water & sanitation

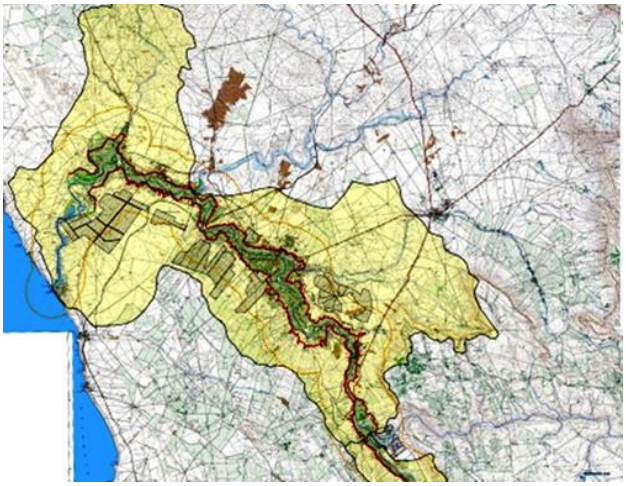
Department:
Water and Sanitation
REPUBLIC OF SOUTH AFRICA

Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam (WP0485)

Capacity Building and Training Report Year 1





September 2018

Department of Water and Sanitation
Directorate: Options Analysis

POST FEASIBILITY BRIDGING STUDY FOR THE PROPOSED BULK CONVEYANCE INFRASTRUCTURE FROM THE RAISED CLANWILLIAM DAM

APPROVAL

Title	:	Capacity Building and Training Report Year 1
Consultants	:	Aurecon South Africa (Pty) Ltd
Report status	:	Final
Date	:	September 2018

STUDY TEAM

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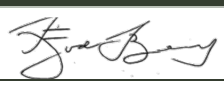
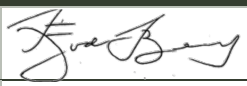
Author signature		Approver signature	
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Directorate: Options Analysis

Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam

CAPACITY BUILDING AND TRAINING REPORT YEAR 1

Final: September 2018

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Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam

Reports produced as part of this project are indicated below.

Bold type indicates this report.

Report Index	Report Number	Report Title
1		Inception Report
2	**P WMA 09/E10/00/0417/2**	**Capacity Building & Training Year 1**
3	P WMA 09/E10/00/0417/3	Capacity Building & Training Year 2
4	P WMA 09/E10/00/0417/4	Water Requirements Assessment
5	P WMA 09/E10/00/0417/5	Distribution of Additional Available Water
6		Existing Infrastructure and Current Agricultural Development Sub-Report
7	P WMA 09/E10/00/0417/6	Existing Conveyance Infrastructure and Irrigated Land
8		Suitable Agricultural Areas and Land Ownership Report
9		Evaluation of Development Options Sub-Report
10	P WMA 09/E10/00/0417/10	Suitable Areas for Agricultural Development
11		Right Bank Canal Design Sub-Report
12		Conceptual Design Sub-Report
13		Environmental Screening Sub-Report
14		Jan Dissels and Ebenhaeser Schemes Design Sub-Report
15	P WMA 09/E10/00/0417/13	Feasibility Design
16	P WMA 09/E10/00/0417/7	Topographical Surveys
17	P WMA 09/E10/00/0417/8	Geotechnical Investigations
18	P WMA 09/E10/00/0417/9	Soil Survey
19		Financial Viability of Irrigation Farming Sub-Report
20	P WMA 09/E10/00/0417/11	Agricultural Production and Farm Development
21		Right Bank Canal Cost Analysis Sub-Report
22		Socio-Economic Impact Analysis Sub-Report
23	P WMA 09/E10/00/0417/12	Socio-Economic Impact Analysis
24	P WMA 09/E10/00/0417/14	Record of Implementation Decisions Report
25	P WMA 09/E10/00/0417/1	Main Report
26	P WMA 09/E10/00/0417/15	Historically Disadvantaged Farmers Report

Concise Description of the Content of Study Reports

Report Index	Report Number	Report Title and Description of Content
1		Inception The report forms part of the contract and stipulates the scope of work for the study, the contract amount and the contract period. It contains a detailed description of tasks and methodology, a study programme, human resource schedule, budget and deliverables. The Capacity Building and Training Plan has been included.
2	P WMA 09/E10/00/0417/2	Capacity Building & Training Year 1 Describes the range of capacity building and training activities planned for the study, and the activities undertaken during the first year of the study, including field-based training, training workshop 1 and mentorship of DWS interns through secondment.
3	P WMA 09/E10/00/0417/3	Capacity Building & Training Year 2 Describes the range of capacity building and training activities planned for the study, and the activities undertaken during the second year of the study, including field-based training, training workshop 2 and mentorship of DWS interns through secondment.
4	P WMA 09/E10/00/0417/4	Water Requirements Assessment Provides an analysis of the existing water use and current water allocations in the study area, and addresses ecological water requirements, water use for irrigated agriculture and projections for future use, current domestic and industrial water use and projections for future use, water use for hydropower and water losses in the water supply system.
5	P WMA 09/E10/00/0417/5	Distribution of Additional Available Water Confirms the volume of additional water available for development, after water has been reserved for the current water uses, as well as making recommendations on how the additional yield should be distributed among water use sectors and water users.
6		Existing Infrastructure and Current Agricultural Development Sub-Report Provides an overview of the extent and general condition of the current bulk water storage and conveyance infrastructure. This report also provides an overview of the locality and extent of the existing agricultural areas determined by reviewing Geographic Information System (GIS) data obtained from various sources.
7	P WMA 09/E10/00/0417/6	Existing Conveyance Infrastructure and Irrigated Land An update of the Sub-Report, providing a refinement of the current agricultural water requirements following evaluation of the current crop types, an assessment of the desirability of diverting releases for downstream irrigators via the Clanwilliam Canal and Jan Dissels River, to meet the summer ecological flows in the lower Jan Dissels River, and presents an Implementation Action Plan with costs.

Report Index	Report Number	Report Title and Description of Content
8		Suitable Agricultural Areas and Land Ownership Sub-Report Description of the collection of information and the preparation undertaken for the analysis of options, which includes a summary of existing irrigated areas and water use, cadastral information, land ownership, environmental sensitivity, soils suitability, water quality considerations and constraints, and the initiation of the process to identify additional areas suitable for irrigation.
9		Evaluation of Development Options Sub-Report Describes the salient features, costs and impacts of identified potential irrigation development options for new irrigation development in the lower Olifants River. This provides the background and an introduction to the discussions at the Options Screening Workshop held in December 2018.
10	P WMA 09/E10/00/0417/10	Suitable Areas for Agricultural Development Describes the supporting information, process followed and the salient features, costs and impacts of identified potential irrigation development options for new irrigation development in the lower Olifants River. Recommends the preferred options to be evaluated at feasibility level.
11		Right Bank Canal Feasibility Design Sub-Report Describes the Design Criteria Memorandum, based on best practice in engineering and complying with recognised codes and standards. Description of route alignments and salient features of the new Right Bank canal. Feasibility-level design of bulk infrastructure, including evaluation of capacities, hydraulic conditions, canal design, surface flow considerations, canal structures, power supply and access roads. Operational considerations and recommendations.
12		Conceptual Design Sub-Report Describes the scheme layouts at a conceptual level and infrastructure components to be designed, alternatives to consider or sub-options, and affected land and infrastructure, as well as the updated recommended schemes for new irrigation development.
13		Environmental Screening Sub-Report Describes and illustrates the opportunities and constraints, and potential ecological risks/impacts and recommendations for the short-listed bulk infrastructure development options at reconnaissance level. Describes relevant legislation that applies to the proposed irrigation developments.

Report Index	Report Number	Report Title and Description of Content
14		Jan Dissels and Ebenhaeser Schemes Feasibility Design Sub-Report Describes the Design Criteria Memorandum, based on best practice in engineering and complying with recognised codes and standards. Description of route alignments and salient features of the Jan Dissels and Ebenhaeser schemes. Feasibility-level design of bulk infrastructure, including evaluation of capacities, hydraulic conditions, intake structures, balancing dams and reservoirs, rising mains and gravity pipelines and trunk mains where relevant, power supply and access roads. Operational considerations and recommendations.
15	P WMA 09/E10/00/0417/13	Feasibility Design Description of the approach to and design of selected bulk infrastructure at feasibility level, with supporting plans and implementation recommendations.
16	P WMA 09/E10/00/0417/7	Topographical Surveys Describes the contour surveys for the proposed identified bulk infrastructure conveyance routes and development areas, the surveying approach, inputs and accuracy, as well as providing the survey information.
17	P WMA 09/E10/00/0417/8	Geotechnical Investigations Presents the findings of geotechnical investigations of the various identified sites, as well as the approach followed, field investigations and testing, laboratory testing, interpretation of findings and geotechnical recommendations.
18	P WMA 09/E10/00/0417/9	Soil Survey Describes the soil types, soil suitability and amelioration measures of the additional area covering about 10 300 ha of land lying between 60 to 100 m above river level, between the upper inundation of the raised Clanwilliam Dam and Klawer.
19		Financial Viability of Irrigation Farming Sub-Report Describes the findings of an evaluation of the financial viability of pre-identified crop-mixes, within study sub-regions, and advises on the desirability of specific crops to be grown in these sub-regions. It includes an evaluation of the financial viability of existing irrigation farming or expanding irrigation farming, as well as the identification of factors that may be obstructive for new entrants from historically disadvantaged communities.
20	P WMA 09/E10/00/0417/11	Agricultural Production and Farm Development This report will focus on policy, institutional arrangements, available legal and administrative mechanisms as well as the proposed classes of water users and the needs of each. This would include identifying opportunities for emerging farmers, including grant and other types of Government and private support, and a recommendation on the various options and opportunities that exist to ensure that land reform and water allocation reform will take place through the project implementation.

Report Index	Report Number	Report Title and Description of Content
21		Right Bank Canal Cost Analysis Sub-Report Provides an economic modelling approach to quantify the risk of the failure of the existing main canal and the determination of the economic viability of the construction of the new right bank canal to reduce the risk of water supply failure.
22		Socio-Economic Impact Analysis Sub-Report Describes the socio-economic impact analysis undertaken for the implementation of the new irrigation development schemes, for both the construction and operational phases. This includes a description of the social and economic contributions, the return on capital investment, as well as the findings of a fiscal impact analysis.
23	P WMA 09/E10/00/0417/12	Socio-Economic Impact Analysis Synthesis of agricultural economic and socio-economic analyses undertaken, providing an integrated description of agricultural production and farm development and socio-economic impact analysis, as well as the analysis of the right bank canal costs and benefits.
24	P WMA 09/E10/00/0417/14	Record of Implementation Decisions Describes the scope of the project, the specific configuration of the schemes to be implemented, the required implementation timelines, required institutional arrangements and the required environmental and other approval requirements and mitigation measures, to ensure that the project is ready for implementation.
25	P WMA 09/E10/00/0417/1	Main Report Provides a synthesis of approaches, results and findings from the supporting study tasks and interpretation thereof, culminating in the study recommendations. Provides information in support of the project funding motivation to be provided to National Treasury.
26	P WMA 09/E10/00/0417/15	Historically Disadvantaged Farmers Report Describes the activities undertaken by an independent consultant to evaluate existing HDI Farmers policies and legislative context, identify, map and analyse prospective HDI farmers and potential land for new irrigation, as well as propose a mechanism for the identification and screening of HDI farmers.

Executive Summary

The objective of the Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam is to provide recommendations on the bulk conveyance infrastructure required for the equitable distribution of the existing and additional water from the raised Clanwilliam Dam. The additional water will be used to meet the ecological water requirements of the Olifants River, provide irrigation water to existing irrigators at a higher level of assurance and most importantly support historically disadvantaged farming projects and other broad-based black economic empowerment opportunities.

This report describes the range of capacity building and training activities planned for the study, and the activities undertaken to date, specifically:

- Field-based training undertaken at sites in the study area and attendance of study meetings, for three trainees, from 1 to 3 November 2017.
- Training and Capacity Building Workshop 1 held on 31 August 2018 in Bellville.
- Planned Training and Capacity Building Workshop 2 to be held in Pretoria on 1 November 2018.
- Planned mentorship of DWS interns through secondment.

Contents

Tables

1 Introduction

1.1 Introduction

The objective of the Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam is to provide recommendations on the bulk conveyance infrastructure required for the equitable distribution of the existing and additional water from the raised Clanwilliam Dam. The additional water will be used to meet the ecological water requirements of the Olifants River, provide irrigation water to existing irrigators at a higher level of assurance and most importantly support historically disadvantaged farming projects and other broad-based black economic empowerment opportunities.

The planned training and capacity building program for the project, as described in the Inception Report (DWS, 2017), includes the following components:

- Two (2) dedicated Training and Capacity Building Workshops with staff from the Department of Water and Sanitation (DWS) and potentially from other government departments as well,
- Mentorship of three DWS interns through secondment for a period of eight months each, and
- One day field-based training at sites in the study area.

A detailed Capacity Building and Training Plan was included as Appendix B of the Inception Report of this study.

1.2 Objective of This Report

This report (the first of two reports) describes the training and capacity building activities that have taken place in the period from the start of the project up to 31 August 2018.

The attendance register for the training provided during this period is included in **Appendix A**.

Completed course evaluation forms for the training provided during this period are given in **Appendix B**.

Hand-outs of the training material have been included in **Appendix C**.

All presentations have been provided to DWS and trainees in electronic format.

1.3 Planned Training and Progress

Table 1.1 indicates the training and capacity building activities undertaken to date, as well as the future planned activities.

Table 1.1: **Planned Training and Progress**

Training timeline	Training subject	Training completed
1-3 November 2017	Field-based training and attendance of various study meetings	3 days completed
31 August 2018	Training Workshop 1: Bulk Water Infrastructure Development Training, Bellville	1 day completed
1 November 2018	Training Workshop 2: Bulk Water Infrastructure Development Training, Pretoria	To be held
10 Sep - Dec 2018	Mentorship of interns	Not started yet

There had been several attempts to date to identify and engage trainees in internships, but this has been less successful. The trainees identified for their internships to start on 10 September 2018 at the Century City office of Aurecon are:

- Leon Nomjila of DWS, based in Bellville
- Johan van Zyl of DWS, based in Clanwilliam

These internships will focus on the options analysis activity.

2 Training Undertaken

2.1 Field-based Training

Officials from the Department of Water and Sanitation (DWS), Provincial Department of Agriculture, Western Cape (DoAWC) and Department of Agriculture, Fisheries and Forestry (DAFF) attended a study field trip, from 1 to 3 November 2017, along with the PSP, Aurecon, as part of the situation assessment activity of the study.

Three trainees (Table 2.1) joined the officials for the situation assessment field trip, and also attended several study meetings.

The group travelled together and at each component or area visited, as well as *enroute*, the history of the scheme, operational aspects, aspects relating to the study objectives and issues of interest to the trainees were explained.

Table 2.1: Trainees involved in field-based training

Trainee	Organisation	Telephone	Cell	Email
Takalani Rambere	DWS W Cape	021-941 6291		ramberet@dws.gov.za
Nyiko Makaring	DWS W Cape	021-941 6061	072 973 8234	makaringn@dws.gov.za
Uzair Bham	DWS W Cape	021-941 6323	083 415 0158	bhamu@dws.gov.za

The programme for the field trip was as follows:

Table 2.2: Field training programme

Item	Component / area visited
Wednesday, 1 November 2017	
1	Clanwilliam Dam
2	Lower Jan Dissels River

Item	Component / area visited
3	Clanwilliam WUA canal
4	Bulshoek Weir
5	LORWUA canal
6	Ebenhaeser
Thursday, 2 November 2017 (refer to Table 2.3)	
7	Attendance of study meetings in Vredendal and Clanwilliam
Friday, 3 November 2017	
8	Visit to typical farm in the Clanwilliam WUA area
9	Visit area around Clanwilliam Dam

The trainees attended the project meetings as indicated in Table 2.3.

Table 2.3: Project meetings attended by trainees

Meeting	Meeting Date
Fact-finding meeting with Lower Olifants River WUA	2 Nov 2017
Project Steering Committee, Clanwilliam	2 Nov 2017
Fact-finding meeting with Clanwilliam Water User Association (WUA)	3 Nov 2017

2.2 Training Workshop 1

A training course on Water Resource Development was held on the 31st of August 2018 at the DWS offices in Bellville for DWS. The training course was attended by 23 staff members from the DWS, regional office, one representatives of the DAFF national office and three (3) representatives from the Provincial Department of Agriculture, Western Cape, i.e. 27 trainees in total.

The training agenda was as included below.

Table 2.4: Agenda for Training Workshop 1

	Agenda		
Tea and coffee upon arrival			
1	08:30	Welcome and introductions	Chairperson
2	08:45	Overview of Bulk Water Development	Study Team: Erik van der Berg
	10:15	*Morning tea/coffee*	
6	10:30	Surface Water Hydrology	Study Team: Louise Dobinson
	12:00	*Lunch (will be provided)*	
7	12:45	Water Use, Requirements and Allocation	Study Team: Willie Enright
	14:15	*Afternoon tea/coffee*	
8	14:30	Water quality considerations in development planning	Study Team: Nico Rossouw
9	16:00	Discussion and questions	All
11	16:30	Closure	Chairperson

Erik van der Berg presented and discussed the **bulk water development** component. He introduced and provided an overview of development principles and approaches for the development of bulk water storage and conveyance infrastructure, and the various steps in the process, illustrated with examples. This also included an explanation of unit reference values (URVs).

Ms Louise Dobinson presented the **surface water hydrology** component. She explained the key concepts and approach to water resources assessment and hydrological modelling. The objective of the session was to provide the attendees with an overview of the context in which hydrological modelling is undertaken.

Willie Enright gave an overview of the **water use, future water requirements and water allocation** component. This addressed water use, the Reserve, water allocation reform, future supply and supply options, risk evaluation and proposed water allocation for the Clanwilliam Bridging Study.

Nico Rossouw presented the **water quality considerations** in development planning. He provided an overview of the value of water quality management and principles, and water quality sampling and analysis, focusing on aspects and examples relevant to the study.

On completing this training session, the participants should be:

- More familiar with the overall process and principles of bulk water development planning, and development responsibilities.
- Understand the basic principles of determination of a URV for a scheme.
- Understand the key concepts and some approaches to surface water hydrology and modelling.
- Be more familiar with water use, future water requirements and water allocation, and how it applies to the Clanwilliam Bridging Study.
- Be familiar with the principles and practices of water quality management in development planning, and the state of water quality in the lower Olifants River.

In terms of **lessons learnt,** most attendees agreed that the training was well organised and well presented, although a concern of several attendees was that the presentation material was less relevant to their roles and thus had limited practical relevance. Several trainees seemed under the impression that the training would only deal with the outcomes of the Clanwilliam Bridging Study. The course objectives should be conveyed very clearly for any further training, i.e. not only the agenda should be circulated to trainees before a training session. Some of the material also seemed challenging and several attendees would have preferred more focus on case studies and less general theory and background. The full-day training also seemed to be a bit much.

Appendices

APPENDIX A: ATTENDANCE REGISTER

TRAINING WORKSHOP 1: LIST OF ATTENDEES

On 31 August 2018 at DWS, Voortrekker/Blanckenberg Str, Bellville, 2nd floor boardroom

#	Name	Surname	Organisation	Contact number	Email address
1	Vivi	Mbandezelo	DoAWC	078 7415170	ViviM@elsenburg.com
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28	Louise	Dobinson	Aurecon	083 4575664	Louise.Dobinson@aurecongroup.com
29	Nico	Rossouw	Aurecon	021 5265762	Nico.Rossouw@aurecongroup.com
30	Willie	Enright	Aurecon	082 8073535	wateright1@gmail.com

Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam

1st Training Workshop: 31st August, DWS, Bellville

ATTENDANCE REGISTER

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APPENDIX B: COURSE EVALUATION FORMS

Copies of all evaluation forms have been provided electronically.

APPENDIX C: PRESENTATIONS AND HANDOUTS

Copies of all training material have been provided electronically.

Handout: Example of Unit Reference Value calculation:

NPV CALCULATION: DESALINATION SCHEME

System Yield	21.9	million m^3/a			Implementation Period	1.75	years	

CAPITAL COST COMPONENTS (R M)	**CIVIL**	**MECH/ELEC**	**OTHER**	**TOTAL**
Reservoir (60Ml)	59.00			59.00
Pumpstation to Mzingazi	1.48	5.98		7.46
Pipeline to Mzingazi	25.89	1.36		27.25
Marine works: intake and outfall	299.20	52.80		352.00
Desal plant	497.00	497.00		994.00
Power supply infrastructure		20.00		20.00
Land acquisition and site preparation			5.50	5.50
Access roads			5.50	5.50
Prof services & consulting fees				773.00
Total cost	882.57	577.14	11.00	**2243.71**

ANNUAL COST COMPONENTS (R MILLION)				
Maintenance	Civil	0.50%	4.41	
	Mech	4.00%	0.24	
	Dams	0.25%	0.00	
			4.65	
Desal labour			0.76	R/m^3
Chemical cost			0.55	R/m^3
Operating cost			15.80	
Other costs (Admin)			7.35	

Calender Year	**Year No**	**Supply (million m^3)**	**Pumpstations**	**Pipelines**	**Reservoir**	**Desal plant**	**Power supply infr**	**Land acq**	**Access Roads**	**Consulting fees**	**Desal labour**	**Chemical Cost**	**Maint cost**	**Elec cost**	**Other cost**	
2014	1		4.26	15.57	33.71	568.00	11.43	3.14	3.14	441.71	0.00	0.00				
2015	2	2.88	3.20	11.68	25.29	426.00	8.57	2.36	2.36	331.29	2.18	1.58	1.16	3.95	1.84	
2016	3	21.90									16.62	12.05	4.65	15.80	7.35	
2017	4	21.90									16.62	12.05	4.65	15.80	7.35	
2018	5	21.90									16.62	12.05	4.65	15.80	7.35	
2019	6	21.90									16.62	12.05	4.65	15.80	7.35	
2020	7	21.90									16.62	12.05	4.65	15.80	7.35	
2021	8	21.90				24.78					16.62	12.05	4.65	15.80	7.35	
2022	9	21.90									16.62	12.05	4.65	15.80	7.35	
2023	10	21.90									16.62	12.05	4.65	15.80	7.35	
2024	11	21.90									16.62	12.05	4.65	15.80	7.35	
2025	12	21.90									16.62	12.05	4.65	15.80	7.35	
2026	13	21.90									16.62	12.05	4.65	15.80	7.35	
2027	14	21.90				24.78					16.62	12.05	4.65	15.80	7.35	
2028	15	21.90									16.62	12.05	4.65	15.80	7.35	
2029	16	21.90									16.62	12.05	4.65	15.80	7.35	
2030	17	21.90	3.59								16.62	12.05	4.65	15.80	7.35	
2031	18	21.90									16.62	12.05	4.65	15.80	7.35	
2032	19	21.90									16.62	12.05	4.65	15.80	7.35	
2033	20	21.90				24.78					16.62	12.05	4.65	15.80	7.35	
2034	21	21.90									16.62	12.05	4.65	15.80	7.35	
2035	22	21.90		0.82							16.62	12.05	4.65	15.80	7.35	
2036	23	21.90									16.62	12.05	4.65	15.80	7.35	
2037	24	21.90									16.62	12.05	4.65	15.80	7.35	
2038	25	21.90									16.62	12.05	4.65	15.80	7.35	
2039	26	21.90				24.78					16.62	12.05	4.65	15.80	7.35	
2040	27	21.90									16.62	12.05	4.65	15.80	7.35	
2041	28	21.90									16.62	12.05	4.65	15.80	7.35	
2042	29	21.90									16.62	12.05	4.65	15.80	7.35	
2043	30	21.90									16.62	12.05	4.65	15.80	7.35	
2044	31	21.90									16.62	12.05	4.65	15.80	7.35	
2045	32	21.90	3.59			24.78					16.62	12.05	4.65	15.80	7.35	
2046	33	21.90									16.62	12.05	4.65	15.80	7.35	
2047	34	21.90									16.62	12.05	4.65	15.80	7.35	
2048	35	21.90									16.62	12.05	4.65	15.80	7.35	
2049	36	21.90									16.62	12.05	4.65	15.80	7.35	
2050	37	21.90									16.62	12.05	4.65	15.80	7.35	NPV Cost
NPV of supply @	6%	302.25	12.72	25.77	54.31	1007.89	18.41	5.06	5.06	711.55	216.42	156.83	64.72	219.80	102.31	2600.87
NPV of supply @	8%	238.99	12.17	25.08	52.90	975.98	17.93	4.93	4.93	693.02	167.96	121.71	51.28	174.14	81.06	2383.07
NPV of supply @	10%	194.62	11.66	24.42	51.55	946.06	17.47	4.81	4.81	675.35	134.29	97.31	41.84	142.10	66.14	2217.81
URV @	**6%**	**8.60**														
URV @	**8%**	**9.97**														
URV @	**10%**	**11.40**														

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