



CTCN Eswatini

D1.4 Report on prioritized small-scale growers

September 2023

Contents



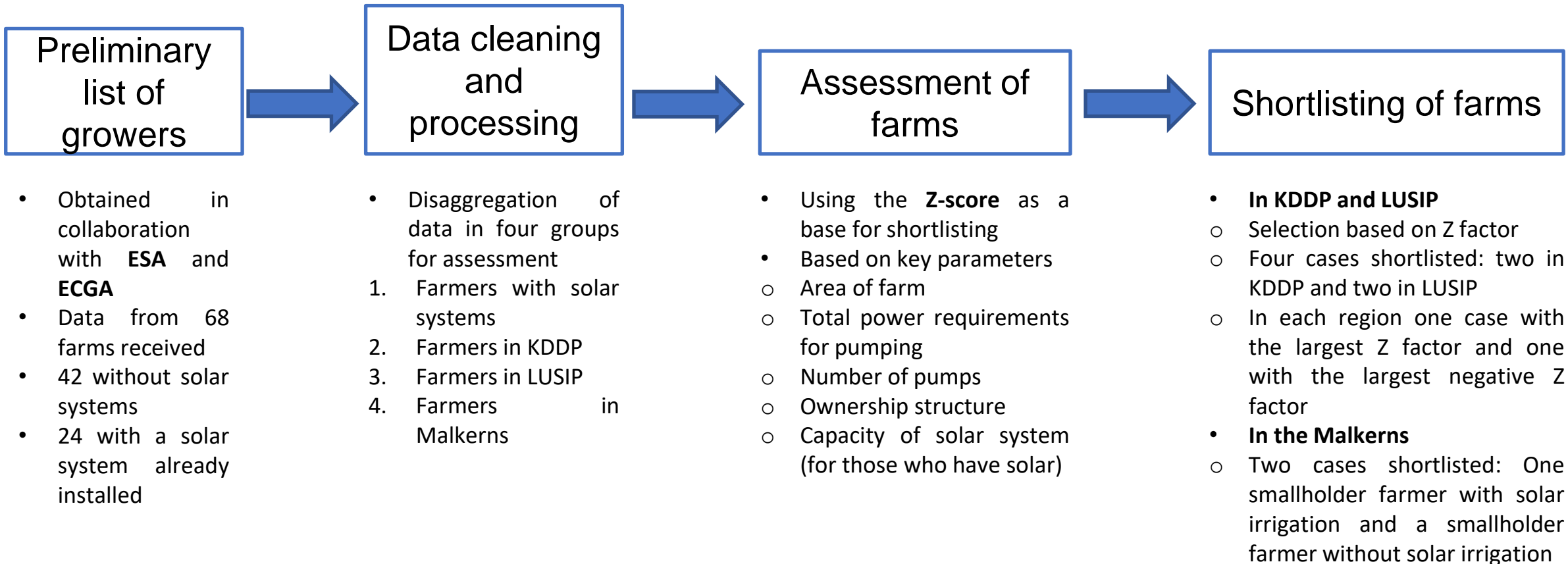
1. Methodology for prioritization of cane growers
2. Pool of candidates
3. Selected small-scale growers
4. Next steps
5. Matrix for selection of cases

List of abbreviations



Abbreviation	Meaning
ECGA	Eswatini Cane Growers Association
ESA	Eswatini Sugar Association
Ha	Hectare
KDDP	Komati Downstream Development Project
LUSIP	Lower Usuthu Smallholder Irrigation Project
kW	Kilowatt
kWp	Kilowatt peak
	Average
	Standard deviation

1. Methodology for prioritization



1. Methodology for prioritization



Rationale: Considering the project’s objective of evaluating the feasibility of introducing solar irrigation in sugarcane farmers in Eswatini, and with the aim of evaluating the feasibility under different conditions, it has been decided to select, in **KDDP** and **LUSIP**, **two cases per region**, one farm characterized with a **small area, a small number of pumps and low pumping requirements** (in kW). In contrast, the second case will be selected aiming for the evaluation of a **large area, with a high number of pumps and high pumping requirements**.

This approach requires evaluating the relationship of a value with respect to the mean of a group of values, this can be calculated using the Z-score (or standard score of a value). The higher the Z-score (both positive or negative), the farther is a value from the mean values in the group.

$$z = \frac{x - \mu}{\sigma}$$

Where:

x – Represents the amount to which the Z-score is being calculated

μ – Represents the mean of the data set

σ – Represents the standard deviation of the data set

1. Methodology for prioritization



Adding the Z-scores for the area, total power and number of pumps within a farm will allow for the identification of the farms that stand out above and below the average in each one of the two regions, as follows:

$$Z_{farm} = Z_{area} + Z_{total\ power} + Z_{number\ of\ pumps}$$

For each one of these two regions the two largest Z values (positive and negative) were selected, leading to eight candidate farms, four as a first choice, and four as a second option.

1. Methodology for prioritization



The Z-score approach was used to shortlist case studies in the KDDP and LUSIP areas, in the Malkerns the pool of available case studies was smaller, therefore the selection process had to be conducted using a different method.

The pool of cases available cases in Malkerns was more limited, with three farms/farming cooperatives without solar irrigation systems, and four farms with solar irrigation systems already implemented, for a total of seven cases.

Considering that the Malkerns is a smaller region, it was decided to select two cases: one with a solar irrigation system already implemented and one without a solar system, with the aim of comparing their conditions and evaluating the experience of the farm with the solar irrigation system.

1. Methodology for prioritization



The criteria used in the Malkerns was not quantitative, but qualitative, based on a series of criteria, including:

- Community ownership of the farms
- Selecting one case with solar system and one without for comparison purposes
- Both farms should have a similar size for comparison purposes
- The solar system should be operational for at least two years.

2. Pool of candidates



Farmers without a solar irrigation system:

No.	Growers	Area (ha)	Region	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
1	Vukasidwashini Farmers Association	349.57	North	semi-solid sprinkler	4	11	630	Mhlume	Komati river
2	Hhohho Cotton Growers	351.20	North	drip and pivots	4	10	560	Mhlume	Komati river
3	Mangweni/Tingonono Farmers Association	194.40	North	semi-solid sprinkler	4	9	344	Mhlume	River Majama
4	Mbombowendlovu Multipurpose Coop.	450.00	North	sprinklers & pivots	2	8	1,365	Mhlume	Komati river
5	Ingcayizivela Farmers Association	423.48	North	sprinklers & pivots	2	9	785	Mhlume	Komati river
6	Phuzamoya	228.00	South	sprinklers & pivots	1	4	315	Big Bend	River Phuzumoya
7	Mnyangombili Farmers Limited	398.30	North	semi-solid sprinkler	2	7	1,145	Mhlume	Mafucula
8	Mthombowempilo Farmers Association	160.84	North	floppy system	2	5	375	Mhlume	Komati

2. Pool of candidates



Farmers without a solar irrigation system:

No.	Growers	Area (ha)	Region	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
9	Mpofu Multi purpose	160.00	North	semi-solid sprinkler	2	5	261	Mhlume	River
10	Mashobashoba	123.00	South	semi-solid sprinkler	2	5	300	Big Bend	River
11	Maplotini	235.00	South	drip	1	4	219	Big Bend	
12	Lomdashi investment	630.75	South	sprinklers & pivots	2	16	1,137	Big Bend	Dam
13	Ndinda farmers	59.71	North	sprinklers & pivots	2	2	165	Mhlume	River
14	Buhle Besive	178.10	North	semi-solid sprinkler	2	8	450	Mhlume	River
15	Intamakuphila Malibeni	234.20	North	semi-solid sprinkler	2	6	390	Mhlume	River
16	Sivukile farmers	108.80	North	semi-solid sprinkler	2	3	145	Mhlume	River
17	Nhlanguyavuka	144.30	North	semi-solid sprinkler	2	4	240	Mhlume	River

2. Pool of candidates



Farmers without a solar irrigation system:

No.	Growers	Area (ha)	Region	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
18	Bambanani Maliba Farmers Association	302.68	North	sprinklers & pivots	2	5	450	Mhlume	River
19	Mthomanzi Investments	106.00	South	semi-solid sprinkler	1	3	165	Big Bend	LUSIP dam
20	Matimavu	85.00	South	semi-solid sprinkler	1	3	270	Big Bend	LUSIP dam
21	Ayandza Emadvodza Farmers Association	205.43	North	semi-solid sprinkler	2	6	450	Mhlume	River
22	Bambanani Balimi Farmers Assoc.	231.40	North	drip	1	2	520	Simunye	Dam
23	Madlangampisi Farmers Company	152.60	North	semi-solid sprinkler	1	3	265	Mhlume	River
24	Mavalela	133.19	South	semi-solid sprinkler	1	2	264	Big Bend	Sivunga dam
25	Singeni`	48.80	North	sprinklers & pivots	1	1	90	Mhlume	River

2. Pool of candidates



Farmers without a solar irrigation system:

No.	Growers	Area (ha)	Region	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
26	Bomakhelwane Investment	89.20	South	semi-solid sprinkler	1	3	135	Big Bend	LUSIP dam
27	Libhumane Investments	76.00	South	semi-solid sprinkler	1	2	90	Big Bend	LUSIP dam
28	Maphobeni Cane Growers	62.60	South	sprinklers & pivots	1	2	180	Big Bend	LUSIP dam
29	Phendukani	113.00	South	sprinklers & pivots	1	2	82	Big Bend	LUSIP dam
30	Kwenta Akufani Investments	192.47	South	semi-solid sprinkler	1	2	180	Big Bend	Mpofu dam
31	Mtfweni Investment	104.50	South	semi-solid sprinkler	1	3	225	Big Bend	LUSIP dam
32	Asibebahle Mbabala Investments	41.15	South	semi-solid sprinkler	1	1	55	Big Bend	Mpofu dam
33	Mbabala Mngomaneni investments	54.94	South	semi-solid sprinkler	1	1	45	Big Bend	Mpofu dam

2. Pool of candidates



Farmers without a solar irrigation system:

No.	Growers	Area (ha)	Region	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
34	Sekuyakhona Ngoni Investments	126.20	South	sprinklers & pivots	1	2	150	Big Bend	Mpofu dam
35	Umchwele	118.90	South	semi-solid sprinkler	1	3	202	Big Bend	LUSIP Feeder canal
36	Mganyaneni FA	45.40	South	sprinklers & pivots	1	1	75	Big Bend	LUSIP dam
37	Lobovu Farmers Coop	86.20	South	semi-solid sprinkler	1	2	150	Big Bend	LUSIP dam
38	Emadvodza ayayengana Farmers	113.35	North	semi-solid sprinkler	1	1	110	Mhlume	River
39	Sinqobanjalo Investment (Pty) Limited	214.70	North	semi-solid sprinkler	2	6	344	Mhlume	River
40	Etibusweni Farm	49.00	Malkerns	dragline sprinkler	1	2	74	Simunye	
41	Mbetseni Farm	90.00	Malkerns	dragline sprinkler	1	2	110	Simunye	
42	Umbane	264.30	Malkerns	semi sprinkler	1	3	330	Simunye	

2. Pool of candidates



Farmers with a solar irrigation system:

No.	Growers	Area (ha)	Location	Mill	Solar Plant		Status	Installation Date
					Size (kWp)	No. Plant		
1	United Plantations	885	South	Ubombo	1,500	1	Operational	2017
2	Batch Farms(Pty) Limited	178	South	Ubombo	99	1	Operational	2019
3	Volindi Estates	161	North	Mhlume	35	1	Operational	2019
4	Murton Nigel	26	South	Ubombo	30	1	Operational	2019
5	Packard & Wright	31	Malkerns	Simunye	69	1	Operational	2019
6	L.A. Hulley (Pty) Ltd	46	Malkerns	Simunye	100	1	Operational	2020
7	Makhomba	85	Malkerns	Simunye	60	2	Operational	2020
8	Dalcrue Farm	290	Malkerns	Simunye	452	4	Operational	2021
9	River View Farm	88	South	Ubombo	70	1	Operational	2021
10	Tambankulu Sugar Estate	3,439	North	Mhlume	1,600	1	Operational	2021
11	John Bezuidenhout	0	South	Ubombo	69	1	Operational	2021
12	Crooks Brothers Limited	2,157	South	Ubombo	1,371	5	Operational	2021
13	Canterbury	196	South	Ubombo	355	1	Operational	2021
14	Nhlanhla Nhleko	9.5	South	Ubombo	22	1	Operational	2022
15	Cel'colo Sukati	34	South	Ubombo	62	1	Operational	2022
16	Manguluza Johannes Tsabedze	7.5	South	Ubombo	14.7	1	Operational	2022

2. Pool of candidates



Farmers with a solar irrigation system:

No.	Growers	Area (ha)	Location	Mill	Solar Plant		Status	Installation Date
					Size (kWp)	No. Plant		
17	Nisela - site 1	760	South	Ubombo	198	1	Operational	2022
18	Ben Ngcamphalala	15.7	South	Ubombo	24	1	Operational	2022
19	Phakama Mafucula	325	North	Mhlume	65.4	1	Operational	2022
20	Calamuva - phase 1 (99kW)	173.8	North	Mhlume	99	1	Operational	2022
21	Mavela Farmers	62.6	North	Simunye	38	1	Operational	2023
22	Ekuvinjelweni	207.2	North	Mhlume	132	2	Operational	2023
23	Mgulugulu		South	Ubombo	36.8	1	Operational	2023
24	Vuka Sive Samaja	50	South	Ubombo	93	1	Operational	2023

3. Selected small-scale growers



KDDP

Shortlisted farms

Growers	Area (ha)	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
Mbombowendlovu Multipurpose Coop.	450.00	sprinklers & pivots	2	8	1,365	Mhlume	Komati river
Singeni`	48.80	sprinklers & pivots	1	1	90	Mhlume	River

Second option

Growers	Area (ha)	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
Mnyangombili Farmers Limited	398.30	semi-solid sprinkler	2	7	1,145	Mhlume	Mafucula
Emadvodza ayayengana Farmers	113.35	semi-solid sprinkler	1	1	110	Mhlume	River

3. Selected small-scale growers



LUSIP

Shortlisted farms

Growers	Area (ha)	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
Lomdashu investment	630.75	sprinklers & pivots	2	16	1,137	Big Bend	Dam
Asibebahle Mbabala Investments	41.15	semi-solid sprinkler	1	1	55	Big Bend	Mpofu dam

Second option

Growers	Area (ha)	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Location
Phuzamoya	228.00	sprinklers & pivots	1	4	315	Big Bend	River Phuzumoya
Mbabala Mngomaneni investments	54.94	semi-solid sprinkler	1	1	45	Big Bend	Mpofu dam

3. Selected small-scale growers



Malkerns

Shortlisted farms

Growers	Area (ha)	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Solar system	Solar system size (kWp)	Year of installation
Etibusisweni Farm	49.00	dragline sprinkler	1	2	74	Simunye	No		
A. Hulley (Pty) Ltd	46.00	-				Simunye	Yes	100	2020

Second option

Growers	Area (ha)	Irrigation system	Number of pumping stations	Number of pumps	Total power requirements (kW)	Mill	Solar system	Solar system size (kWp)	Year of installation
Mbetseni Farm	90.00	dragline sprinkler	1	2	110	Simunye	No		
Makhomba	85.00	-				Simunye	Yes	60	2020

4. Next steps



- Contacting the shortlisted farmers to confirm interest and availability to participate in the assessment
- Development of technical and economical assessment questionnaire
- Data collection and analysis

5. Matrix for the selection of cases



KDDP

Growers	Area (ha)	Irrigation system type	Number of pumping stations	Pumps per grower	Power per grower (kW)	Location	Z-value area	Z-value total power	Z-value number of pumps	Sum of Z-values
Vukasidwashini Farmers Association	349.57	semi-solid sprinkler	4	11	630	Komati river	1.06	0.55	1.83	3.44
Hhohho Cotton Growers	351.2	drip and pivots	4	10	560	Komati river	1.08	0.33	1.48	2.89
Mangweni/Tingonono Farmers Association	194.4	semi-solid sprinkler	4	9	344	River Majama	-0.25	-0.33	1.13	0.56
Mbombowendlovu Multipurpose Coop.	450	sprinklers & pivots	2	8	1365	Komati river	1.91	2.79	0.79	5.49
Ingcayizivela Farmers Association	423.48	sprinklers & pivots	2	9	785	Komati river	1.69	1.02	1.13	3.84
Mnyangombili Farmers Limited	398.3	semi-solid sprinkler	2	7	1145	Mafucula	1.48	2.12	0.44	4.03
Mthombowempilo Farmers Association	160.84	floppy system	2	5	375	Komati	-0.53	-0.23	-0.26	-1.02
Mpofu Multi purpose	160	semi-solid sprinkler	2	5	261	River	-0.54	-0.58	-0.26	-1.37
Ndinda farmers	59.71	sprinklers & pivots	2	2	165	River	-1.39	-0.87	-1.30	-3.56

5. Matrix for the selection of cases



KDDP

Growers	Area (ha)	Irrigation system type	Number of pumping stations	Pumps per grower	Total per grower (kW)	Location	Z-value area	Z-value total power	Z-value number of pumps	Sum of Z-values
Buhle Besive	178.1	semi-solid sprinkler	2	8	450	River	-0.39	0.00	0.79	0.40
Intamakuphila Malibeni	234.2	semi-solid sprinkler	2	6	390	River	0.09	-0.19	0.09	-0.01
Sivukile farmers	108.8	semi-solid sprinkler	2	3	145	River	-0.97	-0.93	-0.95	-2.85
Nhlanguyavuka	144.3	semi-solid sprinkler	2	4	240	River	-0.67	-0.64	-0.60	-1.92
Bambanani Maliba Farmers Association	302.68	sprinklers & pivots	2	5	450	River	0.67	0.00	-0.26	0.41
Ayandza Emadvodza Farmers Association	205.43	semi-solid sprinkler	2	6	450	River	-0.15	0.00	0.09	-0.07
Madlangampisi Farmers Company	152.6	semi-solid sprinkler	1	3	265	River	-0.60	-0.57	-0.95	-2.12
Singeni`	48.8	sprinklers & pivots	1	1	90	River	-1.48	-1.10	-1.64	-4.22
Emadvodza ayayengana Farmers	113.35	semi-solid sprinkler	1	1	110	River	-0.93	-1.04	-1.64	-3.62
Sinqobanjalo Investment (Pty) Limited	214.7	semi-solid sprinkler	2	6	344	River	-0.08	-0.33	0.09	-0.31

5. Matrix for the selection of cases



LUSIP

Growers	Area (ha)	Irrigation system type	Number of pumping stations	Pumps per grower	Power per grower (kW)	Location	Z-value area	Z-value total power	Z-value total number of pumps	Sum of Z-values
Phuzamoya	228	sprinklers & pivots	1	4	315	River Phuzumoya	0.69	0.40	0.25	1.34
Mashobashoba	123	semi-solid sprinkler	2	5	300	River	-0.13	0.34	0.56	0.77
Maplotini	235	drip	1	4	219		0.75	-0.02	0.25	0.98
Lomdashi investment	630.75	sprinklers & pivots	2	16	1136.5	Dam	3.85	3.99	4.01	11.85
Mthomanzi Investments	106	semi-solid sprinkler	1	3	165	LUSIP dam	-0.26	-0.25	-0.07	-0.58
Matimavu	85	semi-solid sprinkler	1	3	270	LUSIP dam	-0.43	0.20	-0.07	-0.29
Mavalela	133.19	semi-solid sprinkler	1	2	264	Sivunga dam	-0.05	0.18	-0.38	-0.25
Bomakhelwane Investment	89.2	semi-solid sprinkler	1	3	135	LUSIP dam	-0.39	-0.38	-0.07	-0.85
Libhumane Investments	76	semi-solid sprinkler	1	2	90	LUSIP dam	-0.50	-0.58	-0.38	-1.46
Maphobeni Cane Growers	62.6	sprinklers & pivots	1	2	180	LUSIP dam	-0.60	-0.19	-0.38	-1.17
Phendukani	113	sprinklers & pivots	1	2	82	LUSIP dam	-0.21	-0.62	-0.38	-1.20

5. Matrix for the selection of cases



LUSIP

Growers	Area (ha)	Irrigation system type	Number of pumping stations	Pumps per grower	Power per grower (kW)	Location	Z-value area	Z-value total power	Z-value total number of pumps	Sum of Z-values
Kwenta Akufani Investments	192.47	semi-solid sprinkler	1	2	180	Mpofu dam	0.41	-0.19	-0.38	-0.15
Mtfweni Investment	104.5	semi-solid sprinkler	1	3	225	LUSIP dam	-0.27	0.01	-0.07	-0.33
Asibebahle Mbabala Investments	41.15	semi-solid sprinkler	1	1	55	Mpofu dam	-0.77	-0.73	-0.69	-2.20
Mbabala Mngomaneni investments	54.94	semi-solid sprinkler	1	1	45	Mpofu dam	-0.66	-0.78	-0.69	-2.13
Sekuyakhona Ngoni Investments	126.2	sprinklers & pivots	1	2	150	Mpofu dam	-0.10	-0.32	-0.38	-0.80
Umchwele	118.9	semi-solid sprinkler	1	3	202	LUSIP Feeder canal	-0.16	-0.09	-0.07	-0.32
Mganyaneni FA	45.4	sprinklers & pivots	1	1	75	LUSIP dam	-0.74	-0.65	-0.69	-2.08
Lobovu Farmers Coop	86.2	semi-solid sprinkler	1	2	150	LUSIP dam	-0.42	-0.32	-0.38	-1.12