

PRELIMINARY REPORT ON MONITORING OF WATER TABLE AND SALINITY USING PIEZOMETERS IN THE MAKHATHINI IRRIGATION SCHEME

by

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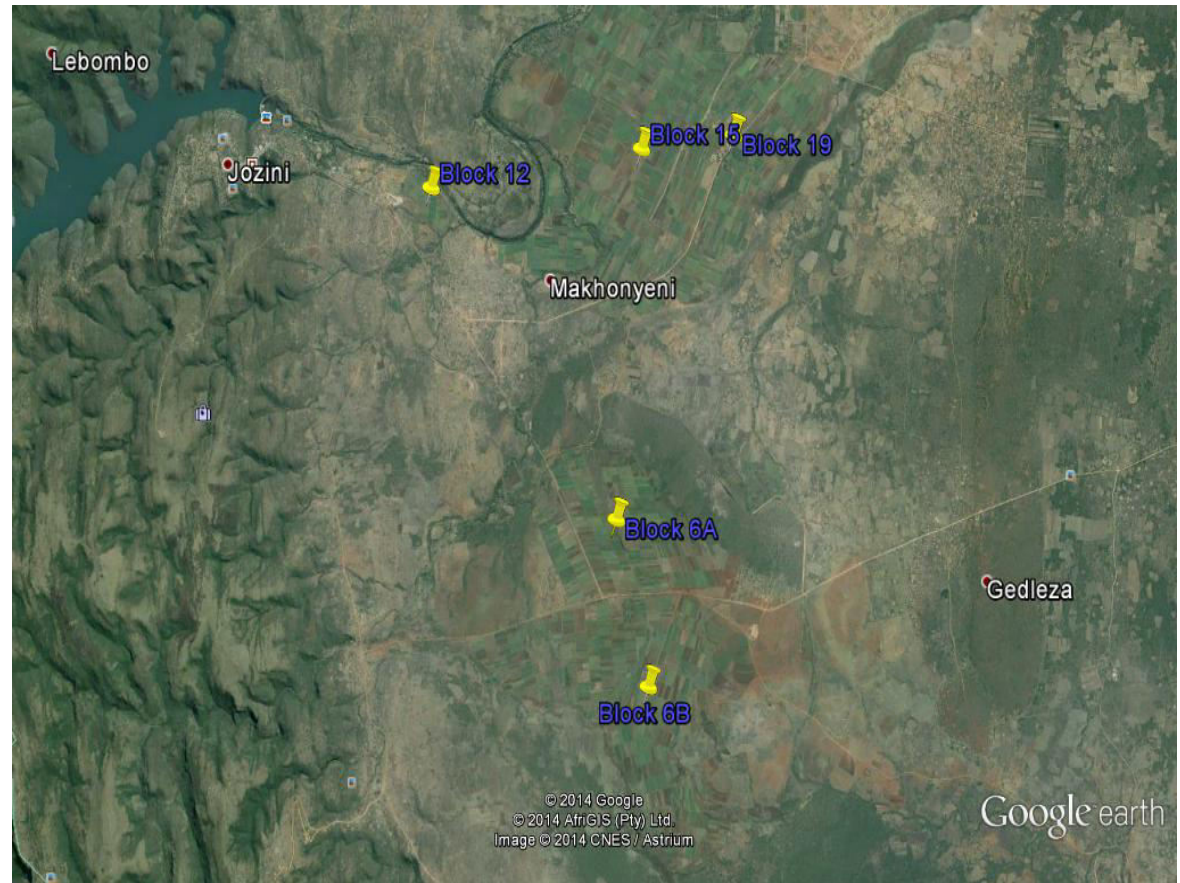
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INTRODUCTION

The Makhathini Irrigation Scheme

- Is located on the floodplains of the Pongola River, below the Jozini Dam
- It covers an area of 3 900 ha
- 390 farmers are currently settled on individual plots
- The average size of a plot is about 10 ha/person
- There is a potential to expand the scheme by 9 100ha



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INTRODUCTION

- Waterlogging is a problem on the scheme due to:
 - Poor irrigation management
 - The shallow water table and
 - Heavy rainfall experienced in the area
- During the rainfall seasons, excess water drains to the north-eastern part of the scheme towards the Pongola River, and the rest of the excess water drains to the southern side into the Balabuhlanga Pan
- The critical water table depth from the soil surface is between 1.5 and 2 m, depending on the following characteristics:
 - Soils
 - Evapotranspiration rate, and
 - The root depth of the crops
- Waterlogging affects a number of biological and chemical processes in soils.
- Waterlogging impacts crop growth negatively in both short and long term.



INTRODUCTION

- Salinity is also a problem in the scheme – these is a result of movement of salts stored in the soil profile and the surface



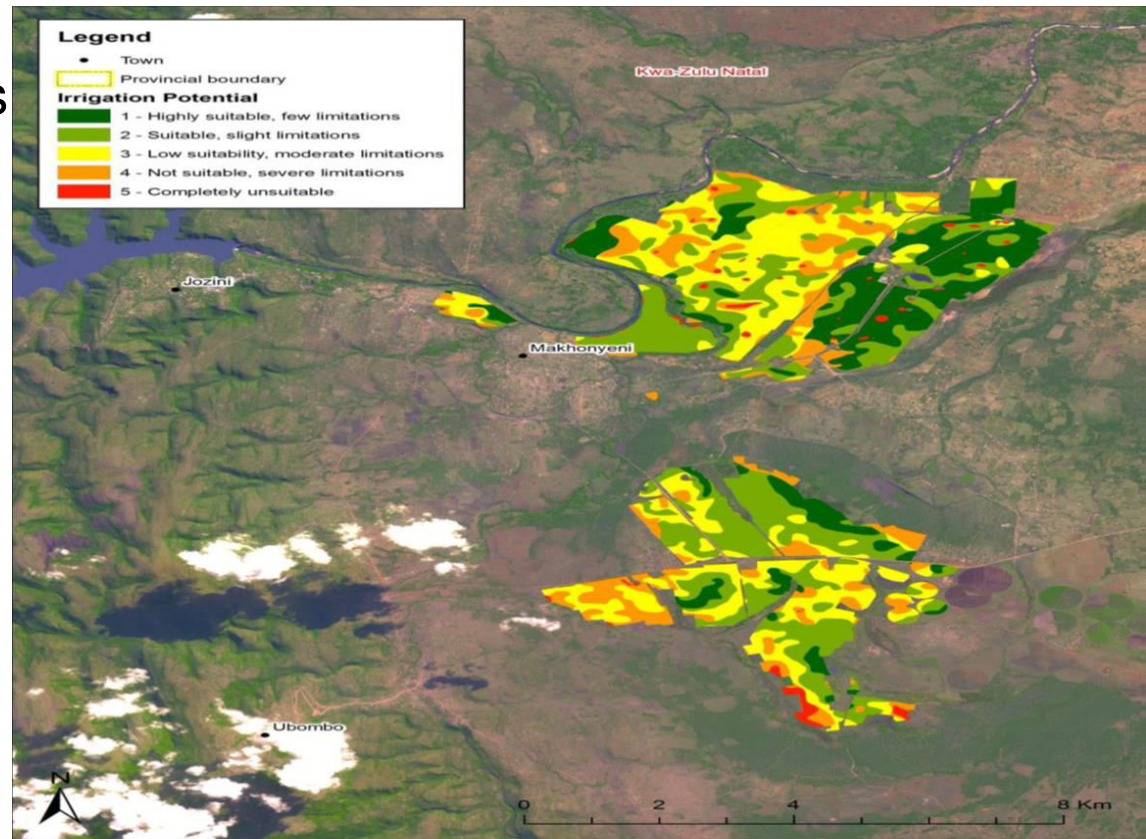
Aims

- Identify the affected areas with drainage problems in the scheme
- To recommend measures to address the drainage and salinity problem
 - Design of the subsurface drainage
 - installation of subsurface drainage



Soil characteristics

- The majority of the soils on the irrigation scheme are characterized by a relatively high silt and clay content (silt and clay content is 20% and 45% respectively)
- The north-eastern part of the scheme could be classified as Irrigation Class 1 and 2 soils
- The rest is classified as Irrigation Class 3 soils (with Irrigation Class 4 and 5 found intermittently)

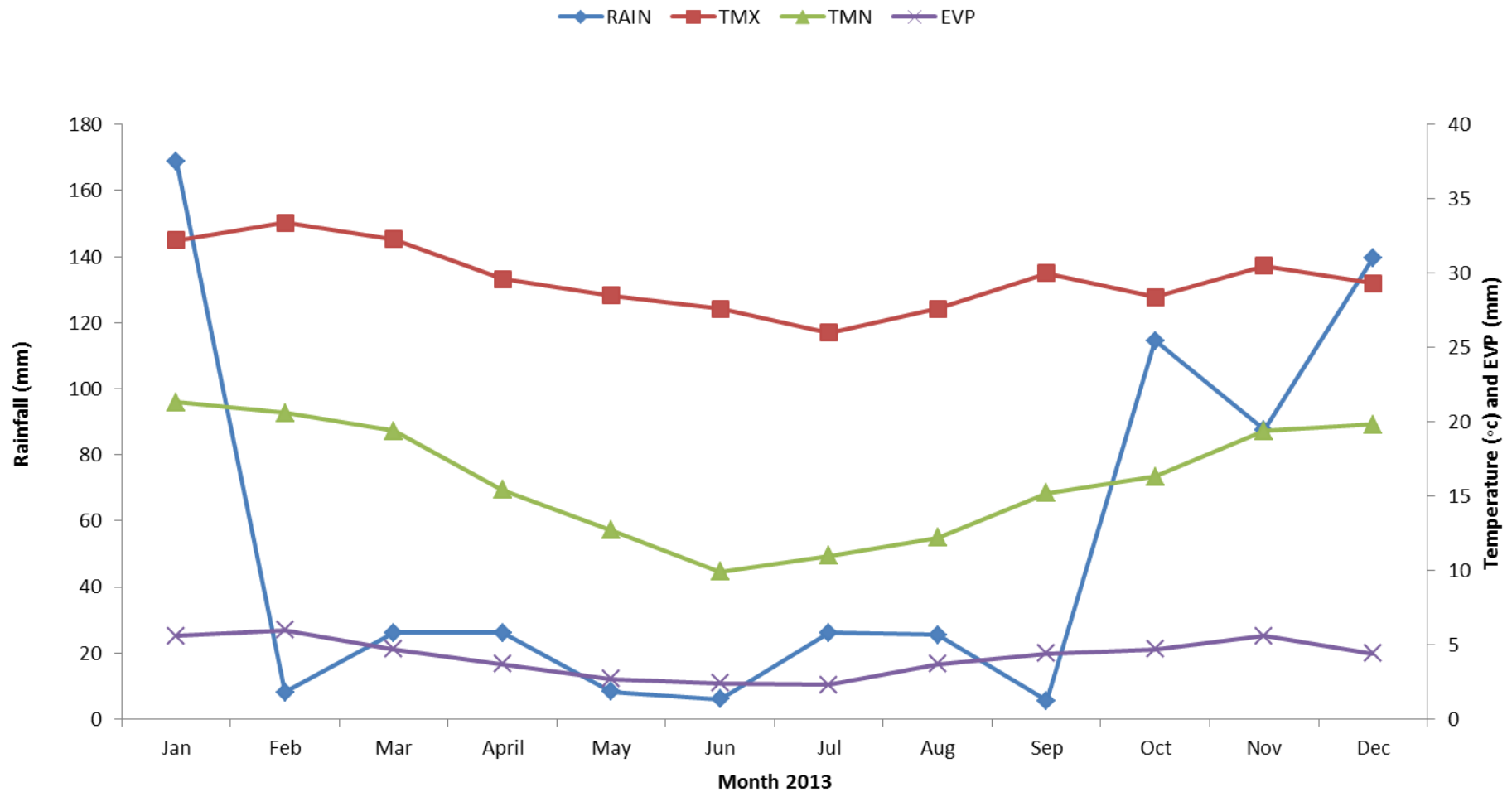


METHODS AND MATERIALS

- A total of 281 piezometers were installed in five blocks (6A, 6B, 12, 15 and 19)
- The GPS co-ordinates and maps of the installed piezometers was provided by the KZN Provincial Department of Agriculture
- The Electrical Conductivity was measured
- The water level was measured using the piezometers
- The readings were taken 4 times in 14 months
- The main crops grown in the area are
 - sugarcane,
 - maize, and
 - variety of vegetables



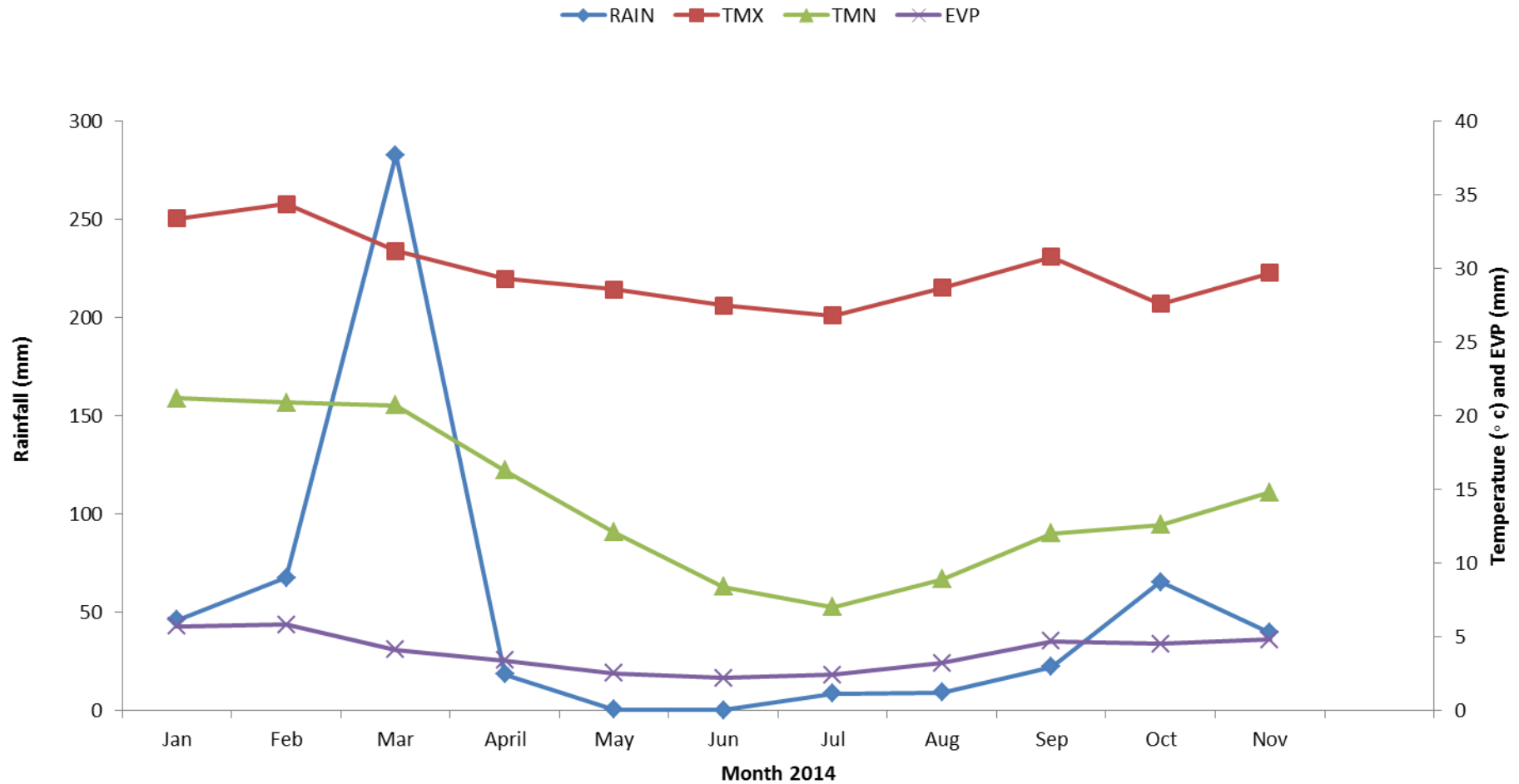
CLIMATIC DATA FOR MAKHATHINI IRRIGATION SCHEME



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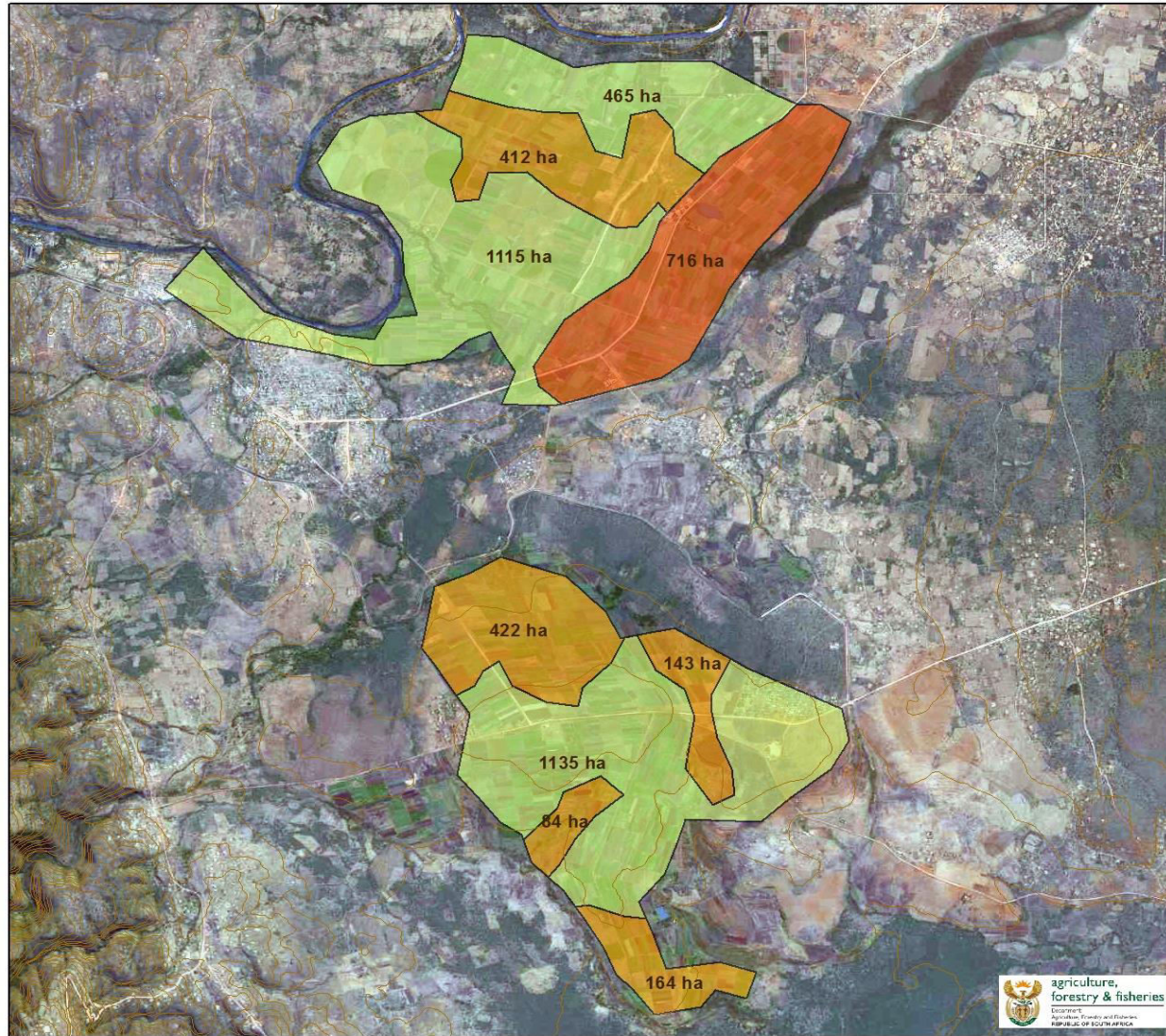
RESULTS

PERIOD	BLOCKS	6A	6B	12	15	19
August 2013	EC ($\mu\text{S}/\text{cm}$)	1418	1330	782	631	1820
	Water level (m)	2.1	1.8	2.9	2.4	0.4
October 2013	EC ($\mu\text{S}/\text{cm}$)	2866	1720	652	1563	1756
	Water level (m)	2.3	1.9	2.8	2.7	0.4
May 2014	EC ($\mu\text{S}/\text{cm}$)	3416	1605	741	1883	2804
	Water level (m)	1.7	1.6	2.9	2.3	0.3
October 2014	EC ($\mu\text{S}/\text{cm}$)	3102	1423	723	1203	3205
	Water level (m)	1.9	1.6	2.9	2.6	0.3

International standard for EC in maize is 1100 $\mu\text{S}/\text{cm}$ and for sugarcane is 1700 $\mu\text{S}/\text{cm}$ and for water level is 1.5m






MAKHATHINI DRAINAGE MAP



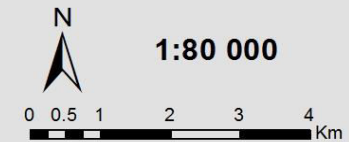
Makhithini Drainage

Drainage Areas

-  Drainage Problem
-  No Drainage Problem
-  Potential Drainage Problem

Contours

-  20 m



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CONCLUSIONS AND RECOMMENDATIONS

- Field observations show that there is poor irrigation management
- Drainage problem was identified in Block 19. A design for a sub-surface drainage system was recommended
- It was also recommended that after the installation of the sub-surface drainage system in Block 19, the area will need to be monitored to determine the impact of the sub-surface drainage system on the water table and plant growth
- It is recommended that the area with potential drainage problems be monitored on bi-annual basis
- It is recommended that farmers be trained on irrigation management
- It is recommended that farmers be provided by gypsum to apply in the affected areas



ACKNOWLEDGEMENT

- The acknowledgements

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NDZA KHENSA

RE YA LEBOGA

SIYABONGA

NDIA LIVHUWA

THANK YOU



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