

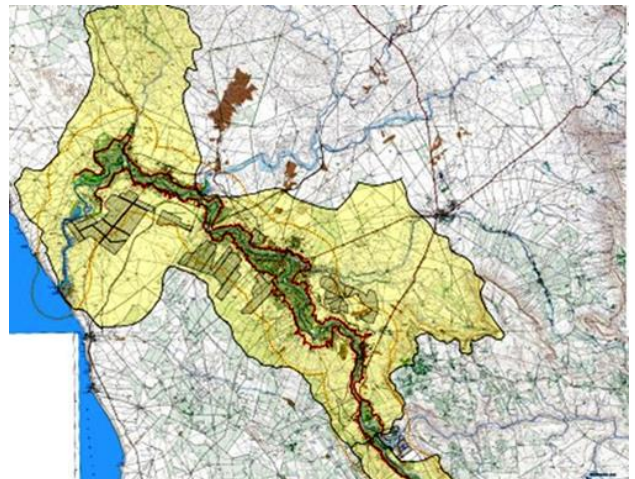


## water & sanitation

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 2



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 2  
**DWS Report Number** : P WMA 09/E10/00/0417/3  
**Consultants** : Aurecon South Africa (Pty) Ltd  
**Report status** : Final  
**Date** : February 2019

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**STUDY TEAM**

Approved for Aurecon South Africa (Pty) Ltd:

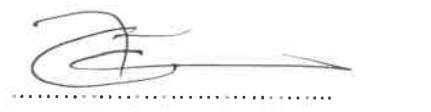
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*Technical Director*

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Directorate Options Analysis

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**DEPARTMENT OF WATER AND SANITATION**

Directorate: Options Analysis

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

**CAPACITY BUILDING AND TRAINING REPORT YEAR 2**

**Final: February 2019**

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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
<b>3</b>	<b>P WMA 09/E10/00/0417/3</b>	<b>Capacity Building &amp; Training Year 2</b>
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		<p><b>Inception</b> 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.</p>
2	P WMA 09/E10/00/0417/2	<p><b>Capacity Building &amp; Training Year 1</b> 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.</p>
3	P WMA 09/E10/00/0417/3	<p><b>Capacity Building &amp; Training Year 2</b> 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.</p>
4	P WMA 09/E10/00/0417/4	<p><b>Water Requirements Assessment</b> 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.</p>
5	P WMA 09/E10/00/0417/5	<p><b>Distribution of Additional Available Water</b> 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.</p>
6		<p><b>Existing Infrastructure and Current Agricultural Development Sub-Report</b> 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.</p>
7	P WMA 09/E10/00/0417/6	<p><b>Existing Conveyance Infrastructure and Irrigated Land</b> 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.</p>

<b>Report Index</b>	<b>Report Number</b>	<b>Report Title and Description of Content</b>
8		<b>Suitable Agricultural Areas and Land Ownership Sub-Report</b> 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		<b>Evaluation of Development Options Sub-Report</b> 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	<b>Suitable Areas for Agricultural Development</b> 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		<b>Right Bank Canal Feasibility Design Sub-Report</b> 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		<b>Conceptual Design Sub-Report</b> 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		<b>Environmental Screening Sub-Report</b> 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		<p><b>Jan Dissels and Ebenhaeser Schemes Feasibility Design Sub-Report</b> 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.</p>
15	P WMA 09/E10/00/0417/13	<p><b>Feasibility Design</b> Description of the approach to and design of selected bulk infrastructure at feasibility level, with supporting plans and implementation recommendations.</p>
16	P WMA 09/E10/00/0417/7	<p><b>Topographical Surveys</b> 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.</p>
17	P WMA 09/E10/00/0417/8	<p><b>Geotechnical Investigations</b> 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.</p>
18	P WMA 09/E10/00/0417/9	<p><b>Soil Survey</b> 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 Klaver.</p>
19		<p><b>Financial Viability of Irrigation Farming Sub-Report</b> 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.</p>
20	P WMA 09/E10/00/0417/11	<p><b>Agricultural Production and Farm Development</b> 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.</p>



<b>Report Index</b>	<b>Report Number</b>	<b>Report Title and Description of Content</b>
21		<b>Right Bank Canal Cost Analysis Sub-Report</b> 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		<b>Socio-Economic Impact Analysis Sub-Report</b> 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	<b>Socio-Economic Impact Analysis</b> 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	<b>Record of Implementation Decisions</b> 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	<b>Main Report</b> 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	<b>Historically Disadvantaged Farmers Report</b> 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:

- The Training and Capacity Building Workshop 2 held on 4 December 2018 in Pretoria on Bulk Water Infrastructure Development.
- Mentorship of DWS interns through secondment, for three trainees, from September 2018.

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# 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 second of two reports) describes the training and capacity building activities that have taken place in the period from 1 September 2018 to date.

The attendance register for training workshop 2 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 and described in the Capacity Building and Training Report Year 1.

**Table 1.1: Training and Progress, Year 1**

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

Table 1.2 indicates the training and capacity building activities undertaken and described in this report

**Table 1.2: Training and Progress, Year 2**

Training timeline	Training subject	Training completed
4 December 2018	Training Workshop 2: Bulk Water Infrastructure Development Training, Pretoria	1 day completed
11 - 21 Sep 2018 1 Nov to date	Mentorship of interns	<ul style="list-style-type: none"> <li>• Options analysis methodology</li> <li>• Use of QGIS and Autocad Civil3D software</li> <li>• Use of Google Earth Pro</li> <li>• Pipeline and pump station design and costing at reconnaissance level – in house spreadsheet use</li> <li>• Report writing</li> </ul>



## 2 Training Undertaken

### 2.1 Training Workshop 2

A training course on Water Resource Development was held on the 4<sup>th</sup> of December 2018 at the Aurecon offices in Pretoria for DWS head office staff. The training course was attended by 37 staff members from DWS head office, from the following Directorates:

- Options Analysis
- Water Resource Planning Systems
- Water Resource Planning
- Water Sector Skills Development
- RQS
- RQS Analytical Services
- Regional Co-ordination
- Infrastructure Development
- Civil Engineering
- Dam Safety Surveillance

The training agenda was as included below.

**Table 2.1: Agenda for Training Workshop 2**

<b>Time</b>	<b>Activity/Topic</b>
08:30-08:45	Welcome and Introduction
08:45-10:30	Overview of Bulk Water Resources Development
10:30-11:00	Tea/Coffee Break
11:00-12:30	Surface Water Hydrology
12:30-13:30	Lunch
13:30-14:30	Water Use, Future Water Requirements and Water Allocation
14:30-15:00	Tea/Coffee Break
15:00-16:30	Water Quality Considerations in Development Planning
16:30	Closure

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 Andriette Combrinck 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.

Erik van der Berg 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 and that it was relevant to their roles. Some trainees would have liked to receive training notes or slide printouts as well with pens/writing materials, preferably before the training course. One trainee commented that the URV explanation could possibly be simplified. Some trainees referred to more time being allowed for in-depth 'information' and practical tasks, i.e. allowing more time for the course. A request was made to provide further training for geotechnical/geological engineering.

## 2.2 Mentorship of interns

The trainees doing internships at the Century City office of Aurecon are:

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


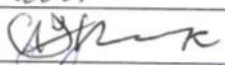




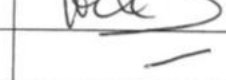
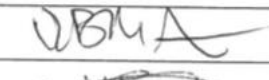

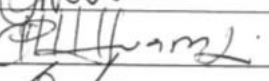
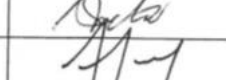
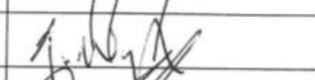

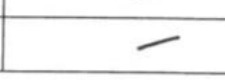




These internships are focussing on the options analysis activity, working within the consultant project team.

The trainees are not junior employees and they have other responsibilities to oversee for the Department. This has unfortunately resulted in their mentorship being continually interrupted.


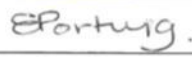






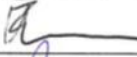






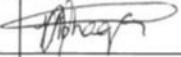
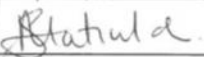

Records of staff secondments, that indicate actual time spent in the Aurecon office, as well as the learning activities, have been included in Appendix B. The training started on 11 September 2018. Special computers and software was however needed for the trainees. The trainees thus returned to DWS for a while until specially set up computers for them were available and returned to Aurecon during November 2018.






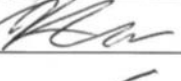
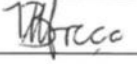

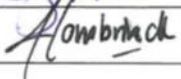


# Appendices

## APPENDIX A: ATTENDANCE REGISTER

WATER RESOURCE DEVELOPMENT - DWS INTERNAL TRAINING LECTURE Aurecon offices, Lynnwood Bridge, Pretoria - 04 December 2018					
No.	Attendee	Directorate	Telephone	E-mail	Signature
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3.	Ms Sanet van Jaarsveld	Options Analysis	012 336 7284	<a href="mailto:VanJaarsveldS@dws.gov.za">VanJaarsveldS@dws.gov.za</a>	
4.	Mr Tinashe Chizema	Options Analysis	012 336 6583	<a href="mailto:ChizemaT@dws.gov.za">ChizemaT@dws.gov.za</a>	
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7.	Mr Hristo Dudenski	Options Analysis	012 336 7849	<a href="mailto:DudenskiH@dws.gov.za">DudenskiH@dws.gov.za</a>	
8.	Dr Beason Mwaka	WR Planning Systems	012 336 8188	<a href="mailto:MwakaB@dws.gov.za">MwakaB@dws.gov.za</a>	
9.	Mr Richard Martin	WR Planning Systems	012 336 8072	<a href="mailto:MartinR@dws.gov.za">MartinR@dws.gov.za</a>	
10.	Mr Ntobeko Cele	WR Planning Systems	012 336 8816	<a href="mailto:CeleN2@dws.gov.za">CeleN2@dws.gov.za</a>	
11.	Mr Mondli Dlamini	WR Planning Systems	012 336 7913	<a href="mailto:DlaminiM4@dws.gov.za">DlaminiM4@dws.gov.za</a>	
12.	Itani Ndwambi	WR Planning Systems	012 336 6628	<a href="mailto:Ndwambii@dws.gov.za">Ndwambii@dws.gov.za</a>	
13.	Ms Sivashni Naicker	WR Planning Systems	012 336 8171	<a href="mailto:NaickerS@dws.gov.za">NaickerS@dws.gov.za</a>	
14.	Ms Jackie Jay	Water Quality Planning	012 336 7443	<a href="mailto:JayJ@dws.gov.za">JayJ@dws.gov.za</a>	
15.	Mr Jurgo Van Wyk	Water Quality Planning	012 336 8407	<a href="mailto:VanWykJ@dws.gov.za">VanWykJ@dws.gov.za</a>	
16.	Mr Tendani Nditwani	Water Resource Planning	012 336 8189	<a href="mailto:NditwaniT@dws.gov.za">NditwaniT@dws.gov.za</a>	
17.	Mr Patrick Mlilo	Water Resource Planning	012 336 8199	<a href="mailto:MliloP@dws.gov.za">MliloP@dws.gov.za</a>	
18.	Mr Lesego Lekubu	Operational Support	012 336 7142	<a href="mailto:LekubuL@dws.gov.za">LekubuL@dws.gov.za</a>	



<b>WATER RESOURCE DEVELOPMENT - DWS INTERNAL TRAINING LECTURE</b>					
<b>Aurecon offices, Lynnwood Bridge, Pretoria - 04 December 2018</b>					
<b>No.</b>	<b>Attendee</b>	<b>Directorate</b>	<b>Telephone</b>	<b>E-mail</b>	<b>Signature</b>
19.	Mr Nkosikhona Mbeje	Water Sector Skills Development	012 336 8678	<a href="mailto:MbejeN@dws.gov.za">MbejeN@dws.gov.za</a>	
20.	Ms Esna Portwig	RQS	012 808 9500	<a href="mailto:PortwigE@dws.gov.za">PortwigE@dws.gov.za</a>	
21.	Katlego Mashaba	RQS	012 808 9500	<a href="mailto:MashabaK@dws.gov.za">MashabaK@dws.gov.za</a>	
22.	Mr Adriaan van Rooyen	RQS	012 808 9500	<a href="mailto:VanRooyenA@dws.gov.za">VanRooyenA@dws.gov.za</a>	
23.	Zimbini Mazula	RQS	012 808 9500	<a href="mailto:MazulaZ@dws.gov.za">MazulaZ@dws.gov.za</a>	
24.	Onalenna Motlhaping	RQS	012 808 9500	<a href="mailto:MotlhapingO@dws.gov.za">MotlhapingO@dws.gov.za</a>	
25.	Ntuthuko Mthabela	RQS Analytical Services	012 808 9500	<a href="mailto:MthabelaN@dws.gov.za">MthabelaN@dws.gov.za</a>	
26.	Ms Kentse Mathiba	Regional Co-ordination	012 336 6875	<a href="mailto:MathibaK@dws.gov.za">MathibaK@dws.gov.za</a>	
27.	Mr Uzair Bham	Infrastructure Development	012 336 7926	<a href="mailto:BhamU@dws.gov.za">BhamU@dws.gov.za</a>	
28.	Mr Nyiko Makaring	Infrastructure Development	012 336 8219	<a href="mailto:MakaringN@dws.gov.za">MakaringN@dws.gov.za</a>	
29.	Mr Takalani Rambere	Infrastructure Development	012 336 6873	<a href="mailto:RambereT@dws.gov.za">RambereT@dws.gov.za</a>	
30.	Mr Tielman Burger	Civil Engineering	012 336 8216	<a href="mailto:burgert@dws.gov.za">burgert@dws.gov.za</a>	
31.	Mr Riaan De Lange	Civil Engineering	012 336 7674	<a href="mailto:DeLangeR2@dws.gov.za">DeLangeR2@dws.gov.za</a>	
32.	Mr Chris Hattingh	Civil Engineering	012 336 6542	<a href="mailto:HattinghC2@dws.gov.za">HattinghC2@dws.gov.za</a>	
33.	Mr Johan Hattingh	Civil Engineering	012 336 6541	<a href="mailto:hattinghi@dwa.gov.za">hattinghi@dwa.gov.za</a>	
34.	Mr Thando Maphaqa	Civil Engineering	012 336 2106	<a href="mailto:maphaqat@dws.gov.za">maphaqat@dws.gov.za</a>	
35.	Ms Shono Mathuloe	Civil Engineering	012 336 6772	<a href="mailto:mathuloes@dws.gov.za">mathuloes@dws.gov.za</a>	
36.	Ms Nompumelelo Mgabisa	Civil Engineering	012 336 8561	<a href="mailto:MgabisaN@dws.gov.za">MgabisaN@dws.gov.za</a>	

WATER RESOURCE DEVELOPMENT - DWS INTERNAL TRAINING LECTURE					
Aurecon offices, Lynnwood Bridge, Pretoria - 04 December 2018					
No.	Attendee	Directorate	Telephone	E-mail	Signature
37.	Ms Tsako Mkhabela	Civil Engineering	012 336 8783	<a href="mailto:mkhabelat@dws.gov.za">mkhabelat@dws.gov.za</a>	
38.	Ms Londeka Mnguni	Civil Engineering	012 336 8345	<a href="mailto:mngunil@dws.gov.za">mngunil@dws.gov.za</a>	-
39.	Ms Otilia Mthethwa	Civil Engineering		<a href="mailto:MthethwaO2@dws.gov.za">MthethwaO2@dws.gov.za</a>	-
40.	Mr Sylvester Mthethwa	Civil Engineering	012 336 8529	<a href="mailto:mthethwas@dws.gov.za">mthethwas@dws.gov.za</a>	
41.	Ms Samukelisiwe Ngubane	Civil Engineering	012 336 8773	<a href="mailto:ngubanes2@dws.gov.za">ngubanes2@dws.gov.za</a>	
42.	Mr Myezo Poyo	Civil Engineering	012 336 7436	<a href="mailto:poyom@dwa.gov.za">poyom@dwa.gov.za</a>	-
43.	Mr Vincent Ramphisa	Civil Engineering	012 336 8225	<a href="mailto:Ramphisak@dws.gov.za">Ramphisak@dws.gov.za</a>	Apology.
44.	Mr Johannes Van Zyl	Civil Engineering	012 336 8478	<a href="mailto:VanZylJ@dws.gov.za">VanZylJ@dws.gov.za</a>	
45.	Mr Motebele Moshodi	Dam Safety Surveillance	012 336 7748	<a href="mailto:MoshodiM@dws.gov.za">MoshodiM@dws.gov.za</a>	
46.	Ms Lucy Munro	Dam Safety Surveillance	012 336 7499	<a href="mailto:MunroL@dws.gov.za">MunroL@dws.gov.za</a>	
47.	Ms Phedorian Raophala	Dam Safety Surveillance	012 336 8546	<a href="mailto:RaophalaP@dws.gov.za">RaophalaP@dws.gov.za</a>	-
48.	Mr Bradley Africa	Dam Safety Surveillance	012 336 8963	<a href="mailto:AfricaB2@dws.gov.za">AfricaB2@dws.gov.za</a>	
49.	Mr Erik van der Berg	Aurecon	021 526 5790	<a href="mailto:Erik.VanDerBerg@arecongroup.com">Erik.VanDerBerg@arecongroup.com</a>	-
50.	Mr Nico Rossouw	Aurecon	021 526 5762	<a href="mailto:Nico.Rossouw@arecongroup.com">Nico.Rossouw@arecongroup.com</a>	
51.	Ms Andriette Combrinck	Aurecon	012 427 2344	<a href="mailto:Andriette.combrinck@arecongroup.com">Andriette.combrinck@arecongroup.com</a>	
52	MS Nelisiwe Mkhosi	CIVIL ENGINEERING	012 336 7887	<a href="mailto:MkhosiN@dws.gov.za">MkhosiN@dws.gov.za</a>	-
53	Johan van Zyl	Aurecon	012 427 2080	<a href="mailto:johan.vanzyl@arecongroup.com">johan.vanzyl@arecongroup.com</a>	
54	Simnikwe Mjadu	RDS	012 505 9534	<a href="mailto:mjadus@dws.gov.za">mjadus@dws.gov.za</a>	

## APPENDIX B: RECORD OF STAFF SECONDMENTS

### WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**SEPTEMBER 2018**

**Name:** Lindile Leon Nomjila

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
						1	
2	3	4	5	6	7	8	
							1
9	10	11	12	13	14	15	
		7.5	7.5	7.5			2 22.5
16	17	18	19	20	21	22	
							3
23	24	25	26	27	28	29	
							4
30							

### ACTIVITIES UNDERTAKEN

Week #	Short description of Activities
1	
2	Read through, Inception reports, Options discussion paper report and distribution of additional available water report to familiarise myself with project background and objectives.
3	
4	

## WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

This record captures the actual hours of secondment, working on the project and the activities undertaken.

**NOVEMBER 2018**

**Name:** Lindile Leon Nomjila

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
				1	2	3	
							1
4	5	6	7	8	9	10	
	8	8	8	0 (Sick)	0		2 24
11	12	13	14	15	16	17	
	0 (DWS office)	8	8	8	7		3 31
18	19	20	21	22	23	24	
	0 (DWS Office)	8	6	7	8		4 29
25	26	27	28	29	30		
	0 (DWS Office)	8	8	8	0 Site visit/ meeting		5 24

### ACTIVITIES UNDERTAKEN

Week #	Short description of Activities
1	
2	<ul style="list-style-type: none"> <li>Getting started with computer setup with IT, telephone call obtaining new password with IT abroad as the old one has expired.</li> <li>Read project report; Suitable Agricultural Land Ownership Report for background knowledge.</li> <li>Downloading QGIS files.</li> <li>Installation of autoCad Civil 3D.</li> <li>Going through Pipeline Costing examples on excel spread shit.</li> <li>Meeting with Erik to discuss things that we should do to try and catch-up quickly and where to find them, and to discuss Daniel's Generic planning and costing notes for dams. Allen to comment on it and use the same approach for canals.</li> </ul>

Week #	Short description of Activities
3	<ul style="list-style-type: none"> <li>• Certification: Anti bribery and Corruption, Went through the Code of Conduct and Health and Safety online training.</li> <li>• Read through Suitable Agricultural Land Option Report amended.</li> <li>• Doing an exercise on different options for water distribution to Jakkalsvlei /Graafwater area using google earth and autoCad Civil 3D Went through Option Reference Guide to check who is responsible or to contact for what aspects of the project.</li> </ul>
4	<ul style="list-style-type: none"> <li>• Recording activities/ tasks and hours worked on the record.</li> <li>• Pipeline costing examples</li> <li>• Attended Project Steering Committee meeting no.7</li> </ul>
5	<ul style="list-style-type: none"> <li>• Pipe line costing Option 1</li> <li>• Pipe line costing Option 2</li> <li>• Converting the pipe route (Coordinates &amp; Altitude) into (Chainage &amp; Elevation) using GPS visualizer and pro-plan route</li> <li>• Pipe line costing Option 3</li> <li>• Pipe line costing Option 4</li> <li>• Doing cost comparison between the two options.</li> </ul>



## WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**DECEMBER 2018**

**Name:** Lindile Leon Nomjila

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
						1	
2	3	4	5	6	7	8	
	0 (DWS Office)	7	8	8			1 23
9	10	11	12	13	14	15	
	6	8	8				2 22
16	17	18	19	20	21	22	
	Public Holiday 0	8	8				3 16
23	24	25	26	27	28	29	
							4
30							

### ACTIVITIES UNDERTAKEN

Week #	Short description of Activities
1	Assisting Mlungisi with pipeline options and costing using google earth Assisting Mlungisi with converting google earth coordinates and altitude into chainage and elevation using pro-plan route and visualizer. Doing maps for each of the 31 options. Preparing documents and maps for options workshop
2	Options evaluation workshop Day1 Options evaluation workshop Day 2
3	Water requirements and design flows for new area (23-30) New areas pipeline design (24-30)
4	

## WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**JANUARY 2019**

**Name:** Leon Nomjila

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
		1	2	3	4	5	
		Leave	Leave	Leave	Leave		1 0
6	7	8	9	10	11	12	
	Leave	Leave	Leave	Leave	Leave		2 0
13	14	15	16	17	18	19	
	Leave	Bellville Office	Bellville Office	Bellville Office	Bellville Office		3 0
20	21	22	23	24	25	26	
	Bellville Office	7	8	6	8		4 29
27	28	29	30	31			
	8	8	8	8	3		5 35

### ACTIVITIES UNDERTAKEN

Week #	Short description of Activities
1	Leave
2	Leave
3	Pipeline design for new areas 27, 28,29 and 30
4	Pipeline design for new areas 31,32, and 34
5	Pipeline design for new areas 35, 36, and 40 Checking which of the identified areas for the project falls within biodiversity sensitive areas on google earth and autocad. Amendments to the report on balancing dam costs

**WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam:  
RECORD OF DWS STAFF SECONDMENT**

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**September 2018**

**Name:** Mlungisi Fodini

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
						1	
2	3	4	5	6	7	8	
							1
9	10	11	12	13	14	15	
		<b>7.5</b>	<b>7.5</b>	<b>7.5</b>			2 <b>22.5</b>
16	17	18	19	20	21	22	
							3
23	24	25	26	27	28	29	
							4
30							

**Activities undertaken**

Week #	Short description of Activities
1	
2	<ul style="list-style-type: none"> <li>Read through, Inception reports, Options discussion paper report and distribution of additional available water report to familiarise myself with project background and objectives.</li> </ul>
3	
4	

## WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**DECEMBER 2018**

**Name:** Mlungisi Fodini

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
						1	
2	3	4	5	6	7	8	
	6	8	8	7	8		1 37
9	10	11	12	13	14	15	
	DWS	DWS	DWS	DWS	DWS		2
16	17	18	19	20	21	22	
	0 (public holiday)	8	8	8	6		3 30
23	24	25	26	27	28	29	
	Leave	Xmas	Family Day	Leave	Leave		4 0
30							

### Activities undertaken

Week #	Short description of Activities
1	<ul style="list-style-type: none"> <li>▪ Getting started with computer setup with IT, logged call to obtain new password.</li> <li>▪ Read project report; Suitable Agricultural Land Ownership Report for background knowledge.</li> <li>▪ Have discussion with Leon to assist &amp; Waseem to bring me up to speed with pipeline costing calculation for shortlisted options.</li> <li>• Doing pipeline costing examples on excel spread sheet for optimisation for some of the shortlisted options.</li> <li>• Creating maps for pipes with their respective areas on google earth for some of the shortlisted options.</li> </ul>
2	<ul style="list-style-type: none"> <li>▪ DWS (whole week)</li> </ul>
3	<ul style="list-style-type: none"> <li>▪ Calculating the cost of land for the new irrigable land.</li> <li>▪ Doing new pipeline design using Google Earth.</li> </ul>
4	<ul style="list-style-type: none"> <li>▪ Leave (whole week &amp; including holidays)</li> </ul>

**WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam:  
RECORD OF DWS STAFF SECONDMENT**

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**JANUARY 2019**

**Name:** Mlungisi Fodini

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
		1	2	3	4	5	
	New Year	Leave	Leave	Leave	Leave		1 0
6	7	8	9	10	11	12	
	Leave	Leave	Leave	Leave	Leave		2 0
13	14	15	16	17	18	19	
	Sick Leave	Sick Leave	Sick Leave	Sick Leave	Sick Leave		3 0
20	21	22	23	24	25	26	
	DWS	DWS	DWS	DWS	DWS		4 0
27	28	29	30	31			
	DWS	DWS	DWS	DWS	DWS		5 0

**ACTIVITIES UNDERTAKEN**

Week #	Short description of Activities
1	▪ Leave (whole week & including holidays).
2	▪ Leave (whole week).
3	▪ DWS (whole week).
4	▪ DWS (whole week).

## WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**November 2018**

**Name:** Johan van Zyl

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
				1	2	3	
				5	4		1 9
4	5	6	7	8	9	10	
	9	7	8	0	4		2 28
11	12	13	14	15	16	17	
	9	6	8	8	4		3 37
18	19	20	21	22	23	24	
	8	8	7	0	4		4 27
25	26	27	28	29	30		
	8	0	0	0	0		5 8

### ACTIVITIES UNDERTAKEN

Week #	Short description of Activities
1	Working through the reports to get the background of the project.
2	River Losses to Evaporation (quick study). Calculated the area of the river with Google Earth and used the MAE and MAP to calculate the losses.
3	River Losses to Evaporation (detailed study). Calculated the area of the river with ArcGIS and used the MAE and MAP to calculate the losses. Importing images from Google Earth and georeferencing them in ArcGIS. Anti-bribery and Corruption/Code of Conduct/Global Health & Safety online training. Meeting with Prof Andre Gorgens.
4	River Losses to Evaporation (detailed study). Calculated the area of the river with ArcGIS and used the MAE and MAP to calculate the losses. Importing images from Google Earth and georeferencing them in ArcGIS
5	River Losses to Evaporation (detailed study).



**WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam:  
RECORD OF DWS STAFF SECONDMENT**

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**DECEMBER 2018**

**Name:** Johan van Zyl

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
						1	
2	3	4	5	6	7	8	
	8	8	5	0 (Clanwilliam Office)	0 (Clanwilliam office)		1 21
9	10	11	12	13	14	15	
	0 (V&V meeting BVL office)	8 (Meeting Elsenburg)	8 (Meeting Elsenburg)	8	4		2 28
16	17	18	19	20	21	22	
	Public Holiday	8	8	4	0 (Clanwilliam Office)		3 20
23	24	25	26	27	28	29	
	Leave	Leave	Leave	Leave	Leave		4 0
30							

**ACTIVITIES UNDERTAKEN**

Week #	Short description of Activities
1	Pipe line costing calculations for the proposed options.
2	Options meeting and evaluation of the options.
3	Calculating of water requirement for amended and new areas identified in options meeting. Planning pipe routes and calculating pipe size, cost
4	

## WP0485 Post Feasibility Bridging Study for the Proposed Bulk Conveyance Infrastructure from the Raised Clanwilliam Dam: RECORD OF DWS STAFF SECONDMENT

*This record captures the actual hours of secondment, working on the project and the activities undertaken.*

**JANUARY 2019**

**Name:** Johan van Zyl

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Weekly hours
		1	2	3	4	5	
		Leave	Leave	Leave	Leave		1 0
6	7	8	9	10	11	12	
	Leave	Leave	Leave	Leave	Leave		2 0
13	14	15	16	17	18	19	
	Clanwilliam Office	Clanwilliam Office	Clanwilliam Office	8	4		3 12
20	21	22	23	24	25	26	
	8	8	8	7	4		4 35
27	28	29	30	31			
	Clanwilliam Office	9	8	8			5 25

### ACTIVITIES UNDERTAKEN

Week #	Short description of Activities
1	Leave
2	Leave
3	Finalizing the section on potion cost in Sub Report Cost of water supply to farm boundary.
4	Finalizing the section on potion cost in Sub Report Cost of water supply to farm boundary.
5	Generating shape files and converting them to kmz files for identified areas.

## **APPENDIX C: COURSE EVALUATION FORMS**

Copies of all evaluation forms have been provided electronically.

## **APPENDIX D: 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 <sup>3</sup> /a			Implementation Period		1.75 years									
CAPITAL COST COMPONENTS (R M)					ANNUAL COST COMPONENTS (R MILLION)											
	CIVIL	MECH/ELEC	OTHER	TOTAL												
Reservoir (60MI)	59.00			59.00	Maintenance	Civil	0.50%	4.41								
Pumpstation to Mzingazi	1.48	5.98		7.46		Mech	4.00%	0.24								
Pipeline to Mzingazi	25.89	1.36		27.25		Dams	0.25%	0.00								
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	Desal labour			0.76						R/m <sup>3</sup>		
Access roads			5.50	5.50	Chemical cost			0.55						R/m <sup>3</sup>		
Prof services & consulting fees				773.00	Operating cost			15.80								
Total cost	882.57	577.14	11.00	<b>2243.71</b>	Other costs (Admin)			7.35								
Calender Year	Year No	Supply (million m <sup>3</sup> )	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 of supply @ 6%	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%	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%	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
<b>URV @ 6%</b>	<b>6%</b>	<b>8.60</b>														
<b>URV @ 8%</b>	<b>8%</b>	<b>9.97</b>														
<b>URV @ 10%</b>	<b>10%</b>	<b>11.40</b>														



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