.43 24.67 24.91 25.38 25.86 25.86 25.86 25.86</td> <td>25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.24 25.24 25.24 25.24 25.24</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td></td> <td></td> <td></td> <td>3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81</td> <td>5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74</td> <td>1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00</td> <td>2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91</td> <td>3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43</td> <td>2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87</td> <td>6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70</td> <td>5.57 5.63 5.69 5.75 5.81 5.99 6.05 6.11 6.17 6.23 6.29 6.35 6.40 6.46</td> <td></td> <td>47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10</td> <td>47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10</td> <td>47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.67 49.67 49.67 50.15 50.38 50.62 50.86 51.10</td> <td>47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10</td> <td></td> <td>28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29</td> <td>28 28 29 29 29 29 29 29 29 29 29 29 29 29 29</td> <td>28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29</td>	2021 2022 2023 2024 2025 2026 2026 2027 2028 2029 2030 2031 2031 2033 2033 2034 2035 2035 2035 2035 2035 2035 2035 2035	6 7 8 9 10 11 12 12 13 14 15 15 15 16 17 17 18 19 20 20 21 22 22 22 22 22 24 25 26 26 27	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.07 23.07 23.07 23.07 23.24 23.72 23.94 23.72 23.94 23.72 23.94 23.72 23.96 24.19 24.43 24.67 24.91 25.38 25.86 25.86 25.86 25.86	25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.99 6.05 6.11 6.17 6.23 6.29 6.35 6.40 6.46		47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10	47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.67 49.67 49.67 50.15 50.38 50.62 50.86 51.10	47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
2047       32       27.05       25.24       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       1       <	2021 2022 2023 2024 2025 2026 2026 2028 2028 2029 2029 2029 2033 2031 2033 2033 2033 2033 2035 2035 2035 2035	6 7 9 9 10 11 12 13 14 14 15 16 16 17 17 18 19 20 21 22 23 24 25 26 26 29	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 23.07 23.24 23.46 23.46 24.19 24.43 24.43 24.67 24.19 24.43 24.67 24.19 24.62 25.38 26.52 25.38 26.52 25.38 26.52 25.38 26.52 25.38 26.52 25.38 26.52 25.38 26.52 25.38 26.52 25.38 26.52 26.52 26.52 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55 27.55	25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 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2049       34       27.52       25.24       0.0       0.0       0.0       c.0       c.Returbishment lunding       3.81       5.74       1.00       2.91       3.43       2.47       6.70       6.88       52.76       52.76       52.76       52.76       52.76       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       50.00       5	201 2022 2023 2024 2025 2026 2026 2027 2028 2029 2030 2031 2031 2030 2031 2030 2035 2036 2035 2036 2035 2036 2035 2036 2039 2039 2039 2039 2039 2039 2039 2039	6 7 7 10 11 11 12 13 14 14 15 16 17 18 19 20 21 22 23 24 22 23 24 22 25 226 226 227 28 29 30	20.87 21.11 21.34 21.58 21.62 22.20 22.20 22.23 22.77 23.71 23.24 23.48 23.48 23.48 23.48 23.97 23.24 23.48 23.97 23.24 23.48 23.97 23.24 23.48 23.97 24.43 24.67 24.67 24.67 24.67 25.14 25.14 25.62 25.62 25.69 26.57	25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54 25.54	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.83 5.93 6.05 6.11 6.11 6.23 6.29 6.35 6.40 6.46 6.52 6.58 6.64		47.53 47.77 48.01 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 50.62 50.62 51.10 51.33 51.81	47.53 47.77 48.01 48.24 48.24 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10 51.33 51.57 51.81	47.53 47.77 48.01 48.24 48.24 48.86 48.72 48.96 49.19 49.43 49.43 49.67 49.67 49.67 49.67 49.91 50.15 50.38 50.62 50.86 51.10 51.33 51.57 51.81	47.77 48.01 48.24 48.48 48.72 48.95 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.62 50.62 50.86 51.10 51.33 51.57 51.61		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
2006         35         27.76         25.24         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.	201 2022 2023 2024 2025 2026 2027 2027 2027 2028 2030 2031 2033 2034 2034 2034 2035 2036 2036 2036 2037 2038 2039 2039 2039 2039 2039 2039 2039 2039	6 7 9 9 10 11 11 12 13 14 14 16 16 16 16 19 19 20 21 22 22 22 24 25 26 26 27 28 29 30 31	20.87 21.11 21.34 21.58 21.82 22.06 22.29 22.53 22.77 23.01 23.24 23.48 23.48 24.97 24.91 25.14 25.34 25.86 26.69 26.69 26.69 26.69 26.69 26.69 26.69 26.57 26.81	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	0.0				3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	5.74 5.74 5.74 5.74 5.74 5.74 5.74 5.74	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.93 5.99 6.05 6.11 6.17 6.23 6.29 6.35 6.40 6.45 6.58 6.58 6.58 6.58		47.53 47.77 48.01 48.01 48.24 48.48 48.72 48.96 49.19 49.67 49.91 50.15 50.38 50.62 50.62 50.62 51.10 51.33 51.57 51.81 52.05	47.53 47.77 48.01 48.24 48.24 48.24 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.62 50.62 50.86 51.10 51.53 51.81 51.81	47.53 47.77 48.01 48.24 48.24 48.24 48.24 48.72 49.96 49.19 49.43 49.67 49.91 50.15 50.15 50.32 50.86 51.10 51.57 51.57 51.57 52.05	47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38 50.62 50.86 51.10 51.33 51.57 51.81 52.05		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
	201 2022 2023 2024 2025 2026 2027 2028 2027 2039 2031 2030 2031 2033 2033 2034 2034 2034 2035 2035 2035 2035 2036 2038 2040 2040 2040 2040 2044 2044 2044 204	6 7 8 9 9 10 11 12 12 13 14 14 15 14 14 15 16 17 17 17 19 20 21 22 23 24 24 25 26 26 27 28 20 30 31 33	20.87 21.11 21.34 21.58 22.20 22.20 22.20 22.23 22.77 22.01 22.24 23.42 23.42 23.42 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 24.19 25.38 25.62 25.86 26.09 26.39 26.62 27.28	2624 2624 2624 2624 2624 2624 2624 2624			0.0	0.0	<pre>0.0</pre>	ment funding			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	$\begin{array}{c} 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\$	1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3,43 3,43 3,43 3,43 3,43 3,43 3,43 3,43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.99 6.05 6.11 6.17 6.23 6.25 6.35 6.40 6.46 6.52 6.52 6.52 6.52 6.54 6.70 6.76 6.68		47.53 47.77 48.01 48.24 48.48 48.42 48.42 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.62 50.62 50.62 50.62 51.33 51.57 51.81 52.05 52.28	47.53 47.77 48.01 48.24 48.48 48.48 48.48 48.96 49.91 50.19 50.38 50.38 50.38 50.65 50.38 50.86 51.33 51.57 51.81 52.05 52.25	47.53 47.77 48.01 48.24 48.46 48.46 48.96 49.91 49.91 49.67 49.91 50.38 50.86 51.33 55.86 51.10 51.57 51.57 51.57 51.57 52.05 52.28	47.77 48.01 48.24 48.24 48.24 48.26 49.96 49.19 50.15 50.82 50.86 51.10 50.55 50.86 51.10 51.57 51.81 52.05 52.28		28 28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29
	2021 2022 2022 2024 2024 2025 2026 2027 2026 2027 2028 2028 2028 2029 2029 2029 2029 2031 2033 2034 2035 2035 2035 2035 2035 2035 2035 2035	6 7 8 9 9 10 11 12 12 13 14 14 15 14 14 15 16 17 17 17 19 20 21 22 23 24 24 25 26 26 27 28 20 30 31 33	20.87 21.11 21.34 21.58 21.62 22.06 22.29 22.25 22.27 23.01 23.02 23.27 23.27 23.24 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 23.42 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24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42 24.42	2824 2824 2824 2824 2824 2824 2824 2824			0.0	0.0	<pre>0.0</pre>	ment funding			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81	$\begin{array}{c} 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 5.74\\ 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6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.57 5.63 5.69 5.75 5.81 5.87 5.99 6.05 6.11 6.23 6.29 6.35 6.40 6.40 6.40 6.40 6.40 6.40 6.75 6.68 6.62 6.68		47.53 47.77 48.01 48.24 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.36 50.62 50.86 51.10 51.33 61.57 51.81 52.05 52.28 52.76	47,53 47,77 48,01 48,24 48,48 48,48 48,48 48,72 48,98 49,19 49,43 50,15 50,15 50,68 50,66 50,68 50,68 50,68 51,10 51,33 51,57 51,81 52,28 52,26 52,26	47,53 47,77 48,01 48,24 48,26 48,26 48,26 48,26 48,26 49,43 49,84 49,94 49,94 49,94 49,94 49,94 49,94 49,94 50,15 50,62 50,66 50,66 50,66 51,10 51,51 51,81 52,28 52,26 52,276	47.77 48.01 48.04 48.24 48.24 48.24 48.24 48.26 49.19 49.43 49.67 49.43 49.67 49.43 49.67 49.91 50.05 50.82 50.86 51.10 51.53 51.55 52.05 52.28 52.28 52.28		28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29	28 28 28 29 29 29 29 29 29 29 29 29 29 29 29 29

. miniaAi	ION SC	CHEME	COMPON	ENTS OF	NLY							100%	Capital F	Redempt	ion		All po	wer cros	ss-subs	idized	0							
					T COMPONENTS	S (R'million)												IMP	LEMENTAT		NDITURE	TIMING						
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL WORKS	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh	-	0%	0%	0%	0%	0%	PERCENTA 0%		0%	ION (i.e. 0%=	grant funding) 0%	0%	0%	0%	0%	0%	0%
							1	1	1								Ntab Ops	Prim & Sec	Tertiary	Ntab				Lalini Ops			Eng &	
ga Dam Supply Only	285.2	242.4					42.8					Year	Proj. mangt 0.0	Ntab Dam 0.0	Ntab Advance 0.0	Ntab WTW 0.0	Village 0.0	Lines 0.0	Lines 0.0	Irrigation 0.0	Eng & Other 456.4	r Lalini Dam 0.0	Lalini Advance 0.0	Village 0.0	Lalini Condu 0.0	uit HEP Plant	s Other 0.0	DEA 0.0
for HEP	187.2	159.1					28.1			4.2		2015	0.0								22.8						0.0	0.0
Dam Works	51.7					12.9	12.9	25.9				2016 2017	0.0	0.0	0.0	0.0	0.0	0.0	0.0		68.5 68.5	0.0	0.0	0.0	0.0		0.0	0.0
												2017 2018	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Secondary												2019	0.0	0.0		0.0		0.0	0.0	0.0	68.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
												2020 2021	0.0	0.0		0.0		0.0	0.0 0.0	0.0 0.0	68.5 45.6	0.0			0.0	0.0 0.0	0.0	0.0
Secondary												2021	0.0	0.0				0.0	0.0	0.0	45.6	0.0				0.0	0.0	0.0
												2023																0.0
ations econdary	********											2024 2025																0.0
lies econdary																												
secondary																												
Works																								1				
upply i farms dev	750.2		519.2	62.7		75.9	59.9	20.0	12.5	2.5																		
	94.5					94.5																						*******
and Mitigations	259.1 16.3				259.1				16.3																			
& EMP	197.3				197.3				10.3																			
4	1841.6	401,6	519.2	62.7	456.4	183.4	143.7	45.8	28.8	6.7		Check:>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	456.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0
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& Mitigations & EMP								-																				
	0.0	0.0	0.0	0.0	0.0	0.0		0.0	0.0	0.0													1					
AL	1841.6	401.6	519.2	62.7	456.4	183.4	143.7	45.8	28.8	6.7				XI	0000 170	ONS COSTS (	Di-silii>	2 2	· · ·							- 500	249	37
					1	1	1	1	1	MAINTENANCE CO	OSTS				UPERAIN	JNS COSIS (	R million)		TREATMENT	COSTS				1				
										RATE			ITEM			COST/A			Using cost Ra	and per m3 =		1	0.25					
										0.25%	Dam Pipelines, Reservoirs					1.00			POWER Energy Cost :	B/ kWHr		Pumping	0.50					
										0.50%	Treatment Works, Civ		Sings			3.43			Energy Cost :	R/ kWHr		Sales	0.8					
								+			M & E Total					2.87						1						
	YEAR	,	WATER	Ì	CAPITA	AL & REFURBIS	HMENT EXPEN	DITURE		HYDROPO	WER INCOME	PUM	PING COSTS	r –	0.00		OSTS (R'millic			1	DISCO	OUNTED WATER	SUPPLIED	i			TOTAL COSTS	s
	0.00000	S	UPPLIED	1	000000	(R'm HEPs		Proj Mant	Eng	(R'n Power Output		(F Power		Dams	Pipelines	WTW	M & E	STAFF	Treatment			(million m ³ ) DISCOUNT RAT					R'million SCOUNT RAT	
EAD	10	(m)	lion m ³ (a)	Dam #		ners	wiw	Proj Mant	EMP	kWh/a	Income	MW	Charge	Dams	Reservoirs	Civil &	MAE	SIAFF	Treatment		6%	8%	10%	2%		6%	8%	10%
EAR	NO.		llion m ³ /a)	Dam & Ass.	Pipelines					1 100000000		100000	Seconder of			Buildings											0	
		(mi POTABLE	lion m ³ /a) IRRIGATION	Ass. Inf.	& Reservoirs		0.0		& Other			-		-		go												
015	NO.		llion m ³ /a)	Ass. Inf. 0.0	& Reservoirs 0.0	0.0	0.0	0.0	0.0			-											-		-	0		0
2015 2016 2017	0 1 2		llion m ³ /a)	Ass. Inf. 0.0 0.0 0.0	& Reservoirs 0.0 0.0 0.0	0.0	0.0	0.0	0.0 0.0 0.0																	0	0	0
2015 2016 2017 2018	0 1 2 3		llion m ³ /a)	Ass. Inf. 0.0 0.0 0.0 0.0	& Reservoirs 0.0 0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0	0.0 0.0 0.0 0.0																	0	0	0 0 0 0
YEAR 2015 2016 2017 2018 2019 2020	0 1 2		llion m ³ /a)	Ass. Inf. 0.0 0.0 0.0	& Reservoirs 0.0 0.0 0.0	0.0	0.0	0.0	0.0 0.0 0.0			3.81		1.00	2.91	3.43	2.87	6.70	5.16		45.87	45.87	45.87	45.87		0 0 0	0	0
2015 2016 2017 2018 2019 2020 2020	0 1 2 3 4	POTABLE 20.63 20.87	25.24 25.24	Ass. Inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81		1.00	2.91	3.43 3.43	2.87	6.70	5.22		46.11	46.11	46.11	46.11		0 0 0 22 22	0 0 0 22 22	0 0 0 22 22
2015 2016 2017 2018 2019 2020 2020 2021 2022	0 1 2 3 4 5 6 7	20.63 20.87 21.11	lion m ³ /a) IRRIGATION 25.24 25.24 25.24 25.24	Ass. inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81		1.00 1.00	2.91 2.91	3.43 3.43 3.43	2.87 2.87	6.70 6.70	5.22 5.28		46.11 46.34	46.11 46.34	46.11 46.34	46.11 46.34		0 0 0 22 22 22 22	0 0 0 22 22 22 22	0 0 0 22 22 22 22
2015 2016 2017 2019 2020 2021 2022 2022 2022 2024	0 1 2 3 4 5 6 7 8 9	POTABLE 20.63 20.87 21.11 21.34 21.58	lion m ³ /a) IRRIGATION 25.24 25.24 25.24 25.24 25.24 25.24	Ass. Inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81		1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40		46.11 46.34 46.58 46.82	46.11 46.34 46.58 46.82	46.11 46.34 46.58 46.82	46.11 46.34 46.58 46.82		0 0 0 22 22 22 22 22 22 22 22	0 0 0 22 22	0 0 0 22 22 22
015 016 017 018 019 020 021 022 023 023 023 023	0 1 2 3 4 5 6 7 7 8 9 10	POTABLE 20.63 20.87 21.11 21.34 21.58 21.82	lien m ² (a) IRRIGATION 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	Ass. Inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81		1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91	3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45		46.11 46.34 46.58 46.82 47.06	46.11 46.34 46.58 46.82 47.06	46.11 46.34 46.58 46.82 47.06	46.11 46.34 46.58 46.82 47.06		0 0 0 22 22 22 22 22 22 22 22 22 22	0 0 0 22 22 22 22 22 22 22 22 22	0 0 0 22 22 22 22 22 22 22 22 22 22
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115	0 1 2 3 4 5 6 7 7 8 9 9 9 10 11 11 12 13 14 15 16 14 15 16 14 17 18 9 20 21 22 22 22	20.63 20.63 20.67 21.14 21.58 21.62 22.06 22.29 22.53 22.77 23.01 23.24 23.46 23.44 23.46 24.19 24.49 24.67 24.49 24.67 24.19	IERN m ² /a)           IRRIGATION           22,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24           23,24	Ass, inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	291 291 291 291 291 291 291 291 291 291	3.43 3.43 3.43 3.43 3.43 3.43 3.43 3.43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.23 5.40 5.45 5.57 5.57 5.63 5.69 5.75 5.81 5.83 5.99 6.05 5.11 6.11 6.23		46.11 46.58 46.58 47.29 47.53 47.79 47.53 47.77 48.01 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15 50.38	46.11 46.34 46.58 47.20 47.23 47.53 47.77 48.01 48.24 48.24 48.24 48.24 48.26 49.19 49.43 49.43 49.67 49.91 50.15 50.38	46.11 46.58 46.62 47.70 47.23 47.77 48.01 48.24 48.24 48.24 48.24 48.26 49.95 49.19 49.43 49.67 49.91 50.15 50.38	46.11 46.34 46.68 47.29 47.53 47.77 48.01 48.24 48.48 48.72 48.89 49.43 49.43 49.43 49.67 49.91 50.15		0 0 0 2 22 22 22 22 22 22 22	0 0 0 22 22 22 22 22 22 22 22 22 22 22 2	0 0 0 22 22 22 22 22 22 22 22
115           116           117           118           119           12020           12021           12022           12022           12022           12023           12024           12025           12026           12027           12028           12029           12029           12029           12029           12029           12030           12031           12032           12033           12034           12035           12036           12037           12038           12039           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030           12030 </td <td>0 1 2 3 4 5 6 7 7 8 9 9 10 11 12 13 14 15 16 17 18 19 19 20 21 22 20 22 23 225</td> <td>20.63 20.67 21.11 21.34 21.55 21.62 22.29 22.53 22.77 23.04 23.24 23.46 23.72 23.24 23.46 23.72 23.96 24.43 24.43 24.44 24.67 24.91</td> <td>100 m²/a)           IRRIGATION           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24</td> <td>Ass, inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0</td> <td>&amp; Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td>0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0</td> <td></td> <td></td> <td>3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81</td> <td></td> <td>1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00</td> <td>2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91</td> <td>3 43 3 43 3 43 3 43 3 43 3 43 3 43 3 43</td> <td>2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87</td> <td>6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70</td> <td>5.22 5.28 5.34 5.40 5.45 5.57 5.63 5.69 5.75 5.81 5.87 5.99 6.05 6.11 6.17 6.23</td> <td></td> <td>46.11 46.34 46.58 47.06 47.20 47.53 47.77 48.01 48.84 48.48 48.72 48.91 48.48 48.72 48.91 9 49.43 49.19 49.43 49.57 49.51 50.15</td> <td>46.11 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.48 48.72 49.91 49.91 49.91 50.15</td> <td>46.11 46.58 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.48 48.72 49.91 49.91 49.43 49.67</td> <td>46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15</td> <td></td> <td>0 0 0 22 22 22 22 22 22 22 22</td> <td>0 0 0 22 22 22 22 22 22 22 22 22 22 22 2</td> <td>0 0 22 22 22 22 22 22 22 22 22 22 22 22</td>	0 1 2 3 4 5 6 7 7 8 9 9 10 11 12 13 14 15 16 17 18 19 19 20 21 22 20 22 23 225	20.63 20.67 21.11 21.34 21.55 21.62 22.29 22.53 22.77 23.04 23.24 23.46 23.72 23.24 23.46 23.72 23.96 24.43 24.43 24.44 24.67 24.91	100 m ² /a)           IRRIGATION           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24           25 24	Ass, inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0			3.81 3.81 3.81 3.81 3.81 3.81 3.81 3.81		1.00 1.00 1.00 1.00 1.00 1.00 1.00 1.00	2.91 2.91 2.91 2.91 2.91 2.91 2.91 2.91	3 43 3 43 3 43 3 43 3 43 3 43 3 43 3 43	2.87 2.87 2.87 2.87 2.87 2.87 2.87 2.87	6.70 6.70 6.70 6.70 6.70 6.70 6.70 6.70	5.22 5.28 5.34 5.40 5.45 5.57 5.63 5.69 5.75 5.81 5.87 5.99 6.05 6.11 6.17 6.23		46.11 46.34 46.58 47.06 47.20 47.53 47.77 48.01 48.84 48.48 48.72 48.91 48.48 48.72 48.91 9 49.43 49.19 49.43 49.57 49.51 50.15	46.11 46.58 46.82 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.48 48.72 49.91 49.91 49.91 50.15	46.11 46.58 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.48 48.48 48.72 49.91 49.91 49.43 49.67	46.11 46.34 46.58 47.06 47.29 47.53 47.77 48.01 48.24 48.24 48.24 48.48 48.72 48.96 49.19 49.43 49.67 49.91 50.15		0 0 0 22 22 22 22 22 22 22 22	0 0 0 22 22 22 22 22 22 22 22 22 22 22 2	0 0 22 22 22 22 22 22 22 22 22 22 22 22
015	0 1 2 3 4 5 6 7 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 24 22 24 22 24 25 26 26 27 27 27 26 27 27 27 27 27 27 27 27 27 27	20.63 20.63 20.87 21.14 21.34 21.58 21.62 22.06 22.29 22.53 22.77 23.01 23.24 23.24 23.24 23.40 23.47 23.24 23.49 24.43 24.49 24.43 24.49 24.49 25.14 25.58 25.66	IRIGN M ¹ 3) IRIGATION 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 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48.96           49.91           49.43           50.15           50.86           51.10           51.35           50.86           51.10           51.57           51.81</td><td>46.11 46.34 46.58 46.59 47.06 47.06 47.06 47.50 47.77 48.01 48.24 48.51 48.24 48.572 48.51 48.572 48.51 98.67 48.915 50.36 50.62 50.62 50.62 50.62 50.515 50.62 50.515 50.62 51.10 51.57 51.83</td><td>46.11 46.34 46.58 46.62 47.06 47.26 47.26 47.53 47.77 48.01 49.24 49.45 49.45 49.45 49.45 49.45 49.45 49.67 49.91 50.36 50.62 50.62 50.62 50.62 51.10 51.33 51.57 51.81</td><td>46.11 46.54 46.54 47.06 47.06 47.06 47.53 47.77 48.01 48.24 48.94 48.92 48.94 49.72 48.91 94.94 49.67 49.91 50.15 50.35 50.62 50.62 50.62 51.10 51.15 51.57 51.81</td><td></td><td>0 0 0 0 22 22 22 22 22 22 22</td><td>0 0 0 22 22 22 22 22 22 22 22 22 22 22 2</td><td>0 0 0 0 22 22 22 22 22 22 22</td></t<>	Ass, inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 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46.58\\ 46.58\\ 47.06\\ 47.29\\ 47.75\\ 47.77\\ 48.24\\ 48.24\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 48.40\\ 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        49.43           50.15           50.86           51.10           51.35           50.86           51.10           51.57           51.81</td><td>46.11 46.34 46.58 46.59 47.06 47.06 47.06 47.50 47.77 48.01 48.24 48.51 48.24 48.572 48.51 48.572 48.51 98.67 48.915 50.36 50.62 50.62 50.62 50.62 50.515 50.62 50.515 50.62 51.10 51.57 51.83</td><td>46.11 46.34 46.58 46.62 47.06 47.26 47.26 47.53 47.77 48.01 49.24 49.45 49.45 49.45 49.45 49.45 49.45 49.67 49.91 50.35 50.62 50.62 50.62 50.62 51.10 51.33 51.57 51.81</td><td>46.11 46.54 46.54 47.06 47.06 47.06 47.53 47.77 48.01 48.24 48.94 48.92 48.94 49.72 48.91 94.94 49.67 49.91 50.15 50.35 50.62 50.62 50.62 51.10 51.15 51.57 51.81</td><td></td><td>0 0 0 0 22 22 22 22 22 22 22</td><td>0 0 0 22 22 22 22 22 22 22 22 22 22 22 2</td><td>0 0 0 0 22 22 22 22 22 22 22</td></t<>	Ass, inf. 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0	& Reservoirs 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0	0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 0.0 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# **APPENDIX I**

# MODELS USED TO CALCULATE THE URV OF CONJUNCTIVE SCHEME

1 - 1

| IER SU                                                                                       | PPLIE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   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247</td><td>155.74<br/>155.74<br/>155.74<br/>155.74</td><td>10.00<br/>10.07<br/>10.14<br/>10.21</td><td>59.33<br/>59.74<br/>60.15<br/>60.57</td><td>3.61<br/>3.61<br/>3.61<br/>3.61</td><td>17.13<br/>17.13<br/>17.13<br/>17.13</td><td>19.11<br/>19.11<br/>19.11<br/>19.11</td><td>26.49<br/>26.49<br/>26.49<br/>26.49</td><td>41.50<br/>41.50<br/>41.50<br/>41.50</td><td>6.58<br/>6.64<br/>6.70<br/>6.76</td><td></td><td>51.57<br/>51.81<br/>52.05<br/>52.28</td><td>51.57<br/>51.81<br/>52.05<br/>52.28</td><td>51.57<br/>51.81<br/>52.05<br/>52.28</td><td>51.57<br/>51.81<br/>52.05<br/>52.28</td><td></td><td>18<br/>18<br/>19<br/>19</td><td>18<br/>18<br/>19<br/>19</td><td>18<br/>18<br/>18<br/>19<br/>19</td></refurbish<> | ment funding                                                                                                                                         | 202 438 247<br>202 438 247<br>202 438 247<br>202 438 247<br>202 438 247<br>202 438 247<br>202 438 247                                    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|                                                                                              | TOTAL           570.4         570.4           570.4         570.4           100.3         100.3           100.4         570.4           198.7         112.7           716.6         716.6           776.3         328.6           776.4         518.2           201.6         555.5           500.6         555.5           500.6         555.5           500.7         70.9           221.2         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           3202.8         3202.8           < | YOTAL         DAM           570.4         454.9           570.4         454.9           100.3         100.3           100.4         147.8           100.5         155.7           112.7         156.8           155.7         156.7           112.7         12.7           112.7         12.7           112.7         12.7           112.7         12.7           112.7         12.7           112.7         12.4           45.9         90.2           1112.7         147.3           112.7         147.4           112.7         142.4           112.7         144.3           112.7         144.4           110.7         144.4           110.7         144.4           110.7         144.4           110.7         144.4           110.7         144.4           110.7         144.4           111.8         21.34           9         21.35           113         22.23           14         22.01 | TOTAL         DAM         PIPELNES           570.4         454.9         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TOTAL         DAM         PPELNES         TANKS           570.4         454.9         TANKS         TANKS           100.3         1         1         1         1           100.3         1         1         1         1         1           100.3         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1</td> <td>CAPITAL COST COMPONENT<br/>TOTAL         DAM         PIPELINES         TANKS         NON-<br/>WORKS           570.4         484.9         70.9         WORKS         WORKS           100.5         901.6         147.5         100.5           100.3         901.6         149.5         100.5           100.4         901.6         149.5         100.6           1127.7         106.6         75.2         75.2           716.0         519.2         52.7         108.6           718.2         519.2         52.7         130.6           718.3         602.2         207.4.3         200.7         130.6           518.6         766.4         766.4         766.4         766.4           755.5         90.0         90.0         90.0         90.0         90.0           755.5         90.0         90.0         90.0         90.0         90.0           70.9         9         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0<td>CAPTIAL COST COMPONENTS (R*million)<br/>707AL         DAM         PIPELNES         TAIKS         NOH         CIVIL<br/>WORKS           570.4         454.9        </td><td>CAPITAL COST COMPONENTS (Fmillion)           TOTAL         DAM         PIPELINES         TANKS         NON         CVIA.         M &amp; E           570.4         484.9        </td><td>TOTAL         DAM         PPELNES         TAKS         NN-<br/>WORKS         CVL<br/>WORKS         P &amp; E         BullDNG           570.4         484.9        </td><td>CAPITAL COST COMPONENTS (Privillico)           TOTAL         DAM         PIPELINES         TAKIS         NON-<br/>WORKS         CAVI.         M &amp; E         BUILDING         POWER           570.4         444.9        </td><td>OTAL         DMI         PIPELINES         VARS         NON         CVIL<br/>WORKS         M &amp; E         BUILDING         FOWER         STAFF           5704         4         44.9        </td><td>DTAL         DM         PPELINES         TARKS         ROK.<br/>WORS         OVER<br/>LOWING         B &amp; E         BULDING         POWERT         STAF         HEP           774         44.9        </td><td>CAPTAL COST COMPONENTS (Prelines):         POLINIC         POLINIC<!--</td--><td>Control         Control         Control         Control         Control         First         First</td><td>Control Cost Cost Cost Cost Cost Cost Cost Cost</td><td>Initial of the prelime of the final of the press of the pres</td><td>Low         Define Control         Define Control         Notes         Notes&lt;</td><td>Nove         Version         Control controloging memory<br/>works         Nove         Nove</td><td>UNA         MPAILING         UNDER<br/>VOIDE         NDER<br/>VOIDE         UNDER</td><td>Unit         Unit         <!--</td--><td>UP1         UP1         UP1<td>UN1         UN1         UN1<td>Unit         Unit         <!--</td--><td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td></td></td></td></td></td></td> | CAPTIAL COST         CAPTIAL COST           TOTAL         DAM         PPELNES         TANKS           570.4         454.9         TANKS         TANKS           100.3         1         1         1         1           100.3         1         1         1         1         1           100.3         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1         1 | CAPITAL COST COMPONENT<br>TOTAL         DAM         PIPELINES         TANKS         NON-<br>WORKS           570.4         484.9         70.9         WORKS         WORKS           100.5         901.6         147.5         100.5           100.3         901.6         149.5         100.5           100.4         901.6         149.5         100.6           1127.7         106.6         75.2         75.2           716.0         519.2         52.7         108.6           718.2         519.2         52.7         130.6           718.3         602.2         207.4.3         200.7         130.6           518.6         766.4         766.4         766.4         766.4           755.5         90.0         90.0         90.0         90.0         90.0           755.5         90.0         90.0         90.0         90.0         90.0           70.9         9         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0         90.0 <td>CAPTIAL COST COMPONENTS (R*million)<br/>707AL         DAM         PIPELNES         TAIKS         NOH         CIVIL<br/>WORKS           570.4         454.9        </td> <td>CAPITAL COST COMPONENTS (Fmillion)           TOTAL         DAM         PIPELINES         TANKS         NON         CVIA.         M &amp; E           570.4         484.9        </td> <td>TOTAL         DAM         PPELNES         TAKS         NN-<br/>WORKS         CVL<br/>WORKS         P &amp; E         BullDNG           570.4         484.9        </td> <td>CAPITAL COST COMPONENTS (Privillico)           TOTAL         DAM         PIPELINES         TAKIS         NON-<br/>WORKS         CAVI.         M &amp; E         BUILDING         POWER           570.4         444.9        </td> <td>OTAL         DMI         PIPELINES         VARS         NON         CVIL<br/>WORKS         M &amp; E         BUILDING         FOWER         STAFF           5704         4         44.9        </td> <td>DTAL         DM         PPELINES         TARKS         ROK.<br/>WORS         OVER<br/>LOWING         B &amp; E         BULDING         POWERT         STAF         HEP           774         44.9        </td> <td>CAPTAL COST COMPONENTS (Prelines):         POLINIC         POLINIC<!--</td--><td>Control         Control         Control         Control         Control         First         First</td><td>Control Cost Cost Cost Cost Cost Cost Cost Cost</td><td>Initial of the prelime of the final of the press of the pres</td><td>Low         Define Control         Define Control         Notes         Notes&lt;</td><td>Nove         Version         Control controloging memory<br/>works         Nove         Nove</td><td>UNA         MPAILING         UNDER<br/>VOIDE         NDER<br/>VOIDE         UNDER</td><td>Unit         Unit         <!--</td--><td>UP1         UP1         UP1<td>UN1         UN1         UN1<td>Unit         Unit         <!--</td--><td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td></td></td></td></td></td> | CAPTIAL COST COMPONENTS (R*million)<br>707AL         DAM         PIPELNES         TAIKS         NOH         CIVIL<br>WORKS           570.4         454.9 | CAPITAL COST COMPONENTS (Fmillion)           TOTAL         DAM         PIPELINES         TANKS         NON         CVIA.         M & E           570.4         484.9                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | TOTAL         DAM         PPELNES         TAKS         NN-<br>WORKS         CVL<br>WORKS         P & E         BullDNG           570.4         484.9 | CAPITAL COST COMPONENTS (Privillico)           TOTAL         DAM         PIPELINES         TAKIS         NON-<br>WORKS         CAVI.         M & E         BUILDING         POWER           570.4         444.9 | OTAL         DMI         PIPELINES         VARS         NON         CVIL<br>WORKS         M & E         BUILDING         FOWER         STAFF           5704         4         44.9 | DTAL         DM         PPELINES         TARKS         ROK.<br>WORS         OVER<br>LOWING         B & E         BULDING         POWERT         STAF         HEP           774         44.9 | CAPTAL COST COMPONENTS (Prelines):         POLINIC         POLINIC </td <td>Control         Control         Control         Control         Control         First         First</td> <td>Control Cost Cost Cost Cost Cost Cost Cost Cost</td> <td>Initial of the prelime of the final of the press of the pres</td> <td>Low         Define Control         Define Control         Notes         Notes&lt;</td> <td>Nove         Version         Control controloging memory<br/>works         Nove         Nove</td> <td>UNA         MPAILING         UNDER<br/>VOIDE         NDER<br/>VOIDE         UNDER</td> <td>Unit         Unit         <!--</td--><td>UP1         UP1         UP1<td>UN1         UN1         UN1<td>Unit         Unit         <!--</td--><td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td></td></td></td></td> | Control         Control         Control         Control         Control         First         First | Control Cost Cost Cost Cost Cost Cost Cost Cost    | Initial of the prelime of the final of the press of the pres | Low         Define Control         Define Control         Notes         Notes< | Nove         Version         Control controloging memory<br>works         Nove         Nove | UNA         MPAILING         UNDER<br>VOIDE         NDER<br>VOIDE         UNDER | Unit         Unit </td <td>UP1         UP1         UP1<td>UN1         UN1         UN1<td>Unit         Unit         <!--</td--><td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td></td></td></td> | UP1         UP1 <td>UN1         UN1         UN1<td>Unit         Unit         <!--</td--><td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td></td></td> | UN1         UN1 <td>Unit         Unit         <!--</td--><td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td></td> | Unit         Unit </td <td>Unit         Unit         <!--</td--><td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td></td> | Unit         Unit </td <td>Unite         Unite         Unit         Unite         Unite         <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<></td> | Unite         Unit         Unite         Unite <th< td=""><td>UN         UN         N        UN<td>Unit         Unit         <!--</td--><td>image: image: /td></td></td></th<> | UN         N        UN <td>Unit         Unit         <!--</td--><td>image: image: /td></td> | Unit         Unit </td <td>image: image: /td> | image: |

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TEM	IER SI	JPPLIE	: CONJU	NCTIVES	SCHEME	= INCL	ERTIA	RIES				Lalini	Grant Fu	inded			All po	wer cros	ss-subsi	dized								
					COMPONENTS	(R'million)																						
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL	M&E	BUILDING	POWER	STAFF P.A.	HEP OUTPUT kWh		100%	100%	100%	100%	100%	PERCENTA 100%	100%			grant funding) 0%	0%	0%	0%	0%	0%	0%
				-			1										Ntab Ons	Prim & Sec		Ntab				Lalini Oos				
ibelanga Dam		484.9					85.6						Proj. mangt	Ntab Dam	Ntab Advance	Ntab WTW	Village	Lines	Tertiary Lines	Irrigation	Eng & Other	Lalini Dam	Lalini Advance	Village	Lalini Condui		Eng & Other	DEA TO
ater Supply Only crement for HEP	570.4 374.4	484.9					56.2			4.2	29 064 021	Year 2015	202.9	944.9	267.5	716.6	103.5	1360.2	1625.6	750.2	1081.7 54.1	0.0	0.0	0.0	0.0	0.0	370.8 18.5	0.0 7
sociated Dam Works	103.5					25.9	25.9	51.7				2016	29.0	94.5	127.1		49.1				162.3						55.6	0.0
all HEP elines	100.3					15.0	85.3					2017 2018	29.0 29.0	200.8	127.1 13.4	143.3 250.8	49.1 5.2	272.0 544.1	325.1 650.2	150.0	162.3	0.0	0.0	0.0	0.0	0.0	55.6 55.6	0.0 1
imary & Secondary	1060.6		901.5			53.0	106.1			4.1		2019	29.0	200.8		250.8		408.0	487.7	300.1	162.3	0.0	0.0	0.0	0.0	0.0	55.6	0.0 1
rtiary	1474.9		1253.6			73.7	147.5					2020	29.0 29.0	200.8 47.2		71.7		68.0 68.0	81.3 81.3	262.6 37.5	162.3	0.0			0.0	0.0	55.6 37.1	0.0
imary & Secondary	186.8			149.5		18.7	18.7					2022	£370					00.0			108.2	0.0					37.1	0.0
entiary mping Stations	135.7			108.6		13.6	13.6					2023 2024																0.0
imary & Secondary	112.7				***********		95.8	16.9				2024						********						******		*****		
rtiary	8.4						7.2	1.3		11.6																		
er supplies hary & Secondary	45.9								45.9																			
tiary	6.6								6.6																			
tment Works ation Supply	716.6				75.2	359.9	281.5			12.3																		
ulk and farms dev	750.2		519.2	62.7		75.9	59.9	20.0	12.5	2.5																	*******	
ts r Items and Mitigations	189.0 518.2				518.2	189.0																						
er lines	32.6								32.6																			
neering & EMP -TOTAL	766.4 7153.3	803.2	2674.3	320.7	766.4 1359.8	824.8	983.0	89.9	97.6	34.7	29 064 021	Chasks	202.9	944.9	267.5	710.0	102.5	1360.2	1625.6	750.0	1081 7	0.0	0.0	0.0	0.0	0.0	370.8	0.0 7
Dam	754.5	641.3	20/4.3	320.7	1309.8		113.2	89.9	37.0	34.7 6.8	29 064 021 173 374 226	GRECKS	202.9	944.9	207.5	/10.0	103.5	1360.2	1025.0	/00.2	1081.7	0.0	0.0	0.0	0.0	0.0	370.8	0.0
ciated Dam Works	159.3		100.0			135.4	23.9																					
luit/Tunnel	861.6		430.8			430.8																						
all	70.9						48.3	12.5	10.0																			
in Is	221.2 555.5			-	-	9.4 555.5	156.0	33.9	21.9																			
er Items & Mitigations	50.0				50.0	333.5				1																		
TOTAL	320.8 2993.7	641.3	430.8	0.0	320.8 370.8	1131.1	341.4	46.4	32.0	6.8	173 374 226																	
ND TOTAL	10147.0		3105.1	320.7	1730.6	1955.9	1324.4	136.3	129.6	41.5	202 438 247				12. 11.11.11.11.11.11.11.11.11.11.11.11.11			1								1		
	4	_						-		MAINTENANCE C	DETE				OPERATI	ONS COSTS (	R'million)		TREATMENT C	OPTE				-				
										RATE	5515		ITEM			COST/A			Using cost Rand				0.25					
										0.25%	Dam Pipelines, Reservoirs					3.61 17.13	1		POWER Energy Cost : R	D/ DIAILE		Pumping	0.50					
										0.50%	Treatment Works, Civ	il Works, Buik	dings			19.11			Energy Cost : R			Sales	0.8					
					-		-			2.00%	M & E Total					26.49												
	YEAR	1	VATER	1	CAPITA	L & REFURBIS	HMENT EXPEN	DITURE			WER INCOME	PUM	PING COSTS						1		DISCO	UNTED WATER	SUPPLIED	í		Т	TAL COSTS	
YEAR	10000	SI	JPPLIED		1000000	(R'mi	illion)			(R')	million)	()	R'million)			WTW	OSTS (R'millio					(million m ² )					R'million	
TEAR	NO.	(mi	lion m ³ /a)	Dam & Ass.	Pipelines	HEPs	WTW	Proj Mant	Eng	Power Output kWh/a	Energy Income	MW	Energy Charge	Dams	Pipelines Reservoirs	Civil &	M&E	STAFF	Treatment		6%	DISCOUNT RAT	10%	2%	1	6%	SOUNT RATE	
		POTABLE	IRRIGATION	Inf.	Reservoirs				& Other			1000			1000000000	Buildings					1.000				1			
2015 2016	0			0.0 270.7	0.0	0.0	0.0	29.0	18.5			-							********				-			48 355	48	48 4
2017	2			377.0	597.1	0.0	143.3	29.0	55.6																	1 202	1 202	1 202 12
2018 2019	3			219.3 200.8	1344.3 1195.8	0.0	250.8 250.8	29.0	55.6			-		-							-				-	1 899	1 899	1 899 18 1 732 17
2020	5	20.63	25.24	200.8	411.8	0.0	71.7	29.0	55.6			8.33	49.46	3.61	17.13	19.11	26.49	41.50	5.16		45.87	45.87	45.87	45.87		931	931	931 93
2021 2022	6	20.87	25.24 25.24	47.2	186.8	0.0	0.0	29.0	37.1	202 438 247 202 438 247	155.74	8.40	49.87 50.28	3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.22 5.28		46.11 46.34	46.11 46.34	46.11 46.34	46.11 46.34		307 45	307 45	307 3 45 4
2022	8	21.11	25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247	155.74	8.54	50.28	3.61	17.13	19.11	26.49	41.50	5.34		46.58	46.58	46.58	46.58		45	45 8	8
2024	9	21.58	25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247	155.74	8.61	51.10	3.61	17.13	19.11	26.49	41.50	5.40		46.82	46.82	46.82	46.82		9	9	9 1
2025	10	21.82	25.24 25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247	155.74	8.68	51.51	3.61	17.13	19.11 19.11	26.49	41.50	5.45		47.06	47.06	47.06	47.06	-	9	9	9 9
2027	12	22.29	25.24		0					202 438 247	155.74	8.82	52.34	3.61	17.13	19.11	26.49	41.50	5.57		47.53	47.53	47.53	47.53	1	10	10	10 1
2028	13	22.53	25.24							202 438 247	155.74	8.89	52.75	3.61	17.13	19.11	26.49	41.50	5.63		47.77	47.77	47.77	47.77		10	10	10 1
2029 2030	14 15	22.77 23.01	25.24 25.24		-				-	202 438 247 202 438 247	155.74	8.96	53.16 53.57	3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.69 5.75		48.01 48.24	48.01 48.24	48.01 48.24	48.01 48.24		11	11	11 1
2031	16	23.24	25.24							202 438 247	155.74	9.10	53.98	3.61	17.13	19.11	26.49	41.50	5.81		48.48	48.48	48.48	48.48		12	12	12 1
2032 2033	17 18	23.48 23.72	25.24 25.24		-					202 438 247 202 438 247	155.74	9.17	54.39 54.81	3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.87 5.93		48.72	48.72	48.72 48.96	48.72		12	12	12
	18	23.72	25.24	-	-	0.0	179.1	<:Refurbish	ment funding	202 438 247	155.74	9.24	55.22	3.61	17.13	19.11	26.49	41.50	5.93		48.96	48.96	48.96	48.90	-	13	13 192	192 1
2033 2034	20	24.19	25.24		-					202 438 247	155.74	9.38	55.63	3.61	17.13	19.11	26.49	41.50	6.05		49.43	49.43	49.43	49.43		14	14	14 1
2034 2035	21 22	24.43 24.67	25.24 25.24	4	-					202 438 247 202 438 247	155.74 155.74	9.44 9.51	56.04 56.45	3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.11 6.17		49.67 49.91	49.67 49.91	49.67 49.91	49.67 49.91		14 15	14 15	14
2034 2035 2036		24.91	25.24				-			202 438 247	155.74	9.58	56.86	3.61	17.13	19.11	26.49	41.50	6.23		50.15	50.15	50.15	50.15		15	15	15 1
2034 2035	23	25.14	25.24							202 438 247	155.74	9.65	57.27	3.61	17.13	19.11	26.49	41.50	6.29		50.38	50.38	50.38	50.38		16	16	16 1
2034 2035 2036 2037 2038 2039	23 24		25.24	-	1					202 438 247 202 438 247	155.74 155.74	9.72 9.79	57.69 58.10	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.35 6.40		50.62 50.86	50.62 50.86	50.62 50.86	50.62 50.86	1	16 17	16 17	16
2034 2035 2036 2037 2038	23 24 25	25.38 25.62				-	-			202 438 247	155.74	9.86	58.51	3.61	17.13	19.11	26.49	41.50	6.46		51.10	51.10	51.10	51.10	1	17	17	17 1
2034 2035 2036 2037 2038 2039 2040 2041 2042	23 24 25 26 27	25.38 25.62 25.86	25.24 25.24	-						202 438 247	155.74	9.93	58.92	3.61	17.13	19.11	26.49	41.50	6.52		51.33	51.33				18	18	
2034 2035 2036 2037 2038 2039 2040 2041 2041 2042 2043	23 24 25 26 27 28	25.38 25.62 25.86 26.09	25.24 25.24 25.24								155 74	10.00	50.99						6.50				51.33	51.33	-			18
2034 2035 2038 2037 2038 2039 2040 2041 2042 2042 2043 2044 2044 2045	23 24 25 26 27	25.38 25.62 25.86 26.09 26.33 26.57	25.24 25.24 25.24 25.24 25.24 25.24							202 438 247 202 438 247 202 438 247	155.74 155.74	10.00	59.33 59.74	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.58 6.64		51.57 51.81	51.33 51.57 51.81	51.57 51.81	51.57 51.81		18	18 18	18
2034 2005 2036 2037 2038 2040 2040 2041 2042 2043 2044 2044 2045 2046	23 24 25 26 27 28 29 30 31	25.38 25.62 25.86 26.09 26.33 26.57 26.81	25.24 25.24 25.24 25.24 25.24 25.24 25.24							202 438 247 202 438 247 202 438 247 202 438 247	155.74 155.74 155.74	10.07 10.14	59.74 60.15	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.64 6.70		51.57 51.81 52.05	51.57 51.81 52.05	51.57 51.81 52.05	51.57 51.81 52.05	-	18 18 19	18 18 19	18 18 19
2034 2035 2036 2037 2038 2039 2040 2041 2044 2042 2043 2044 2044 2045	23 24 25 26 27 28 29 30 31 31 32	25.38 25.62 26.09 26.33 26.57 26.81 27.05	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24							202 438 247 202 438 247 202 438 247 202 438 247 202 438 247	155.74 155.74 155.74 155.74	10.07 10.14 10.21	59.74 60.15 60.57	3.61 3.61 3.61	17.13	19.11 19.11 19.11	26.49 26.49 26.49	41.50 41.50 41.50	6.64 6.70 6.76		51.57 51.81 52.05 52.28	51.57 51.81 52.05 52.28	51.57 51.81 52.05 52.28	51.57 51.81 52.05 52.28	-	18 18 19 19	18 18 19 19	18 1 18 1 19 1 19 1
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0000       001       0020       0.0       002       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0 <th< td=""><td></td><td>1 239</td><td></td><td></td><td>F</td><td>1</td><td></td><td></td><td></td><td>1000 500</td><td></td><td></td><td></td><td>23</td><td>22122-11</td><td></td><td>22080</td><td></td><td></td><td>00000</td><td>539/802</td><td></td><td></td><td></td><td>_</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></th<>		1 239			F	1				1000 500				23	22122-11		22080			00000	539/802				_													
1000       17       2010       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0 <th0< td=""><td></td><td>844 220</td><td></td><td></td><td>ŀ</td><td>-</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>155.74</td><td>67</td><td>202 438 247</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>5</td><td></td></th0<>		844 220			ŀ	-																		155.74	67	202 438 247											5	
0       110       112       12.42       15.24       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0 <t< td=""><td>45 45</td><td>45</td><td></td><td>45</td><td></td><td>1</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>0.0</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>7</td><td></td></t<>	45 45	45		45		1																						0.0									7	
19.       21.82       23.84       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       0.0       <		8	-	8	-	-								4	5.34		6.49		19.11						.7	202 438 247	0.0	0.0	0.0	0.0	0.0	-	0.0	25.24			8	
11 22.00 12 22.00 25.44 20.24 82.47 15.74 8.20 5.124 - 10 10 8.40 6.10 - 10 20.00 10 20.00 20.24 20.7 15.24 8.20 6.25 3.61 17.3 19.11 20.40 4.10 5.81 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 4.75 <td></td> <td>9</td> <td>+</td> <td>9</td> <td>ł</td> <td>-</td> <td></td> <td>51.51</td> <td></td> <td></td> <td>47</td> <td>202 438 247 202 438 247</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>0.0</td> <td>+</td> <td>0.0</td> <td></td> <td></td> <td></td> <td>10</td> <td></td>		9	+	9	ł	-																51.51			47	202 438 247 202 438 247	0.0	0.0	0.0	0.0	0.0	+	0.0				10	
10       22.03       29.34       CM	10 10	10	1	10	L.	1	47.29		47.29	47.29	9	47.29		1	5.51	41.50	26.49		19.11	17.13	3.61	51.92	8.75	155.74	47	202 438 247								25.24	2.06	2	11	2026
14         277         854         154         257         854         155         856         3.61         3.75         8.96         3.61         7.73         19.1         3.64         4.50         5.67         4.60         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75         5.75 <td></td> <td>10</td> <td>'</td> <td>10</td> <td>ł</td> <td>-</td> <td>47.53</td> <td>-</td> <td>47.53</td> <td>47.53</td> <td>3</td> <td>47.53</td> <td></td> <td>7</td> <td>5.57</td> <td></td> <td></td> <td></td> <td>19.11</td> <td>17.13</td> <td></td> <td></td> <td>8.82</td> <td>155.74</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		10	'	10	ł	-	47.53	-	47.53	47.53	3	47.53		7	5.57				19.11	17.13			8.82	155.74								-						
19       23.01       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73       9.73      <	10 10 11 11	10	+	10		1					1	47.77		3	5.63	41.50			19.11	17.13		53.16	8.89		47	202 438 247 202 438 247						-						
11         23.4         25.4         12         25.4         12         25.4         12         25.4         12         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4         25.4	11 11	11	1	11		1	48.24		48.24	48.24	4	48.24		5	5.75	41.50	6.49		19.11	17.13	3.61	53.57	9.03	155.74	47	202 438 247			1					25.24	3.01	2	15	2030
11         12         27.2         25.4         12.4         12.4         27.4         57.4         97.4         57.4         97.4         57.4         97.4         17.3         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.1         17.		12 12		12	ł	-	48.48	_	48.48	48.48	8	48.48		1	5.81	41.50	6.49		19.11	17.13				155.74								-		25.24	3.24	2		2031
10       23.69       25.49       25.49       25.49       27.10       27.10       27.10       27.10       27.10       27.10       27.10       27.10       27.10       27.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17.10       17	12 12 13 13	12	+	12	F	-	48.72	-	48.72	48.72	6	48.72		3	5.87		6.49		19.11	17.13	3.61	54.89	9.17	155.74	47	202 438 247 202 438 247	$\rightarrow$					+		25.24	3.48	2		2032 2033
21       24.43       95.44       95.44       95.44       96.04       3.61       71.3       19.11       20.49       41.50       61.17       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.67       49.6	192 192	192	1	192	1	-	49.19		49.19	49.19	9	49.19		9	5.99	41.50			19.11		3.61		9.31		47	202 438 247	nt funding	Refurbishme	179.1	0.0				25.24			19	
2037         22         24.47         55.4         95.4         95.4         95.4         54.65         54.65         54.65         54.65         54.65         54.65         54.65         54.65         54.65         54.65         54.71         19.11         54.46         41.50         64.73         49.15         64.57         49.51         54.56         54.57         95.8         56.465         54.71         19.11         54.46         41.50         64.73         49.51         44.50         64.57         55.8         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38 <td></td> <td>14</td> <td></td> <td></td> <td>+</td> <td>-</td> <td></td> <td>1</td> <td>-</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td>		14			+	-																									1	-						
2000         24         25.14         25.24         25.44         25.24         25.24         25.27         3.61         17.3         19.11         26.49         41.50         6.29         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38         50.38<		15			F	-																										-						
000         05         55.8         55.4         95.4         97.8         57.6         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97.9         97		15			F	1																																
204         26         25.4         C         C         C         202.499.247         15.74         9.79         9.10         3.61         17.3         19.11         20.49         41.50         6.09         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86         50.86		16			ł	-																					$\rightarrow$					-						
Object         27         25.66         25.24         -         -         -         202 438 247         19.57.4         9.86         9.5.51         3.61         17.13         19.11         20.46         41.50         6.62         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10         51.10 </td <td></td> <td>16</td> <td>1</td> <td>17</td> <td>ŀ</td> <td>1</td> <td></td>		16	1	17	ŀ	1																																
204         29         29.3         25.4         Image: Constraint of the state of the st		17			F	1																															27	
00         0.8.77         25.34         (n)	18 18 18 18	18	+	18	ŀ	-																					$\rightarrow$					-						
2046         31         2631         2534         C         C         C         2020         2023         2024         1057.4         1014         60.15         3.61         17.13         19.11         20.49         41.50         6.70.7         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         52.05         <	18 18	18	1	18	ŀ	1	51.81		51.81	51.81	1	51.81		4	6.64	41.50	6.49		19.11	17.13	3.61	59.74	10.07	155.74	47	202 438 247					E.			25.24	6.57	2	30	2045
2040         33         27.28         25.34         Image: Constraint of the co	19 19	19	1	19	F	1	52.05		52.05	52.05	5	52.05		D	6.70		6.49		19.11	17.13	3.61	60.15	10.14	155.74	47	202 438 247								25.24	6.81	2	31	
2049         34         27.52         25.24         0.0         0.0         179.1          CRedubitment funding         202 438 247         155.74         10.35         61.39         3.61         17.13         19.11         26.49         41.50         6.88         52.76         52.76         52.76         52.76         52.76         52.76         52.76         52.76         52.76         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00	19 19	19 20	+	19	ŀ	-	52.28 52.52	-	52.28	52.28 52.52	8	52.28		2	6.76		6.49		19.11	17.13	3.61	60.57	10.21 10.28	155.74	7	202 438 247 202 438 247	$\rightarrow$	2				-		25.24	7.05	2		2047
2050         35         27.76         25.24         202.438.247         155.74         10.42         61.80         3.61         17.13         19.11         26.49         41.50         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         53.00         <	20 20	200	2	200	t	1	52.76		52.76	52.76	6	52.76		в	6.88	41.50	6.49		19.11	17.13	3.61	61.39	10.35	155.74	47	202 438 247	nt funding	Refurbishme	179.1	0.0	0.0		0.0	25.24	7.52	2		2049
	20 20 200 200			21	F		53.00		53.00		-			4	6.94	41.50	6.49		19.11	17.13	3.61	61.80	10.42	155.74										25.24	7.76	2	35	2050
UNY OF WATER SUPPLIED NY WATER SUPPLIED NY WATER SUPPLIED NY WATER SUPPLIED NY	20 20	21																																				

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JRV: ALL WA	IER SU	PPLIE	D: CONJU	NCTIVES	SCHEMI	E INCL	ERTIAF	RIES				Lalini	, Tertiary	/ & Irriga	tion Gra	nt	All po	wer cros	ss-subs	idized								
4					COMPONENTS													IMP	LEMENTAT	ION EXPE	NDITURE	TIMING						
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL WORKS	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh	-	70%	100%	100%	100%	100%	PERCENTA 100%	GE OF CAPITA	L REDEMPT	ON (i.e. 0%=)	grant funding) 0%	0%	0%	0%	0%	0%	0%
				T	1	1	1							1	1		Ntah Ons	Prim & Sec	Tertiary	Ntab		-		Lalini Ops			Eng &	
langa Dam er Supply Only	570.4	484.9					85.6					Vere	Proj. mangt 142.1	Ntab Dam 944.9	Ntab Advance 267.5	Ntab WTW 716.6	Village	Lines 1360.2	Lines 0.0	Irrigation 0.0	Eng & Other 1142.6	Lalini Dam	Lalini Advance	Village	Lalini Condu	t HEP Plants	Other 370.8	0.0
r Supply Only ment for HEP	374.4	484.9 318.3					85.6 56.2			4.2	29 064 021	Year 2015	20.3	944.9	267.5	716.6	103.5	1360.2	0.0	0.0	57.1	0.0	0.0	0.0	0.0	0.0	18.5	0.0
iated Dam Works	103.5	010.0				25.9	25.9	51.7				2016	20.3	94.5	127.1		49.1				171.4						55.6	0.0
HEP	100.3					15.0	85.3					2017	20.3	200.8	127.1	143.3	49.1	272.0	0.0		171.4	0.0	0.0	0.0	0.0		55.6	0.0
nes ary & Secondary	1060.6		901.5			53.0	106.1			4.1		2018 2019	20.3 20.3	200.8	13.4	250.8 250.8	5.2	544.1 408.0	0.0	0.0	171.4 171.4	0.0	0.0	0.0	0.0	0.0	55.6 55.6	0.0
ary a secondary ary	1474.9		1253.6			73.7	147.5			3.1		2019	20.3	200.8		71.7		68.0	0.0	0.0	171.4	0.0	0.0	0.0	0.0	0.0	55.6	0.0
rvoirs	10000000					0.00000	1.5.6.50					2021	20.3	47.2		0.020		68.0	0.0	0.0	114.3	0.0				0.0	37.1	0.0
ary & Secondary	186.8			149.5		18.7	18.7					2022 2023						100000000000000000000000000000000000000			114.3	0.0					37.1	0.0
ary ing Stations	135.7			108.6		13.6	13.6					2023												•••••••				0.0
ary & Secondary	112.7						95.8	16.9				2025			-													
ыў.	8.4						7.2	1.3		11.6																		
r supplies ary & Secondary	45.9								45.9																			
Bry & Decondary Bry	6.6								6.6								a concerno a											
ment Works	716.6		*******		75.2	359.9	281.5			12.3																		
tion Supply																												
lk and farms dev	750.2		519.2	62.7		75.9 189.0	59.9	20.0	12.5	2.5	*************																*******	
tems and Mitigations	518.2				518.2	100.0																						
lines	32.6				000000				32.6																			
ering & EMP OTAL	766.4	803.2	2674.3	320.7	766.4	824.8	983.0	89.9	97.6	34.7	29 064 021	Check	142.1	944.9	267.5	716.6	103.5	1360.2	0.0	0.0	1142.6	0.0	0.0	0.0	0.0	0.0	370.8	0.0
Dam	754.5	641.3	20/4.3	520.7	1000.0	024.0	113.2	03.5	57.0	6.8	173 374 226		.46.1	344.0	201.0	, 10.0	103.3	1000.2	0.0	0.0		0.0	0.0	0.0	0.0	0.0	010.0	
ated Dam Works	159.3			5		135.4	23.9																					
it/Tunnel	861.6		430.8		-	430.8																						
1	70.9					-	48.3	12.5	10.0																			
1	221.2					9.4	156.0	33.9	21.9										*******									
is	555.5					555.5																						
Items & Mitigations eering & EMP	50.0 320.8	-			50.0 320.8	-																						
OTAL	2993.7	641.3	430.8	0.0	370.8	1131.1	341.4	46.4	32.0	6.8	173 374 226				-		-		-				-		-	-		
ID TOTAL	10147.0	1444.4	3105.1	320.7	1730.6	1955.9	1324.4	136.3	129.6	41.5	202 438 247	•	0									15	d					
	1			12	-			-		MAINTENANCE C	OPTP				OPERATI	ONS COSTS	(R'million)		TREATMENT	COSTS				-				
										RATE	0313		ITEM			COST/A		1	Using cost Ra	ind per m3 =			0.25					
										0.25%	Dam					3.61			POWER			-						
										0.50%	Pipelines, Reservoirs Treatment Works, Civ	il Marke Duile	tions			17.13			Energy Cost : Energy Cost :	R/ kWHr		Pumping Sales	0.50	-				
										2.00%	M & E	II WORKS, DUIL	angs			26.49			Energy Cost :	PV SWITT		Sales	0.0	-				
				0							Total					66.34	2							1				
	YEAR		WATER		CAPITA		HMENT EXPEND	NTURE		HYDROPO	OWER INCOME		PING COSTS	1	OP		COSTS (Rimilli	00)		1	DISCO	UNTED WATER	SUPPLIED	7		TO	TAL COSTS	S
YEAR	NO.	SI (mil	UPPLIED	Dam &	Pipelines	(R'mi HEPs	llion) WTW	Proi Mant	Eng	(R' Power Output	million) Energy	Power	R'million) Energy	Dams	Pipelines	WTW	M&E	STAFF	Treatment			(million m') DISCOUNT RAT	TEP			DIE	R'million COUNT RATE	TO
1241		1000	[	Ass.	å	1167.0		riojmani	EMP	kWh/a	Income	MW	Charge	Dama	Reservoirs	Civil &	muc	Jinit	Incadingent		6%	8%	10%	2%	1		8%	
		POTABLE	IRRIGATION	Inf.	Reservoirs				& Other	100000						Buildings												
2015	0			0.0	0.0	0.0	0.0	20.3 20.3	18.5 55.6	-		-											-	-	-	39 347	39 347	39 347
2017	2			377.0	272.0	0.0	143.3	20.3	55.6			<u> </u>													1	868	868	868
2018	3			219.3	544.1	0.0	250.8	20.3	55.6																1	1 090	1 090	1 090
2019	4	1221221	100000	200.8	408.0	0.0	250.8	20.3	55.6					-	100000	22/22	10000	100000	1000					-	-	936	936	936
2020 2021	5	20.63 20.87	25.24 25.24	200.8 47.2	68.0 68.0	0.0	71.7	20.3 20.3	55.6 37.1	202 438 247	155.74	8.33 8.40	49.46 49.87	3.61 3.61	17.13	19.11	26.49 26.49	41.50 41.50	5.16 5.22		45.87 46.11	45.87 46.11	45.87 46.11	45.87 46.11	-	579 180	579 180	579 180
2022	7	21.11	25.24	0.0	0.0	0.0	0.0	0.0	37.1	202 438 247	155.74	8.47	50.28	3.61	17.13	19.11	26.49	41.50	5.28		46.34	46.34	46.34	46.34		45	45	45
2023	8	21.34	25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247	155.74	8.54	50.69	3.61	17.13	19.11	26.49	41.50	5.34		46.58	46.58	46.58	46.58	-	8	8	8
2024 2025	9 10	21.58 21.82	25.24 25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247 202 438 247	155.74	8.61 8.68	51.10 51.51	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.40 5.45		46.82 47.06	46.82 47.06	46.82 47.06	46.82 47.06	-	9	9	9
2025	11	22.06	25.24	3.0	5.0	3.0	0.0	5.0	5.0	202 438 247 202 438 247	155.74	8.68	51.51	3.61	17.13	19.11	26.49	41.50	5.51		47.06	47.06	47.06	47.06	1	10	10	10
2027	12	22.29	25.24					-		202 438 247	155.74	8.82	52.34	3.61	17.13	19.11	26.49	41.50	5.57		47.53	47.53	47.53	47.53	-	10	10	10
2028	13	22.53 22.77	25.24	-						202 438 247	155.74	8.89	52.75	3.61	17.13	19.11	26.49 26.49	41.50 41.50	5.63		47.77	47.77	47.77	47.77	-	10	10	10
2029 2030	14 15	22.77 23.01	25.24 25.24		-	-				202 438 247 202 438 247	155.74	8.96 9.03	53.16 53.57	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.69 5.75		48.01 48.24	48.01 48.24	48.01 48.24	48.01 48.24	1	11	11	11
2031	16	23.24	25.24			-				202 438 247	155.74	9.10	53.98	3.61	17.13	19.11	26.49	41.50	5.81		48.48	48.48	48.48	48.48	1	12	12	12
2032	17	23.48	25.24							202 438 247	155.74	9.17	54.39	3.61	17.13	19.11	26.49	41.50	5.87		48.72	48.72	48.72	48.72		12	12	12
2033 2034	18 19	23.72	25.24 25.24			0.0	179.1	<:Refurbish	mont for dire	202 438 247	155.74	9.24	54.81	3.61 3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.93 5.99		48.96	48.96	48.96	48.96	-	13	13	13
2034 2035	19 20	23.96 24.19	25.24 25.24		-	0.0	179.1	<:Heturbish	ment tunding	202 438 247 202 438 247	155.74	9.31 9.38	55.22 55.63	3.61	17.13	19.11	26.49 26.49	41.50 41.50	5.99 6.05		49.19 49.43	49.19 49.43	49.19 49.43	49.19 49.43	-	192 14	192 14	192 14
2035	20	24.19	25.24			-				202 438 247	155.74	9.38	56.04	3.61	17.13	19.11	26.49	41.50	6.11		49.43	49.43	49.43	49.43	1	14	14	14
2037	22	24.67	25.24	<u> </u>						202 438 247	155.74	9.51	56.45	3.61	17.13	19.11	26.49	41.50	6.17		49.91	49.91	49.91	49.91		15	15	15
2038	23	24.91	25.24							202 438 247	155.74	9.58	56.86	3.61	17.13	19.11	26.49	41.50	6.23		50.15	50.15	50.15	50.15	-	15	15	15
2039 2040	24 25	25.14 25.38	25.24 25.24	-	-	-				202 438 247 202 438 247	155.74	9.65	57.27 57.69	3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.29 6.35		50.38 50.62	50.38 50.62	50.38	50.38 50.62	1	16	16	16
2041		25.62	25.24	8		1				202 438 247	155.74	9.79	58.10	3.61	17.13	19.11	26.49	41.50	6.40		50.86	50.86	50.86	50.86	1	17	17	17
2042	26 27	25.86	25.24							202 438 247	155.74	9.86	58.51	3.61	17.13	19.11	26.49	41.50	6.46		51.10	51.10	51.10	51.10	1	17	17	17
	28	26.09 26.33	25.24 25.24		-					202 438 247	155.74	9.93	58.92 59.33	3.61	17.13	19.11	26.49 26.49	41.50 41.50	6.52 6.58		51.33 51.57	51.33 51.57	51.33	51.33 51.57	-	18	18	18
2043	29	26.33	25.24	-	-	1				202 438 247 202 438 247	155.74	10.00	59.33 59.74	3.61	17.13	19.11	26.49	41.50	6.58		51.57	51.57	51.57	51.57	1	18	18	18
2043 2044 2045		26.81	25.24							202 438 247	155.74	10.14	60.15	3.61	17.13	19.11	26.49	41.50	6.70		52.05	52.05	52.05	52.05	1	19	19	19
2044 2045 2046	31					1	1			202 438 247	155.74	10.21	60.57	3.61	17.13	19.11	26.49	41.50	6.76		52.28	52.28	52.28	52.28	1	19	19	19
2044 2045 2046 2047	31	27.05	25.24			-																			-			
2044 2045 2046 2047 2048	31 32 33	27.05 27.28	25.24	0.0	0.0	0.0	179.1	< Befurbish	pant funding	202 438 247	155.74	10.28	60.98	3.61	17.13	19.11	26.49	41.50	6.82		52.52	52.52	52.52	52.52	1	20	20	20
2044 2045 2046 2047	31	27.05		0.0	0.0	0.0	179.1	<:Refurbish	ment funding		155.74 155.74 155.74		60.98 61.39 61.80	3.61 3.61 3.61														

	TOTAL	DAM	PIPELINES	CAPITAL COST	COMPONENTS	(R'million)																						
	TOTAL	DAM																	LEMENTATIO									
			PIPELINES	TANKS	NON- WORKS	CIVIL WORKS	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh		50%	100%	100%	100%	100%	PERCENTAC 0%	GE OF CAPITAL			grant funding) 0%	0%	0%	0%	0%	0%	0%
																	Ntab Ops	Prim & Sec	Tertiary	Ntab				Lalini Ops			Eng &	
nga Dam Supply Only	570.4	484.9					85.6					Year	Proj. mangt 101.5	Ntab Dam 944.9	Ntab Advance 267.5	Ntab WTW	Village 103.5	Lines	Lines	Irrigation 0.0	Eng & Other 1183.2	Lalini Dam	Lalini Advance	Village	Lalini Condui	t HEP Plants	Other 370.8	0.0
ant for HEP	374.4	318.3			20000000000		56.2			4.2	29 064 02	2015	14.5								59.2						18.5	0.0
d Dam Works	103.5					25.9 15.0	25.9 85.3	51.7				2016	14.5	94.5 200.8	127.1		49.1	0.0			177.5	0.0	0.0	0.0	0.0		55.6	0.0
	100.3					15.0	85.3					2017 2018	14.5 14.5	200.8	127.1 13.4	143.3 250.8	49.1 5.2	0.0	0.0	0.0	177.5 177.5	0.0	0.0	0.0	0.0	0.0	55.6 55.6	0.0 0.0
Secondary	1060.6		901.5			53.0	106.1			4.1		2019	14.5	200.8		250.8		0.0	0.0	0.0	177.5	0.0	0.0	0.0	0.0	0.0	55.6	0.0
s	1474.9		1253.6			73.7	147.5					2020 2021	14.5 14.5	200.8 47.2		71.7		0.0	0.0 0.0	0.0 0.0	177.5 118.3	0.0 0.0			0.0	0.0 0.0	55.6 37.1	0.0 0.0
Secondary	186.8			149.5		18.7	18.7					2022									118.3	0.0					37.1	0.0
	135.7			108.6		13.6	13.6					2023 2024																0.0
Stations Secondary	112.7						95.8	16.9				2024																0.0
	8.4						7.2	1.3		11.6																		
plies Secondary	45.9								45.9																			
Coconsury	6.6								6.6																			
Works	716.6		0101400003.810001		75.2	359.9	281.5			12.3				100000000000000000000000000000000000000			1000000000							100.0000.0000	-			
Supply d farms dev	750.2		519.2	62.7		75.9	59.9	20.0	12.5	2.5							******	******										
	189.0					189.0																						
and Mitigations	518.2 32.6				518.2				32.6																			
& EMP	766.4				766.4																							
L	7153.3	803.2 641.3	2674.3	320.7	1359.8	824.8	983.0 113.2	89.9	97.6	34.7 6.8	29 064 02 173 374 22	Check>	101.5	944.9	267.5	716.6	103.5	0.0	0.0	0.0	1183.2	0.0	0.0	0.0	0.0	0.0	370.8	0.0
Dam Works	159.3	641.3		-		135.4	23.9	-		6.8	173 374 22	2																
nel	861.6		430.8			430.8			·																			
	70.9						48.3	12.5	10.0	-																		
	221.2					9.4	156.0	33.9	21.9	100000000000000000000000000000000000000		100000000				1000	000000000000000000000000000000000000000		0.00000000						0.000	0.000000		
& Mitigations	555.5 50.0			-	50.0	555.5				-																		
& EMP	320.8				320.8																							
L TAL	2993.7	641.3	430.8	0.0	370.8	1131.1 1955.9	341.4	46.4	32.0	6.8	173 374 22	6			1		1											
TAL	10147.0	1444.4	3105.1	320.7	1730.6	1955.9	1324.4	136.3	129.6	41.5	202 438 24	<u>a</u>			OPERATIO	ONS COSTS	R'million)							1				
										MAINTENANCE C	OSTS		ITEM			COST/A			TREATMENT C Using cost Rand				0.25					
										0.25%	Dam		TTEM			3.61	1		POWER									
										0.50%	Pipelines, Reservoirs Treatment Works, Ch	d Marke Built	diese			17.13 19.11			Energy Cost : R Energy Cost : R	R/ kWHr		Pumping Sales	0.50	1				
										2.00%	M&E	in morka, bain	unga			26.49		-	Linergy court . In	e strik.		Guida	0.0					
			VATER	-		L & REFURBIS					Total	1	PING COSTS	1		66.34	I			<ul> <li>a</li> </ul>		UNTED WATER S		1			TAL COSTS	
	YEAR		JPPLIED			(R'mil	lion)			(R'	million)	(	R'million)		- 211.2		OSTS (R'millic					(million m ³ )					R'million	
YEAR	NO.	(mi	lion m ³ /a)	Dam &	Pipelines	HEPs	WTW	Proj Mant	Eng	Power Output kWh/a	Energy	Power	Energy Charge	Dams	Pipelines Beservoirs	WTW Civil &	M&E	STAFF	Treatment		6%	DISCOUNT RAT 8%	ES 10%	2%	1		SOUNT RATE	
		POTABLE	IRRIGATION	Inf.	Reservoirs				& Other	KINE	income		Citarge		Theastroara	Buildings					0.4	0.0	10.0	2.70				
2015 2016	0			0.0 270.7	0.0	0.0	0.0	14.5 14.5	18.5 55.6			-													-	33 341	33 341	33 341
2017	2			377.0	0.0	0.0	143.3	14.5	55.6			-		-												590	590	590
2018	3			219.3 200.8	0.0	0.0	250.8	14.5 14.5	55.6 55.6				8	-									3			540	540	540 522
2019 2020	5	20.63	25.24	200.8	0.0	0.0	250.8 71.7	14.5	55.6			8.33	49.46	3.61	17.13	19.11	26.49	41.50	5.16		45.87	45.87	45.87	45.87		522 505	522 505	505
2021	6	20.87	25.24	47.2	0.0	0.0	0.0	14.5	37.1	202 438 247	155.74	8.40	49.87	3.61	17.13	19.11	26.49	41.50	5.22		46.11	46.11	46.11	46.11		106	106	106
2022 2023		21.11 21.34	25.24 25.24	0.0	0.0	0.0	0.0	0.0	37.1	202 438 247 202 438 247	155.74 155.74	8.47 8.54	50.28 50.69	3.61 3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.28 5.34		46.34 46.58	46.34 46.58	46.34 46.58	46.34 46.58	-	45 8	45 8	45 8
2024	9	21.58	25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247	155.74	8.61	51.10	3.61	17.13	19.11	26.49	41.50	5.40		46.82	46.82	46.82	46.82	1	9	9	9
2025 2026	10	21.82 22.06	25.24 25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247 202 438 247	155.74 155.74	8.68 8.75	51.51 51.92	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.45 5.51		47.06 47.29	47.06 47.29	47.06 47.29	47.06 47.29	-	9 10	9	9 10
2026	12	22.29	25.24						-	202 438 247	155.74	8.82	52.34	3.61	17.13	19.11	26.49	41.50	5.57		47.53	47.53	47.53	47.53		10	10	10
2028	13	22.53	25.24							202 438 247	155.74	8.89	52.75	3.61	17.13	19.11	26.49	41.50	5.63		47.77	47.77	47.77	47.77		10	10	10
2029 2030	14 15	22.77 23.01	25.24 25.24			-				202 438 247 202 438 247	155.74	8.96	53.16 53.57	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.69 5.75		48.01 48.24	48.01 48.24	48.01 48.24	48.01	-	11	11	11
2031	16	23.24	25.24							202 438 247	155.74	9.10	53.98	3.61	17.13	19.11	26.49	41.50	5.81		48.48	48.48	48.48	48.48	1	12	12	12
2032 2033	17 18	23.48 23.72	25.24 25.24			-			-	202 438 247 202 438 247	155.74	9.17	54.39 54.81	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.87 5.93		48.72 48.96	48.72 48.96	48.72 48.96	48.72 48.96	-	12	12	12
2034	19	23.96	25.24	-		0.0	179.1	<:Refurbish	nent funding	202 438 247	155.74	9.31	55.22	3.61	17.13	19.11	26.49	41.50	5.99		49.19	49.19	49.19	49.19		192	192	192
2035	20	24.19	25.24			9 O				202 438 247	155.74	9.38	55.63	3.61	17.13	19.11	26.49	41.50	6.05		49.43	49.43	49.43	49.43		14	14	14
2036	21	24.43 24.67	25.24							202 438 247 202 438 247	155.74	9.44	56.04 56.45	3.61	17.13	19.11	26.49	41.50 41.50	6.11		49.67	49.67	49.67	49.67	1 1	14	14	14
2038	23	24.91	25.24		-	8				202 438 247	155.74	9.58	56.86	3.61	17.13	19.11	26.49	41.50	6.23		50.15	50.15	50.15	50.15	1	15	15	15
2039	24 25	25.14 25.38	25.24 25.24							202 438 247 202 438 247	155.74	9.65	57.27 57.69	3.61	17.13	19.11	26.49 26.49	41.50 41.50	6.29		50.38 50.62	50.38 50.62	50.38 50.62	50.38 50.62	-	16 16	16 16	16
2040 2041	25 26	25.38	25.24							202 438 247 202 438 247	155.74	9.72	57.69	3.61	17.13	19.11	26.49	41.50	6.35		50.62	50.62	50.62	50.62	1	16	16	16
2042	27	25.86	25.24						-	202 438 247	155.74	9.86	58.51	3.61	17.13	19.11	26.49	41.50	6.46		51.10	51.10	51.10	51.10	-	17	17	17
2043 2044	28 29	26.09 26.33	25.24 25.24	H		-		-		202 438 247 202 438 247	155.74 155.74	9.93	58.92 59.33	3.61 3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.52 6.58		51.33 51.57	51.33 51.57	51.33 51.57	51.33 51.57	1	18 18	18 18	18 18
2045	30	26.57	25.24			1				202 438 247	155.74	10.07	59.74	3.61	17.13	19.11	26.49	41.50	6.64		51.81	51.81	51.81	51.81	1	18	18	18
2046	31 32	26.81 27.05	25.24 25.24						-	202 438 247 202 438 247	155.74 155.74	10.14	60.15 60.57	3.61	17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.70 6.76		52.05 52.28	52.05 52.28	52.05 52.28	52.05 52.28	-	19 19	19 19	19 19
		CU.1.a	6.3.64	-	-					202 438 247 202 438 247	155.74	10.21	60.98	3.61	17.13	19.11	26.49	41.50	6.82		52.52	52.52	52.28	52.28	1	20	20	20
2047 2048	33	27.28	25.24	_																								
2047	33 34 25	27.28 27.52 27.76	25.24 25.24 25.24	0.0	0.0	0.0	179.1	<:Refurbish	ment funding	202 438 247 202 438 247	155.74 155.74	10.35	61.39 61.80	3.61	17.13	19.11	26.49	41.50	6.88 6.94		52.76 53.00	52.76 53.00	52.76 53.00	52.76 53.00		200 21	200 21	200

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URV: ALL WA	IER SI	JPPLIE	D: CONJU	NCTIVE	SCHEME	INCL .	ERTIA	RIES				100%	Grant Fu	inded			All po	wer cros	ss-subsi	idized								
EM				CAPITAL COST	COMPONENTS			4											LEMENTAT									
	TOTAL	DAM	PIPELINES	TANKS	NON- WORKS	CIVIL WORKS	M&E	BUILDING	POWER SUPPLY	STAFF P.A.	HEP OUTPUT kWh	-	0%	0%	0%	0%	0%		GE OF CAPITAL				0%	0%	0%	0%	0%	0%
																	Ntab Ops	Prim & Sec	Tertiary	Ntab				Lalini Ops			Eng &	
abelanga Dam Water Supply Only	570.4	484.9					85.6					Year	Proj. mangt 0.0	Ntab Dam 0.0	Ntab Advance 0.0	Ntab WTW 0.0	Village 0.0	Lines 0.0	Lines 0.0	Irrigation 0.0	Eng & Other 1284.7	Lalini Dam 0.0	Lalini Advance 0.0	Vilage 0.0	Lalini Condu 0.0	uit HEP Plants 0.0	Other 370.8	DEA TO 0.0 1
ncrement for HEP	374.4	318.3					56.2			4.2	29 064 021	2015	0.0			0.0		0.0	0.0	0.0	64.2		0.0	0.0	0.0	0.0	18.5	0.0
sociated Dam Works	103.5					25.9	25.9	51.7				2016	0.0	0.0	0.0	0.0	0.0	0.0	0.0		192.7	0.0	0.0	0.0	0.0		55.6 55.6	0.0
nali HEP pelines	100.3					15.0	85.3					2017 2018	0.0 0.0	0.0	0.0 0.0	0.0	0.0	0.0	0.0	0.0	192.7	0.0	0.0		0.0	0.0	55.6 55.6	0.0
Primary & Secondary	1060.6		901.5			53.0	106.1			4.1		2019	0.0	0.0		0.0		0.0	0.0	0.0	192.7	0.0	0.0	0.0 0.0	0.0	0.0	55.6	0.0
Tertiary eservoirs	1474.9		1253.6			73.7	147.5					2020	0.0	0.0		0.0		0.0	0.0	0.0 0.0	192.7 128.5	0.0	1000		0.0	0.0	55.6 37.1	0.0
Primary & Secondary	186.8			149.5		18.7	18.7					2021	0.0	0.0				0.0	0.0	0.0	128.5	0.0				0.0	37.1	0.0
Tertiary	135.7			108.6		13.6	13.6					2023																0.0
umping Stations Primary & Secondary	112.7						95.8	16.9				2024						*********					*****					0.0
l'ertiary	8.4						7.2	1.3		11.6																		
ower supplies Primary & Secondary	45.9								45.9																			
Fertiary a secondary	6.6								6.6																			
eatment Works	716.6				75.2	359.9	281.5			12.3																	100100000	
rigation Supply cl bulk and farms dev	750.2		519.2	62.7		75.9	59.9	20.0	12.5	2.5																		
pads	189.0			01.7		189.0	50.0	20.0	Theod																			
ther items and Mitigations	518.2				518.2				32.6																			
ower lines ngineering & EMP	32.6 766.4				766.4				32.6																			
UB-TOTAL	7153.3	803.2	2674.3	320.7	1359.8	824.8	983.0	89.9	97.6	34.7	29 064 021	Check>	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	1284.7	0.0	0.0	0.0	0.0	0.0	370.8	0.0 1
alini Dam ssociated Dam Works	754.5	641.3		-		135.4	113.2 23.9	-	1	6.8	173 374 226							о 								·		
Conduit/Tunnel	861.6	0	430.8			430.8	23.9																					
EPs														1					1									
Small Main	70.9					9,4	48.3	12.5	10.0																			
loads	555.5					555.5			-	1		1																
Other items & Mitigations	50.0 320.8	3		-	50.0 320.8																							
UB-TOTAL	2993.7	641.3	430.8	0.0	370.8	1131.1	341.4	46.4	32.0	6.8	173 374 226	8						-								1		ĺ.
RAND TOTAL	10147.0	1444.4	3105.1	320.7	1730.6	1955.9	1324.4	136.3	129.6	41.5	202 438 243	•			005047	ONS COSTS (	(Disculling a)											
				1				1	B	MAINTENANCE C	OSTS				OPERATI	045 00515 (	(K million)	70	TREATMENT	COSTS								
										RATE			ITEM			COST/A			Using cost Ran	nd per m3 =			0.25					
										0.25%	Dam Pipelines, Reservoirs	-				3.61			POWER Energy Cost : I	B/ kWHr		Pumping	0.50					
										0.50%	Treatment Works, Ch	il Works, Build	lings			19.11			Energy Cost :	R/ kWHr		Sales	0.8					
										2.00%	M & E Total					26.49 66.34	-											
	YEAR		WATER	1	CAPITA	L & REFURBIS	HMENT EXPEN	DITURE			OWER INCOME	PLIM	PING COSTS	1					-	( ) ( )	DISCO	UNTED WATER	SUPPLIED			T	OTAL COSTS	
	0.0000000		UPPLIED			(R'mi	illion)			(8)	million)	()	Tmillion)				OSTS (R'millio	****				(million m ³ )	0.00010000				R'million	
YEAR	NO.	(mi	llion m³/a)	Dam & Ass.	Pipelines	HEPs	WTW	Proj Mant	Eng EMP	Power Output kWh/a	Energy	Power	Energy Charge	Dams	Pipelines Reservoirs	WTW Civil &	M&E	STAFF	Treatment		6%	DISCOUNT RAT	10%	2%	1		COUNT RAT	
		POTABLE	IRRIGATION	Inf.	Reservoirs				& Other							Buildings												
2015	0			0.0	0.0	0.0	0.0	0.0	18.5			-										-			-	19	19 56	19 1 56 5
2010	2			0.0	0.0	0.0	0.0	0.0	55.6			2											1 3		1	56	56	56 5
2018	3			0.0	0.0	0.0	0.0	0.0	55.6																	56	56	56 5
2019 2020	4	20.63	25.24	0.0	0.0	0.0	0.0	0.0	55.6 55.6			8.33	49.46	3.61	17.13	19.11	26.49	41.50	5.16		45.87	45.87	45.87	45.87	-	56 218	56 218	56 5 218 2
2021	6	20.87	25.24	0.0	0.0	0.0	0.0	0.0	37.1	202 438 247	155.74	8.40	49.87	3.61	17.13	19.11	26.49	41.50	5.22		46.11	46.11	46.11	46.11	1	44	44	44 4
2022 2023		21.11 21.34	25.24 25.24	0.0	0.0	0.0	0.0	0.0	37.1	202 438 247	155.74 155.74	8.47 8.54	50.28 50.69	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.28 5.34		46.34 46.58	46.34 46.58	46.34 46.58	46.34 46.58	-	45	45 8	45 4 8 1
2023	9	21.58	25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247 202 438 247	155.74	8.61	51.10	3.61	17.13	19.11	26.49	41.50	5.40		46.82	46.82	46.82	46.82		8	9	9 1
2025	10	21.82	25.24	0.0	0.0	0.0	0.0	0.0	0.0	202 438 247	155.74	8.68	51.51	3.61	17.13	19.11	26.49	41.50	5.45		47.06	47.06	47.06	47.06		9	9	9 1
2026 2027	11 12	22.06 22.29	25.24 25.24							202 438 247 202 438 247	155.74 155.74	8.75 8.82	51.92 52.34	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.51 5.57		47.29 47.53	47.29 47.53	47.29 47.53	47.29 47.53	1	10	10	10 1
2028	13	22.53	25.24							202 438 247	155.74	8.89	52.75	3.61	17.13	19.11	26.49	41.50	5.63		47.77	47.77	47.77	47.77		10	10	10 1
2029	14	22.77	25.24			1	-		1	202 438 247	155.74	8.96	53.16	3.61	17.13	19.11	26.49	41.50	5.69		48.01	48.01	48.01	48.01		11	11	11 1
2030 2031	15 16	23.01 23.24	25.24 25.24							202 438 247 202 438 247	155.74	9.03	53.57 53.98	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.75 5.81		48.24 48.48	48.24 48.48	48.24 48.48	48.24 48.48	-	11	11 12	11 1 12 1
2032	17	23.48	25.24							202 438 247	155.74	9.17	54.39	3.61	17.13	19.11	26.49	41.50	5.87		48.72	48.72	48.72	48.72		12	12	12 1
2033	18 19	23.72 23.96	25.24 25.24			0.0	0.0	<:Refurbist		202 438 247 202 438 247	155.74 155.74	9.24 9.31	54.81 55.22	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	5.93 5.99		48.96 49.19	48.96 49.19	48.96 49.19	48.96 49.19	-	13	13 13	13 1 13 1
	20	23.96	25.24	-		0.0	0.0	<:Heturbist	Iment funding	202 438 247 202 438 247	155.74	9.31	55.63	3.61	17.13	19.11	26.49	41.50	6.05		49.19	49.19	49.19	49.19	1	13	13	13 1
2034 2035		24.43	25.24							202 438 247	155.74	9.44	56.04	3.61	17.13	19.11	26.49	41.50	6.11		49.67	49.67	49.67	49.67	1	14	14	14 1
2035 2036	21	24.67	25.24	-						202 438 247 202 438 247	155.74	9.51	56.45	3.61	17.13	19.11	26.49	41.50 41.50	6.17		49.91	49.91	49.91	49.91	-	15	15	15 1
2035 2036 2037	22					2				202 438 247	155.74	9.65	57.27	3.61	17.13	19.11	26.49	41.50	6.29		50.38	50.38	50.38	50.38	1	16	16	16 1
2035 2036	22 23	24.91 25.14	25.24					_	_	202 438 247	155.74	9.72	57.69	3.61	17.13	19.11	26.49	41.50	6.35		50.62	50.62	50.62	50.62		16	16	16 1
2035 2036 2037 2038 2039 2040	22 23 24 25	24.91 25.14 25.38	25.24							202 438 247	155.74	9.79 9.86	58.10 58.51	3.61	17.13	19.11	26.49 26.49	41.50	6.40 6.46		50.86	50.86	50.86	50.86		17	17	17 1
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2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2043 2044 2045	22 23 24 25 26 27 28 29 30	24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57	25.24 25.24 25.24 25.24 25.24 25.24 25.24							202 438 247 202 438 247 202 438 247	155.74 155.74 155.74	9.93 10.00 10.07	59.33 59.74	3.61 3.61	17.13 17.13	19.11 19.11	26.49 26.49	41.50 41.50	6.52 6.58 6.64		51.33 51.57 51.81	51.33 51.57 51.81	51.33 51.57 51.81	51.33 51.57 51.81	-	18 18 18	18 18 18	18 1 18 1 18 1
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2005 2006 2007 2009 2009 2040 2044 2044 2044 2044 2044	22 23 24 25 26 27 28 29 30 31 32 33	24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24						most for the	202 438 247 202 438 247	155.74 155.74 155.74 155.74 155.74 155.74	9.93 10.00 10.07 10.14 10.21 10.28	59.33 59.74 60.15 60.57 60.98	3.61 3.61 3.61 3.61 3.61	17.13 17.13 17.13 17.13 17.13 17.13	19.11 19.11 19.11 19.11 19.11	26.49 26.49 26.49 26.49 26.49 26.49	41.50 41.50 41.50 41.50 41.50 41.50	6.52 6.58 6.64 6.70 6.76 6.82		51.33 51.57 51.81 52.05 52.28 52.52	51.33 51.57 51.81 52.05 52.28 52.52	51.33 51.57 51.81 52.05 52.28 52.52	51.33 51.57 51.81 52.05 52.28 52.52		18 18 18 19 19 20	18 18 19 19 20	18         1           18         1           18         1           19         1           19         1           20         1
2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2044 2045 2046 2047	22 23 24 25 26 27 28 29 30 31 32	24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	<td>ment funding</td> <td>202 438 247 202 438 247 202 438 247 202 438 247 202 438 247 202 438 247 202 438 247</td> <td>155.74 155.74 155.74 155.74 155.74</td> <td>9.93 10.00 10.07 10.14 10.21</td> <td>59.33 59.74 60.15 60.57</td> <td>3.61 3.61 3.61 3.61</td> <td>17.13 17.13 17.13 17.13</td> <td>19.11 19.11 19.11 19.11</td> <td>26.49 26.49 26.49 26.49</td> <td>41.50 41.50 41.50 41.50</td> <td>6.52 6.58 6.64 6.70 6.76</td> <td></td> <td>51.33 51.57 51.81 52.05 52.28</td> <td>51.33 51.57 51.81 52.05 52.28 52.52 52.76</td> <td>51.33 51.57 51.81 52.05 52.28</td> <td>51.33 51.57 51.81 52.05 52.28 52.52 52.76</td> <td></td> <td>18 18 19 19 20 20</td> <td>18 18 19 19 20 20</td> <td>18         1           18         1           18         1           19         1           19         1           20         1           20         2</td>	ment funding	202 438 247 202 438 247 202 438 247 202 438 247 202 438 247 202 438 247 202 438 247	155.74 155.74 155.74 155.74 155.74	9.93 10.00 10.07 10.14 10.21	59.33 59.74 60.15 60.57	3.61 3.61 3.61 3.61	17.13 17.13 17.13 17.13	19.11 19.11 19.11 19.11	26.49 26.49 26.49 26.49	41.50 41.50 41.50 41.50	6.52 6.58 6.64 6.70 6.76		51.33 51.57 51.81 52.05 52.28	51.33 51.57 51.81 52.05 52.28 52.52 52.76	51.33 51.57 51.81 52.05 52.28	51.33 51.57 51.81 52.05 52.28 52.52 52.76		18 18 19 19 20 20	18 18 19 19 20 20	18         1           18         1           18         1           19         1           19         1           20         1           20         2
2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2044 2044 2045 2046 2046 2046 2046 2049	22 23 24 25 26 27 28 29 30 31 32 33	24.91 25.14 25.38 25.62 25.86 26.09 26.33 26.57 26.81 27.05 27.28 27.52	25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24 25.24	0.0	0.0	0.0	0.0	<refurbish< td=""><td>nment funding</td><td>202 438 247 202 438 247</td><td>155.74 155.74 155.74 155.74 155.74 155.74 155.74</td><td>9.93 10.00 10.07 10.14 10.21 10.28 10.35</td><td>59.33 59.74 60.15 60.57 60.98 61.39</td><td>3.61 3.61 3.61 3.61 3.61 3.61 3.61</td><td>17.13 17.13 17.13 17.13 17.13 17.13 17.13</td><td>19.11 19.11 19.11 19.11 19.11 19.11 19.11</td><td>26.49 26.49 26.49 26.49 26.49 26.49 26.49 26.49</td><td>41.50 41.50 41.50 41.50 41.50 41.50</td><td>6.52 6.58 6.64 6.70 6.76 6.82 6.88</td><td></td><td>51.33 51.57 51.81 52.05 52.28 52.52 52.76 53.00</td><td>51.33 51.57 51.81 52.05 52.28 52.52</td><td>51.33 51.57 51.81 52.05 52.28 52.52 52.76 53.00</td><td>51.33 51.57 51.81 52.05 52.28 52.52</td><td></td><td>18 18 19 19 20 20 21</td><td>18 18 19 19 20</td><td>18         1           18         1           18         1           19         1           19         1           20         1           20         2</td></refurbish<>	nment funding	202 438 247 202 438 247	155.74 155.74 155.74 155.74 155.74 155.74 155.74	9.93 10.00 10.07 10.14 10.21 10.28 10.35	59.33 59.74 60.15 60.57 60.98 61.39	3.61 3.61 3.61 3.61 3.61 3.61 3.61	17.13 17.13 17.13 17.13 17.13 17.13 17.13	19.11 19.11 19.11 19.11 19.11 19.11 19.11	26.49 26.49 26.49 26.49 26.49 26.49 26.49 26.49	41.50 41.50 41.50 41.50 41.50 41.50	6.52 6.58 6.64 6.70 6.76 6.82 6.88		51.33 51.57 51.81 52.05 52.28 52.52 52.76 53.00	51.33 51.57 51.81 52.05 52.28 52.52	51.33 51.57 51.81 52.05 52.28 52.52 52.76 53.00	51.33 51.57 51.81 52.05 52.28 52.52		18 18 19 19 20 20 21	18 18 19 19 20	18         1           18         1           18         1           19         1           19         1           20         1           20         2

J-7