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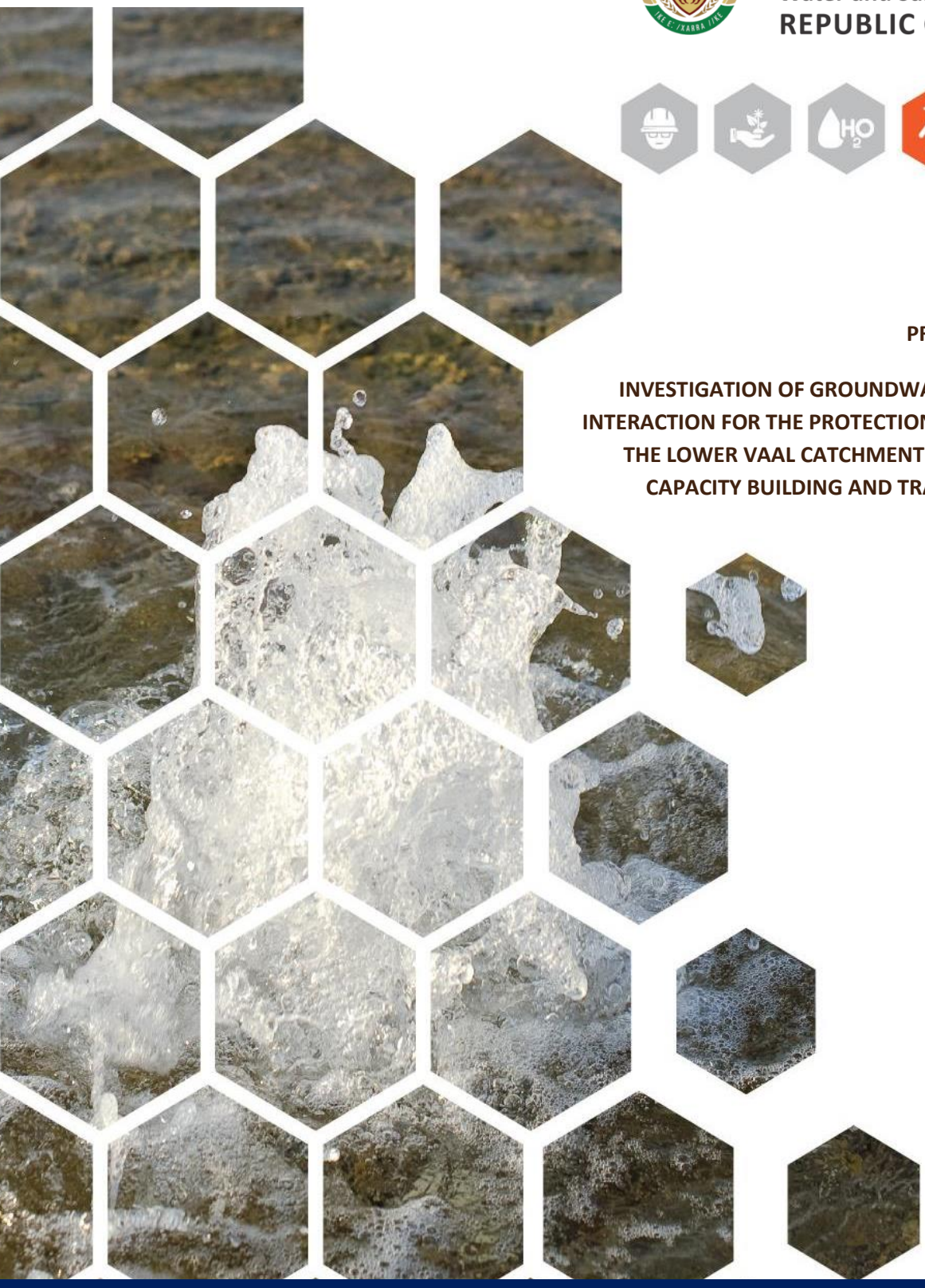

PROJECT NUMBER: WK21047

INVESTIGATION OF GROUNDWATER AND SURFACE WATER INTERACTION FOR THE PROTECTION OF WATER RESOURCES IN THE LOWER VAAL CATCHMENT. SURFACE GROUNDWATER CAPACITY BUILDING AND TRAINING REPORT (WP11380)

DATE: September 2023

REPORT VERSION: V1.0

WP11380

DWS REPORT NUMBER: RDM/WMA05/00/GWSW/0623

DEPARTMENT OF WATER AND SANITATION

CHIEF DIRECTORATE: WATER ECOSYSTEMS

INVESTIGATION OF GROUNDWATER AND SURFACE WATER INTERACTION FOR THE PROTECTION OF WATER RESOURCES IN THE LOWER VAAL CATCHMENT WP11380

CAPACITY BUILDING AND TRAINING REPORT

SEPTEMBER 2023
FINAL

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DOCUMENT INDEX

Report name	Report number
Inception Report	RDM/WMA05/00/GWSW/0122
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Gap Analysis Report	RDM/WMA05/00/GWSW/0322
Hydrocensus Report	RDM/WMA05/00/GWSW/0422
Water Resources Assessment Report	RDM/WMA05/00/GWSW/0522
Quantified Recharge and Baseflow Report	RDM/WMA05/00/GWSW/0123
Groundwater Quality Categorization Report	RDM/WMA05/00/GWSW/0223
Protection Zones Report	RDM/WMA05/00/GWSW/0323
Surface-Groundwater Interaction Report	RDM/WMA05/00/GWSW/0423
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Main Report on Surface-Subsurface Interactions	RDM/WMA05/00/GWSW/0723
Close-out Report	RDM/WMA05/00/GWSW/0823

Bold indicates this report

APPROVAL

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REPORT SCHEDULE

Version	Date
First draft	September 2023
Second draft	
Final	September 2023

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BHNR	Basic Human Needs Reserve
CD: WEM	Chief Directorate: Water Ecosystems Management
CV	Coefficient of Variability
Dir: NWRP	Directorate National Water Resource Planning
DM	District Municipality
DWS	Department of Water and Sanitation
EIA	Environmental Impact Assessment
GRAII	Groundwater Resource Assessment Phase II
GRIP	Groundwater Resource Information Project
GRUs	Groundwater Resource Units
IUA	Integrated Unit of Analysis
ISP	Internal Strategic Perspective
MAP	Mean annual precipitation
MAR	Mean Annual Runoff
MCA	Multi-Criteria Analysis
MRU	Management Resource Units
NGA	National Groundwater Archive
NGI	National Geo-spatial Information
NWA	National Water Act
OCSD	Off-Channel Storage Dam
PES	Present Ecological State
PES/EI/ES	Present Ecological State/Ecological Importance/Ecological Sensitivity
PM	Project Manager
PMC	Project Management Committee
PSC	Project Steering Committee
PSP	Professional Service Provider
RDRM	Revised Desktop Reserve Model
REC	Recommended Ecological Category
RO	Regional Office
RPO	Red Meat Producers Organisation
RQO(s)	Resource Quality Objective(s)
RU(s)	Resource Unit(s)
SALGA	South African Local Government Association

SAM	Social Accounting Matrix
ToR	Terms of Reference
TPC(s)	Threshold(s) of Probable Concern
WARMS	Water Authorisation and Management System
WIM	Water Impact Model
WMA	Water Management Area
WR2012	Water Resources of South Africa 2012
WRC	Water Resource Classes
WRCS	Water Resource Classification System
WRSM2000/Pitman	Water Resources Simulation Model 2000 – Pitman Model
WRUI	Water Resource Use Importance
WRYM	Water Resources Yield Model
ZQM	National Groundwater Quality Monitoring Network

1 INTRODUCTION

1.1 Study Context

The purpose of the NWA (1998) is to ensure that the nation's water resources are protected, used, developed, conserved, managed and controlled in ways which take into account amongst other factors: promoting equitable access to water; redressing the results of past racial and gender discrimination; promoting the efficient, sustainable and beneficial use of water in the public interest; facilitating social and economic development; protecting aquatic and associated ecosystems and their biological diversity and; meeting international obligations (NWA, 1998). Chapter 3 introduces a series of measures which together are intended to protect all water resources.

The Chief Directorate: Water Ecosystems Management (CD: WEM) is tasked with the responsibility to coordinate all Reserve determination studies which have priority over other uses in terms of the NWA.

This study intends to determine and quantify groundwater and surface water interactions and identify protection zoning to prevent the disturbance of the ecological integrity of ecosystems where such interactions occur. A feasibility study undertaken by the Department of Water and Sanitation (DWS) in 2007 and the National Water Resource Strategy II identified the need for surface-subsurface interaction studies in the lower Vaal. The purpose of such studies would be understanding subsurface processes when determining the Reserve.

1.2 Aims and Objectives of the Project

The need to undertake significant groundwater-surface water interaction studies became apparent to the DWS due to the need to understand the groundwater balance when determining the Reserve. Groundwater not only provides for dispersed water supply needs, but also make significant contributions to the ecological reserve, as well as to Basic Human Needs for future water supply. The main objectives of the study are:

- Review existing water resource information;
- Conduct a hydrocensus on an institutional level;
- Conduct a water resource assessment of surface water, groundwater, baseflow, abstraction, surface and groundwater balance, present status category;
- Quantify aquifer parameters and describe aquifer types;
- Determine groundwater-surface water interactions both in terms of quality and quantity to determine protection zones;
- Capacity building and skills transfer to DWS staff.

1.3 Purpose and Outline of Report

This report forms the final deliverable of the study and serves as feedback on the capacity building undertaken during the project and the skills transferred.

Chapter 1: Introduction: provides a general background to the project, study area and purpose of the project.

Chapter 2: Capacity Building and Training: the training programme is discussed.

1.4 Study Area

The Lower Vaal catchment (former WMA 10) lies in the north-eastern part of the Northern Cape Province, the western part of Northwest Province, and a part of the northern Free State Province (**Figure 1-1)**. It contains the Molopo, Harts, and Vaal (below Bloemhof dam) catchments. The basins are located in a semi-arid to arid region of South Africa. Most of the surface water resources originate upstream of Bloemhof dam. Groundwater is an important water resource, especially in areas located away from surface water bodies. Groundwater use depletes the already meagre surface water resources by inducing losses from river channels or depleting flow from dolomitic eyes and as baseflow. The water in the Lower Vaal region drains to the Lower Orange drainage region before reaching the Atlantic Ocean near the town of Alexander Bay in the western corner of the country.

Included in these basins are the Lower Vaal (C9) River, the incremental catchment downstream of Bloemhof Dam and upstream of Douglas weir, the Harts (C3), and Kuruman/Molopo catchments (D4). These catchments include Tertiary catchments C31-C33, C91-92, D41, and Quaternary catchments D73A, D42C-D, D73B-E. These catchments also contain dolomite aquifers, where interaction with surface water can be significant.

The Lower Vaal is located between the Middle Vaal drainage region and the Lower Orange drainage region, with the Upper Orange basin to the southeast, and Botswana to the north. The Lower Vaal has an area of approximately 136 146 km^2. It excludes the Riet-Modder River catchment) (C5), the Molopo River system above its confluence with the Nossob (parts of D42) and portions of the Vaal River catchment below the confluence with the Harts and Douglas weir (parts of C92B and C, and D71B). It is important to note that although the Riet-Modder Catchment forms part of the Vaal River Basin, it is included as part of the Upper Orange River sub-system, mainly because there are several transfers from the Orange River to support water requirements in the Riet-Modder catchment. The only connection between the Vaal and Riet-Modder rivers is the spills from the Riet-Modder catchment into the Vaal River just upstream of Douglas Weir.

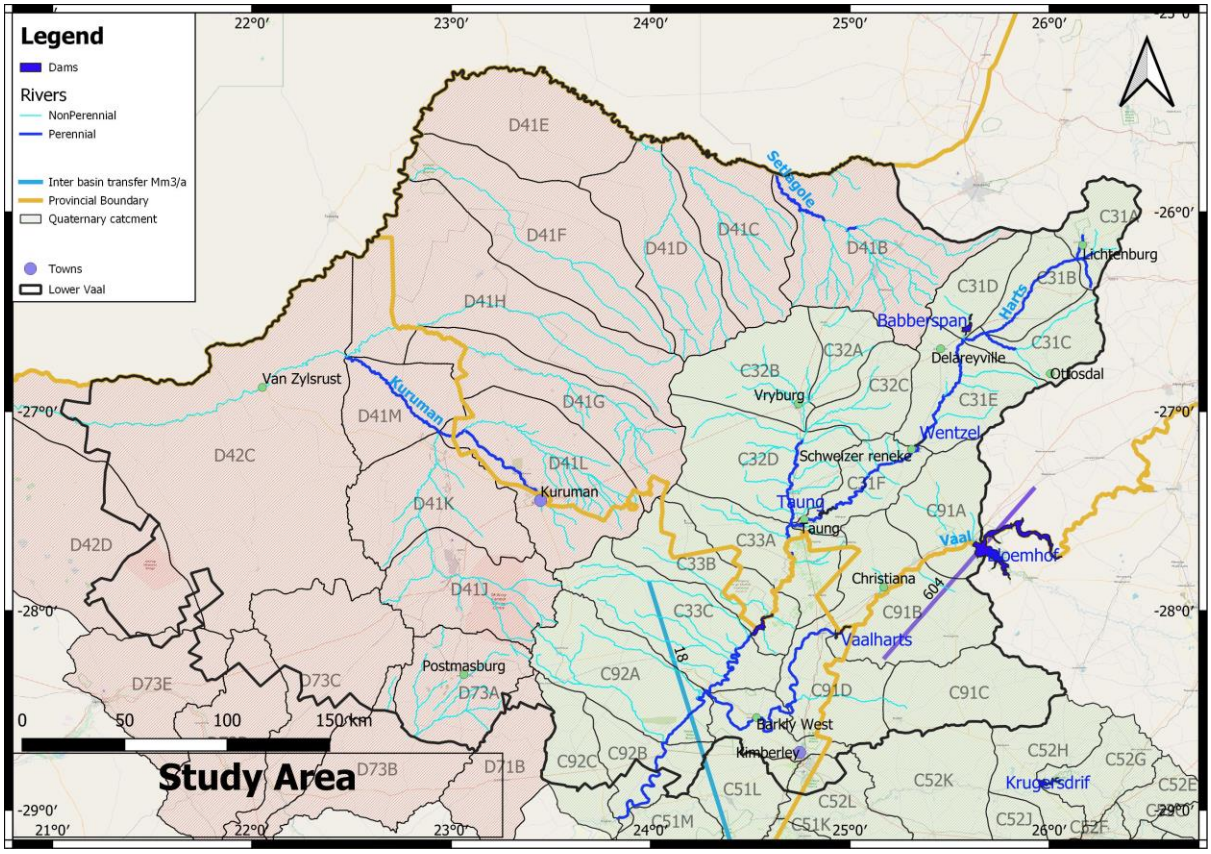

Figure 1-1 Lower Vaal drainage Region

The main rivers of the Lower Vaal catchment, the Vaal, and Harts, are perennial and most of their tributaries are ephemeral. The main source of surface water is the Vaal River, which flows into the study area below Bloemhof Dam, before its confluence with the Orange River. The main dams are Wentzel, Taung, Spitskop, Vaalharts Weir, Douglas weir and Bloemhof. The largest pan is Barberspan, located in the Harts sub-catchment.

The Kuruman and Molopo Rivers, which drain the Kalahari and northern Lower Orange regions of Drainage region D, do not make a meaningful contribution to the surface water resources of the Orange River, and only interact with groundwater via evapotranspiration and losses of flow generated by upstream springs into dry river channels. These dolomitic springs form distinct groundwater ecosystems and are themselves a form of surface-groundwater interaction.

The Molopo and its tributary the Kuruman River together drain the western part of the Lower Vaal catchment. The Kuruman River originates approximately 35 km southeast of Kuruman and becomes ephemeral approximately 120 km north-west of Kuruman, east of Van Zylrust.

Major towns include Kimberley, Lichtenburg, Kuruman, Vryburg and Postmasburg.

2 CAPACITY BUILDING AND TRAINING

2.1 Defining Scope and Content

The Capacity Building task as described in the Inception report had as an objective the further capacitation of DWS staff. The process followed was through liaison with DWS during the inception phase of the study. A 5-day training session in the use and application of the DWS water resource models was envisaged, with specific attention to the groundwater-surface water interaction simulation methods.

2.1.1 Approach:

- Training course in data extraction to assess groundwater resources
- Training course on WRSM2000/Pitman with emphasis on modelling surface-groundwater interactions with hands on application of the model, together with raining material
- Participation of DWS by parallel assessment of data used throughout the study
- Secondment of staff for certain tasks

The training will also include the following:

- Presenting the theory and simulation algorithms with interactive discussions.
- Demonstrating the application of the surface-groundwater model using example catchments.
- Practicals for trainees to evaluate key concepts:
    - Baseflow separation.
    - Recharge derived from Soil Moisture – output of rainfall-runoff model.
    - Evaluate model parameter sensitivities on the simulation results.

Discussions with DWS led to the following approach:

2.1.2 Expectations

- An introductory background;
- To analyse, evaluate and manage data; and
- To do the actual WRSM Pitman modelling.

2.1.3 Background of Delegates

A few have groundwater modelling background from University but have not been using modelling software in a very long while.

Most weren't comfortable with numerical data: hence we propose an introduction then the actual modelling.

Both a lecture and hands on training with access to software and data.

2.1.4 PSP Needs Analysis

What is needed in South Africa now for RDM studies and water resources studies is the integration of surface and groundwater on a common platform and how they impact on each other to derive an integrated water balance. This can be achieved using WRSM Pitman modelling with the groundwater component included. The networks developed for the project, which will be shared with them to learn how to calibrate against the existing data sets.

The D41A catchment was used as a preliminary training exercise. This network and has many training advantages:

- It emphasises the drying up of springs from interaction with high groundwater abstraction.
- It has dolomite and non-dolomite areas so clearly shows the need to consider groundwater in delineation of runoff units.
- Dolomite catchments, having largely groundwater-controlled runoff, make it is easier to see the impact of groundwater parameters and how they impact model calibration.
- D41A has the Molopo eye (non-impacted) and Grootfontein (highly impacted and spring dried up) to see how groundwater abstraction impacts baseflow
- A groundwater report was completed for the Northern reconciliation Strategy hence the hydrogeology and model network are well described.
- It is also hydrologically part of Lower Vaal as it feeds into D41, the Molopo basin.

The candidates selected by the DWS for training are listed below:

Capacity Building Candidates
Molokomme, Lerato
Boniwe, Nobubele
Majola, Kwazikwakhe
Khoza, Philani
Netshiendeulu, Ndivhuwo
Fuku, Portia Leah
Thebe, Olebogeng(Kimberley)
Baloyi, Lucky (Kimberley)
Ngilande, Terrence (Bloemfontein)
Mulangaphuma, Lawrence
Mazibuko, Molefi
Gonah, Ticha
Makhwedzha, Rendani
Naicker, Sivashni

2.2 Training Provided

The training in November 2022 consisted of several aspects:

- A basic introduction to groundwater interaction processes, and the significance of groundwater in the GRDM process
- Available data and how to identify common data errors
- Calibration of WRSM Pitman
- Introduction to using WRSM Pitman
- The D41A catchment
- Hands on calibration of D41A by delegates working in pairs
- Report back by delegates on their calibration results and the impacts of abstraction
- Selection of another catchment by delegates for group calibration
- Discussion on lessons learnt
- All delegates given a log-in to water Resources 2012 for future model networks and obtaining data

2.3 Agenda

The agenda of the training is shown in **Table 2-1.**

Table 2-1 Training agenda

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SURFACE - SUBSURFACE INTERACTIONS IN THE LOWER VAAL

GROUNDWATER TRAINING SESSION

Venue: WRP Boardroom Groenkloof Pretoria

Aims: (1) General dissemination of information regarding groundwater concepts; (2) discussion around groundwater-surface water interactions; and (3) the groundwater understanding needed by water resource manager (4) hand on-training with interaction modelling in WRSM 2000 managers.

Learning outcomes: The groundwater training session will aid managers in understanding groundwater concepts and data outputs in the RDM context, identify common errors, and introduce them to integrated SW-GW modelling of interactions.

Subject	**Time** **Start 10:00:00 AM**
DAY 1: SESSION 1 - OBJECTIVES AND BASIC GROUNDWATER CONCEPTS	
1.1 Objectives of groundwater workshop 1.2 Groundwater and RDM 1.3 Basic concepts and definitions of terms (e.g. baseflow, recharge, interflow) 1.4 Steps in integrating Groundwater into the GRDM process	
LUNCH	
DAY 1: SESSION 2 - QUANTIFYING GROUNDWATER-SURACE WATER INTERACTIONS	
1.5 What water resource managers should look for - common errors 1.6 Interactive modelling: GRAII and WRSM Pitman 1.7 Purpose and calibration 1.6 Common data errors	
DISCUSSION + CLOSURE	**16:00** **Start 09:00:00 AM**

DAY 2: SESSION 1 - WRSM PITMAN MODEL	
Recap Session 2 of 22nd November 2.1 Introduction to WRSM - Pitman	
LUNCH	
DAY 2: SESSION 2 - WRSM PITMAN	
2.2 Interactions in WRSM Pitman 2.3 Calibration 2.4 Data outputs and manipulation 2.5 Data presentation	
DISCUSSION + CLOSURE	**15:00** **Start 09:00:00 AM**
DAY 3: SESSION 1 - SETTING UP INTERACTION MODEL FOR UPPER MOLOPO D41A	
3.1 Presentation of data On Upper Moplopo and Background 3.2 Groups of 2 to take the data and begin data entry **LUNCH** 3.3 Report Back on conceptual model and calibration targets 3.4 Discussion of issues and problems	
CLOSURE	**16:00** **Start 09:00:00 AM**
DAY 4: SESSION 2 - CALIBRATION IN GROUPS OF 2	
4.1 Calibration of Molopo 4.2 Groups to present calibration results **LUNCH**	
4.3 Report Back by groups on calculated water levels, baseflow, recharge etc 4.4 Discussion of issues and problems 4.5 Group discussion. Lessons learnt problems and challenges for GRDM	
CLOSURE	**15:00**
Day 1 is an open presentation, with questions as we progress Day 2 is training in WRSM Pitman by Allan Bailey, one of the developers of the model Day 3 and 4 are only short background presentations of study area for the day. Delegates than work with supplied data Delegates will be required to bring computers to Day 2, 3 and 4 Data files will be presented in excel or text files	
Presenter KS: Karim Sami AB Allan Bailey	

2.4 Feedback on Phase 1

Course evaluation forms were provided, and the feedback is given in Appendix 1.

2.5 Phase 2

Feedback from the previous course suggested more surface water training is desired so the Harts River with a gauging station was selected as the most suitable network

Phase 2 in 2023 consisted of the following steps:

- Two-hour refresher course online focussed on calibration of surface and groundwater
- Provide delegates with the Upper Harts River network to calibrate surface and groundwater via independent work
- Group feedback on calibration results
- Give delegates a task to assess a WULA for a groundwater abstraction and whether it should be awarded in terms of meeting an RQO of inflows into a dam

Desired Outcome: Give delegates time to think about conceptual model, parameterisation and try and solve a problem independently. Solve a realistic scenario of a licence application and impact on Reserve.

The programme for Phase 2 is shown in **Table 2-2**.

Table 2-2 Phase 2 Programme

ACTION	TIME REQUIRED	TOTAL TIME FRAME	RESPONSIBLE
Identify and confirm returning and new delegates	2 weeks	2 weeks	LM
2- hour refresher course online	Date To be confirmed	3 weeks	LM to set based on availability of delegates
Send a Harts river WRSM network and handout on parameters to calibrate	1 week after refresher	1 month	KS
Independent work	1 week – 1 month to be agreed	2 months	delegates
Group online feedback on calibration and justification	Half day		ALL
Set exercise of WULA application and set reserve to protect	Day after group online		KS
Independent work	1 week	9 weeks	delegates
Half day feedback of impact of WULA on water resources and Reserve. Delegates to motivate to grant WULA or NOT or what they would allocate		10 weeks	ALL

2.6 Materials Provided

The following was provided to the delegates who partook in the programme:

- Full D41A WRSM Pitman Model network 1920-2020
- Sami groundwater manual theory and calibration manual
- Registration and Logins to Water Resources 2012 to obtain national Networks
- Copy of all presentations
- C31 WRSM Pitman Model network 1920-2020

3 APPENDIX 1 FEEDBACK

EASE OF UNDERSTANDING

Please select the most relevant response to each question.

Were the goals/objectives of the training clearly defined at the start of the course? *

1. ( ) Yes
2. ( ) To some extent
3. ( ) No
4. ( ) Don't know

Do you feel confident that this course has helped you to gain new skills? *

5. ( ) Yes
6. ( ) To some extent
7. ( ) No
8. ( ) Don't know

OVERALL SATISFACTION

Please select the most relevant response to each question.

Was the course effective in communicating information on the training topic? *

9. ( ) Yes
10. ( ) To some extent
11. ( ) No
12. ( ) Don't know

Did you feel supported throughout this training? *

13. ( ) Yes
14. ( ) To some extent
15. ( ) No
16. ( ) Don't know

Did you feel comfortable asking questions in relation to the course content or materials? *

17. ( ) Yes
18. ( ) To some extent
19. ( ) No
20. ( ) Don't know

Did you get the answers you needed to these questions? *

21. ( ) Yes
22. ( ) To some extent
23. ( ) No

24. ( ) Don't know

Do you know where to get additional resources in relation to this course topic? *

25. ( ) Yes
26. ( ) To some extent
27. ( ) No
28. ( ) Don't know

TRAINER PERFORMANCE

Please select the most relevant response to each question.

Was the trainer well prepared? *

29. ( ) Yes
30. ( ) To some extent
31. ( ) No
32. ( ) Don't know

Was the trainer knowledgeable on the topic? *

33. ( ) Yes
34. ( ) To some extent
35. ( ) No
36. ( ) Don't know

Was the trainer open to feedback? *

37. ( ) Yes
38. ( ) To some extent
39. ( ) No
40. ( ) Don't know

Software Training

Please select the most relevant response to each question.

Was the Software easy to use? *

41. ( ) Yes
42. ( ) To some extent
43. ( ) No
44. ( ) Don't know

Were there any technical issues, like an answer not being saved, that contributed to feelings of frustration with the experience? *

45. ( ) Yes
46. ( ) To some extent

47. ( ) No
48. ( ) Don't know

Were you given enough background and information to be comfortable setting up the model? *

49. ( ) Yes
50. ( ) To some extent
51. ( ) No
52. ( ) Don't know

TIME REQUIREMENTS

Please select the most relevant response to each question.

Did you feel like the training was longer than it needed to be? *

53. ( ) Yes
54. ( ) To some extent
55. ( ) No
56. ( ) Don't know

Were there sections of the training that seemed unnecessarily repetitive? *

57. ( ) Yes
58. ( ) To some extent
59. ( ) No
60. ( ) Don't know

Were there any elements of the training that you felt weren't relevant? *

61. ( ) Yes
62. ( ) To some extent
63. ( ) No
64. ( ) Don't know

PERCEPTION OF VALUE

Please select the most relevant response to each question.

How relevant was the course content to your role and/or professional development? *

65. ( ) Yes
66. ( ) To some extent
67. ( ) No
68. ( ) Don't know

Would you recommend this course to others? *

69. ( ) Yes

70. ( ) To some extent
71. ( ) No
72. ( ) Don't know

Please share more information on the questions you responded to with "No" or "To some extent" or "Don't know".

Recommend part two of training to learn how the link between surface water and groundwater was determined for the lower vaal.

Share the three most important things you learned from this course.

Calibration, streamflow vs water uses

How do you think we can improve this training course to make it more relevant for future trainees?

Produce manual that will assist RDM, formulated to determine SW GW links.

EASE OF UNDERSTANDING

Please select the most relevant response to each question.

Were the goals/objectives of the training clearly defined at the start of the course? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Do you feel confident that this course has helped you to gain new skills? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

OVERALL SATISFACTION

Please select the most relevant response to each question.

Was the course effective in communicating information on the training topic? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Did you feel supported throughout this training? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Did you feel comfortable asking questions in relation to the course content or materials? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Did you get the answers you needed to these questions? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Do you know where to get additional resources in relation to this course topic? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

TRAINER PERFORMANCE

Please select the most relevant response to each question.

Was the trainer well prepared? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Was the trainer knowledgeable on the topic? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Was the trainer open to feedback? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Software Training

Please select the most relevant response to each question.

Was the Software easy to use? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were there any technical issues, like an answer not being saved, that contributed to feelings of frustration with the experience? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were you given enough background and information to be comfortable setting up the model? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

TIME REQUIREMENTS

Please select the most relevant response to each question.

Did you feel like the training was longer than it needed to be? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were there sections of the training that seemed unnecessarily repetitive? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were there any elements of the training that you felt weren't relevant? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

PERCEPTION OF VALUE

Please select the most relevant response to each question.

How relevant was the course content to your role and/or professional development? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Would you recommend this course to others? *

- ( ) Yes

- ( ) To some extent
- ( ) No
- ( ) Don't know

Please share more information on the questions you responded to with "No" or "To some extent" or "Don't know". The first session didn't look much into the surface water aspect, it was more focused on the groundwater aspect.

Share the three most important things you learned from this course. An understanding of groundwater terms, concepts and how to calibrate and set-up the Pitman Model.

How do you think we can improve this training course to make it more relevant for future trainees? The suggestion would be to cover at a broader scale the surface water aspect and have practical sessions.

EASE OF UNDERSTANDING

Please select the most relevant response to each question.

Were the goals/objectives of the training clearly defined at the start of the course? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Do you feel confident that this course has helped you to gain new skills? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

OVERALL SATISFACTION

Please select the most relevant response to each question.

Was the course effective in communicating information on the training topic? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Did you feel supported throughout this training? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Did you feel comfortable asking questions in relation to the course content or materials? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Did you get the answers you needed to these questions? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Do you know where to get additional resources in relation to this course topic? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

TRAINER PERFORMANCE

Please select the most relevant response to each question.

Was the trainer well prepared? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Was the trainer knowledgeable on the topic? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Was the trainer open to feedback? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Software Training

Please select the most relevant response to each question.

Was the Software easy to use? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were there any technical issues, like an answer not being saved, that contributed to feelings of frustration with the experience? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were you given enough background and information to be comfortable setting up the model? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

TIME REQUIREMENTS

Please select the most relevant response to each question.

Did you feel like the training was longer than it needed to be? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were there sections of the training that seemed unnecessarily repetitive? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Were there any elements of the training that you felt weren't relevant? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

PERCEPTION OF VALUE

Please select the most relevant response to each question.

How relevant was the course content to your role and/or professional development? *

- ( ) Yes
- ( ) To some extent
- ( ) No
- ( ) Don't know

Would you recommend this course to others? *

- ( ) Yes

- ( ) To some extent
- ( ) No
- ( ) Don't know

Please share more information on the questions you responded to with "No" or "To some extent" or "Don't know".

- **The course was more focused on GW, and as a SW person I struggled with some of the things, and feel that I needed more time to fully understand some of the things.**

Share the three most important things you learned from this course.

- **Rainfall data modelling using CHIRPS, deeper understating of the WR2012 and interaction between SW & GW**

How do you think we can improve this training course to make it more relevant for future trainees?

- **More time should be allocated on the practical component of the course, i.e., less theory and more practical.**