

# WWF-MDF\_ID1854-ZA06370C\_Water stewardship in the upper uThukela: Smallholder climate resilient agriculture and water provision

## Milestone 4: 2<sup>nd</sup> Project report.

### EXECUTIVE SUMMARY

Between January and June 2023, the following broad activities have been undertaken:

1. Spring protection: Vimbukhalo finalisation of localised scheme (borehole refurbishment and reticulation for multipurpose use) for 53 Households. Follow up meetings re management and maintenance have been held with the water committee. Follow-up meetings and maintenance activities in Stulwane undertaken for the protected spring and reticulation system (11 extra Households now included). A total of 2 700Kl of water access per annum (1 908Kl in Vimbukhalo and 792Kl in Stulwane) has been provided. Drinking water quality tests (SANS241) have been undertaken for these systems.
2. CRA implementation: 25 collaboratively managed trials (CMTs across 6 villages plus 99 participants crop growth monitoring (124 participants in total) with a total of 9,3 ha of CA trials and 27,9ha of CA fields in total.
3. Runoff and rainfall results compiled for 8 participants. Water infiltrated in CA fields (reduced runoff) of 240 000l/ha. Thus, a volumetric gain of 6 696Kl of water.
4. Soil samples (17 CMTs and 5 other participants) analysed.
5. Bulk density and WP undertaken for 8 participants (Sampling in May'23). Fodder supplementation trials planted and monitored for 9 participants.
6. Fodder biomass and feed quality analysis done. Fodder supplementation experimentation for 7 participants. Fodder supplementation w/s for planning and review planned in June/July
7. Crop diversity and marketing: Introduction of different varieties of maize (generic hybrids and short season maize), beans, cover crops (sorghum, Sun hemp sunflower), fodder crops (turnips, cowpeas) into the system.
8. Meetings and stakeholder engagement:
  - a. Attendance of the Bergville LM Extravaganza -6 Dec 2022
  - b. Maloti-Drakensberg dragon heritage indaba 11-14 Dec 2022
  - c. Bergville regenerative agriculture farmers' open day – 23 February 2023 (focus on CC and water)
  - d. UKZN-ESS: Adaptive planning for water and resource conservation in Stulwane and Ezibomvini: 28,29 March 2023.
  - e. uThukela Water Partnership (11 April-core group, 23 May)
9. WWF monitoring and evaluation framework developed and completed for Mahlathini indicators in Annexure 1

### NARRATIVE REPORT

#### PROJECT DETAILS

<b>Assessment: The project is going well and is on track to finish by the set date</b>	On track to achieve outcomes	1	Yes
	Concern about progress	2	
	Did not achieve outcomes	3	
<b>Project No and Title</b>	WWF-MDF_ID1854-ZA06370.C_Water stewardship in the upper uThukela: Smallholder climate resilient agriculture and water provision		
<b>Date of approval</b>	6 <sup>th</sup> October 2020		
<b>Start and end date</b>	1 <sup>st</sup> July 2022- 30 April 2024		
<b>Project value</b>	R1 285 000		
<b>Contractor's name</b>	Mahlathini Development Foundation		

<b>Project objectives</b>	<p>106 farmers across 5-8 villages improve on CA in their farming system (20ha's). A volumetric water benefit (VWB) for reduced runoff (~500 000l/ha/annum) and reduced consumption (~7 million l/ha) are assumed and measured.</p> <p>Spring protection (v box) with limited reticulation to header tanks and taps for 20 households which is community owned and managed is implemented in at least 1 village with full involvement of institutional stakeholders to explore governance and stewardship options.</p>
<b>Project outcomes</b>	<p>1.3.2. <i>Monitoring and measurement of VWB of Conservation Agriculture and livestock integration practices in the upper uThukela for smallholder farmer communities</i></p> <p>1.3.2.1 Development of CA farmer level trials for a minimum 75 participants with measurement of run-off, rainfall, bulk density, evapotranspiration and water productivity for around 8-12 participants.</p> <ol style="list-style-type: none"> <li>a. 5 Members of 5 CRA learning groups plan, layout and plan CA collaboratively managed trials (CMT's). Run-off pans installed for 8-12 participants for round 1</li> <li>b. Crop growth monitoring for 25 CMTs, run-off and rainfall results compiled, bulk density and water productivity sampling undertaken and analysed, and yield measurements undertaken for round 1</li> <li>c. 5 Members of 5 CRA learning groups plan, layout and plan CA collaboratively managed trials (CMT's). Run-off pans installed for 8-12 participants for round 2</li> <li>d. Crop growth monitoring for 25 CMTs, run-off and rainfall results compiled, bulk density and water productivity sampling undertaken and analysed and yield measurements undertaken for round 2</li> </ol> <p>1.3.3 <i>Improved crop diversity, yields, and marketing for three local value chains leading to improved livelihood and incomes for smallholder farmers in the upper uThukela</i></p> <p>1.3.3.1 Inclusion of a range of options for cropping different varieties of maize, legumes and cover crops for 110 CA participants undertaking CA farmer level experimentation. Measurement of cropping areas, crop growth and yield for a minimum of 75 participants.</p> <ol style="list-style-type: none"> <li>a. CA trials set up for 110 participants across 5 CRA learning groups in the Emmaus area. Planning meetings, demonstration and learning workshop and planting support. Cropping areas measured. Round 1</li> <li>b. Monitoring for a minimum of 20% of 110 farmer level CA trials. Yield measurements done. Round 1</li> <li>c. CA trials set up for 110 participants across 5 CRA learning groups in the Emmaus area. Planning meetings, demonstration and learning workshop and planting support. Cropping areas measured. Round 2</li> <li>d. Monitoring for a minimum of 20% of 110 farmer level CA trials. Yield measurements done. Round 2</li> </ol> <p>1.3.4 <i>Improved livestock management through fodder supplementation and production awa rangeland management practices</i></p> <p>1.3.4.1 Fodder supplementation farmer level experiments undertaken for a minimum of 11 participants with monitoring of growth, yield and animal condition scoring</p> <ol style="list-style-type: none"> <li>a. Planning for fodder supplementation trials across 5 CRA learning groups. Participants outline their trials, are provided with layout and logistical support and start planting. Round 1</li> <li>b. Monitoring of 11 fodder trials, planning for winter fodder supplementation. Planning for fodder supplementation. Round 1</li> <li>c. Planning for fodder supplementation trials across 5 CRA learning groups. Participants outline their trials, are provided with layout and logistical support and start planting. Round 2</li> <li>d. Monitoring of 11 fodder trials, planning for winter fodder supplementation. Planning for fodder supplementation. Round 2</li> </ol>

	<p>1.3.5 <i>Improved access to water at household level for both consumption and farming through community owned water provision projects.</i></p> <p>1.3.5.1 Water committees and external service providers plan and implement a local water supply scheme through protection of at least 1 spring and reticulation to ~20 households</p> <ol style="list-style-type: none"> <li>a. Meetings with water committees, walkabouts and local surveys, engineering support for layouts and scenarios, planning for local water provision options, implementation initiated.</li> <li>b. Local water provision implementation completed. Meetings with water committees re maintenance, operations and conflict resolution</li> </ol> <p>1.3.6 <i>Improved governance and water stewardship in the communal tenure areas of the upper uThukela through multiple stakeholder engagement activities with the CRA learning groups.</i></p> <p>1.3.6.1 CRA learning groups undertake meetings for planning, analysis and review and also undertake cluster meetings to jointly explore and share information and options. They participate in multistakeholder level activities and liaise and negotiate with relevant role players such as the uThukela District Municipality, councillors, and Traditional Authorities</p> <ol style="list-style-type: none"> <li>a. Review and planning meetings held with a min of 2 CRA learning groups, Cluster meetings held around specific thematic issues. 2 Workshops to discuss water and resource stewardship and management. Attendance of 1-2 multistakeholder events</li> </ol>
<b>Reporting period</b>	July-December 2022
<b>Significant approved changes</b>	Beneficiary numbers for CA changed from 250 to 110, with concomitant reduction in hectares to 15,8 ha. 25 Fodder supplementation trials reduced to 11.
<b>Changes in capacity to deliver outcomes</b>	None

<b>Milestone 4: Progress in Activities 1-5</b>	
1.	1.3.2.1.(b) Crop growth monitoring for 25 CMTs, run-off and rainfall results compiled, bulk density and water productivity sampling undertaken and analysed ( <i>analysis still in progress</i> ), and yield measurements undertaken for round 1 ( <i>Yield measurements still in progress</i> )
2.	1.3.3.1 (b) Monitoring for a minimum of 20% of 110 farmer level CA trials. Yield measurements to be completed in June 2023. Round 1.
3.	1.3.4.1 (b) Monitoring of 9 fodder trials, planning for winter fodder supplementation. Planning for fodder supplementation. Round 1
4.	1.3.5.1 (b) Local water provision implementation completed. Meetings with water committees re maintenance, operations and conflict resolution
5.	1.3.6.1(a) Review and planning meetings held with a min of 2 CRA learning groups, Cluster meetings held around specific thematic issues. 2 Workshops to discuss water and resource stewardship and management. Attendance of 1-2 multistakeholder events

## 1 PROGRESS PER OBJECTIVE AND OUTCOME

Table 1: Progress against specific outcomes and activities for the period January- May 2023

<b>Outcome</b>	<b>Activities</b>	<b>Progress (Milestone 3)</b>
CA with VWB for reduced runoff and water productivity	Development of CA farmer level trials for a minimum 25 participants with measurement of run-off, rainfall, bulk density,	<ul style="list-style-type: none"> <li>✓ 25 CMT's across 6 villages plus 99 participants crop growth monitoring (124 participants in total)</li> <li>✓ CA trials (9,3ha), CA total (27,9ha)</li> <li>✓ Runoff and rainfall results compiled for 8 participants.</li> </ul>

	evapotranspiration and water productivity for around 8-12 participants.	<ul style="list-style-type: none"> <li>✓ Soil samples (17 CMTs and 5 other participants) analysed.</li> <li>✓ Bulk density and WP undertaken for 8 participants (<i>Sampling in May'23</i>)</li> </ul>
	Inclusion of a range of options for cropping different varieties of maize, legumes and cover crops. Measurement of cropping areas, crop growth and yield for a minimum of 75 participants	<ul style="list-style-type: none"> <li>✓ Range of trials including remedial fenced and fodder trials alongside strip cropping and block trials for intercropping and crop rotation</li> <li>✓ Yield measurements for 25 CMTS and 50 participants (overall 75 participants) _ <i>May'23</i></li> </ul>
	Fodder supplementation farmer level experiments undertaken for a minimum of 11 participants with monitoring of growth, yield and animal condition scoring	<ul style="list-style-type: none"> <li>✓ Fodder supplementation trials planted and monitored for 9 participants.</li> <li>✓ Fodder biomass and feed quality analysis</li> <li>✓ Fodder supplementation experimentation – 7 participants +</li> <li>✓ <i>Fodder supplementation w/s for planning and review planned in June/July</i></li> </ul>
Improved access to water at household level for both consumption and farming through community owned water provision projects.	Water committees and external service providers plan and implement a local water supply scheme through protection of at least 1 spring and reticulation to ~20 households	<ul style="list-style-type: none"> <li>✓ Vimbukhalo finalisation of localised scheme for 53 Households</li> <li>✓ Follow up meetings re management and maintenance.</li> <li>✓ Follow-up meetings and maintenance activities in Stulwane for protected spring and reticulation system (11 extra Households)</li> <li>✓ Total of 2 700KI of water access per annum (1 908KI in Vimbukhalo and 792KI in Stulwane)</li> </ul>
Improved governance and water stewardship in the communal tenure areas of the upper uThukela through multiple stakeholder engagement activities with the CRA learning groups	CRA learning groups undertake meetings and stakeholder engagement	<ul style="list-style-type: none"> <li>✓ Attendance of the Bergville LM Extravaganza -6Dec 2022</li> <li>✓ Bergville regenerative agriculture farmers' open day – 23 February 2023 (focus on CC and water)</li> <li>✓ UKZN-ESS: Adaptive planning for water and resource conservation in Stulwane and Ezibomvini: 28,29 March 2023.</li> <li>✓ uThukela Water Partnership (11 April-core group, 23 May)</li> </ul>

1.1 CA WITH VWB FOR REDUCED RUNOFF AND WATER PRODUCTIVITY

1. Collaboratively managed trials (CMTs)

Participants have the following CA treatments: strip cropping, cover crops, different maize varieties, use of 2 row tractor drawn planters and annual and perennial livestock fodder species. Crop growth monitoring has been conducted for all CMTs in Bergville

The table below outlines the CMT participants (22 participants) with associated activities such as runoff pans and rain gauges (8 participants), soil sampling (25 participants), lime application (7 participants), specific trials in stover retention/fencing (3 participants) and remediation of plots (3 participants). The latter is for participants who have practices CA for a minimum of 3 years, but due to poor soil conditions have made little progress. 3 Participants started this process, but only 1 planted this plot – due to difficulties in accessing tractors for ploughing and lime application.

Table 2: CMTs and associated activities outlined for 28 participants: May 2023

	Village	Name and Surname	CMTs	Fenced 500 m <sup>2</sup>	Remedial trial	Runoff pans (3/field)	Soil sample results	Lime	Fodder (sampling, exp)
1	Vimbukhalo	Phumelele Hlongwane							
2		Landiwe Dlamini							
3		Zodwa Zikode							
4		Nombono Dladla							
5		Mantombi Mabizela							
6		Cabangani Hlongwane							
7	Vimbukhalo	Sbongile Mpulo							

8		Zweni Ndaba							
9		Bukisiwe Mpulo							
10		Zibonele Sithole							
11		Sindisiwe Makhathini							
12	<b>Eqeleni</b>	Thulani Dlamini							Veld hay
13		Ntombakhe Zikode					4,5t/ha (9bags)		
14		Sthabiso Manyathi							Veld hay, SCC
15		Thulile Zikode					3-9t/ha (5bags)		
16		Nah Khumalo							
17		Nomavila Ndaba							
18			Lungile Dladla						
19	<b>Stulwane</b>	Nelisiwe Msele					0 – 3t/ha (4bags)		
20		Dombi Ntshingila /Dlamini							
21		Nothile Zondi							Veld hay, lespedeza
22		Thulani Dlamini (Danger)					1,5-6t/ha (4bags)		Veld hay
23		Khulekani Dladla					0-4t/ha (8bags)		Veld hay, lespedeza, SCC
24		Nondomiso Zondi							
25	<b>Madakane</b>	Xolile Gambu					4,5t/ha (9bags)		
26		Nokuthula Mabaso							
27	<b>Emahlathini</b>	Buyisiwe Sithebe/ Ndaba							Veld hay
28		Buyisiwe Hlongwane							

Note: Cells in red denote participants who have lost their trials due to a heavy hailstorm on the 1<sup>st</sup> February 2023.



Figure 1: Above Hail damage for CMTs in Ezibomvini Left: Zodwa Zikode and Right: Nombono Dladla



## 2. Soil sampling and soil fertility analysis

Soil samples were taken for the participants in the CA programme undertaking the collaboratively managed trials (CMT's). Samples were taken prior to planting, in October 2022. Of the 27 participants earmarked for Soil fertility analysis, samples were taken for 20 participants. Existing results were compiled for 4 of the participants and no samples were taken for 3 participants as shown in the table below.

Table 3: Soil fertility analysis samples for Bergville: December 2022

Name	Surname	Village	Year of sample	Sample ID	
				Control	Trial
1. Landiwe	Dlamini	Ezibomvini	2022	1	1
2. Zodwa	Zikode	Ezibomvini	2019	2	2
3. Nombono	Dladla	Ezibomvini	-		
4. Mantombi	Mabizela	Ezibomvini	2022	4	4
5. Phumelele	Hlongwane	Ezibomvini	2019	5	5
6. Sbongile	Mpulo	Vimbukhalo	2022	6	6
7. Zweni	Ndaba	Vimbukhalo	2022	7	7
8. Bukisiwe	Mpulo	Vimbukhalo	2022	8	8
9. Zibonelo	Sithole	Vimbukhalo	-		
10. Thulani	Dlamini	Eqeleni	2022	10	10
11. Ntombakhe	Zikode	Eqeleni	2022	11	11
12. Nah	Khumalo	Eqeleni	2022	12	12
13. Sthabiso	Manyathi	Eqeleni	2022	13	13
14. Thulisile	Zikode	Eqeleni	2022	14	14
15. Nelisiwe	Msele	Stulwane	2019	15	15
16. Dombi	Ntshingila	Stulwane	-		
17. Nothile	Zondi	Stulwane	2022	17	17
18. Thulani	Dlamini	Stulwane	2019	18	18
19. Khulekani	Dladla	Stulwane	2022	19	19
20. Xolile	Gambu	Madakaneni	2022	20	20
21. Thembi	Hadebe	Ezinyonyane	2022	21	21
22. Mthokozi	Shange	Ezinyonyane	2022	22	22
23. Nondomiso	Sikhosana/Zondi	Stulwane	2022	23	23
24. Cabangani	Hlongwane	Ezibomvini	2022	24	24
25. Buyisiwe	Hlongwane	Emahlathini	2022	26	26
26. Buyisiwe	Ndaba	Emahlathini	2022	27	27
27. Sindisiwe	Makhathini	Vimbukhalo	2022	28	28

Samples were taken as composites across fields, using a zigzag sampling pattern with a minimum 9 subsamples that were combined and analysed through the Soil laboratory at the CEDARA Research station of the KZN Department of Agriculture. Two samples were taken for each participant:

- CA trial: A composite of the 1000m<sup>2</sup> trial plot consisting of intercropping and crop rotation of a number of crops – maize, beans, cowpeas, pumpkins and a summer cover crop mixture (SCC) and
- CA control: A composite of the CA control plot planted consecutively to a monocrop of maize.
- Results have been summarized into the table below.

Table 4: Soil fertility sample results for Bergville: 2022

	Name and surname	Area	Org. C %	N %	pH	Clay %	Acid sat (%)	N Required (kg/ha)	P required (kg/ha)	Lime req t/ha	Zinc	MAP (Bags/ha)	LAN of MAP Bags/ha
CA control	Landiwe Dlamini	Ezibomvini			4,17	21	5	60	60	0	0	5,5	2,1
CA trial	Landiwe Dlamini	Ezibomvini	1,6	0,14	4,47	28	1	80	20	0	0	5,5	3,6
CA control	Mantombi Mabizela	Ezibomvini			4,44	20	1	60	50	0	0	4,2	2,5
CA trial	Mantombi Mabizela	Ezibomvini	1,6	0,1	4,74	50	1	80	60	0	0	1,8	3,6
CA control	Cabangani Hlongwane	Ezibomvini	1,4	0,13	4,6	31	0	80	60	0	0	5,5	7,9
CA trial	Cabangani Hlongwane	Ezibomvini	1,6	0,15	4,9	27	0	80	60	0	0	5,5	3,6
CA control	Sibongile Mpulo	Vimbukhalo			4,23		4	60	20	0	0	1,8	3,6
CA trial	Sibongile Mpulo	Vimbukhalo	1,9	0,16	4,44	27	3	60	20	0	0	1,8	3,6
CA control	Zweni Ndaba	Vimbukhalo			3,98		18	60	20	0	0	1,8	3,6
CA trial	Zweni Ndaba	Vimbukhalo	2,5	0,19	4,41	39	4	60	20	0	0	1,8	3,6
CA control	Bukisuwe Mpulo	Vimbukhalo			3,89		37	60	20	4	0	1,8	3,6
CA trial	Bukisuwe Mpulo	Vimbukhalo	2	0,15	4,12	48	8	60	20	0	0	1,8	7,9
CA control	Sindiswe Makhathini	Vimbukhalo	0,8	0,1	4,12	24	10	80	60	0	0	1,8	5
CA trial	Sindiswe Makhathini	Vimbukhalo	1	0,1	3,11	20	9	80	60	0	0	5,5	3,6
CA control	Thulani Dlamini	Eqeleni			4,02		8	60	60	0	0	5,5	2,1
CA trial	Thulani Dlamini	Eqeleni	1,7	0,15	4,17	33	4	80	60	0	0	5,5	3,6
CA control	Ntombakhe Zikode	Eqeleni	1,4	0,12	4,04	34	15	80	60	0	0	5,5	3,6
CA trial	Ntombakhe Zikode	Eqeleni	1,5	0,09	4,74	42	1	80	20	0	0	1,8	5
CA control	Nah Khumalo	Eqeleni	3,6	0,26	4,18	41	5	60	60	0	0	5,5	2,1
CA trial	Nah Khumalo	Eqeleni	2,7	0,19	4,48	46	2	60	20	0	0	1,8	3,6
CA control	Sthabiso Manyathi	Eqeleni	1,6	0,06	3,9	46	18	80	45	0	0	4,1	4,1
CA trial	Sthabiso Manyathi	Eqeleni	1,5	0,09	4,05	39	10	80	25	0	0	2,3	4,8
CA control	Thulisile Zikode	Eqeleni	1,6	0,13	4,84	48	0	80	20	0	0	1,8	5
CA trial	Thulisile Zikode	Eqeleni	1,8	0,17	4,52	35	1	80	20	0	0	1,8	5
CA control	Nothile Zondi	Stulwane	2,4	0,11	3,86	49	42	60	20	6,5	0	1,8	3,8
CA trial	Nothile Zondi	Stulwane	2,9	0,19	3,92	44	34	60	45	4	0	4,1	2,7
CA control	Khulekani Dladla	Stulwane	2,8	0,19	4,3	52	3	60	20	0	0	1,8	3,6
CA trial	Khulekani Dladla	Stulwane	2,6	0,2	4,69	49	1	60	20	0	0	1,8	3,6
CA control	Nondomiso Zondi	Stulwane	2,5	0,14	3,9	52	59	60	60	8	0	5,5	2,1
CA trial	Nondomiso Zondi	Stulwane	2,8	0,18	3,91	50	41	60	60	5,5	0	5,5	2,1
CA control	Xolile Gambu	Madakaneni	1,3	0,08	4,14	32	8	80	60	0	0	5,3	3,6
CA trial	Xolile Gambu	Madakaneni	1,3	0,07	4,05	38	14	80	60	0	0	5,5	3,6
CA control	Thembi Hadebe	Ezinyonynae	0,9	0,09	4,15	25	5	80	60	0	0	5,5	3,6
CA trial	Thembi Hadebe	Ezinyonynae	1,1	0,11	4,23	26	4	80	60	0	0	5,5	3,6
CA control	Mthokozisi Shange	Ezinyonynae	2,6	0,14	3,99	49	17	60	60	0	0	5,5	2,1
CA trial	Mthokozisi Shange	Ezinyonynae	2,1	0,13	3,99	48	17	60	60	0	0	5,5	2,1
CA control	Buyisiwe Hlongwane	Emahlathini	1,5	0,08	3,98	37	18	80	60	0	0	5,5	3,6
CA trial	Buyisiwe Hlongwane	Emahlathini	1,7	0,08	3,76	46	49	80	20	7	0	1,8	5
CA control	Buyisiwe Ndaba	Emahlathini	2,2	0,15	3,87	47	26	60	40	1,5	0	5,5	3,6
CA trial	Buyisiwe Ndaba	Emahlathini	2,4	0,16	3,75	50	47	60	20	5,5	0	1,8	3,6
CA control	Nelisiwe Msele	Stulwane	2,9	0,25	4,19	43	13	60	45	0	0	4,1	2,7
CA trial	Nelisiwe Msele	Stulwane	2,8	0,27	4,48	40	1	60	20	0	0	1,8	3,6
CA control	Phumelele Hlongwane	Ezibomvini	1,5	0,17	5,4	35	1	80	20	0	0	1,8	5,0
CA trial	Phumelele Hlongwane	Ezibomvini	2	0,19	5,1	43	1	60	20	0	0	1,8	3,6

CA trial	Zodwa Zikode	Ezibomvini	1,4	0,16	5,2	25	1	80	20	0	0	1,8	5,0
CA control	Thulani Dlamini	Stulwane	3,1	0,29	3,99	55	21	60	20	1	1	1,8	3,6
CA trial	Thulani Dlamini	Stulwane	3,1	0,24	3,92	51	28	60	60	2	0	5,5	2,1
AVERAGES for CA trials			1,9	0,15	4,09	38	13	67	37	1,1	0	3,4	3,6
AVEERAGES for CA controls			1,5	0,11	4,18	32	15	68	43	0,9	0,04	3,9	3,6
Average kg of fertilizer required per 1000m <sup>2</sup> trial plot												16,8	17,9

A comparison of the fertilizer requirements (kg/ha) as well as the % organic carbon (%Org C) and % nitrogen (%N) in the soil was made for the CA trial and CA control samples, to see whether the difference in these values could be considered significant. Higher average and mean values for %Org C and %N are recorded for the CA trials as are lower P-fertilizer requirements. These values are however not statistically significant.

The graph below indicates the values for the CA trial and CA control plots averaged across the seven villages where samples were taken. From the graph the differences seem quite small, although there appears to be a trend of increased %Org C for the CA trial plots when compared to the CA control plots.

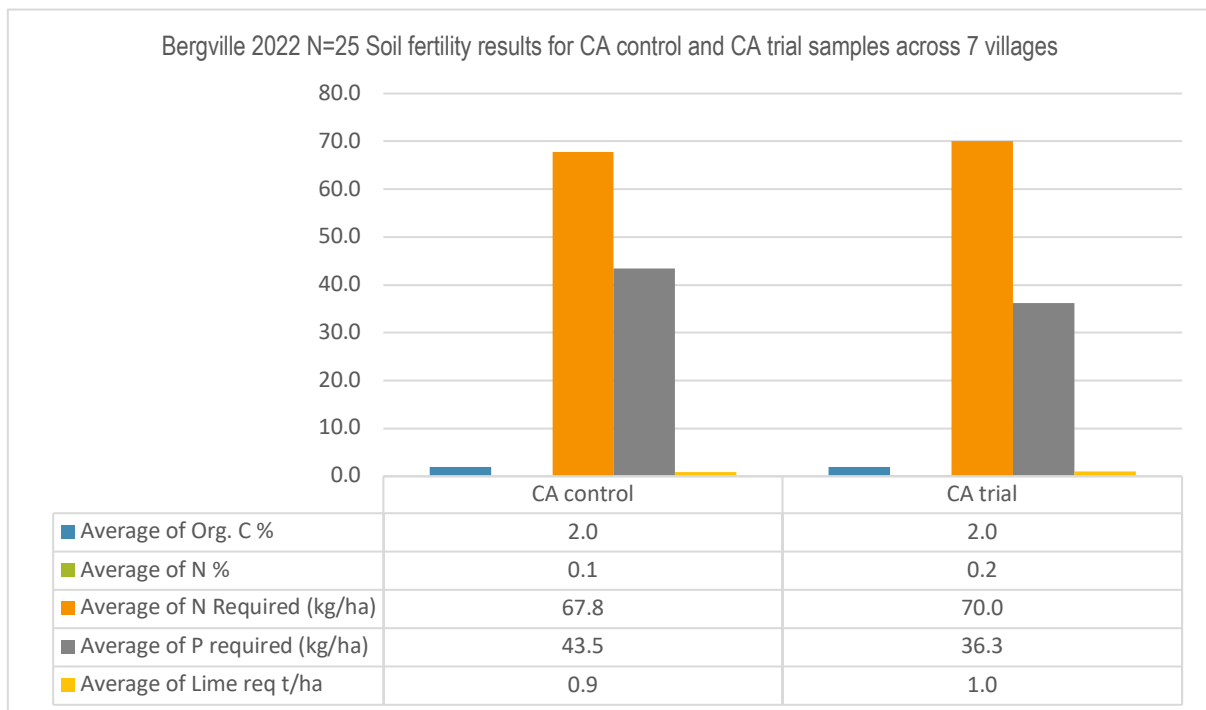


Figure 2: Average %OrgC and %N values for CA control and trial plots across 7 villages in Bergville, 2022.

Analysis of means, medians and a Wilcoxon-Mann-Whitney test, using all participants (N=27) show that the differences are not statistically significant, given that  $p = 0,801$ .

N	41			
Org. C % by Sample	N	Mean	Mean SE*	SD
CA control	17	2,006	0,1700	0,819
CA trial	24	1,983	0,1431	0,606
Pooled	41			0,701



\* Standard error of the mean based on the pooled sample variance.

N	41					
Org. C % by Sample	Minimum	1st Quartile	Median	95% CI	3rd Quartile	Maximum
CA control	0,80	1,40	1,60	1,40 to 2,60	2,667	3,60
CA trial	1,00	1,54	1,85	1,60 to 2,50	2,558	3,10
Wilcoxon-Mann-Whitney test						
Hypothesized difference	0					
Org. C % by Sample	N	Rank sum	Mean rank			
CA trial	24	513,5	21,40			
CA control	17	347,5	20,44			
W statistic	513,50					
Z approximation	0,25					
p-value	0,8011					
H0: $\Delta = 0$ The shift in location between the distributions of the populations is equal to 0.						
H1: $\Delta \neq 0$ The shift in location between the distributions of the populations is not equal to 0.						

The other interesting difference between the CA trial and CA control samples is the difference in P-requirement between the two sets of samples, with the control samples on average needing 43kg/ha and the trial samples 37kg/ha. The amount of phosphate required depends on soil types (%clay), organic matter and acidity, as well as soil amelioration strategies employed. The pH doesn't vary much between the control and trial samples, but there is some difference in % acid saturation.

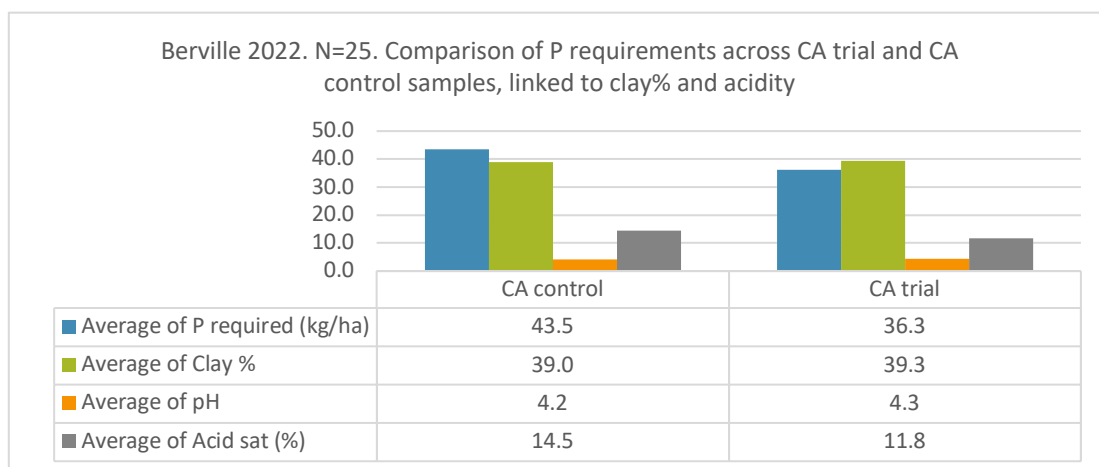


Figure 3: Comparison of P requirements for CA trial and control samples in Berville 2022

The question of how much each of these factors (pH, %clay, acid saturation and % Org C) influence the P-requirement was explored using a correlation matrix (Pearson's-r). The results below indicate moderate to weak correlation for all 4 these

components. It can thus be hypothesised that the difference in P requirement has to do with better nutrient provision and management for the CA trails than the control plots.

Correlation

Pearson's r	P required	Acid sat	Clay %	pH	Org. C %
P required	-	0,128	-0,232	-0,379	-0,199
Acid sat	0,128	-	0,486	-0,631	0,314
Clay %	-0,232	0,486	-	-0,157	0,697
pH	-0,379	-0,631	-0,157	-	-0,128
Org. C %	-0,199	0,314	0,697	-0,128	-

A yield chart from the previous season (2020-2021) for a similar group of farmers in Bergville indicates however a significant difference in yields for the CA trial vs CA control plots: A result due primarily to the improved soil fertility management regime in the CA trial plots consisting of judicious use of fertilizer, multi cropping and crop rotation.

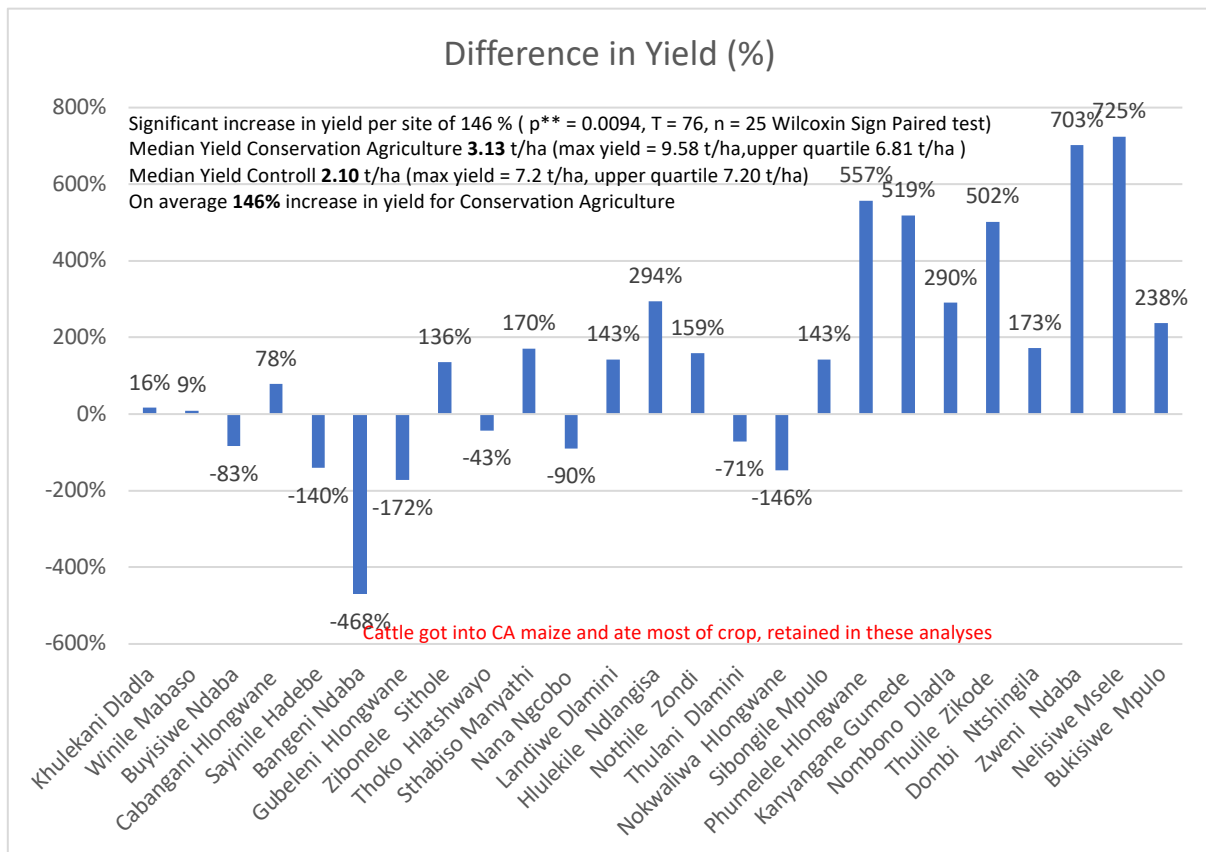


Figure 4: Difference in yields between Ca trial and control Plots Bergville 2020-2021 n=25.

Fertilizer requirements for the 2022 planting season have been averaged for all participants and the average amount has been provided as a recommendation, namely 16,8kg of MAP and 17,9 Kg of LAN per 1000m<sup>2</sup> trial plot. The practice of using MAP and LAN, to reduce the acidification impact of the fertilizer on the soil has been continued.

### 3. VWB for reduced runoff and water productivity

Participant farmers have been provided with monitoring sheets to record rainfall events and run-off for their CA trials and their control plots. Averages have been calculated for monthly rainfall and runoff for each area as recorded by the participant farmers. The table below indicates the records for the 8 Bergville participants. Zodwa Zikode from Ezibomvini did not keep records after November 2022 and her results have not been included.

Table 5: Summary of rainfall and runoff measurements for 7 participants in Bergville (October 2022-March 2023)

Village	Name	Rainfall	runoff Control	runoff CA
Eqeleni	Sthabiso Manyathi	240,8	26,7	28,5
	ThulisileZikode	930,0	42,1	41,6
Ezibomvini	Zodwa Zikode	524,0	25,7	35,3
	Phumelele Hlongwane	721,5	49,9	47,4
Stulwane	Nelisiwe Msele	828,7	46,8	41,0
	Nothile Zondi	733,4	80,4	92,2
Vimbukhalo	Sibongile Mpulo	590,5	26,3	17,3
	Zweni Ndaba	505,5	16,1	21,8
	Average	634,3	39,22	40,6
	P-value (Wilcoxin)	0,63		
	Percentage rainfall conversion		6,2%	6,4%

Control plots were either ploughed and planted to mono- cropped maize or were a CA mono-cropped maize plot. The CA trial plots were averaged for a maize and bean intercropped plot and a maize only plot within the trial plot layout.

Difference in runoff between the plots were not statistically significant. The average runoff for the Ca trial plots this season was slightly higher than the control plots., leading to a loss of 0,24KI/ha. This is considered to be a result of the extreme weather conditions, including, high rainfall, intense storms, hail, and heatwaves.

The following figure compares the runoff results between 2019/2020 and 2022/2023. This indicates on average a 31% lower runoff percentage for the CA trial plots when compared to the control plots. This equates to a saving of water through reduced runoff for the CA trial plots of 0,24KI/ha/ annum, on average. For the 9,3ha of CA trials this is a saving o 2,232KI/annum.

**Measurements** Runoff – Pans in CA experimental and control plots in cropping fields

% Rainfall conversion to runoff (N=8)	Runoff CA trial plot (L)	Runoff control plot (L)
2019/2020	4%	7%
2020/2021	6%	11%
2021/2022	5%	7%
2022/2023	6,4%	6,2%
<b>Average</b>	<b>5,4 %</b>	<b>7,8%</b>

Right: Installation of run-off pans in a CA trial plot.



- Run-off averages across all CA trial plot 31% lower than runoff in the control plots (CA control maize or ploughed mono cropped )
- Between 2%-5% (ave 2,4%) of total rainfall is saved through reduced runoff in the CA trial plots
- As rainfall increases, the difference in runoff becomes less noticeable.
- For Bergville with 9,3ha of CA trials savings are 9,232KI/annum

24 Liter /m<sup>2</sup> now in the soil.  
That is  
240 000 L/ha on average,  
per year, more water in the  
soil and available to crops

Figure 5: Comparison of average runoff from CA trial and control plots between 2019 and 2023, for 9 participants in Bergville

The graph below compares the average monthly rainfall with the runoff results for each month.

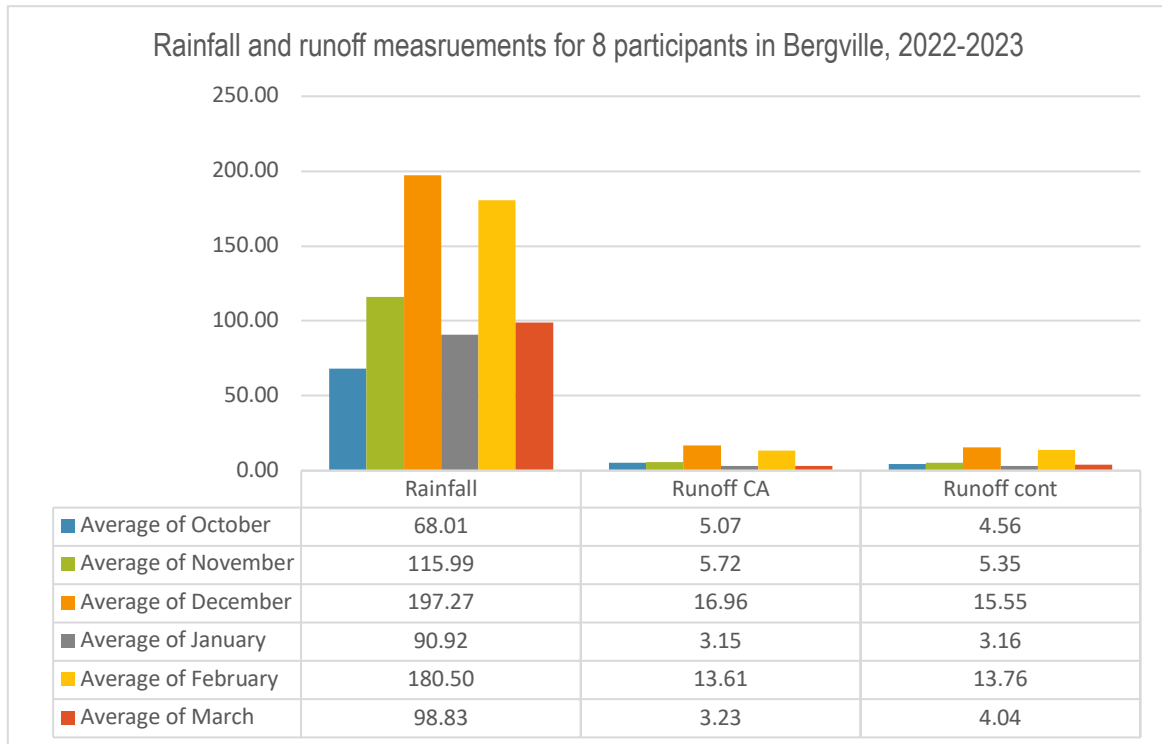


Figure 6: Comparison of monthly rainfall and runoff results for Bergville participants (N=8) between October 2022 and March 2023

Rainfall this season has shown a trend of late onset, with low monthly averages for October and November and substantial rainfall in December. This is similar to the trends for the last three years. What is different, is that rainfall for January has been extremely low this season, providing a marked mid-season drought effect.

The SAWS definition of a heat wave is three consecutive days of max temperature at least 5° C warmer than the mean max of hottest month. The number of heatwaves are increasing over time as shown in the graph below.

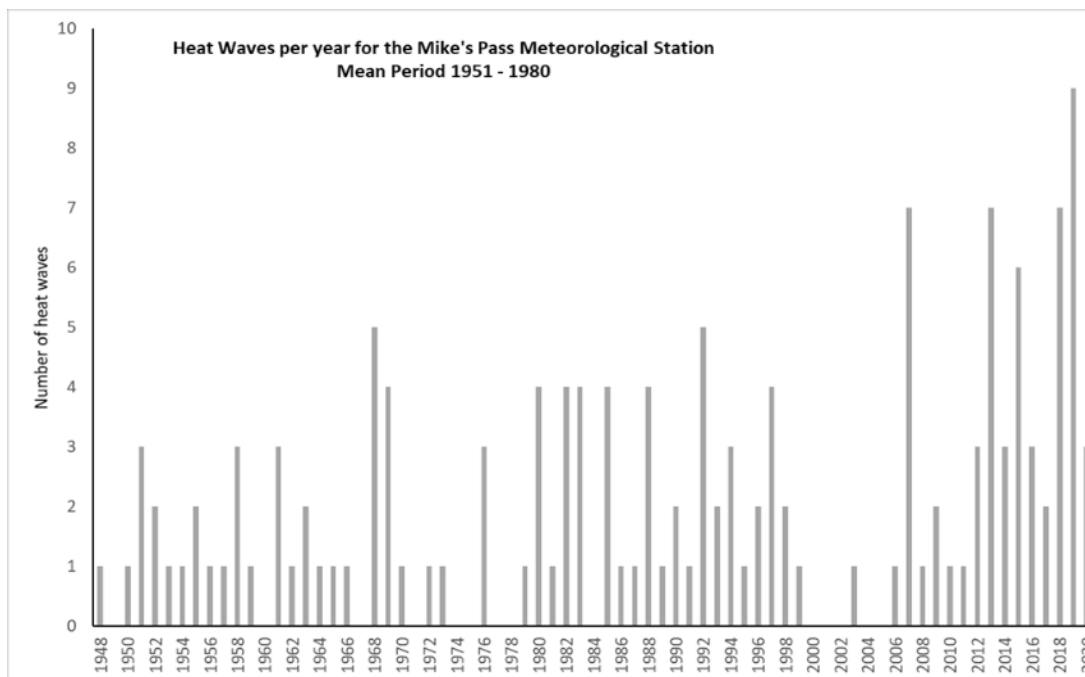


Figure 7: Annual heatwaves as recorded at the Mikes Pass weather stations 1948-2023.

The average temperatures of these heatwaves are normalising and increasing over time

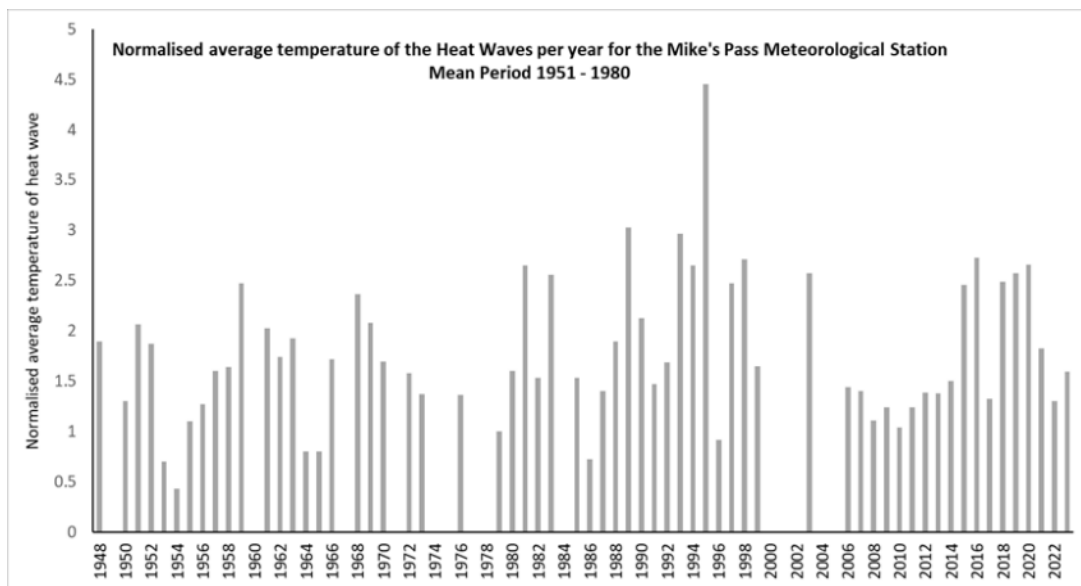


Figure 8: Normalised average temperature of heatwaves at the Mike's Pass meteorological stations 1948-2023

In January 2023, we experienced a heat wave, one day below the threshold, followed by a four-day heat wave. The max temperature during the Jan 2023 heat wave at Mike's Pass did not exceed 30°

By late January, in Bergville, the majority of participants' maize were showing signs of drought stress. A few of the lead farmers, such as Phumelele Hlongwane, in Ezibomvini however were spared and crops remained vibrant. The two photographs below were both taken on the 24<sup>th</sup> January 2023. Cabangani Hlongwane and Phumelele Hlongwane's homesteads are right next to each other and their fields are separated by no more than 50m. Both farmers have been practising CA since 2014.

These two photographs are indicative both of the positive impact of CA on the soil for farmers focused on improving their soil health and on the importance of this aspect to reap the benefits of improved organic matter and soil moisture possible with CA.

A quick comparison of soil characteristics for these two farmers indicates a higher percentage clay for Phumelele's soil – which is a benefit for water holding, but only in conjunction with the higher organic carbon %, Nitrogen percentage and pH that characterises her soils.

Farmers – Ezibomvini (Jan2023)	Org. C %	N %	pH	Clay %
Cabangani Hlongwane	1,6	0,15	4,9	27
Phumelele Hlongwane	2	0,19	5,1	43





Figure 9: Above: Maize showing heat stress in Cabangani Hlongwane's CA plot and Below: Maize and cover crops looking vibrant with good canopy cover in Phumelele Hlongwane's field. Pictures were taken on the same day and fields are in very close proximity.

The heat wave was followed by a few decimating hailstorms that swept across some of the villages. Ezibomvini was the hardest hit of the participating villages in this programme and participants lost between 30-100% of their crops.



Figure 10: Right and Far Right Nombono Dladla from Ezibomvini in her CA trial plot one week before and one week after a severe hailstorm swept across their area.



#### 4. **Crop growth monitoring for CMTs' and other participants**

##### PROGRESS SUMMARY

The small table below outlines all the farmers who have planted CA trial and control plots in Bergville for the 2022-2023 planting season. A total of 124 participants are involved. 40 Participants planted 400m<sup>2</sup> CA trial and control plots and 84 participants planted 1000m<sup>2</sup> CA trial and control plots.

Village	Farmers	Control	
		Tractor Ploughed	CA Control
Ezibomvini	23	0	23
Eqeleni	15	0	15
Estulwane	29	12	17
Emadakaneni	15	5	10
Ezinyonyana	7	0	7
KwaVimbukhalo	35	14	21
<b>Grand Total</b>	<b>124</b>	<b>31</b>	<b>93</b>

Focused trials include the following three aspects:

- Remedial trials (1000m<sup>2</sup>): ploughing in of lime, contouring, cover crops
- Fenced trials (500m<sup>2</sup>): fenced trials for collection of stover over time- zero grazing allowed)
- Fodder trials (1000m<sup>2</sup>): 6-8 strips of fodder (perennial and annual) maize and late season beans

- **Remedial trials**

Participants: Khulekani Dladla (Stulwane), Ntombakhe Zikode (Eqeleni) and Xolile Gambu (Emadakaneni). Of the three only the trial for Khulekani Dladla has thus far been implemented. Ntombakhe Zikode in Eqeleni has received her lime but is struggling with finding a tractor to plough her field, as is Mrs Gambu in Emadakaneni. The municipal tractors are not being used at this time of year and both ladies cannot find a local contractor to assist.

##### **Khulekani Dladla**

His field was sprayed with Roundup in the 2<sup>nd</sup> week of November, ploughed with an addition of 4t/ha of lime/gypsum in the first week of December 2022, after rains finally came and planted on the 15<sup>th</sup> December (plots 1-5) and the 9<sup>th</sup> January 2023 (plots 6-10). No fertilizer was added.

He also planted a 'new' CM trial plot of 1000m<sup>2</sup> with the prescribed layout, to act as a control to this remedial trail once he again plants the standard layout next season.

The brief to plant the whole plot to a high density of a 6-crop cover crop mix (Sun hemp, sunflower, Sorghum, turnips, pumpkin, cowpeas), was misinterpreted to still be a process of planting in plots.

Plot1	Plot2	Plot3	Plot4	Plot5	Plot6	Plot7	Plot8	Plot9	Plot10
M+Pk	Pumpkin (Pk)	Turnip	SCC	Pk	Cowpea (Cp)	SCC	CP	Pk	Turnip

Below are a few indicative pictures.

Figure 11: Khulekani Dladla- Stulwane-Remedial trial.  
 Top left: Plot 4 -SCC. Note the swale made on the contour running from left to right across the plot. Top Right: Plot3- turnip, taken on 6<sup>th</sup> Jan 2023. Bottom: Plot 1-M+Pk, taken on the 24<sup>th</sup> Jan 2023



Mr Dladla mentioned that he has seen the swales collect sediment and that they have reduced the runoff in his plot substantially. He also mentioned that he fixed the swales where there was breakthrough runoff.

- **Fodder trials**

In Bergville the following 10 learning group members have volunteered for the fodder trials. The practise is to plant these towards the end of January, when CMTs are well established and top dressed, so that they do not interfere with food production.

	Name	Surname	Village	Planting Date
1	Sulubha	Mkhwanazi	Vimbukhalo	27 <sup>th</sup> Jan 2023
2	Nonhlanhla	Hlongwane	Vimbukhalo	28 <sup>th</sup> Jan 2023
3	Mrs T	Madondo	Emahlathini	1 <sup>st</sup> Feb 2023
4	Mr	Phakathi	Emahlathini	2 <sup>nd</sup> feb 2023
5	Thulani	Dlamini	Eqeleni	26 <sup>th</sup> Jan 2023
6	Thulani	Dlamini	Stulwane	18 <sup>th</sup> Jan 2023
7	Khulekani	Dladla	Stulwane	15 <sup>th</sup> Dec 2022
8	Nothile	Zondi	Stulwane	19 <sup>th</sup> Jan 2023
9	Phumelele	Hlongwane	Ezibomvini	25 <sup>th</sup> Jan 2023
10	Zodwa	Zikode	Ezibomvini	31 <sup>st</sup> Jan 2023

Layout and planting of the fodder trials are still in progress. For the three farmers in Stulwane, these have been designed around existing strips of Lespedeza which were planted 2-3 seasons ago.

Figure 8:  
 Khulekani's  
 Fodder trial  
 plots with  
 existing  
 Lespedeza  
 strips,  
 planted on  
 17<sup>th</sup> Jan  
 2023





The layout of the fodder trial is as follows:

Plot1 Lespedeza	Plot2 SS maize	Plot3 Lespedeza	Plot4 SS maize	Plot5 Lespedeza
Plot6 SS maize	Plot7 Beans	Plot8 Lespedeza	Plot9 Tall fescue	Plot10 SS maize

Note: SSmaize; PAN5A190 (yellow – short season), beans; Gadra

Mr Dladla mentioned that he cuts and dries the Lespedeza to feed cattle with supplements in winter (SS33). He also allows them into the field to graze - cattle do browse the Lespedeza but do not prefer this option.

- **Fenced trials.**

These have been undertaken for learning group members who have suffered repeatedly from livestock invasions in their fields: Sindisiwe Makhathini (Vimbukhalo), Cabangani Hlongwane (Ezibomvini) and Nodumiso Skosana (Stulwane).

Below are pictures and short descriptions for each of these participants.

Figure 12: Sindisiwe Makhathini in her trial plot 500m<sup>2</sup> of which was fenced and 500m<sup>2</sup> not. She is standing in her plot outside the fenced area.



For Mrs Makhathini, her fenced plots have performed a lot better than her unfenced plots in terms of germination and growth. Behind her in the photograph, is a plot that looks smaller and yellow – this is the SCC plot (Sun hemp, sunflower and sorghum) which was planted without being fertilized. She is standing in the unfence SCC plot, with zero germination. It is likely that seeds and newly germinated crops were predated by crows and goats in her unfenced plots. There is also some evidence of waterlogging towards the bottom of her field

She is in her 3<sup>rd</sup> year of CA implementation and observed that she has been able to produce more food, better maize yields and improved water holding compared to other fields.

Mrs Cabangani Hlongwane form Ezibomvini has been implementing CA for 7years. She has struggled to improve her soil quality and has difficulty with highly compacted, low organic matter clay soils.

Figure 13: Right: Cabangani standing next to her 500m<sup>2</sup> fenced trial. Far right top: A view of her SCC plot inside her fenced trial plot and Far right bottom: A view of her maize only plot inside her fenced plot



Cabangani has a CA control plot planted, as well as a 1000<sup>2</sup>m block trial with the prescribed layout, of which 500m<sup>2</sup> is now fenced. The mid-season dry spell alongside extreme heat has affected her maize

and beans have all but died out. She feels that she needs to move her plot to an area with better soils. It was explained to her that the soil cover she is to build up in her fenced plot, should help with ameliorating this problem by improving soil organic matter and water in her soil. To illustrate this point, her neighbour Phumelele Hlongwane’s trial, photographed on the same day (24<sup>th</sup> Jan 23), showed zero heat stress and was growing extremely well.

Farmers have generally not yet fully made the connection between their long-term soil management practices and the ability of the CA practices to provide resilience to stresses such as heat and mid-season dry spells.

Nondumiso Skosana from Stulwane, has fenced a 500m<sup>2</sup> portion of her 1000m<sup>2</sup> trial plot. She subsequently bought more fencing herself from her savings group share out to start with the fencing of the rest of her field.

Figure 14: Nondumiso Skosana’s 1000m<sup>2</sup> trial of which 500m<sup>2</sup> has been fenced. In the foreground is the SCC plot, which did not germinate. Generally, growth of crops inside her fenced area has been a lot better than outside.



- **Bergville CMTs**

Written by Lungelo Buthelezi

Below, a few case studies are provided for farmers outlining the CA trials they have undertaken. CMT’s have been planted for 22 participants, as outlined in table 4 above.

**Phumelele Hlongwane** has been involved in CA and other CRA activities, including savings and loan associations since 2014. She also has an intensive vegetable gardens, a micro layer unit and undertakes fodder supplementation for her livestock. Livestock now consists only of 1 goat, as other livestock have been stolen. She resides in Ezibomvini village in Bergville with her 6 children, 3 girls and 3 boys and she is the head of a house now as she lost her husband in 2021. She makes a living through CA cropping, gardening, poultry, and her farmer centre and makes around R4000 a month, inclusive of social grants.

She presently undertakes three different CA trials :

- 1000m<sup>2</sup> 10x10m blocks (Planted on 15<sup>th</sup> Nov 2022):

1. M	2. M+B	3. SCC	4. M	5. M+B
10. M+PK	9. SCC	8. M+B	7. M	6. SCC

The CA block trial has been planted at this exact layout since 2021 – thus now for the third year. Varieties planted are as follows: Mazie-PAN53, beans – PAN148, SCC – sunflower, Sun hemp and fodder sorghum and pumpkin- Flat white boer.

- 1 131m<sup>2</sup> strip cropping trial – with the same crops, but planted in 5 strips and

1. M
2. B
3. M
4. Scc
5. M+pk



- 1000m<sup>2</sup> fodder trails; consisting of alternate strip of short season maize and fodder (lespedeza and Tall fescue) (Planted on 30th Jan 2023)

1.	M
2.	B
3.	M
4.	Lespedeza
5.	M
6.	Tall fescue
7.	M
8.	B

She also has as CA control plot (15x93m) which is planted to PAN53 maize and is intercropped with pumpkins. Crop growth in all trials and control plots looked good, with early weeding evident.

Figure 15: showing Phumele Left :CA maize and Beans plot and Right: Strip plot: 5 strips (13m x 87m)



Figure 16: showing Phumelele 's SCC which are taller than her

She has red soils, which are well drained and have good structure. She uses Roundup as pre-planting herbicide and uses a hand hoe for weeding, which she has done 3 times between December and January 2023. She continues to use micro dosing for her fertilizer (with MAP as a basal application and LAN for top dressing). She also applies manure in her rows at a rate of around 10g per plant, She detected stalk borer and applied stalk borer granules to control this infestation.

Growth has been good, with around 98% germination for maize, 80% for beans and 90% for SCC. Maize was hammered by a hailstorm at kernel development at the end of January 2023, but will likely recover enough to produce well.

**Thulani Dlamini (54)** from Eqeleni started CA in 2020, after having seen the positive impact of CA implementation in neighbouring fields. He lives with his wife and 3 children, living primarily of grant money and occasional day labour, which provides around R800/month. He has traditional chickens, cows, goats and a vegetable garden. The rest of his income is made form farming.





He planted his CA strips plot as one of the CMT participants working together with Enviro- champs and MDF members. He is a very active farmer and has a large field of maize besides his CA trial and control plots. The field is irrigated using a pump from the stream below his house and sprinklers.



Figure 17: Left: Thulani Dlamini in his maize only strip plot Centre: in his bean strip plot and Right in his CA control plot

He used Roundup as a pre-planting herbicide, which worked well this season, but he also sprayed 2,4 D (30ml x 16L) x2 to remove black jack and grasses on the 15<sup>th</sup> of January 2023 in his CA control plot and large field.

He planted PAN 53 maize in his trial plots, beans PAN 148- beans, mix summer cover crops (SCC) and PAN5A-190 in his control plot as well traditional maize in his large field. He also added a fodder plot (20m x 50m) planted to short season maize PAN4A-128, Tall fescue and Lespedeza in strips. He applied MAP and LAN fertilizer using micro-dosing in rows with spacing of 50cm in maize and beans and 25cm in SCC.

Crops have grown well with germination of around 90% for maize, 60% for beans and 60% for SCC. His crops have grown well, but showed signs of heat stress in late January during the mid-season drought/heatwave.

Figure 18: Left: Thulani Dlamini in his SCC CA strip plot and Right: Beans starting to pod, at the ned of January 2023.

There was some evidence of stalk borer in his fields, but Mr Dlamini sprayed Kemprin (2mx16l knapsack) on the 27<sup>th</sup> December 2022, which provided good protection. He weeded twice on the 17<sup>th</sup> of Dec 2022 and 4<sup>th</sup> Jan 2023 respectively. The SCC showed some evidence of yellowing, as no fertilizer was added to these strips.



## 5. **Fodder production, supplementation and feed analysis**

The following slide summarises the feed nutrient analysis that has been undertaken as part of the fodder production and supplementation process. This will now be packaged and used in community level workshops to plan an expanded fodder production experimentation process for the coming planting season as well as the specifics of the winter supplementation regime.



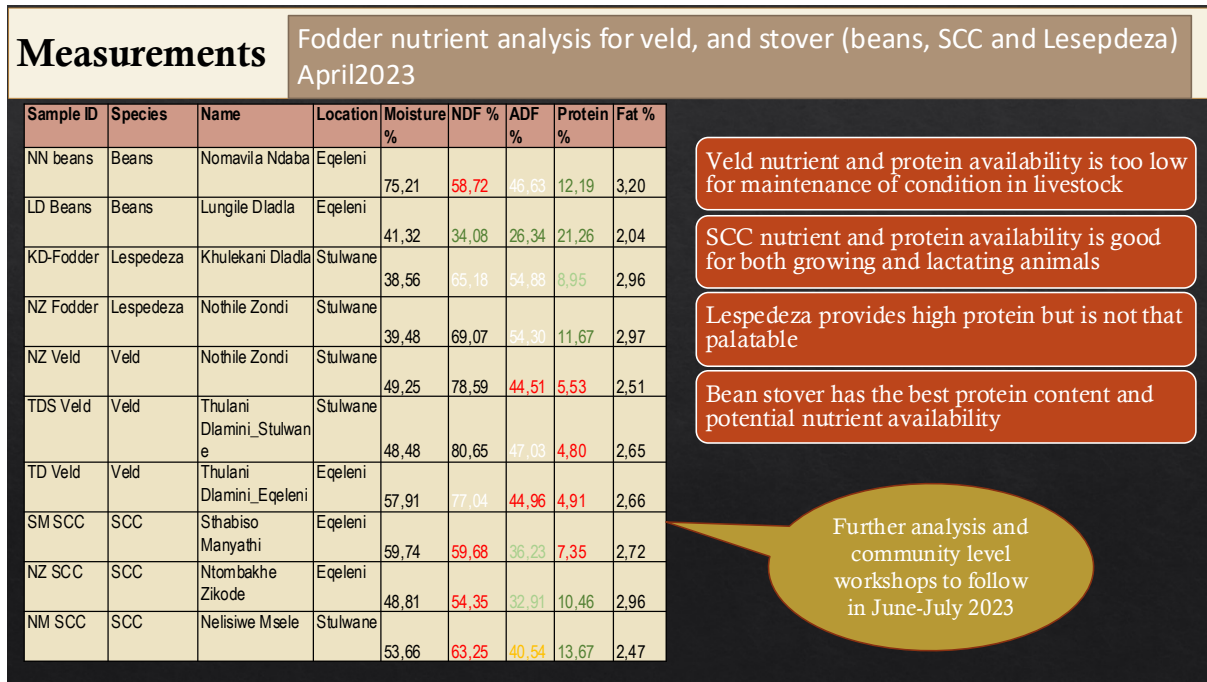


Figure 19: The nutrient analysis summary for different fodder options including veld grass hay, lespedeza, summer cover crop stover and bean stover. April 2023.

## 1.2 WATER ACCESS

### 1. **Vimbukhalo borehole refurbishment and reticulation**

The Vimbukhalo borehole scheme was finalised in the second week of December 2022. The scheme consists of:

1. The borehole pump box, linked to the homestead electricity supply of Mrs Fiasani Mpulo
2. The main 5000 l header tank with 1 tap close to the tank and 4 taps toward the bottom.
3. A 2<sup>nd</sup> 2500l header tank higher up with 1 tap.

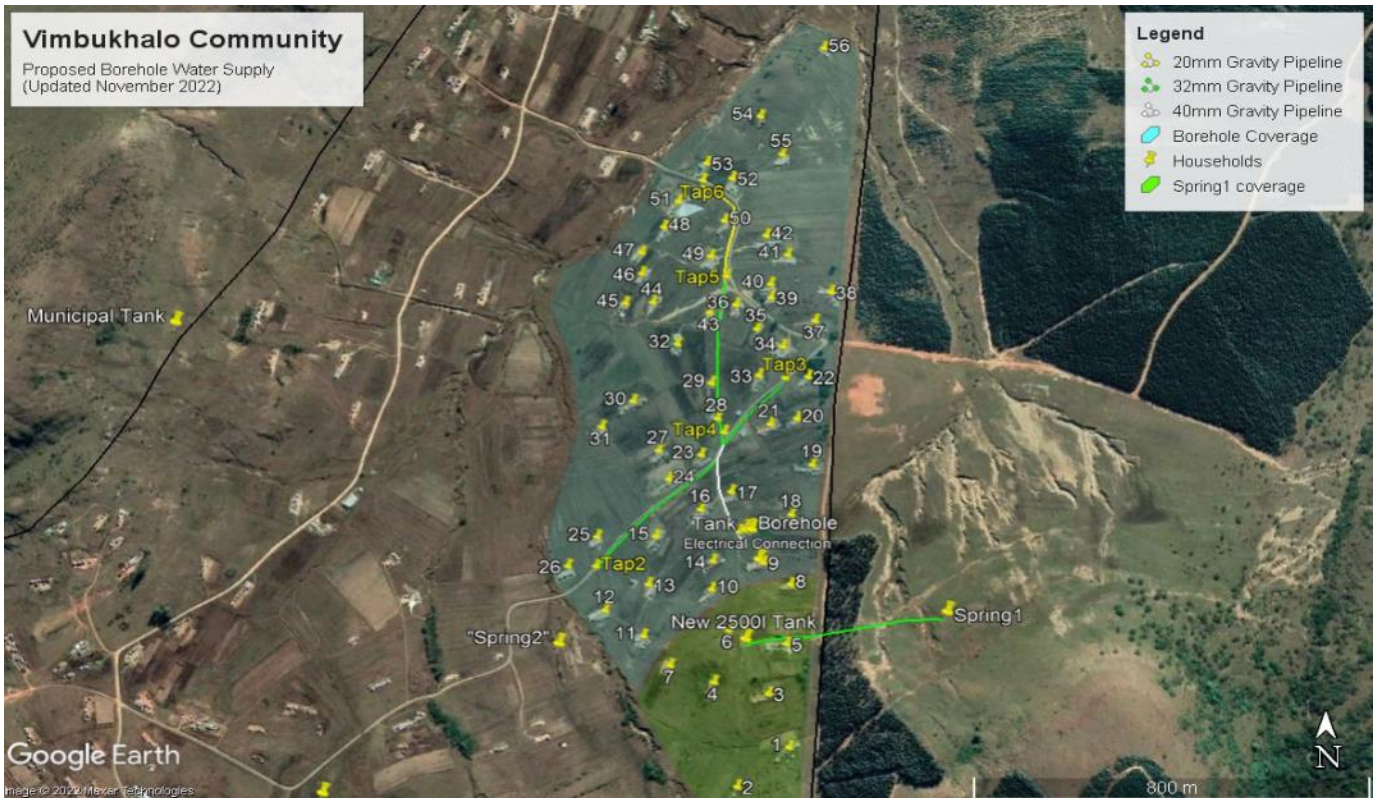


Figure 20: The map outlining the water sources in Vimbukhalo and the proposed scenarios for refurbishment of the borehole. The households that can receive water from these developments are numbered and marked in blue and green respectively.

The scheme services a total of 53 households. A community meeting was called on the 21<sup>st</sup> of January 2023, to finalised participants' financial contributions. Each participant household is to pay R200 to become a member of the water committee. These monies are to be held in an account for maintenance and labour related to the system. Each household also pays R10/ month for water provision to pay for electricity for pumping. Two people who were chosen to take money and record payments; one records payments from people below the road, the other records payments from people above the road.

In January around R210 was collected for pumping and in February the amount was R430. To start, the pump was left on throughout. Every 2<sup>nd</sup> day the valve is opened to fill the top tank – it is left open for a day and then closed again for a day. Issues that arose were primarily around erratic electricity supply in the village as well as to loadshedding. Fiansai Mpulo has also requested assistance with opening and closing the valve for the top tank as it isn't close to her and sometimes, she forgets or is not around.

Some suggestions made to alleviate the challenges were:

1. That Mrs Fiansai Mpulo needs to get a new, separate prepaid electricity box for the borehole pump, to separate this from her personal usage and
2. To request that the councillor assists with a solar electricity for the pump to alleviate the present supply difficulties.





Figure 21: Above Left to Right: the Pump connection, attached to Mrs Fisani Mpulo’s homestead electricity supply, the 5000l header tank with tap and the top 2500l header tank with tap.

During the community deliberations in Feb-March 2023, the system was struck by lightning – requiring an assessment of the whole system and replacement of the electricity box, with lightning protection now included. In addition, the pipes servicing the two header tanks were also replaced with better quality, slightly larger pipes as the water pressure from this pumping system was too high for the initial pipes used.

Figure 22: The Midlands pumps work team repairing the electrical system and replacing input pipes for the header tanks in Vimbukhalo, with the water committee members looking on – end March 2023



### SYSTEM INFORMATION

Previously electricity has just been added to the homesteads pre-paid arrangement for pumping, but in the present case community members haven’t done the required calculations to understand whether this is still working and understandably some of the participants felt that maybe some of the electricity was going to household use. Mrs Fisani Mpulo, the pump operator mentioned that she never had to separate electricity as it was not an issue before.

Thus, a combined process with the Mahlathini facilitators was undertaken to do the calculations; a process complicated considerably by the rolling loadshedding in the area.

Figure 23: Community members present in the Vimbukhalo water meeting to discuss access and participation – 7<sup>th</sup> March 2023



The meeting identified households who fetch from each tap as follows:

- Tap 1 (up at the smaller tank): 7 HH fetch
- Tap 2 (below Mpulo/ near the borehole): 5 HH
- Tap 3 (Below Bukisiwe Mpulo’s HH): 6 HH

- Tap 4 (just below the road opp tuckshop): 11 HH
- Tap 5 (in the middle, below the road): 16 HH
- Tap 6 (near Sbongile Mpulo's HH): 8 HH

To sum up, 13 households get water from the smaller tank at the top, and the big tank feeds water to 40 households, totalling 53 households. 3 households do not pay the R10. From the 27<sup>th</sup> of January 2023 to the 22<sup>nd</sup> of February 2023, R430 worth of electricity was used. From this,  $R430/27\text{days} = R15,92$  a day, which provides an average, but is not a fully reliable representation as the amount of electricity used per day may vary and is affected by how much water was used/how often water was fetched each day. Pumping has been sporadic due to both payment and loadshedding, but on average the tanks are now being filled every 2<sup>nd</sup> day.

The small table below summarises the water use for the two header tanks. This indicates that households can access 100l of water per day.

Tank(L)	No of HH	L/hh/day	Monthly water use (L/mth)	Annual water use (L/yr)
2500	13	96	37 440	
5000	40	62,5	75 000	
<b>TOTALS</b>	<b>53</b>		<b>112 440</b>	<b>1 349 280</b>
<b>Averaging</b>	<b>53</b>	<b>100</b>	<b>159 000</b>	<b>1 908 000</b>

Pumping details: The tanks had to be emptied and timed to fill up using a specific amount of money. Calculations showed that it cost R16,50 to fill both tanks (7 500L). This equals  $R0,32/\text{hh}/\text{pumping} \times 15 = R4,70/\text{month}$ , thus needing around R250/month if pumping is done every 2<sup>nd</sup> day.

Mrs Fisani Mpulo would like to leave the pump on, to avoid having to check all the time and risk empty tanks and annoyance from participants. The original specifications by the engineers however stipulated that pumping should not be done for more than 8hrs a day, to avoid over pumping the borehole. To fill both tanks (7500l) took 5hrs 30 min. **This means the tanks can be filled once per day and overall, this will cost R500/month**

**It also means that each household can collect 2x50l buckets of water per day**

At the end of the meeting, the participants agreed upon the following:

- Paying dates(R10): 9<sup>th</sup> and 10<sup>th</sup> of every month
- Those who are in the savings groups can pay (R10) at the savings meeting which is usually on the 10<sup>th</sup> of every month.
- The meeting participants committed themselves to pass on these decisions to the absent members.

## A NOTE ON GOVERNANCE

These water committees are informal ad hoc localised groupings in the villages, usually with representation from the ward committees of the Traditional Authorities and the formal water committee representatives for the local Municipal Council. In Vimbukhalo this person is Mr Mkhize.

Two strategies exist for formalising the localised water committees – one of intensive upfront organisational structuring, election of office bearers and development of constitution and rules. The second is to develop this process over time, based on the experiences and motivation of the group. Mahlathini has opted for the second approach, as this allows the members of the informal groups to slowly formalize their institution as required by circumstance also provides weight to the decisions made in a participatory way. Governance improved over time. Although this process primarily works through resolution of conflict and instituting rules to avoid specific circumstance from occurring again, it is much more participatory and inclusive than the first strategy and generally leads to a more sustainable outcome.

### 2. *Stulwane spring protection and reticulation scheme*

This localised community owned system, was initiated prior to the commencement of this project. A similar community level process of allowing the community to frame their request and start the process by setting up a water committee and doing



the initial ‘water walks” and surveys was use. Here a spring in a wetland was protected and reticulate d to 5000l header tanks with 4 taps downstream (one added a little later by participants themselves. As it is a gravity fed system, ongoing financial contributions are not required. 28 Households have been supported.

The spring supplies around 10 000l/24hrs.Thus for the 17 hh below the spring around 500l/day at a distance of 200-400m for one of three taps. If those who are nearby, but without easy access to taps are also included, as well as the participants linked to the 4<sup>th</sup> tap, the number of households goes up to 28 with an allocation of ~200l - 380/day.



Here, they decided to elect a spring committee:

Name and Surname	Contact details
Baba Dubanzane	0826282627
Mxholisi Mkhize	0760790738
Nelisiwe Msele	0731504405
Hloniphile Sishi	0728158921
Phekaphi Nyoka	0828697437

Roles of committee members:

- Responsible for any issues arising with the water scheme
- Fix problems with any people not following the rules
- Allocate the use of water and ensure everyone who is eligible gets
- Check regularly that the system is working and used properly
- Open a bank account for the financial contributions and undertake small maintenance activities.
- Call meetings with membership to report on usage, maintenance issues and get permission to use funds for specific activities.
- Communicate with the community level water committee and also the Traditional Authority and councilor.
- Request assistance from community level water committee for issues they cannot solve.

This scheme has been in operation since May2022. A document outlining the full process is provided in Annexure 2. (“Stulwane committee spring protection and reticulation overall process including operation and maintenance”).

Figure 24: Right and Far right: A view of the spring when the v-box was constructed in May '22 and more recently in Feb '23, showing also that the spring was subsequently fenced.



Figure 25: Below Left and Right: The 2 x5000l header tanks at installation and recently in Feb '23 – also fenced.



A conflict arose in January 2023, where a few households closest to the protected spring became unhappy with their lack of easy access to the spring and to water. It was decided then to add two more taps to the scheme (one at the spring and one at the header tanks, to allow reticulate access to these households (4). They were previously expected to collect water from the spring itself and from the header tank overflows but were not happy with this arrangement. These small changes were supported through this project.

In a workshop on water and resource conservation mapping and action planning in April 2023, the issue of water provision for the rest of the Stulwane community was raised. Further spring protection and reticulation of the borehole close to the dip tank are to be considered.

#### **A NOTE ON GOVERNANCE**

The spring committee in Stulwane has been functioning well and has been actively supported by the traditional ward councillor, Mrs Hlongwane. To date all participants have followed the broad instructions and have also assisted in ensuring that people do not come from outside the village to use this water. In the beginning people came from eMadakaneni and Eqeleni with bakkies to load up with water. All participants in this scheme are satisfied with the scheme and with their access to water.



The spring committee has been very active. The small conflict around taps however did indicate that for some levels of conflict and decision making still require a respected 3<sup>rd</sup> party with ‘authority’ in this case Mahlathini, may still be required to make decisions and ensure positive actions and outcomes.

### 3. Water quality testing

Community members have been trained in using E coli testing kits (procured from Praecautio laboratories in Hilton) to assess the quality of water in their water schemes. The eco champs (youth employed part time to undertake resource conservation work in the communities) have been responsible for administering these tests.

Water samples are incubated in pre-prepared test tubes in a “hotbox” for 24 hours. Colour reactions indicate the presence of coliforms (brown) or E coli (green).

Figure 26: Right: An example of three E coli tests taken in the Stulwanae spring protection scheme in 2022/ These have turned green indicating the presence of E coli.



Stulwane	E Coli test results		
	Date	Time	Place
2022/02/17	12:03	S2	Clear
2022/02/17	12:11	S1	Clear
2022/02/17	12:56	E	Clear
2022/02/24	10:00	S2	Clear
2022/02/24	10:13	S1	Clear
2022/02/24	10:20	E	Clear
2022/03/04	09:13	S2	Green
2022/03/04	09:17	S1	Green
2022/03/04	09:22	E	Green
2022/03/10	09:22	S2	Clear
2022/03/10	09:27	S1	Clear
2022/03/10	09:56	E	Clear
2022/04/21	09:07	S1	Clear
2022/04/21	09:15	S2	Clear
2022/04/21	09:20	E	Clear
2022/06/16	08:06	E	Clear
2022/06/16	08:15	S1	Clear
2022/06/16	08:29	S2	Clear
2022/06/23	09:10	E	Clear
2022/06/23	09:25	S1	Clear
2022/06/23	09:32	S2	Clear
2022/09/14	09:56	E	Clear
2022/09/14	09:59	S1	Clear
2022/09/14	10:03	S2	Clear
2022/12/05	09:15	S2	Clear
2022/12/05	09:18	S1	Clear
2022/12/05	08:25	E	Clear
2023/03/03	09:54	S2	Clear
2023/03/03	10:01	S1	Clear
2023/03/03	10:05	E	Clear

KEY:  
 S1- is the protected spring with V-box  
 S2- is the spring lower down  
 E- are the header tanks of the protected spring

After the contamination of the spring and water system in March 2022, the community undertook to build a swale above the spring in the wetland, as they noticed that urn-off from the surrounding areas flowed into the spring intake area and felt that this is what caused the contamination. Subsequently the tests have all been clear.

Full drinking water quality tests (SANS241) have been undertaken by Umgeni water (8 May 2023).

Samples were taken and kept at 4Degrees Celsius for 2 days prior to analysis, which could affect E coli and Coliform counts. As these counts should be 0 and <10 respectively. It was not considered to be problematic, although values recorded would be marginally higher than if the tests were done within 24hours of sampling.

The result was generally favourable expect that:

- E coli counts were 54 iso 0
- Coliform counts were 1203 iso <10 and
- Heterotrophic plate counts were >1000.

Treatment of water for household use will be required. Chemical disinfectant is to be added to the header tanks of this system on a daily basis – Chlorine addition at a rate of 1l/5000l tank.

1.3 GOVERNANCE AND WATER STEWARDSHIP

1. **Multistakeholder events**

**OKHAHLAMBA AGRICULTURE AND LAND SUMMIT\_6 DECEMBER 2022**

Mahlathini presented our work with smallholder farmers in the area under the heading of CbCCA in Northern Drakensberg enhances resilience of smallholder farmers and also had a table with produce from farmers on display and for sale. Stakeholders mainly were from government departments and the municipality outlining projects and programmes being undertaken in the area.



Figure 27: Above Left and Right: the Bergville Extravaganza showing the hall and the MDF farmer's table and stall for sale of produce.

**MALOTI DRAKENSBERG PROECTING AND SAFEGAURDING OF THE DRAGON HERITAGE INDABA AND WORKSHOP – 11-14 December 2022**

The workshop was organised by the Peaks Foundation in association with GLOMOS and the Afromontane Research Unit (UFS), with funding kindly granted by the German Embassy Climate Fund. The goal was “To enhance the growth of an African-based research ‘Community of Practice’ of high excellence, to identify and develop solutions at the local level to contribute to the protection and preservation of the Maloti-Drakensberg”. 53 Participants form a diverse range of stakeholders from both South Africa and Lesotho attended, including academics,



government representatives, civil society and traditional leadership. Continued collaboration between the members of the newly formed Community of Practice (CoP) is a primary outcome of the workshop, in which all parties agreed that there are gaps between research, implementation and policy, and that these gaps can only be bridged by breaking down walls between individual silos and continuing to engage on an ongoing basis.

**BERGVILLE REGENERATIVE AGRICULTURE SMALLHOLDER FARMERS OPEN DAY – 23<sup>rd</sup> FEBRURAY 2023**



This event was held to showcase the conservation agriculture work in relation to climate change resilience and integrated water management. Stakeholder present included Asset Research, the Agricultural Research Council, the WildTrust, KZN Wildlife, uThukela Development Agency, Okahlamba Local Municipality, AGT Foods and PANNAR Seeds, and around 180 smallholder farmers, with around 20 farmers visiting from Ozwathini and Gobizembe in the Midlands.

The event consisted of presentations and discussions at the Emmaus Hall followed by field trial visits in 4 villages.



Figure 28: The Bergville farmers' open day (23<sup>rd</sup> Feb 2023) showing a packed Emmaus hall with over 200 participants in the event



Figure 29: Field visits were undertaken during the open day, to CA trial plots using participants' vehicles- here the group is viewing a Lespedeza plot in Mr Khulekani Dladla's fodder trial in Stulwane,

There have been a number of relationships built and improved upon between government department officials, and the learning groups. These include:

- Closer cooperation between the local councillor Mr Dladla and the communities, specifically in Vimbukhalo
- Closer cooperation with the KZNDARD extension officer Mr Kubone and 4 of the groups starting cooperatives
- A strong collaborative arrangement between the Marketing committees, MDF staff and uThukela Development Agency, which is providing support to the marketing in a number of ways – facilitating setting up stalls in Bergville, offering of transportation of produce to markets, joint marketing days at government events to advertise the work of these groups and negotiations related to improved livestock auctions for these communities.
- A close relationship with the LED unit of the Okahlamba Local Municipality and the municipal manager Mr Malinga.

2. **Local governance – adaptive planning – community level implementation**

In association with the Centre for Water Resources Research at UKZN, and under the auspices of the Water Research Commission a social-ecological mapping of land use patches, including a technical mapping of ecological and water resources as well as a veld assessment was undertaken. This participatory approach is now being developed into resource management adaptive planning process with the CRA learning groups and village-based management structures.

The table below summarises this planning for Stulwane and Ezibomvini.

Table 6: Local resource management plans for village based CRA platforms: March 2023

Local resource management areas for improved eco system services- Community defined		
Key Area	Management required	Notes
<b>Grazing areas</b> (Amadlelo) -Livestock feed and water, firewood, medicinal plants,	<b>Restoration and management.</b> -Clear Lantana and use poison after cutting to stop regrowth -Rotational grazing -Control wildfires and make firebreaks. Storage drums for emergencies with fire one can use -Explore financial benefit – grant/incentive mechanisms -Monitor and manage nutrition of veld (erosion control, overgrazing control, removal of poisonous weeds, re-seed of palatable species) -Awareness raising in the community and for livestock owners.	-Eco-champs to do clearing -Dip tank committees and livestock associations -Better community collaboration with dip tank committee as well as TA and councillors -Community workdays
<b>Wetlands</b> (Amacaphuza), -Reeds (incema) -Food and water for cattle, also in winter -Medicinal plants -Fire retardant -Runoff and flood water management -Improved water quality -Fertile soils with earthworms	<b>Small management changes to manage condition of wetlands.</b> -Fencing to ensure good condition and make drinking troughs for livestock -Awareness raising on wetlands functions and services -Replanting important species into wetlands; then someone needs to police this and ensure people don't just harvest everything -Protection and restoration of important medicinal species for sale: Stop people with big bags who come in and take for selling -Avoid pigs coming in as they mess things up -Avoid fires and burning -Livestock inclusion managed e.g. –allow them in at certain times only. Or maybe make camps and move them. Or allow them to graze on the edges. Or cut and carry feed.	-TA involvement and 'landowners' in wetland areas to outline rules and responsibilities -Community as a whole to follow these -Local water and land use committees to undertake specific actions related to water access and management -Issues around rights around use of water and important medicinal plants need further interventions -Suggestion: talk to livestock association then bring their comments and suggestions to the water committee to continue the conversation and include all
<b>Erosion control</b> -To ensure availability and quality of water and soil resources	<b>Restoration</b> -Awareness raising and outline of responsible actions to enforce -Avoid expanding of minor erosion into dongas. -Prevent siltation and pollution. -Allow re-vegetation, naturally or through re-seeding -Prevent run-off -Check dams, brush packs, stone packs, -Prevent livestock from causing further damage -Control wildfire- make fire breaks Storage drums for emergencies with fire one can use	-TA and livestock committees to undertake some actions -Eco champs to assists -Some actions and contributions from community as a whole (e.g. loan of tractors, small financial contributions -External support -Continued support from UKZN and MDF in mapping, planning, proposal development, community structures and management
<b>Alien trees</b> -Eucalyptus, poplar, and wattle plantations, and patches	Small changes -Promote better management by 'owners' -Cut down and poison lantana and encroaching poplars -Ensure management of wattle patches -Remove trees from water sources and streams in all cases	-TA, Nkosi and 'owners' encouraged to undertake management activities as trees are useful in the community and cannot just be cleared.
<b>Springs and streams</b> -Water provision for drinking, laundry, irrigation,	Protection, restoration, and management – must protect the water sources to ensure supply. - Should protect water so that livestock don't disturb the sources	-TA, local municipality, water committees and localised groups of people using specific water sources to work together on access and management plans and implementation



<p>construction and livestock -Water quality and quantity -Issues are floods, livestock trampling, children use as toilet, litter</p>	<ul style="list-style-type: none"> <li>-Protect the springs; with fencing and the ditches above to avoid water from flowing in overland and contaminating these springs.</li> <li>-Check water quality.</li> <li>-Remove eutrophication.</li> <li>-Check springs regularly.</li> <li>-Drinking spots for livestock</li> <li>-Community awareness and education – and for children</li> <li>-Maintain the water infrastructure that is there.</li> <li>-Avoid doing laundry in the water sources and keeping them clean, no pampers, no urination, no use as toilet, no dumping of dead animals.</li> <li>-Protect springs with pipes to be able to irrigate the gardens (reticulation to taps)</li> <li>-Also use grey water for irrigation.</li> <li>- water harvesting and use.</li> <li>-Make sure children don't play around the water sources... or pollute them</li> <li>-WATER ACCESS:-Big issue</li> </ul>	<ul style="list-style-type: none"> <li>-Community must come together and make rules and regulations re hygiene and water</li> <li>-Those that are involved should talk to others and ensure they also learn - involve the TA councillors and Nkosi....</li> <li>-Asking Mahlathini to help with fencing and funding for water access</li> <li>-Day to day activities of cleaning springs, digging furrows to reduce contamination to be done by locals</li> <li>-Dig refuse pits for disposal of waste – in each locality</li> <li>-Awareness raising and communications</li> <li>-Involve schools</li> <li>-Eco champs to assist with spring protection and management and schools' interventions</li> </ul>
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Figure 30: The Adaptive planning session undertaken in Stulwane, 29<sup>th</sup> March 2023



Figure 31: Above: Pictures of the brush packing and grass re-seeding activities undertaken by the young Eco-champs in Stulwane..

## 2 GAPS AND CONSTRAINTS

Ongoing weather variability has hit smallholder farmers hard – floods and heavy rainfall in December, followed by a heatwave in January 2023, followed closely by extreme hailstorms which completely decimated the crops of around 6 CMT participants.

These extreme weather conditions have also impacted the outcomes of both the run-off and water productivity results. Given the high level of run-off for 2-3 months of the summer season, run-off results have been high and not much difference can be seen between trial and control plots, due to saturation of the soil profile with water and thus increased runoff throughout. Differences in water productivity have also been masked for the same reason.

Generally the project has been proceeding according to plan and all activities are on track.

### 3 COMMENT ON FINANCIAL REPORT

Table 3: Summary of expenditure on CRA activities: December-May 2023

Cost breakdown	Apr-23	Remainder (2022-2024)	Budget (2022-2024)
Inputs for Conservation Agriculture	R145 704,30	R104 295,70	R250 000,00
Spring Protection	R114 721,23	R103 278,77	R218 000,00
Engineering fees	R70 433,82	R26 013,18	R96 447,00
	R330 859,35	R233 587,65	R564 447,00
Total 2022-2023	0,59	59%	

From the above table the project team have thus far used R330859,35 of the funding available for implementation of activities, which is 59% of the budget available for 2022-2024. This means expenditure is on track in relation to the overall budget. As the spring protection work to date has used roughly 50% of that budget, a further spring protection activity is to be undertaken in 2023-2024.

#### NOTES ON EXPENDITURE

Expenditure has been compiled up until the 30<sup>th</sup> April 2023

1. A disbursement of R556 500 was received on the 27<sup>th</sup> July 2022 and a further disbursements of R180 000 was received on the 12<sup>th</sup> December 2022
2. A total of R888 184,14 has been spent between December 2022 and April 2023
3. Expenditure is on track, with a slight under expenditure thus far on capital assets (spring protection), and over expenditure on inputs for CA travel and subsistence. The latter is due to the substantial and unforeseen increase in fuel prices and related hikes in prices of agricultural inputs.

Below is a summary of the financial report.

### 4 FINANCIAL REPORT

The financial report excel sheet is attached as a separate document: "**WWF-ZA06370C-Smallholder CRA and Water Provision\_MDF\_ Financial reporting template\_Milestone 4\_20230601**" Documentation for explaining full expenditure summaries is available on request.



Project number and Name:		WWF_184-ZA063760C – Water stewardship Mahlathini						
Completed by:		Erna Kruger						
		ESTIMATES		ACTUALS				
Code	Description	Total Project Budget	Current Year budget	Previously Reported Actuals	Current Year Actuals	Total Actuals to date	Total Current Year Budget minus Current Year Actuals (D - G = I)	Total Project Budget minus Total Actuals to date (Variance) C - H = J
	Reporting Period	May 2022-April 2024	May2022-June 2023	May 2022-December 2022 (1 Aug2022-20 November 2022)	December 2022-April 2023			
	<b>A - OPENING BALANCE</b>	R 0,00	R 0,00	R 0,00	R 0,00	R 0,00	R 736 500,00	R 0,00
	Approved WWF Income	R 1 285 000,00	R 0,00	R 556 500,00		R 556 500,00	R 0,00	R 728 500,00
	<b>B - TOTAL income + o/balance</b>	<b>R 1 285 000,00</b>	<b>R 0,00</b>	<b>R 556 500,00</b>	<b>R 0,00</b>	<b>R 556 500,00</b>	<b>R 736 500,00</b>	<b>R 728 500,00</b>
	<b>EXPENDITURE by code</b>							
1	Staff costs	R 432 000	R 216 000	R 162 000,00	R 162 000,00	R 324 000,00	R 54 000,00	R 108 000,00
2	Third party fees	R 96 447	R 48 000	R 44 180,17	R 26 253,65	R 70 433,82	R 21 746,35	R 26 013,18
3	Travel and Subsistence	R 211 770	R 109 350	R 105 645,29	R 84 600,00	R 190 245,29	R 24 750,00	R 21 524,71
4	Capital Asset costs	R 218 000	R 109 000	R 75 995,34	R 38 725,89	R 114 721,23	R 70 274,11	R 103 278,77
5	Operating expenses	R 250 000	R 125 000	R 115 809,38	R 29 894,92	R 145 704,30	R 95 105,08	R 104 295,70
6	Meetings / Education / Training	R 20 533	R 10 267	R 0,00	R 10 267,00	R 10 267,00	-R 0,50	R 10 265,50
7	Project Promotion / Communication/ Printing / Publication	R 56 250	R 28 125	R 21 093,75	R 11 718,75	R 32 812,50	R 16 406,25	R 23 437,50
	<b>C - TOTAL EXPENDITURE</b>	<b>R 1 284 999,50</b>	<b>R 645 741,50</b>	<b>R 524 723,93</b>	<b>R 363 460,21</b>	<b>R 888 184,14</b>	<b>R 282 281,29</b>	<b>R 396 815,36</b>
	<b>D – CLOSING BALANCE</b>	<b>R 1 284 999,50</b>	<b>R 645 741,50</b>					<b>R 396 815,36</b>

## 5 SIGNIFICANT PLANNED ACTIONS FOR THE NEXT MILESTONE

- CA implementation: finalisation of yields and water productivity data for round 1. Reviews and re-planning for round 2 of the implementation and initiation of the 124 CA trails for round 2
- Protection of one more spring in Stulwane, specifically for irrigation purposes

## 6 LIST OF ANNEXURES

Complementary information, including photographs.

ANNEXURES:

Annexure 1: Northern Drakensberg Monitoring and Evaluation plan

Annexure 2: Stulwane spring protection and reticulation planning and implementation November 2021-May 2022

Annexure 3: Umgeni water test results

PROJECT MONITORING AND EVALUATION PLAN							
PARTNERS	PROJECT OUTCOME		PROJECT INDICATORS		OVERALL GUIDING QUESTIONS		
	#	What is your project outcome?	#	<b><u>What do you want to measure</u></b> through your monitoring and evaluation?	#	What <b><u>specific question</u></b> would you want answered through your monitoring and evaluation?	Project values for Mahlathini Development Foundation
Mahlathini Development Foundation	1.	Job creation through ecological infrastructure restoration. (Target 1.3)	1.1	Number and nature of jobs created within communities	1.1.1	What is the total number of jobs created, annually?	8
					1.1.2	What type of jobs have been created?	Part time youth eco-champs
					1.1.3	From which communities are these employees?	Stulwane and Ezibomvini villages, Bergville
					1.1.4	How many women are employed?	62,50%
					1.1.5	How many youth are employed?	100%
			1.2	Increased socio-economic benefits	1.2.1	How many days has each person worked per month?	10
					1.2.2	What is the work (technical and professional/role) with which people are engaged?	Spring protection and water access, erosion control and resource conservation, alien clearing
					1.2.3	For how many and by how much has household income increased, as a result of these jobs?	Increase of R1 600/month/household for 8 households
					1.2.4	What additional social value has participation in the project yielded for individuals and households?	Eco-champs have gained training and on the job experience in a number of fields. They have gained recognition in their villages and households for their contributions
			2.	Agro-ecological practices of 106 farmers increase productivity and food security.	2.1	Number and type of farmers implementing agro-ecological practices	2.1.1
	2.1.2	How many farmers are in these villages / communities?					1200 smallholder farming households
	2.1.3	How many farmers are implementing agro-ecological practices?					124 farmers implementing Conservation Agriculture and fodder production
	2.1.4	In which strategic water source area are these farmers?					
	2.1.5	Which crops are grown in the participating villages / communities and in controlled sites?					Maize, dry beans, pumpkins sorghum, sunflowers, Sun hemp, Lespedeza, tall fescue and turnips in controlled sites. Generally only maize is grown in the communities.
				2.1.7	What agro-ecological practices are being implemented?	Conservation agriculture, intercropping, crop rotation, diversification, livestock integration, soil and water conservation	

			2.2	Increased productivity and food security	2.2.1	What is the net yield on agroecology fields versus the control fields?	Still to be calculated. In the past an increase of 30-100%
					2.2.2	How is produce used by households and / or community?	For food and sale locally
					2.2.3	Does and how does this production yield support food security and livelihoods.	Food security is improved. Around 33% of households have enough food for the entire year and the other 66% produce enough for between 50-100% of household needs.

			1.2	Access through spring protection	1.2.1	How many springs are being restored?	1 spring (Stulwane village), 1 borehole (Vimbukhalo village)
					1.2.2	To what extent has the flow rate increased within these springs? How much water in KI is used from the spring / piped to the homestead storage? / How many community members / households access water from the homestead storage?	Stulwane spring: 792Kl/annum, 11 households. Vimbukhalo borehole: 1908Kl/annum, 53 households
					1.2.3	How many farmers access <b>how much</b> water from springs for agro-ecological practices?	Stulwane - 11 farmers, (200-380l/day) Vimbukhalo- 53 farmers (100l/day)
					1.2.4	What is the distance between farms and the springs? How much time is saved through homestead storage?	Local standpipes, maximum distance from homesteads 200m, have been installed. Saves young women between 2 to 4 hours daily.

# Annexure 2:Stulwane spring protection and reticulation planning and implementation November 2021-May 2022

## 1. BACKGROUND

The Stulwane community is located near Emmaus in the Drakensberg region and falls under the Okhahlamba Local Municipality within the Uthukela District Municipality of KwaZulu-Natal. Stulwane is approximately 8km and 25km travel distance from the centres of Emmaus and Winterton respectively.

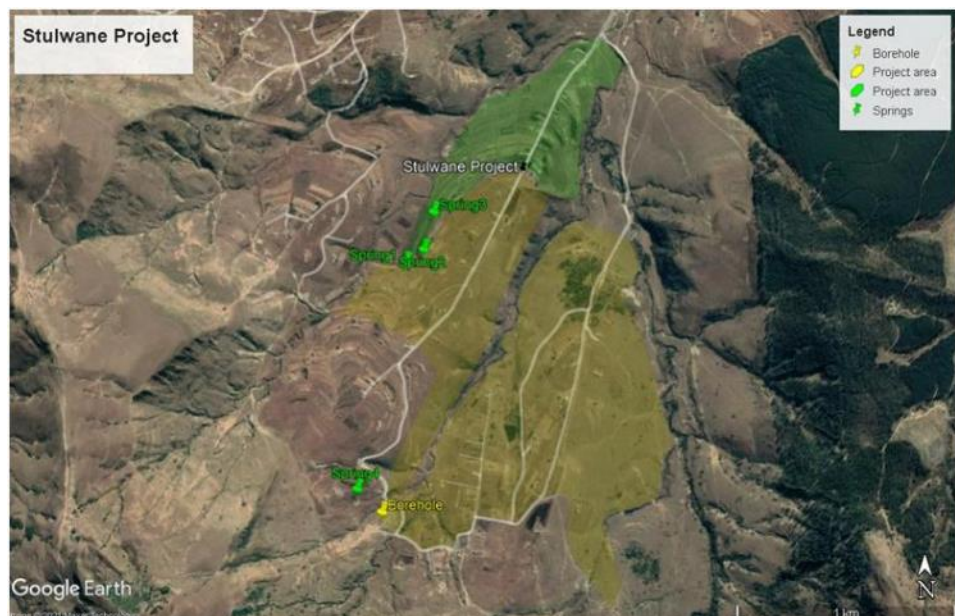
Due to the more mountainous terrain the community is separated into a number of sections. Two of these sections form part of the project area being considered and comprise approximately 90 rural homesteads in total.

There is currently no reticulated municipal water supply in the area. Current water sources accessed by the community include:

- one municipal borehole and tank providing communal water access to one section (installed in Nov 2021)
- a spring fed tank and communal tap located away from any cluster of homesteads (installed in '2017)
- a community borehole with handpump (near the cattle dipping tank, installed in '2017)
- supply by water tanker
- a number of undeveloped springs

A number of potential water sources within, or surrounding, the project area were investigated and mapped by a hydrological team from UKZN in association with community members and the Stulwane Water Committee. These were narrowed down, due to various factors such as access, location and strength of supply, to a few sources for further investigation. These identified supplies include the borehole situated next to the dipping tank, the undeveloped springs (referred to as springs 1, 2 and 3) and the existing developed spring (spring 4).

*Right: Map indicating the undeveloped springs with potential for reticulation*



A further technical investigation was undertaken in November 2021, by an agricultural Engineer, Mr Alain Marechal, who joined the UKZN team and the water committee to assess the technical potential for developing and reticulating these identified sources.

The outcomes are briefly summarized below



**1. Borehole with handpump next to dipping tank (Location: 28° 55' 37.4"S, 29° 22' 03.3"E)**

The borehole situated next to the cattle dipping tank is equipped with a handpump and is operational. This is a community borehole and would be available to develop further. It is situated away from the main groupings of homesteads but at an elevation that would allow gravity reticulation to one or two sections of the project area. The borehole would need to be pump tested to determine its sustainable yield and whether it is feasible to install an electric pump. On the day of the site visit water samples were taken to get an indication of any issues with the water quality. One concern is the proximity of the cattle dipping tank to the borehole and any possible contamination of the groundwater.

**3. 2 Spring 1 (Location: 28° 54' 57.7"S, 29° 22' 07.7"E)**

The spring referred to as "spring 1" is situated upstream of, and close to, springs 2 and 3. Of the three springs this one has the stronger flow and has two upwelling "eyes" evident. Indications from community representatives are that water is available all year round from the spring. There has been no development of this spring apart from a steel drum placed over one eye, and cattle and other livestock are able to access the water. A rough flow measurement was taken on the day of the site visit and indicates a possibility of being able to access at least 10 litres a minute. Water samples were taken to check the e-coli levels in the water. *Right: View of spring 1*



Spring 1 has a flow rate of 10 litres per minute. Reducing this to 7 litres per minute, as a more conservative figure, would give the possibility of accessing 10 000l per 24 hours. This equates to an amount of 500l per household on 17-20 households in the area of coverage below the spring.

NOTE: This is the spring that was chosen for development.

**3 Spring2 (Location: 28° 54' 55.7"S, 29° 22' 10.8"E)**

Spring 2 is situated slightly downstream of spring 1 and has a lower flow. A makeshift barrier / fence has been erected around this spring and a steel drum placed around the eye. Water samples were taken to check the e-coli levels in the water.

*Tight: Spring 2*



**4. 4 Spring3 (Location: 28° 54' 49.7"S, 29° 21' 58.8"E)**

Spring three is situated further downstream of springs 1 and 2. A steel drum has been placed around the eye but no further development of the source has been done. A rough flow measurement taken indicates a possibility of accessing approximately 6-7 litres a minute. Water samples were taken to check the e-coli levels in the water.

*Right: Spring 3*





### 5. **5 Spring4 (Location: 28° 54' 33.6"S, 29° 22' 07.7"E)**

Spring 4 has been developed by the community and consists of two covered chambers (brick and concrete) built around two spring seeps / eyes. Water is piped from the collection chambers to two 2400l tanks that then feed a community standpipe. At the time of inspection the tanks were overflowing but the community representatives did indicate that when used the tanks do fill very slowly. A repair is required to a hole in one tank and fitting of float valves and replacement tank lids.

*Right: Tanks fed from the spring and community standpipe*



## 2. **PROPOSED INTERVENTIONS**

Discussions were held with the community representatives regarding the five water sources and

possible development and use of each source to supply water to various areas of the community. Due to the lower elevation of springs 1, 2 and 3 within the project area it would be necessary to consider an additional source at higher elevation (the borehole or spring 4) in order to supply water to the higher lying sections. The outcome of these discussions was that the borehole and one of the undeveloped springs (1, 2 or 3) could be considered for the project. Spring 4 was to be excluded at this stage due its low flow. It was further recommended that only one of the undeveloped springs should be developed in order to avoid any community issues should the development result in damage and loss of water at the spring eyes.

The project team decided to consider further testing and equipping of the borehole (budget allowing) and protection of one of the springs (1, 2 or 3). Further to developing the water supplies three scenarios would be considered for supplying or reticulating water to the community:

- Scenario 1: Store water in (header) tanks and reticulate to smaller drums fitted with float valves at individual households.
- Scenario 2: Store water in (header) tanks and reticulate water to a number of communal standpipes placed around the community.
- Scenario 3: Store water in (header) tanks and feed centrally placed communal tanks within clusters of households.

For purposes of this report the following will be used to refer to the different areas / sections of the community being supplied:

- Section1: Area of supply coverage below and to the northeast of the borehole  
(Comprising approximately 17 households)
- Section2: Area of supply coverage below and to the north of the borehole  
(Comprising approximately 33 households)
- Section3: Area of supply coverage below the spring  
(Comprising approximately 38 households)

It should be noted that the layouts presented below showing the various reticulation options and extent of coverage are provisional and for planning purposes. The final layouts, including pipeline routes, number of households to be supplied, tap and/or tank positions, will only be determined during the design phase. These would need to take into consideration, among other factors, the actual amount of water available from the developed sources, community input to positioning of tanks and/or standpipes, and proofing of the proposed pipeline routes.

### 3. DESIGN AND IMPLEMENTATION

A meeting was held with the water committee (Nelisie Msele, Dombi Dlamini, Nothile Zondi, Khulekani Dladla, Danger Khumalo and Thulani Dlamini, with 3 enviro champs present on 20<sup>th</sup> January 2022, to discuss process and decision making regarding the water access scenarios developed.

*Right: Nothile, Nelisiwe and 2 of the enviro champs at the water committee meeting in Stulwane*



Below is a summary of the main questions and decisions

#### 1. *Involvement of community*

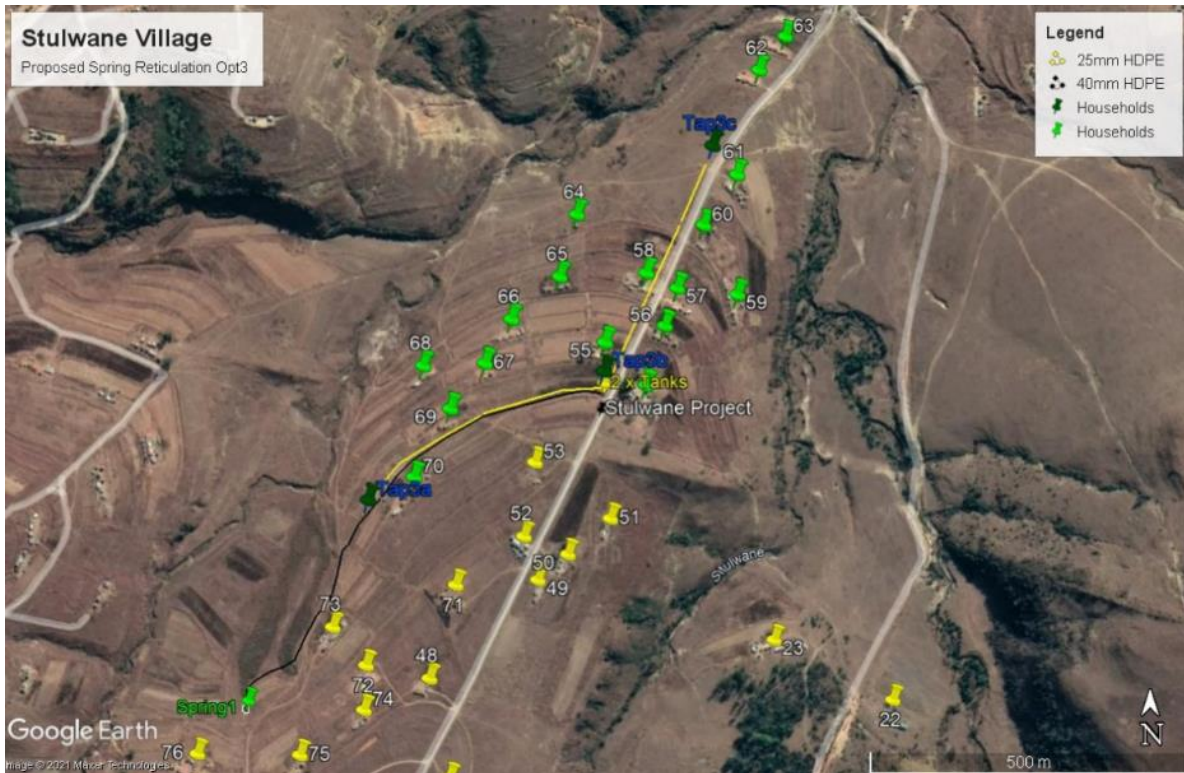
It was decided that a full community meeting be called to outline the reasoning for starting with the spring protection. Working with the borehole requires a pump flow test to ascertain strength which costs around 30K and due to distances from homesteads, the pump will need to be solar, also adding considerably to costs. There is around 50K in the WRC-ESS research budget that can be used for community implementation and with community contributions will be enough to protect spring 1 or 2, provide 2 header tanks and pipelines with 2-3 standpipes with taps.

The community will need to agree to the fact that there isn't presently funding to continue after the spring protection is done and so some people will benefit, and some will not. The spring cannot provide enough water for everyone, so the whole community cannot fetch water there.

Even the spring protection and the borehole if both can work and be implemented will not be able to provide water for the whole community.

- No Access: ~17 Households
- Borehole Section 1: NE.~17 Households
- Borehole Section 2: N. ~ 33 Households
- Spring 1 (Scenario 2: OPTION 3): 10 000l/24hrs.~30 Households Thus for the 17 hh below the spring around 500l/day at a distance of 200-400m for one of three taps. If those who are nearby, but without easy access to taps are also included, the no of hh goes up to around 28 and then around 210l/ day.

The committee decided on option three of the spring protection scenarios, as those households close to the spring also need access.



After the committee meeting and the full community meeting, the group who can benefit from the spring protection need to have a meeting to discuss access, payment, labour contributions, a committee of their own, decisions, and ongoing water management. There will need to be daily opening and closing of valves and checking of water availability and decisions regarding maintenance etc will also be ongoing.

A map with pins for households was used with the group to make a list of those who would be involved. This map was updated again after implementation to take into account the addition of newcomers and removal of some inactive households. The list as at May 2022 is shown below

*Above Left: the committee working on naming the homesteads shown on the small map*



*Table 7: Final list of participants involved and where the collect water (23 households), May 2022*

Pin no	Name and Surname	Access arrangement
48	Mzwandile Khumalo	Fetch from V-box
49	Thembeni Dubazane	Removed – no involvement
50	Sipho Msele	Tap
51	Mthethwa Mpinga	Tap
52	Baskiti Dubazane	Removed – people not around



53	Yaka Gumede	Tap
54	Nelisiwe Msele	Tap
55	Mr Dubazane	Tap
56	Hlaleleni Duma	Tap
57	Baloza Dlamini	Tap
58	Thembi Mpinga	Tap
59	Ntombenhle Mkhize	Tap
60	Eunice Khumalo	Tap
61	Zakhele Nyoka	Tap
62	Mwelase	Tap
63	Zikode	Tap
?	Robert Mpinga	Tap – joined later when relaized water would be close
64	Leliwe Hlongwane	Tap
66	Mlamula Khumalo	Tap
67	P Nyoka	Tap
68	S'nothi Mazibuko	Tap
69	Maminya Msele	Tap
70	Dubula Msele	Tap
71	Dumisani Msele	Reomved- inactive
72	Delani Duma	Fetch from V-box
73	Reserve Msele	Fetch from header tanks
74	Soleni Khumal	Fetch from V-box

### 6. **Protection of Spring 1 or 2**

The committee discussed the issues of closing off a spring, both for cultural reasons and also for individuals to have access at the source. They felt that as people and livestock can still access water from the other springs in the wetland and the wetland itself, it would be okay for everyone. They did say that spring 2 is much more reliable than spring 1, which does dry out sometimes. Although there wasn't agreement – some members felt that the spring just goes mainly underground in drier months.

The following two suggestitons made were taken inton acocunt in the implmentation:

1. Need a standpipe nad tap at the spring which will not affect the filling of the header tanks
2. Lay the pipe in a way that will make it easy to swap to spring 2 if needed.

### 7. **HEADER TANKS AND STANDPIPES**

The committee likes the idea of the 2 header tanks next to the road. There should be no access at these tanks. There was a lot of discussion around other people coming in and stealing water and the committee are aware of the possibilities of abuse of taps and the difficulties with this. They finally suggested 3-4 taps, close of homesteads where they can be wathced nad monitored.

## 8. LOGISTICAL ISSUES FOR DISCUSSION

Mr Marechal also supplied a number of issues for discussion. These are summarized below.

For discussion:	
1. Suitability of the central position proposed for the tank/s. This position is near the village main access road but finalisation depending on land ownership and suitable positioning (advised by community). Note: The pipeline to the tanks drops from the spring but then starts to rise again from roughly midway along the route. The tank position is showing on Google Earth as lower than the spring but we can't really position it any higher than where currently shown.	Yes, suitable. Next to the road. Close to Nelisiwe Msele's homestead. No taps at header tanks
2. Pipeline route from spring to be confirmed on site taking into account homesteads, cultivated fields, terrain etc	Yes, seems fine, Participants have agreed, that pipes can cross fields etc, but will need to discuss on the ground as well
3. Option 1: Tanks and access point in one central position. Most households around this point are within 400m of the tank position. Household by spring and lower households by bridge are around 600m from this point.	
Option 2: Tank position same as in option 1. Water reticulated to two access points (or more) to reduce walking distance. The layout shown reduces walking distance to the households to be served to within 400m	
Option 3: Would be similar to option 2 with a third access point to reduce walking distance to within 200m (water supply guideline).	Yes, this includes most people – but maybe not taps, but tanks, or lockable taps...
The spring proposed for development is the larger of the three. Perhaps some more discussion around community issues with use of this point particularly regarding livestock.	There was some discussion as to whether this spring dries up during drought years. Spring 2 definitely the most reliable.
Availability of local rock to fill behind spring protection wall / chamber	Yes, in riverbed. Enviro champs will assist with labour and building.

## 2. COMMUNITY MEETING DISCUSSIONS AND AGREEMENTS (27 JANUARY 2022)

On the 25<sup>th</sup> of January a full community meeting (~55 participants) was held to discuss progress and get the go ahead from the whole community to focus on protection and reticulation of Spring 1 for the moment only; also with the understanding the funding for the proposed work on the borehole may or may not materialize. In addition, community agreement needed to be firmed up, that water access for the spring one system, would only be for members who can benefit from this- not for everyone in the community and definitely not for people from outside. Spring 2 which is used heavily in the community will be left as is to ensure open access and livestock can easily access water from the wetland and stream surrounding these springs. Thus, the spring protection and reticulation does not remove community access but improves infrastructure and access for those involved who have contributed both with labour and financially.

For the Spring 1 protection, all community members who could benefit from this gravity fed system were called to a meeting on 27<sup>th</sup> January. Here the following issues were discussed and decided upon after introduction of the WRC-ESS process and progress with planning to date. It was reported that around R50 000 could be allocated from this budget for the spring protection work. Community members would need to contribute both financially and with labour to dig the ditches and the enviro champs would assist with the spring protection and reticulation work as well. It was emphasized that only those 26 people on the list are part of this process.

*Right: Spring protection meeting with 27 community participants and the 9 enviro champs present.*



There was a lot of discussion around people coming in with bakkies to take water and also people from other parts of Stulwane and Emadakaneni feeling that they would also have a right to this water. Participants felt it would be difficult to enforce this. It was emphasized that participants would need to fetch water at the 3 proposed taps and not try to connect pipes and hoses to fill tanks at their homes. It was also emphasized that people would need to do their washing at home and not at the taps. Then it was discussed that the two header tanks would provide 10 000l of water per day. They would need to fill up overnight. This would mean around 380l of water per household per day. Some households are much larger than others with small units in the homestead so they would have more than one person collecting water. It was also discussed that the spring committee could provide access to water to people for specific circumstances such as funerals, but that this water could not be used for irrigation or building.

The following was decided

- Each participating household would pay R230 towards the water scheme. Monies will be placed in a bank account and used by the committee for small maintenance tasks. Slips of all expenditure are to be kept to be reported to the membership.
- If larger sums are required for any reason, this will be discussed with the participants and further donations agreed upon.
- The header tanks and taps are to be placed on the road, next to or very close to someone's homestead, so that those people can keep an eye on the infrastructure. People thought it would cause trouble to have these in the households.
- It was agreed that the spring committee and any participants interested would join the engineer and team to finalize the route of the pipes, to ensure they do not cross fields or property that would become problematic. For the most part these pipes need to follow the paths and roads.
- It was proposed that there are locks placed on the taps and that each household who has paid their fee, will be provided with a key for the tap.
- Participants undertook to collect water only during the day to allow the tanks to fill up overnight.
- All households undertook to be part of the labour force, or to employ someone who could help with digging if they were unable themselves.
- Mr Dubazane offered his tractor to start the process of loosening the ground for the digging of the ditches, to make that process easier.
- It was emphasized that the youth team are not from the Council, but through MDF and the community should not issue them. They are there to do agreed upon resource conservation tasks, not just anything the community might need.



- It was also emphasized that the committee is made up of volunteers and that everyone should work together and respect each other – as it is everyone’s responsibility to ensure the system works, not just that of the committee.

Here, they decided to elect a spring committee:

Name and Surname	Contact details
Baba Dubanzane	0826282627
Mxholisi Mkhize	0760790738
Nelisiwe Msele	0731504405
Hloniphile Sishi	0728158921
Phekelaphi Nyoka	0828697437

Roles of committee members:

- Responsible for any issues arising with the water scheme
- Fix problems with any people not following the rules
- Allocate the use of water and ensure everyone who is eligible gets
- Check regularly that the system is working and used properly
- Open a bank account for the financial contributions and undertake small maintenance activities.
- Call meetings with membership to report on usage, maintenance issues and get permission to use funds for specific activities.
- Communicate with the community level water committee and also the Traditional Authority and councilor.
- Request assistance from community level water committee for issues they cannot solve.

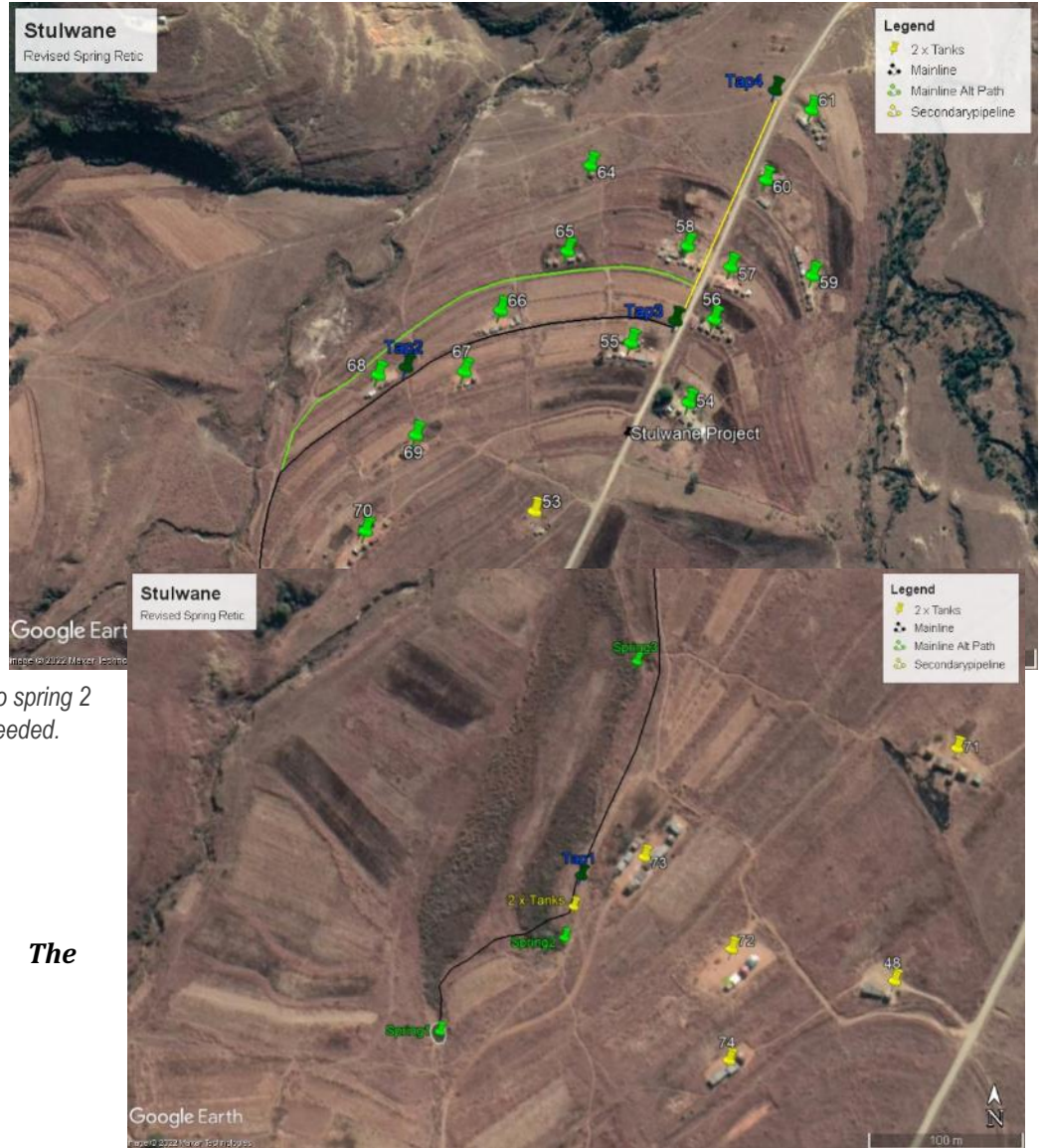
A discussion was held about the role of the Nkosi and councilor. The Nkosi has a representative, Mrs Hlongwane in the village. The Spring committee undertook to inform her of this process and ensure she is onboard. They felt that permission would not need to be obtained as the TA is only responsible for land and it is a good idea for the community to start setting up structures themselves, to manage their resources, as neither the TA nor the councilor will do this for them. They felt that as long as these role players were well informed, they would not object or feel the need to interfere.

**3. SPRING PROTECTION IMPLEMENTATION**

This was initiated in March 2022. The engineer, Alain joined the committee on a walk to peg the route of the pipes and make final decisions around situation of the header tanks and taps. He returned on the 24<sup>th</sup> March with a dumpy level, as there was some concern about the pipe crossing an non-participant’s field and it needed to be moved. A final layout was agreed upon at a meeting of the water committee at a meeting on the 1<sup>st</sup> April.

*Right: The alternative pipeline marked in green, to avoid crossing field and inclusion of 4 taps.*

*Right: The new position of the header tanks close to the spring and layout of the mainline also close to spring 2 to allow for inclusion if needed.*



9. **The**

**implementation**

Mr Chris Ndelela was brought on board as a foreman and it was decided that the enviro champs team would assist with building, alongside a number of community members; Mr Dubazane who offered use of his tractor for collecting stones and digging of the trenches, Mr Khulekane Dladla of the after committee who joined in all operations and Mr Msele, who assisted with building.

To start the grass around the spring was cut and channels were dug to direct water away from the construction site.





Right and far right: The enviro champs brush cutting around the spring and channels dug for directing water.

Right: Alain Marechal, the water committee and enviro-champs: re-directing the main pipeline after initial meetings and discussions of the first layout plan

Materials were ordered and delivered, and the enviro-champs team and Mr Msele worked with Chris Ndlela to start on the v-box construction, while the community members dug the ditches.

Three meetings with the committee and members were required during construction (8<sup>th</sup>, 12<sup>th</sup> April and 12<sup>th</sup> May). The first two were to ensure that all households were involved in participating in required labour for collecting stones and digging of ditches. The 3<sup>rd</sup> was due to new community members wanting to join the process towards the end of construction when it became clear there would in fact be water close to their homes. For the latter they were penalized by having to pay R460 instead of the R230 for the initial participants, as they came in after all the work was done. In this way two more households were brought on board. Below is a chronology of the implementation in pictures.



Above Left to Right: Pegging the position of the v-box wall with Chris Ndlela (red shirt). Covering the area with collected rocks and building of the corner collection box and corner of the wall. Finalisation of the wall with the two outlet pipes for local water access. Digging the ditches for mainline pipe.



Above left to right: Laying of pipe after digging ditches. Building of JoJo tank platform. Connecting of the two JoJo tanks and linking to the spring. Water is flowing. Constructing the 4 taps in the line.



There are three ways in which participants can gain access to water; collecting from the V-box, collecting from the overflow of the JoJo tanks and collecting from the 4 taps. The committee has enforced a rule that participants can only collect water using buckets and that they can not do any washing, be it clothes or cars at the taps themselves.

Above Left to Right: Water access points at the V-box, the Header tanks and one of the taps.



#### 4. MAINTENANCE AND MANAGEMENT

Regarding involvement of institutional stakeholders in the process a number of attempts have been made:

- To date, only the Okhahlamba Municipal Manager Mr. Nkosingiphile Malinga has managed to visit the site. He was impressed with the work that both community and Mahlathini have done and commended the community effort. He is not directly involved in water provision for the area, but could assist with pulling other stakeholders in.
- The ward councillor Mr. Jeffrey Dladla has been invited to the site on several occasions by both community members and Mahlathini but he hasn't found time in his busy schedule to visit the site.
- uThukela Water district officials have been invited on several occasions, committed several officials from the Superintendent, the local engineer, technicians (Siyabonga Masingemi) and local plumber, but none of them has ever set foot on site, despite promises and repeated arrangements being made. This is an ongoing effort with the view to collaboration on future projects.

On the 18<sup>th</sup> of May, a full water committee and membership meeting (13 members attended) was held to discuss operation and maintenance of the now completed system. Participants have been collecting water for around 2 weeks already. Presently the spring is running very strongly and there is a lot of water available.

The membership was very grateful, saying that they never believed it could actually happen and that now collection of water is easy and takes only 10 minutes. They are very happy to be able to get clean water close to their households. The enviro-champs noted that they were proud to have been a part of a process that could assist them and their community in this way. Already other villages have been asking for similar support.

With regard to the issue of clean water, presently the water is being tested on a weekly basis by the enviro-champ team. Below is a small table of the results, with a photograph alongside

Stulwane		E Coli test results		
Date	Time	Place	Colour	
2022/02/17	12:03	S2	Clear	
2022/02/17	12:11	S1	Clear	
2022/02/17	12:56	JT3	Clear	
2022/02/24	10:00	S2	Clear	
2022/02/24	10:13	S1	Clear	
2022/02/24	10:20	JT3	Clear	
2022/03/04	09:13	S2	Green	
2022/03/04	09:17	S1	Green	



S1- is the protected spring with V-box  
 S2- is the spring lower down  
 JT3 – are the header tanks of the protected spring

2022/03/04	09:22	JT3	Green
2022/03/10	09:22	S2	Clear
2022/03/10	09:27	S1	Clear
2022/03/10	09:56	JT3	Clear
2022/03/21	09:07	S2	Clear
2022/03/21	09:15	S1	Clear
2022/03/21	09:40	JT3	Clear
2022/03/31	13:33	S1	Green
2022/04/04	08:30	S2	clear
2022/04/04	10:10	S1	Brown
2022/04/04	10:35	JT3	Clear
2022/04/11	11:34	S2	Clear
2022/04/11	11:36	S1	Brown
2022/04/11	12:11	JT3	Clear
2022/04/18	09:14	S2	Green
2022/04/18	10:35	S1	Green
2022/04/18	11:14	JT3	Green
2022/04/25	08:15	S2	Clear
2022/04/25	10:15	S1	Clear
2022/04/25	10:40	JT3	Clear
2022/05/02	09:58	S2	Clear
2022/05/02	10:39	S1	Clear
2022/05/02	11:10	JT3	Clear

The team taking the E coli results have interpreted these results to mean that if they take samples the day after a rainfall event, then the springs are contaminated, either with coliforms (brown), from livestock and or E coli (from humans). Thus, the suggestion to build a swale above the V-box, to avoid runoff flowing into the spring.

The following decisions were made:

- Re locks for taps: This was initially agreed to, but after heated discussion it was decided not to lock the taps, as individuals in the village should be able to access water. If this became a problem, then locks would be considered
- People can only collect water in buckets – large collection containers or pipes will not be allowed.
- Households closest to taps are responsible for ensuring that people from outside the community do not abuse this access and come with vehicles and big drums. They will be supported by the committee in this activity.
- People from higher up in the village without access can be allowed to collect, but those receiving water from the municipal scheme cannot. For the most part however, those at the top have access to Spring 4 and the borehole, so it was considered provocative of them to collect water at these taps.
- Monies will be collected on a and hoc basis for maintenance and repairs, rather than charging and annual fee.
- No one will be allowed to sell water collected from this scheme.
- The water committee in time would like to be considered as the water service authority in the area. They want to be able to manage the water provision in the longer term with support from the Municipality, but do not feel that handing it over to uThukela Water would be in their interest. They said that already the councilor and others have been making comments about the water not being fit for human consumption and thus the scheme is not 'official'.

A suggestion was made by Mahlathini to ensure that the e coli test results are accessible to the committee and to other role players, to forestall any further rumors of this nature.

- The committee noted that some community members not part of the scheme did not want to follow the rules and for example insisted that they can wash their clothes at the spring, as they have been doing so for some time. Re-education of the community in good practice around water sources may be needed, although participants felt that they could be stubborn about this. The rules do exist traditionally, people have just been ignoring them.

#### 4. FURTHER ACTIONS

It was agreed to place a swale above the V-box to ensure that run-off does not contaminate the spring and to fence the V-Box off from livestock. It was also agreed to construct proper cement access points for community members at the v-box and the header tanks.

*Right: The swale was constructed the following morning by the enviro-champs.*

In addition, the new members requested a further extension in the pipeline and one more tap towards the bottom of the system. This was agreed to, but they would need to get together themselves (5 households), pay their monies to the committee and dig the ditch, before Mahlathini could assist with further pipe and a tap.

2 Locks will be bought in the meantime as it is possible that the two lowest taps will have problems of people coming into the village to try and steal this water. Locks will reduce this temptation.





## Annexure 3: Umgeni water test results

Test Report Number: 2023-0320

Sample ID			2047799	Uncertainty of Measurement (UoM)	SANS 241:2015 Drinking Water Standard Limits Required	SANS 241:2015 Drinking Water Classification
Sample Description			Stulwane Bergville MDF Spring 1			
Method Number	Determinands	Units	Results			
1a	Alkalinity*	mg CaCO <sub>3</sub> /L	19.3	±3.6%	no limit	-
7	Appearance*	Descriptive	Clear Colourless	not applicable	no limit	-
30	Calcium*	mg Ca/L	<5.00	±4.3%	no limit	-
5a	Chloride (soluble)*	mg Cl/L	<1.00	±2.6%	≤300	aesthetic
19	Colour	mg Pt-Co/L	<1.00	±7.3%	≤15	aesthetic
Calculation	Combined Nitrate + Nitrite Ratio*	-	0.20	not applicable	≤1	acute health
21	Conductivity@ 25°C	mS/m	3.27	±1.9%	≤170	aesthetic
121	<i>E. coli</i>	MPN/100mL	<b>54</b>	±8%	0	acute health
94	Fluoride	µg F/L	<100	±5.3%	≤1500	chronic health
30	Iron	mg Fe/L		±3.2%	≤0.3 ≤2.0	aesthetic chronic health
27	Total Hardness*	mg CaCO <sub>3</sub> /L	<33.3	not applicable	no limit	-
80	Heterotrophic plate count @ 37°C	CFU/mL	<b>&gt;1000</b>	±20%	≤1000	operational
30	Potassium*	mg K/L	<5.00	±6.4%	no limit	-
30	Magnesium*	mg Mg/L	<5.00	±3.2%	no limit	-
30	Manganese	mg Mn/L		±2.8%	≤0.1 ≤0.4	aesthetic chronic health
30	Sodium*	mg Na/L	<5.00	±3.3%	≤200	aesthetic
5a	Nitrite (soluble)*	mg N/L	<0.10	±4.2%	≤0.9	acute health
5a	Nitrate (soluble)*	mg N/L	1.03	±6%	≤11	acute health
7	Odour*	Descriptive	Nil	not applicable	Inoffensive	aesthetic
46	pH	pH Units	5.97	±0.57%	≥5 to ≤9.7	operational
5a	Sulphate (soluble)*	mg SO <sub>4</sub> /L		±2.9%	≤250 ≤500	aesthetic acute health
151	Total Organic Carbon	mg C/L	<1.00	±4.3%	≤10	chronic health
121	Total Coliforms	MPN/100mL	<b>1203</b>	±6%	≤10	operational
69	Turbidity	NTU	0.7	±2%	≤1 ≤5	operational aesthetic

**Laboratory Comment:** Sample 2 days old when testing commenced. pH, Alkalinity, *E. coli*, Total Coliforms and Heterotrophic Plate counts may be affected. Treat results with reserve.



# Test Report



## LABORATORY SERVICES DEPARTMENT

Test Report Number: 2013-0318

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Sample ID		2041/09		Uncertainty of Measurement (U95)	SANS 241:2015 Drinking Water Standard Limits (Required)	SANS 241:2015 Drinking Water Classification
Sample Description		Botswana Bergville WSP Spring 1				
Method Number	Parameter	Units	Results			
1a	Alkalinity	mg CaCO <sub>3</sub> /L	19.5	±3.6%	no limit	-
1	Appearance	Descriptive	Clear Colourless	not applicable	no limit	-
30	Calcium	mg Ca/L	<5.00	±4.3%	no limit	-
5a	Chloride (stable)	mg Cl/L	<1.00	±2.6%	500	aesthetic
19	Colour	mg Pt-Co/L	<1.00	±7.3%	5 U	aesthetic
Calculation	Combined Nitrate + Nitrite (NO <sub>3</sub> -N)	-	0.20	not applicable	11	safe health
21	Conductivity @ 25 °C	µmS	3.27	±1.8%	6150	aesthetic
121	Iron	mg Fe/L	34	±6%	1	safe health
34	Fluoride	mg F/L	<0.05	±5.3%	0.7500	chronic health
30	Iron	mg Fe/L	<0.30	±3.2%	0.3	aesthetic
					0.3	chronic health
21	Total Hardness	mg CaCO <sub>3</sub> /L	<20.0	not applicable	no limit	-
80	Microbiological (plate count @ 22 °C)	CFU/mL	>1000	±20%	4 1000	operational
30	Potassium	mg K/L	<5.00	±6.4%	no limit	-
30	Magnesium	mg Mg/L	<5.00	±3.2%	no limit	-
30	Manganese	mg Mn/L	<0.05	±2.8%	0.1	aesthetic
					0.1	chronic health
30	Sodium	mg Na/L	<5.00	±3.2%	500	aesthetic
5a	Nitrite (stable)	mg N/L	<0.10	±4.2%	0.5	safe health
5a	Nitrate (stable)	mg N/L	1.05	±5%	511	safe health
1	Tour	Descriptive	10	not applicable	no limit	aesthetic
40	pH	pH Units	5.27	±0.5%	6.5 to 8.5	operational
5a	Sulphate (stable)	mg SO <sub>4</sub> /L	<1.00	±2.8%	300	aesthetic
					300	safe health
101	Total Organic Carbon	mg C/L	<1.00	±4.3%	2.0	chronic health
121	Total Coliforms	MPN/100mL	1883	±5%	0.1	operational
					0.1	operational
60	Turbidity	NTU	0.7	±2%	0.5	aesthetic

Laboratory Comment: Sample 2 days old when testing commenced. pH, Alkalinity, C. coli Total Coliforms and Microbiological Plate counts may be affected. Treat results with reserve.

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