KNOWLEDGE EXCHANGE TO IMPROVE IMPLEMENTATION OF IRRIGATION WATER MEASUREMENT/METERING AT FARM AND SCHEME LEVEL

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WATER RESEARCH COMMISSION

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Report

to the Water Research Commission

by

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This knowledge exchange initiative emanated from Water Research Commission (WRC) report, TT 783/18, titled “Improving the uptake and impact of research-based knowledge in the digital age – a case study on water measuring and metering in commercial irrigated agriculture’’

EXECUTIVE SUMMARY

Irrigation water measurement is critically important when aiming to improve water-energy-food security. Without wide-scale, accurate measurement, it is not possible to determine how much water is used by the irrigation sector, or to create benchmarks from where water resource management institutions and growers can set targets to become more irrigation efficient and water productive.

The Water Research Commission has published several guidelines (TT248/05, KV247/10, TT465/10, TT466/10, TT550/12 and KV342/15) and training material for the implementation of irrigation water measurement and metering. WRC Report TT 783/18 (2018) is based on a study of the uptake of research-based knowledge on water measurement and metering by commercial irrigated agriculture. Additional actions that tap into the knowledge networks of commercial irrigators are required to achieve the broad-based implementation of water measurement and metering.

Whereas the discourse in the past has focused on the advantages and disadvantages of water measurement and metering, the publication of regulations by the Department of Water and Sanitation (DWS) (Government Notice 131 of 17 February 2017 and Government Notice 141 of 23 February 2018) has required the taking of water for irrigation purposes to be measured, recorded and reported, shifting the focus from the “why” to the “how”. This triggered an urgency among growers and water user associations (WUAs) to know more about the implementation of water measurement and metering, and the value it will add to water management.

The WRC therefore initiated a follow-up knowledge exchange project, of which this document is the final report. It was the project’s objective to support the uptake of water measurement and metering in commercial irrigated agriculture and the uptake of the WRC’s research in this regard by generating content and stimulating participation that specifically address key questions of commercial irrigators and WUAs, as identified in Report TT 783/18 (2018) and other interactions with irrigators.

The project comprised the following:

- A national roadshow on water measurement and metering held at selected sites to cover all nine water management areas (WMAs), with supplier exhibitions
- Brief guides (hard copy and online) for WUAs and growers, based on the WRC’s reports and guidelines for water measurement and metering
- A new website (www.watermeter.org.za) with a blog, videos, useful links, news and latest updates, and downloadable reports, articles, guidelines and presentations

The actions were highly successful and included nine workshops conducted in July and August 2019 across the country’s WMAs. The workshops were attended by 243 delegates. Presentations were given by Ms Sarlet Barnard of the research team and representatives of DWS, as well as the local water management institutions and growers. Local suppliers of water measuring devices were invited to exhibit their products. The South African Association of Water User Associations (SAAFWUA) actively supported the initiative and invited Ms Barnard to give a presentation at its Annual General Meeting (AGM) in Somerset West.

The feedback from attendees was overwhelmingly positive. Of the attendees who completed the evaluation sheets, 99% said that the workshop met their expectations and that they found the content to be useful. In response to the question on how the workshops could be improved, attendees said that they should be held more often and more water users should be invited. They also listed a range of topics that they would like to see addressed in follow-up workshops.

It was therefore clear that there is a need in the agricultural sector for these workshops to be continued and extended.

The DWS has training courses in water measurement that focus on open channel flow and dams. It is recommended that the updated WRC research material on flow measurement, in combination with the DWS's guides on flow measurement, be presented in the nine WMAs at regular intervals throughout the year, either in the form of workshops or training courses, or both.

It is recommended that the additional topics (listed in this report) that the workshops attendees mentioned be included in these workshops or training courses. To enhance continuous learning, three levels are proposed:

- An introduction to flow measurement
- Flow measurement – an intermediate course
- Flow measurement – an advanced course

Many of the suppliers give training on the basic principles of flow measurement, and the operation and maintenance of their products. These suppliers could also be invited to deliver presentations at such training courses.

The website (watermeter.org.za) has also been highly successful in the short period since it went live. According to the Google Analytics report, the website has had 295 visitors since it went live on 18 September 2019 until 1 December 2019 (the date of this report). That is an average of 5.3 visitors a day. The analytics also showed that 251 out of the 295 visitors were within the borders of South Africa when they visited the website. Most of the visitors were in Gauteng (84 visitors), the Northern Cape (72 visitors) and the Western Cape (43 visitors). The blog articles and downloads pages received the most views, with 118 and 115 visitors, respectively. The roadshow, videos, useful links and help centre pages were also popular. These figures show that the website meets a real need in the agricultural sector, and that it works particularly well together with the workshops. It is therefore recommended, as an exit strategy, that the watermeter website be continued, and that new content be added regularly.

It is proposed that the WRC, with the support of the project team as administrator, continues the website for at least another year. The future of the website can be reassessed at the end of March 2021.

ACKNOWLEDGEMENTS

The project team would like to thank Prof Sylvester Mpandeli for his guidance and support, as well as Ms Sandra Fritz for her efficient administration of the project.

The project team would also like to thank the following individuals and organisations:

- All the participating water user associations, irrigation boards, catchment management agencies, growers and intermediaries for their time and the valuable input they shared with the project team. Without these individuals, the project would not have been possible.
- A special thank you to SAAFWUA for its assistance and support with arranging the workshops.
- Our co-researchers for their dedication and excellent work:
  Dr Sarah Slabbert (project leader)
  Ms Nadja Green
  Ms Sarlet Barnard
  Ms Anna-Lize Menssink

LIST OF ACRONYMS AND ABBREVIATIONS

AGM	Annual General Meeting
ARC	Agricultural Research Council
CMA	Catchment Management Agency
CEO	Chief Executive Officer
DDG	Deputy Director-General
DWS	Department of Water and Sanitation
FAQ	Frequently Asked Questions
IB	Irrigation Board
SAAFWUA	South African Association of Water User Associations
SABI	South African Irrigation Institute
SEO	Search Engine Optimisation
WRC	Water Research Commission
WMA	Water Management Area
WUA	Water User Association

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INTRODUCTION

This is the final report of WRC Project K5 2957/4, “Knowledge exchange to improve implementation of irrigation water measurement/metering at farming and scheme level”.

This knowledge exchange initiative emanated from WRC Report TT 783/18, “Improving the uptake and impact of research-based knowledge in the digital age - a case study on water measuring and metering in commercial irrigated agriculture”. The report recommended that the awareness of water measurement and metering be improved among commercial irrigators, their advisors and local water resource management organisations.

The aims of the knowledge exchange initiative were therefore as follows:

- Re-package and update available knowledge and guidelines from selected WRC reports on water measuring and metering into brief guides that are relevant for the target audience and suitable for the proposed channels and media
- Address the knowledge needs of the target audience, within all nine WMAs, by means of a national roadshow on water measuring and metering at selected schemes with supplier exhibitions
- Restructure the current watermeter website (www.watermeter.org.za) with additional features and content that stimulate interaction and dialogue

The report comprises three parts:

- Part 1 reports on the brief guides
- Part 2 reports on the national roadshow with the title “To measure is to know’’
- Part 3 reports on the development of the website, www.watermeter.org.za

An exit strategy for the national roadshow and the website are included in Part 2 and Part 3 of the report.

PART 1: BRIEF GUIDES

1.1 INTRODUCTION

The first aim of the knowledge exchange initiative was to update and re-package the guidelines that the WRC has published in the past on irrigation water measurement and metering. The brief guides that were developed for the national roadshow (see Part 2) comprise updated knowledge and guidelines from selected WRC reports on water measurement and metering that are relevant for the target audience. The guides created a platform to address key questions that were identified in interaction with the target audience during recent WRC projects.

1.2 METHODOLOGY

The main information sources for the guides were WRC research reports TT550/12, KV342/15 and TT783/18. Other reports referenced from these three reports include WRC research reports TT248/05, KV247/10, TT465/10 and TT466/10. The report numbers and their titles are summarised in Table 1.1.

Table 1.1: Reports consulted

Report number	Report title
TT550/12	Guidance for sustainable on-scheme and on-farm water measurement
KV342/15	Irrigation efficiency training material
TT783/18	Improving the uptake and impact or research-based knowledge in the digital age
TT248/05	Guidelines for irrigation water measurement in practice
KV247/10	Training guidelines for implementation of on-farm and on-scheme water measurement and metering
TT465/10	Standards and guidelines for improved efficiency of irrigation water use from dam wall release to root zone application (Main report, Volume 1)
TT466/10	Standards and guidelines for improved efficiency of irrigation water use from dam wall release to root zone application (Guidelines, Volume 2)

Various articles on the subject of water measurement were also consulted, including articles published in the South African Irrigation Institute (SABI) magazine of August/September 2017 and June/July 2018.

The rationale for the selection of content from these reports and articles for the guides is explained below.

Who is the target group?

The primary target group at which the content of the brief guides is aimed includes the user of irrigation water and its distributor. These mainly include WUA management officials, commercial irrigators and their local advisors.

The secondary target group is mostly those individuals in an advisory role, but who ultimately gain from the actions and information gathered from the primary target group, especially with reference to research, planning, management and consulting.

The brief guides aim to create a platform of interactive communication among the different target groups.

What is relevant for the target group?

The table below summarises the measuring methods that have been identified as being relevant for the target group.

Table 1.2: Summary of measuring methods for water balance framework components

Water use component	Details	Recommended measuring method	Reference
Flow	In a river	• Measuring structure (flume of weir with level measurement) • Area-velocity method - Mechanical - Ultrasonic	WRC Report TT248/05 Guidelines for the design of canals and related structures, Department of Water Affairs, 1980 Agricultural Research Council (ARC) Irrigation Design Manual
	In a canal		
	In a pipe	• Flow meter - Mechanical - Electromagnetic - Ultrasonic	WRC Report TT248/05

For each of these methods, the following information was selected for the guides:

- Technical information for selecting a metering or measuring device.
- Installation and management guidelines. Most of the information for the first two points was taken from Report TT248/05.
- Advanced technology and prices of metering devices. Suppliers were contacted directly for this information. It was found that most of the products have concise, yet informative data sheets, as well as detailed installation manuals. During the workshops, opportunity will be given to suppliers to exhibit and market their products. It is strongly recommended that they make product-specific guides available at their exhibitions. This will be arranged with suppliers during the planning of the workshops.
- The contact details and website links of suppliers.

The brief guides served as the basis of the content of the workshop presentations.

The guides can be downloaded from watermeter.org.za.

PART 2: WORKSHOP REPORT AND EXIT STRATEGY

2.1 BACKGROUND

The second aim of the knowledge exchange initiative addressed the knowledge needs of water users in the irrigated agriculture sector in South Africa regarding the measurement and metering of their water use. A national roadshow was identified as an ideal strategy to accomplish the task at hand. The roadshow, titled “To measure is to know”, entailed half-day workshops on water measurement and metering held in all nine WMAs.

The primary target audience was the WUAs’s water management officials, commercial irrigators and relevant local advisors, whereas the secondary target audience included DWS, SAAFWUA and AgriSA.

The workshops aimed to encourage buy-in for water measurement and metering at both farm and scheme levels and to facilitate the uptake of research work that the WRC has done in this field.

- Research has indicated the following:
  - Most growers are measuring their water use. They use different methods, of which water meters is one.
  - Growers value the experience and expertise of fellow growers, especially leader growers.
  - Growers mainly source knowledge from a network of advisors and not directly from research organisations like the WRC and universities.
  - Relationships and trust are important values for any successful communication strategy.
  - Water measurement at farm and scheme level represents different interests. Growers perceive water measuring at the farm edge to mainly serve the interests of the WUAs and the regulator. The value that water metering at the abstraction point adds to water management on the farm still needs to be further explored and demonstrated.

- Notice 141, published in the Government Gazette in February 2018, ended any debate about water metering at abstraction points. Although the importance of water metering and measurement has been triggered by the Regulation, the focus is on how to measure rather than on why, and its value to water management and irrigation efficiency and water productivity.

At the beginning of the project, it was decided to develop an exit strategy for the roadshow, depending on its success. If the primary target audience (WUA water management officials, commercial irrigators and relevant local advisors) did not attend the roadshow, there would be no point in hosting any further workshops.

2.2 THE NATIONAL ROADSHOW

2.2.1 Locations

As indicated in the aims of the project, workshops were hosted at locations strategically selected to attract water users from all nine WMAs. The final locations for the workshops appear in Table 2.1.

Table 2.1: Selected locations for workshops within each water management area

Water management area	Location
Limpopo	Polokwane
Olifants	Polokwane and Mbombela
Inkomati-Usutu	Mbombela
Pongola-Mtamvuna	Bivane Dam
	Mooi River
Mzimvubu-Tsitsikamma	Sunland
Breede-Gouritz	Oudtshoorn
Berg-Olifants	Stellenbosch
Vaal	Vaalharts (Jan Kempdorp)
Orange	Upington

2.2.2 Presenters

- Representatives from DWS's Water Regulation Office were asked to attend, deliver presentations and elaborate on content, as well as to take part in the conversations with regard to the regulations on water use.
- Leader growers from the sampled WUAs were asked to demonstrate how they use precision methods to manage water and the role that water measuring and metering plays in this regard.
- Ms Sarlet Barnard played the role of an advisor by giving a talk on water meters. In her talk, she emphasised the value that water measurement can add to water management practices. She also referred the workshop attendees to the full reports.
- Mr Nic Knoetze from SAAFWUA provided some background on the association and its role in water resource management, as well as the importance of and progress made with establishing catchment management agencies (CMAs), and the transformation of irrigation boards (IBs) into WUAs. He strongly supported the regulations on water measurement, and specifically monitoring and reporting.
- At some of the workshops, the suppliers were also given the opportunity to deliver a presentation on their products and provide some background about their companies.

2.2.3 Invitees and attendees

A personal approach was followed to invite WUA management, growers and intermediaries to the workshops. All the chief executive officers (CEOs) and some of their secretaries were contacted to explain the purpose of the workshop and to set a date that would suit them. An invitation and the workshop programme was sent via email to the host IB, WUA and CMA, which would facilitate the workshop in their respective regions. They then invited their members to the workshop.

Since SAAFWUA has a large contact database of water users in WUAs and IBs throughout the country, they were involved in the arrangement of six of the workshops. The SAAFWUA specifically organised the workshops hosted in Jan Kempdorp and Upington, and negotiated with Vaalharts Water and the Upington Main Irrigation Board to host and facilitate a workshop at their respective offices. Water meter suppliers were also invited to the workshops, as well as DWS officials.

The workshops were held back-to-back during July and August 2019. A total of 243 people attended the workshops.

An example of one of the workshop programmes is given in Appendix A. The presenters and suppliers who attended the various workshops are listed in Table 2.2.

Table 2.2: Workshop attendance: presenters and suppliers

Workshop location	DWS representative	Suppliers	WRC and SAAFWUA
Polokwane	Ms Abashoni Nefale from Regulation DWS Head Office	Flowmetrix, Xylem (Sensus) and Zednet (WRP)	Ms Sarlet Barnard and Mr Nic Knoetze
Sunlands	Mr Andrew Lucas from Regulation DWS, East London	Precision Meters	
Oudtshoorn	None	Irrikor and Netafim	
Stellenbosch	Ms Samantha Saayman from Compliance Monitoring Breede Valley, Western Cape	FloCheck	
Mbombela	Ms Nonceba Noqayi and Ms Gezephi Nyalunga from DWS Compliance Monitoring and DWS Regulation	Flowmetrix, Xylem (Sensus) and Zednet (WRP)	
Bivane Dam	None	Flowmetrix	
Mooi River	None	Flowmetrix	
Vaalharts	Mr Daniel Seiphemo, Chief Water Control Officer from DWS, Kimberley	Flowmetrix	
Upington	None	Flowmetrix	

In Figure 2.1, all the regions represented at the various workshops are indicated with red placemarks.

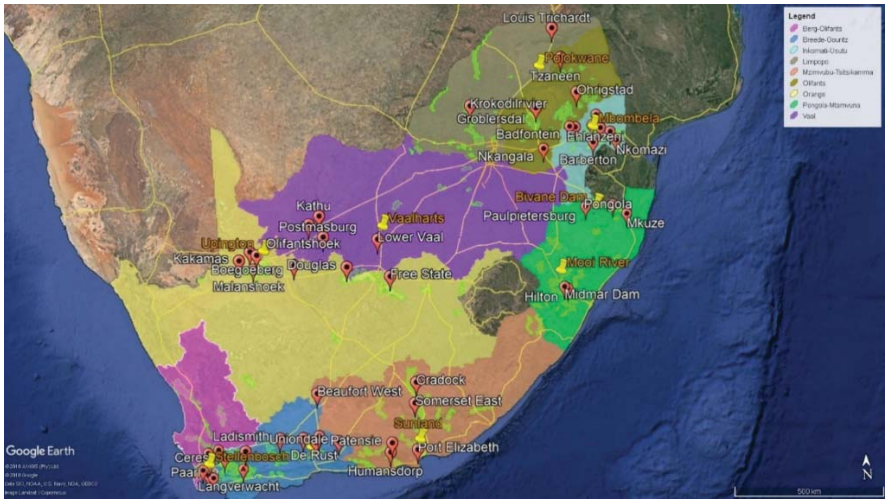


Figure 2.1: Locations of workshops

These regions are also listed in Table 2.3, together with the facilitating organisation and their CEOs.

Table 2.3: Workshop attendance: facilitators and regions represented

WMA	Workshop location	Facilitator CMA/WUA/IB	CEO	Regions represented
Berg-Olifants	Stellenbosch	Berg River IB	Mr Willie Enright	Paarl Somerset West Ceres Grabouw Worcester Bergrivier Kuilsrivier
Breede-Gouritz	Oudtshoorn	Stompdrift-Kammanassie WUA	Mr Riaan Kruger	Uniondale Montagu Langverwacht Ladismith Beaufort West Wynandsrivier Kamanassie Dysseldorp Oudtshoorn
Mzimbuvu-Tsitsikamma	Sunland	LSRWUA	Mr Mike Primmer	Kirkwood Somerset East Cradock Patensie Humansdorp Port Elizabeth
Vaal	Jan Kempdorp	Vaalharts Water	Mr Niel van Eden	Free State Lower Vaal River Kimberley Douglas Postmasburg
Pongola-Mtamvuna	Bivane Dam	Impala WUA	Dr Johan Boonzaaier	Bivane Dam Paulpietersburg Pongola Mkuze Little Mooi River
	Mooi River	MMFA	Mr Tony le Roux	Mooi River Midmar Dam Midlands (Hilton)
Limpopo	Polokwane	Letaba WUA	Mr Jacques Kruger	Tzaneen Ohrigstad Groblersdal Crocodile River (West) Louis Trichardt
Olifants	Polokwane and Mbombela	Letaba WUA and IUCMA	-	See Limpopo and IUCMA

WMA	Workshop location	Facilitator CMA/WUA/IB	CEO	Regions represented
Inkomati-Isuthu	Mbombela	IUCMA	Dr Thomas Gyedu-Ababio	Badfontein Schoemanskloof White River Hazyview Baberton Ehlanzeni Malelane Nkomazi Crocodile River Kaap Rivers Mara Nkangala
Orange	Upington	Upington Islands Main IB	Mr Ludwig Schonborn	Lower Orange River Upington Malanshoek Kanoneiland Keimoes Kakamas Olifantshoek Kathu Postmasburg Boegoeberg

There were many water users and catchment representatives who could not attend the workshops. They sent their apologies. These included water users from Lepalale (Mokolo River) and Hoedspruit (Polokwane workshop), Hobhouse in the Upper Orange catchment (Upington workshop) and water users from the Lower Olifants River catchment (Stellenbosch workshop). All the information shared at the workshop was communicated with them and they received a link to the website.

Fortunately, the SAAFWUA's AGM, held in Somerset West on 15 November 2019, gave the opportunity to those WUAs and IBs who could not attend the workshops in their regions to familiarise themselves with the workshop material and project aims. The invitation to the SAAFWUA's AGM is included in Appendix B.

Those who attend the SAAFWUA's AGM typically include the CEOs and managers of WUAs and IBs throughout South Africa.

The SAAFWUA's AGM for 2019 was well attended as can be seen in Figure 2.2.

Figure 2.2: Attendees at the SAAFWUA's AGM for 2019

Since SAAFWUA has been actively involved with the roadshow and regards water use measurement as very important, it invited speakers on flow measurement to its AGM.

These presenters included the following:

- Ms Sarlet Barnard, who had been delivering presentations on flow measurement during the roadshow. She presented a summarised version of the workshop content and gave feedback on the national roadshow.
- Mr Christiaan Olivier, CEO of the Hex River WUA, who delivered a presentation on the management system the WUA uses in its water supply system.
- Mr Michael Kriel from the DWS, who delivered a presentation on the DWS's water measurement course and training.

Figure 2.3: Michael Kriel delivering a presentation on water measurement at SAAFWUA's 2019 AGM

2.2.4 Workshop content

See Appendix C for the content that was presented at the workshops. The PowerPoint presentations were emailed to all the attendees and are also available on the website. Brief guides were developed from the existing research and given as handouts to all attendees. Figure 2.4 shows the brief guides.

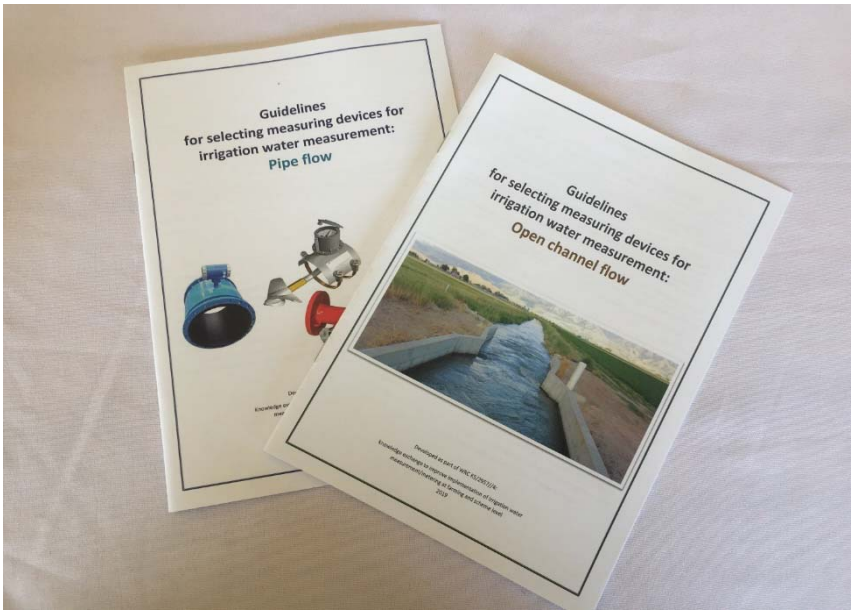


Figure 2.4: Brief guides on flow measurement

At the workshops, opportunity was created for interaction and discussion among the interested and affected parties regarding the topic of water measurement. See the previous deliverable for a summary of the discussions at each workshop.

2.3 FEEDBACK

The attendees were grouped into four categories: producers, suppliers, consultants and “others”. The “other” category typically included water managers of WUAs and IBs, project members, DWS officials and representatives of SAAFWUA. Figure 2.5 shows the percentage attendance per category. Of all those who attended, 35% represented the “other” category, 8% were consultants, 13% were suppliers and 44% were producers or growers.

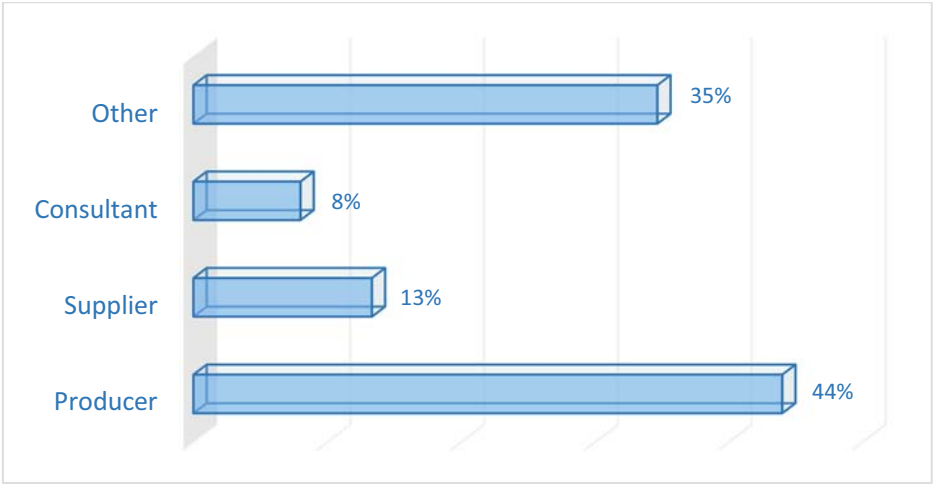


Figure 2.5: Percentage attendance per category

The workshop attendees completed an evaluation form to provide their feedback on the workshops. Of the 243 attendees, 141 (more than 50%) completed the evaluation form. A summary of the feedback is provided below. The full feedback report per workshop appears in Deliverable 3 of the study.

Based on feedback from the evaluation forms:

- 99% of all the attendees said that the workshop met their expectations.
- 99% of all the attendees said that the content was useful to them.

The aspects that the attendees found the most useful included the following:

- The importance of metering to manage water resources and the problems to be addressed
- Better understanding of water use and irrigation
- Cooperation among DWS, agriculture and business
- Practical with technical details about specific products and new technology
- Information on water meters, metering and measurement options and costs (the guideline booklets)
- What is expected of water users and the use of different devices for the same objective
- Supplier exhibitions
- The Water Act, plus challenges water users face to apply the Act
- Information on Government Notice 131 and Government Notice 141 and their application
- Legal, statutory and financial requirements of water measurement compliance
- Institutional arrangements
- Insightful information on water use, distribution and management and how these processes should be managed
- SAAFWUA's presentation in terms of legal provisions for local water management institutions and how billing agency agreements can work
- Potential customers (feedback from a supplier)
- The political aspects and discussions
- New contacts and networking
- Discussions with informed people and the willingness of everyone to learn
- WRC's presentation was very informative
- Different perspectives on metering and practical experience from other users

A total of 46% of the attendees said that the workshop changed their opinion about something. Their reasons for their changed opinions included the following:

- Work together to measure all water use.
- Measurement devices are important for efficient water use.
- Water use should be measured.
- Water use must be calculated for effective water management.
- Water users and farmers are much more willing to adjust and comply with national regulations than many (including the regulator) would assume.
- Users begin to realise that metering is non-negotiable.
- Regulation of both water from boreholes and rivers.
- Users want to be part of the solution.
- The interpretation of the Water Act.
- New technology can make it easier to comply with the regulations.
- Selecting the correct meter for specific abstraction – type and size.
- It is good to install more than one meter.
- The practicality and logistical requirements of installation.

- There has to be agreement on monitoring.
- Membership of WUAs.
- Relationship among WUAs, SAAFWUA and DWS. Adhere to the regulations.
- Clarity on the difference among WUAs, IBs and CMAs and the responsibilities of each.
- Electric power supply measurement.
- Aligning volume allocation, billing and measuring.
- Possible penalties of non-compliance.
- Importance of payment.
- WUA will have to pay for water losses.
- Many more options of metering and measurement.
- There are proper solutions. Different devices.

A total of 76% of the attendees learnt about something new, for example:

- The process to choose and install flow meters
- The need for data transmission and collection
- The urgency of water measurement requirements
- DWS understands the challenges and wants to work together
- Measurement is used for efficiency improvement, not billing
- The lawful aspects of water and measurement
- More clarity about what should be measured in terms of existing water use and general use and licence applications
- Regulations apply to all
- Measurement of water in canals
- Regulation of boreholes
- Role of the WRC
- Statistics of CMAs and WUAs
- New technology
- New development around water metering and its implementation
- Importance of how meters operate and their calibration
- Instrumentation
- Information about water meters, as well as the SAAFWUA and DWS
- A person whose water bill is in arrears cannot be a board member
- Programming of meters
- Various organisations use different systems (information technology systems)
- Hex River and Berg River systems that work very well
- Specifications for water meter installations
- Updates on the regulations and SAAFWUA
- The Inkomati-Usuthu CMA can instruct IBs to manage boreholes that should be registered
- Different types of pipe flow
- Types of flow meters
- The options of implementing flow meters
- Pay water debt and keep a record of abstraction/use volumes
- Expand WUAs to include more users and have an integrated management system
- A water management plan is a requirement for WUAs
- The legality of irrigation boards
- Producers who are not part of an association do not have all the information
- The different accuracies

2.4 CONCLUSIONS AND EXIT STRATEGY

The national roadshow entailed nine workshops and attracted WUA officials, commercial irrigators and relevant local advisors from all nine WMAs. They came to gain and share knowledge on water measurement and metering, and participated enthusiastically.

In total, the nine workshops were attended by 243 people across all nine WMAs in South Africa. The feedback was exceptionally positive. A total of 99% of participants who completed the evaluation forms found that the workshops met their expectations and they found them useful.

In response to the question on how the workshops could be improved, attendees said that they should be held more frequently and that more water users should be invited. They also listed other aspects of the topic that they would like to see addressed in follow-up workshops:

- Discuss the status quo of the implementation of water metering and measurement in the different regions.
- Discuss the conservation of the water resource.
- Discuss the practicability of implementing regulations on water use measurement and how this will be considered by DWS.
- Discuss moisture probes and irrigation scheduling software.
- Integrate with application management and measurement to provide evidence of savings and gains.
- Include site visits.
- The DWS and CMAs should be more involved. The Deputy Director-General (DDG) should also attend.
- Expand it to include officials from DWS and other interested and affected parties without losing the key success factor of open, consultative learning-and-sharing discussions, with the aim to implement the law successfully in a fair, practical and uniform manner.
- Get more people who present practical cases for a better understanding of how to improve water management in practice.
- Involve more growers to tell the audience about the importance of water measurement.
- Conduct workshops for poor rural farmers.
- Improve marketing and communicate the benefits of attendance.
- Invite more suppliers.

These attendees included the secondary target audience. Representatives from DWS attended most of the workshops and gave presentations on the water use regulations in the context of the National Water Act. The Department's presence was important as it is the custodian and regulator of the country's water.

SAAFWUA encourages the installation of water use measuring devices. For this reason, it took a special interest in the workshops. Ms Sarlet Barnard was one of the invited speakers to deliver a presentation on flow measurement at the organisation's 2019 AGM. This event was regarded as a "wrap-up" and conclusion of the roadshow, and was well attended by representatives of WUAs and IBs from all nine WMAs.

The attendance and feedback are evidence that the national roadshow was a huge success. Many attendees requested more workshops and extended workshops. It is therefore clear that there is a need in the agricultural sector for these workshops to be continued and extended.

The DWS has training courses on water measurement that focus on open channel flow and dams. It is proposed that the updated WRC research material on flow measurement, in combination with the DWS guides on flow measurement, be presented in the nine WMAs at regular intervals throughout the year, either in the form of workshops or training courses, or both.

The additional aspects (listed above) that the workshop attendees mentioned should be included in these workshops or training courses. One could even present the topic at three levels:

- An introduction to flow measurement
- Flow measurement – an intermediate course
- Flow measurement – an advanced course

Many of the suppliers give training on the basic principles of flow measurement, and the operation and maintenance of their products. These suppliers could also be invited to give presentations at such training courses.

The DWS and the WRC can expect support from the following organisations:

- SAAFWUA supports the initiative and would like to see all agricultural water users targeted. According to SAAFWUA, wall-to-wall water resource management will make it easier for them to report water use to the DWS. It will also be easier for SAAFWUA to respond to transgressors.

- AgriSA has contact with individual water users and can play an important role to strengthen awareness about water measurement and the need for efficient water resource management.

PART 3: WEBSITE REPORT AND EXIT STRATEGY

3.1 INTRODUCTION

The third aim of the knowledge exchange initiative was to have a watermeter website that would provide information and stimulate interaction and dialogue. The previous watermeter website (www.watermeter.org.za) was closed and replaced with a new website with the same domain name. Part 3 of this report describes the features and content that have been selected for the website. The website went live on 18 September 2019.

3.2 DESKTOP RESEARCH

The features and content selected for the website are based on desktop research of successful websites. In short, successful websites provide users with an excellent user experience and make use of search engine optimisation (SEO) techniques.

3.2.1 User experience

According to Little (2019), user experience is "an individual's perceptions and responses that result from using, or the anticipated use, of a product, service, or system". Effective content writing and easy site navigation are important aspects to consider for user experience of a website.

Effective content writing

High quality content is central to a good user experience – poorly written content could cause a visitor to quickly leave a website (Samson, 2013). According to Wetkoli (2018), without high-quality content, all other efforts to make a website successful would fail.

Best practice

- Keep the content relevant.
- Add facts, questions and stories to make the content interesting and to engage users.
- Use striking headlines and titles.
- Take user experience into account when organising content.

Easy site navigation

Samson (2013) found that a well-structured website that presents information in an orderly and organised way is much more successful than a website that appears chaotic.

Best practice

- Keep the design simple, fresh and unique.
- Add a navigation menu to the top of the website.
- Add appropriate in-text links to the website content.

3.2.2 Search engine optimisation

Search engine optimisation is “the practice of increasing the number and quality of visitors to a website by improving rankings in the algorithmic search engine results” (screamingfrog, 2020). Google uses over 200 factors to score and rank its search engine results (Dean, 2018). These factors include, among others, domain factors, page-level factors, site-level factors and user interaction.

There are many SEO techniques that could be used to optimise and improve different parts of a website or webpage to get a better score and ranking (Wetkoli, 2018). The techniques relevant for this project are discussed below.

Optimising for mobiles

The number of mobile internet users is increasing every year. Websites therefore have to be mobile friendly.

Best practice

- Use responsive design that will scale content to different screen sizes.
- Do not use flash content because most mobile browsers do not support flash players.
- Use bigger fonts.
- Do not place clickable elements too close to each other.
- Avoid pop-ups that might be difficult to close on a mobile device.

Selecting highly effective keywords

Keywords are terms and phrases that people use to search for information using a search engine like Google. It is important to use the correct keywords on a website to get better visibility on search engines.

Best practice

- Use a tool like Google Keyword Planner to choose the most appropriate keywords for the website content.
- Place the most important keywords in the title, headings and URL of the website, meta description tag and the first paragraph of the homepage.
- Update keywords on a regular basis to keep up with changing trends.

Optimising images

Images have to be optimised for search engines. Search engine bots cannot look at the images; they only look at the text that is associated with the image.

Best practice

- Give a readable file name to each image that describes the image.
- Use .jpeg format for images.
- Do not use high-resolution images. Resize and compress these images first. Compressed images will load quicker.
- Include alternative text in images for search engines to understand the content of the images.

3.2.3 Summary

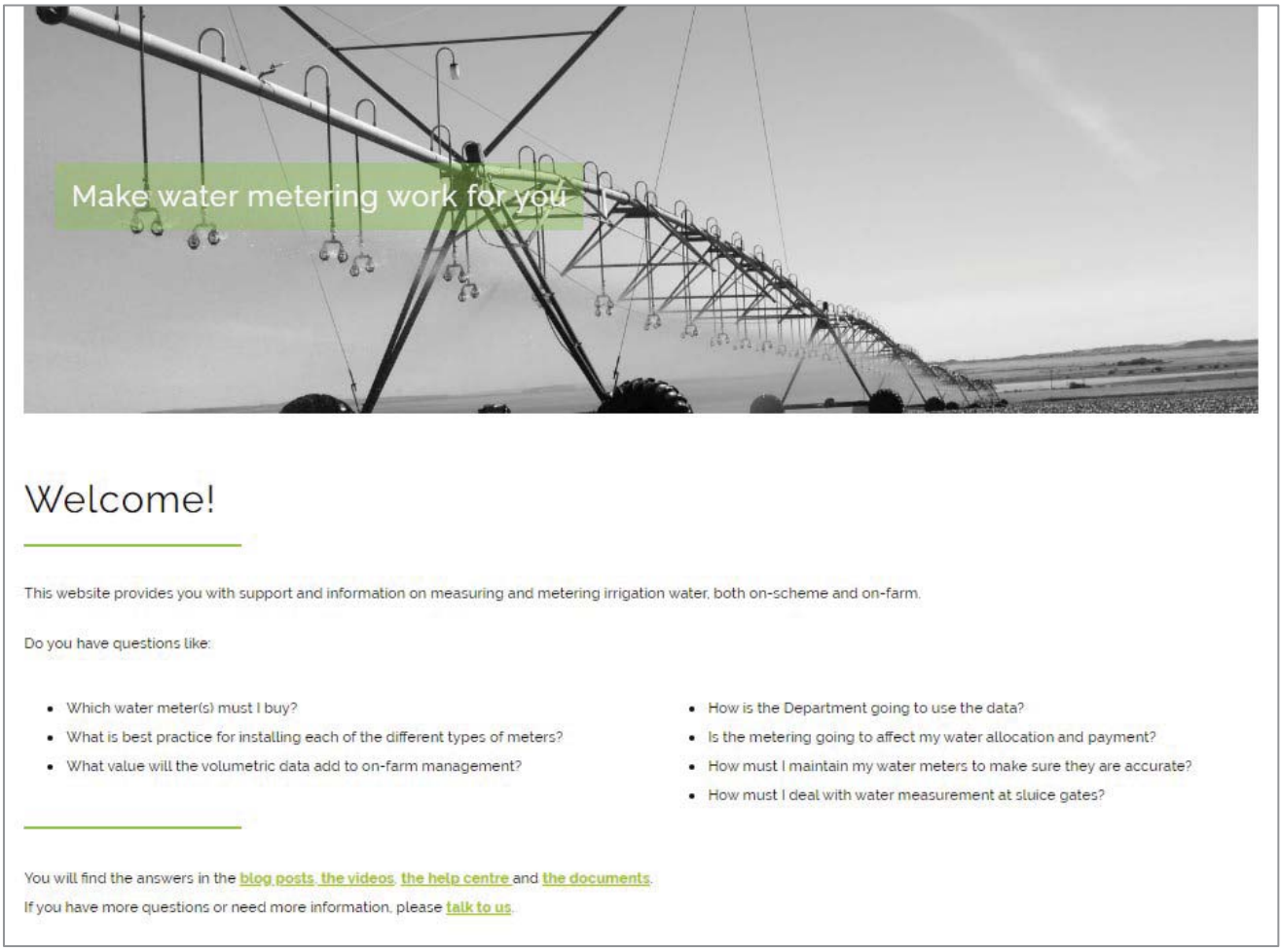
Successful websites are easily accessible and provide an excellent user experience. Furthermore, they use keywords that people type into search engines such as Google, and have useful, high-quality content that users will find interesting and helpful.

3.3 WATERMETER.ORG.ZA: FEATURES AND CONTENT

3.3.1 Home page

Introduction

The home page introduces the website to the target audience. The introduction states the purpose and features of the website. Below is a snapshot from the website that shows the welcome message.

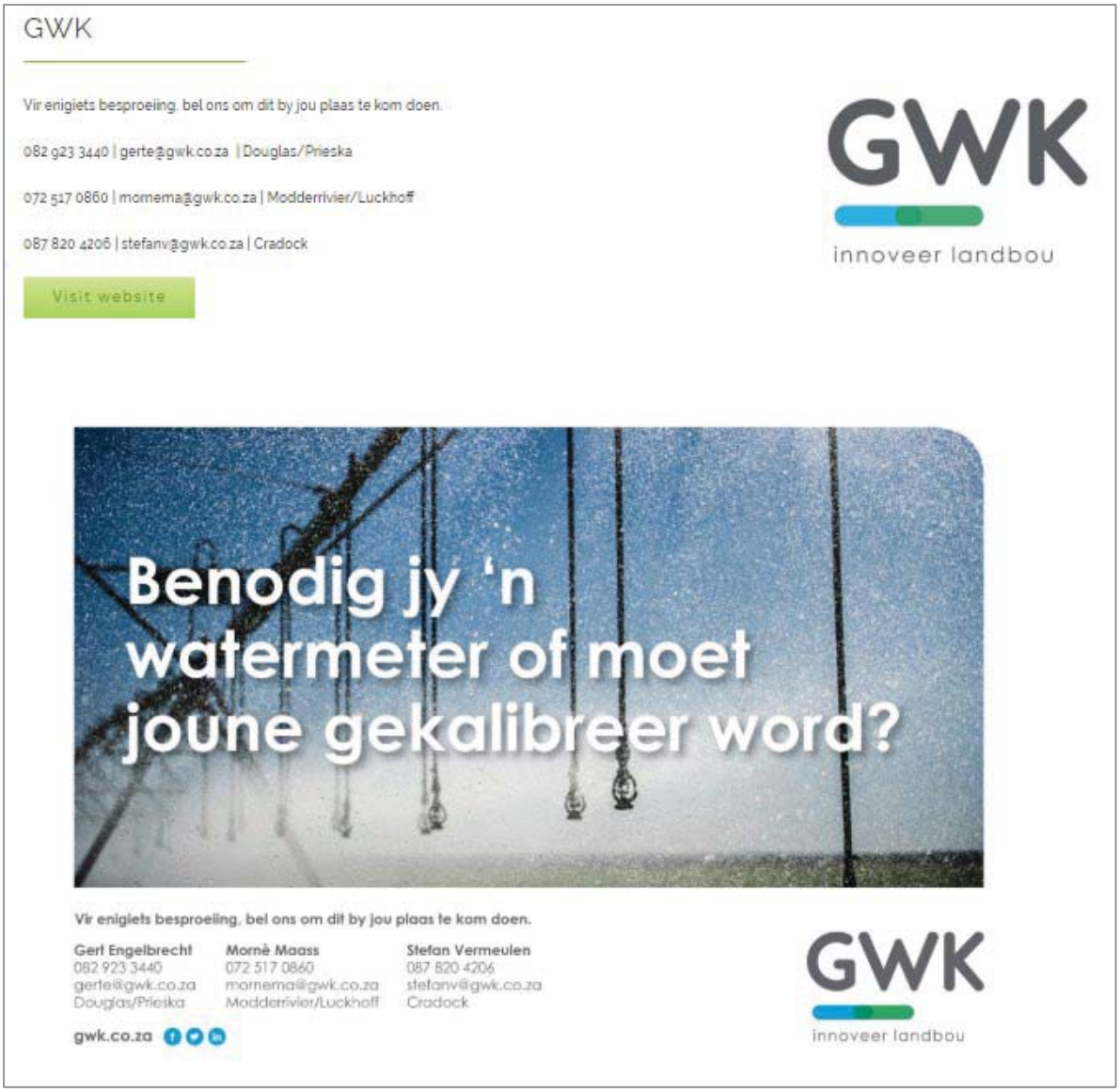


Latest news

A banner appears on the home page showcasing the latest news and developments in water measuring and metering. The banner will be updated on a regular basis. The following snapshot shows a blog article that was featured on the “Latest news” banner.

Advertisements

Supplier logos appear at the bottom of the home page. When a user clicks on the supplier logo, a page with the supplier's advertisement and contact details will open. Below are snapshots of the supplier logos as they appear on the home page, as well as one of the supplier's advertisements.



Links to social media

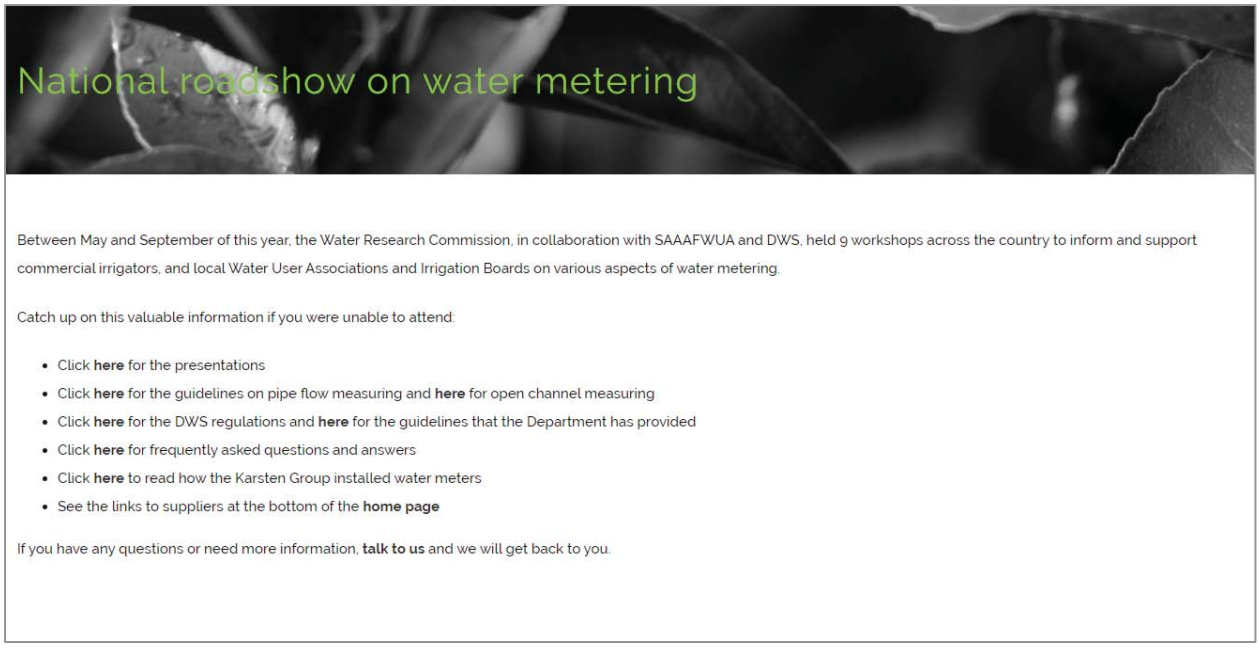
Also on the home page are links to the website's social media pages (Facebook and YouTube). The Facebook page currently has 47 followers.

3.3.2 Features

The following page tabs appear on the home page:

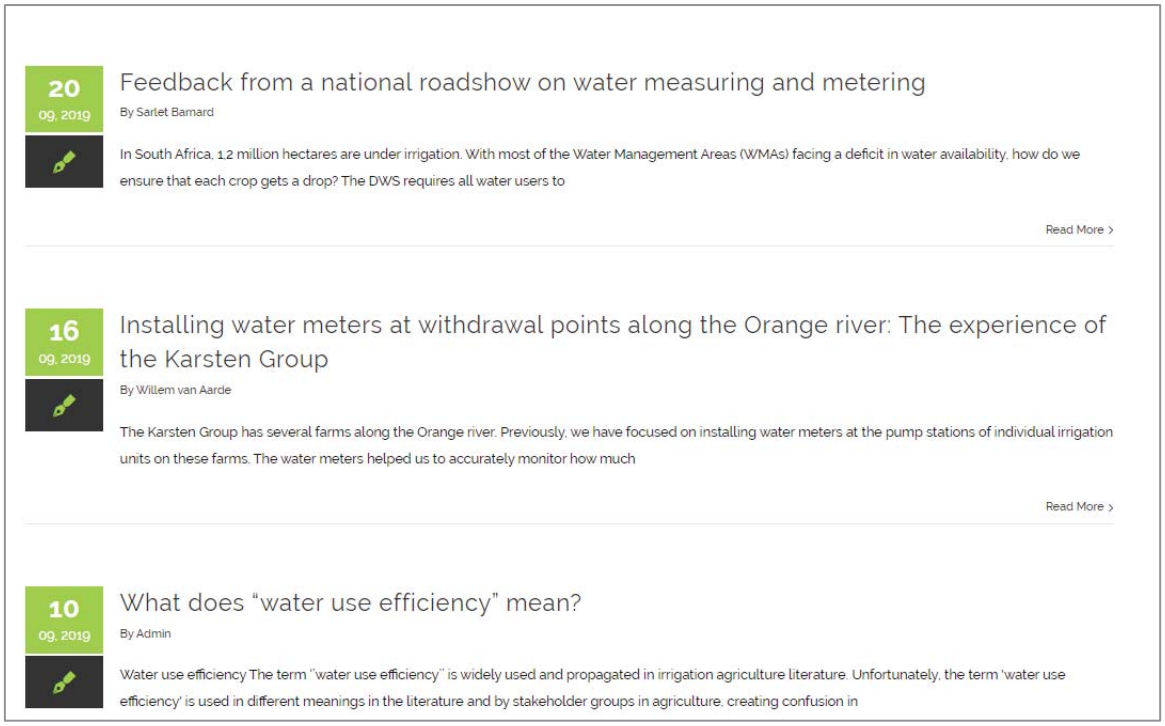
Roadshow

The roadshow page provides readers with a brief summary of the national roadshow and refers those who could not attend it to valuable information and documents on the website. A snapshot of the page follows.



Blog

The website features blog posts on different topics written by different people, including WUA management, growers and advisors. The following blog articles have been posted on the website.



20
09, 2019

Feedback from a national roadshow on water measuring and metering

By Sarlet Barnard

In South Africa, 1.2 million hectares are under irrigation. With most of the Water Management Areas (WMAs) facing a deficit in water availability, how do we ensure that each crop gets a drop? The DWS requires all water users to

Read More >

16
09, 2019

Installing water meters at withdrawal points along the Orange river: The experience of the Karsten Group

By Willem van Aarde

The Karsten Group has several farms along the Orange river. Previously, we have focused on installing water meters at the pump stations of individual irrigation units on these farms. The water meters helped us to accurately monitor how much

Read More >

10
09, 2019

What does "water use efficiency" mean?

By Admin

Water use efficiency The term "water use efficiency" is widely used and propagated in irrigation agriculture literature. Unfortunately, the term 'water use efficiency' is used in different meanings in the literature and by stakeholder groups in agriculture, creating confusion in

Videos

This page contains videos that are linked to YouTube and include supplier videos. See a snapshot below. Videos of Ms Sarlet Barnard's workshop presentation will be added to this page soon.

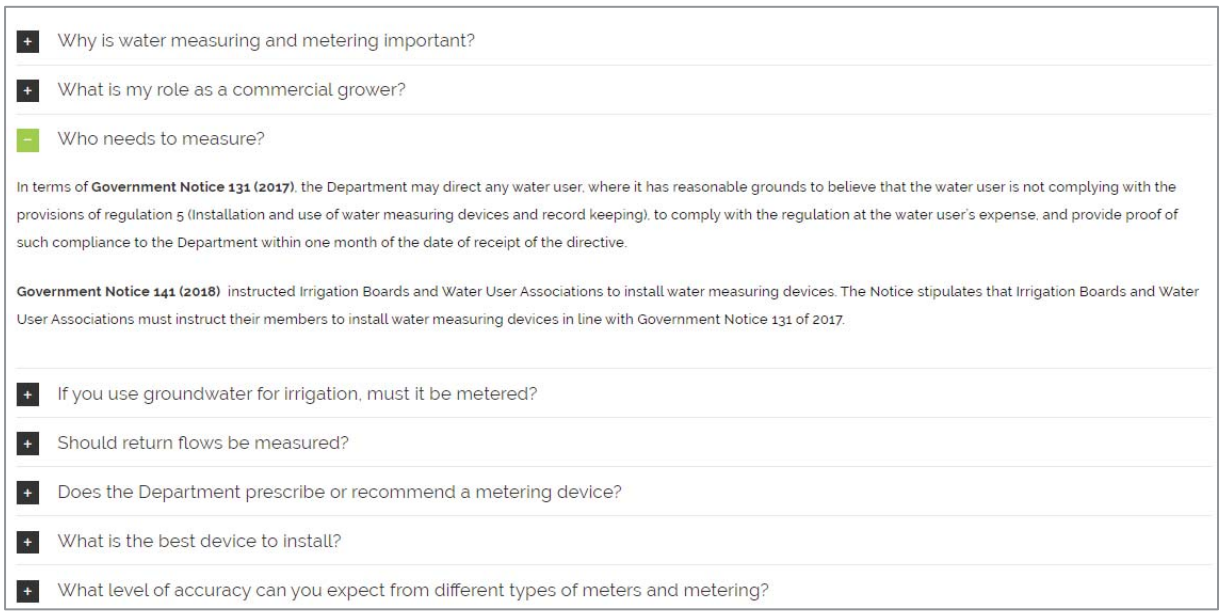
How to install an inline flowmeter by Seametrics

Hex Valley's Next Water Management System

New videos coming soon

Help centre

The help centre page provides answers to frequently asked questions (FAQs). Below is a snapshot of the page that shows some of the questions and one of the answers.

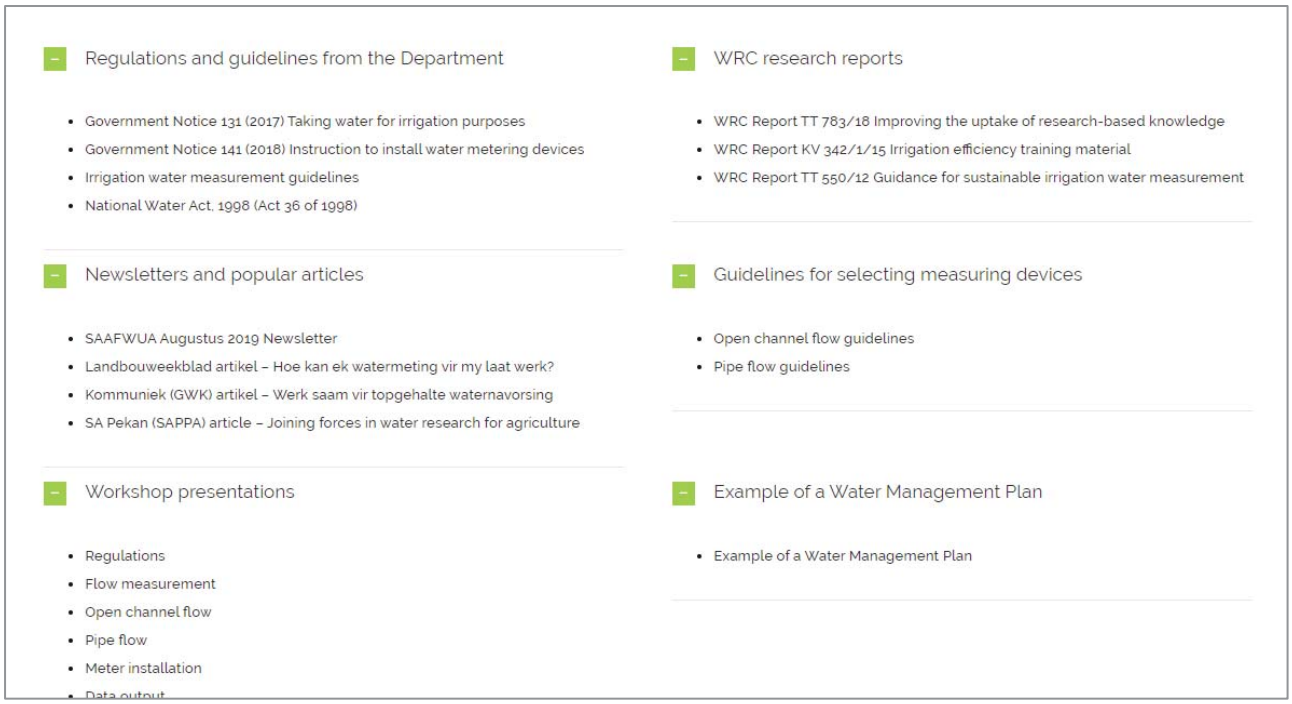


Useful links

The page features links to the following websites:

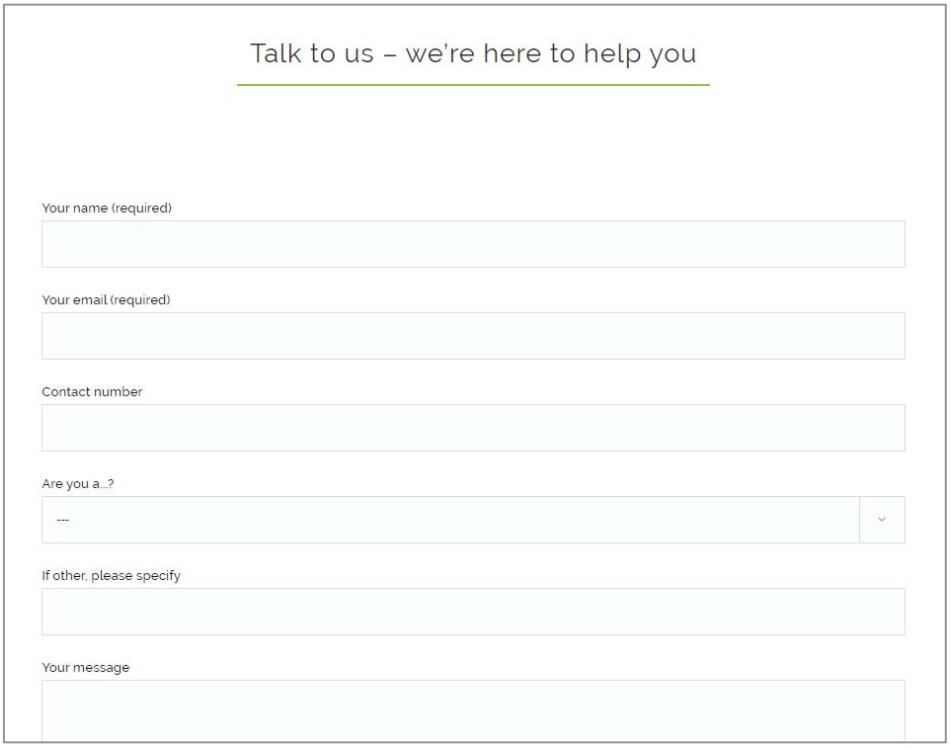
Downloads

The following documents are available for download:



Talk to us

Visitors can fill in the form below and the administrators will contact them. Technical questions will be referred to the relevant expert.



3.4 MARKETING OF THE WEBSITE

All the attendees of the nine workshops that were held nationally in July and August 2019, as well as the workshop attendees of the two previous workshops on water measuring and metering held in Hopetown and Upington in 2018, received an email that invited them to visit the website. An introductory email was also sent to a number of suppliers, consultants, DWS officials and other intermediaries. An example of the introductory email appears below:

Goeiemore/Good morning

We're excited to announce that www.watermeter.org.za has gone live! Besoek die webwerf en kry al die antwoorde wat jy nodig het om volumetriese watermeting suksesvol te implementeer. On your farm and on your scheme.

Ons verwelkom voorstelle en vrae so skryf asseblief vir ons. You can either write to us on this email address or contact us on the website.

Looking forward to hearing from you.

Groete
Sarah Slabbert, Sarlet Barnard en Nadja Green

info@watermeter.org.za
www.watermeter.org.za
Follow us on Facebook and YouTube

These email addresses also formed an email group, which was contacted each month for the duration of the project to share news and new content on the website. Below is an example of such a follow-up email that was sent to the email group:

Good morning to all of you!

Have you wondered:

- How often do I have to verify and re-calibrate my water meters?
- What are the methods available? And which will give the most accurate results?
- Who can assist me with it?
    - Will the verification and re-calibration happen on-site or in a laboratory?
    - How long will it take?
    - What will it cost?

Two new blogs on www.watermeter.org.za discuss answers to your questions. You can click here to get to the articles. Please add your comments and any other questions you might have.

Regards
Sarah & Nadja

3.5 TRACKING USERS AND USER EXPERIENCE

Google Analytics has been activated, which tracks the traffic on the website, as well as some details of its visitors. The website has had 295 visitors since it went live on 18 September 2019 until 1 December 2019 (the date of this report). That is an average of 5.3 visitors a day. The analytics showed that 251 of the 295 visitors were within the borders of South Africa when they visited the website. Figure 3.1 shows the split across the nine provinces.

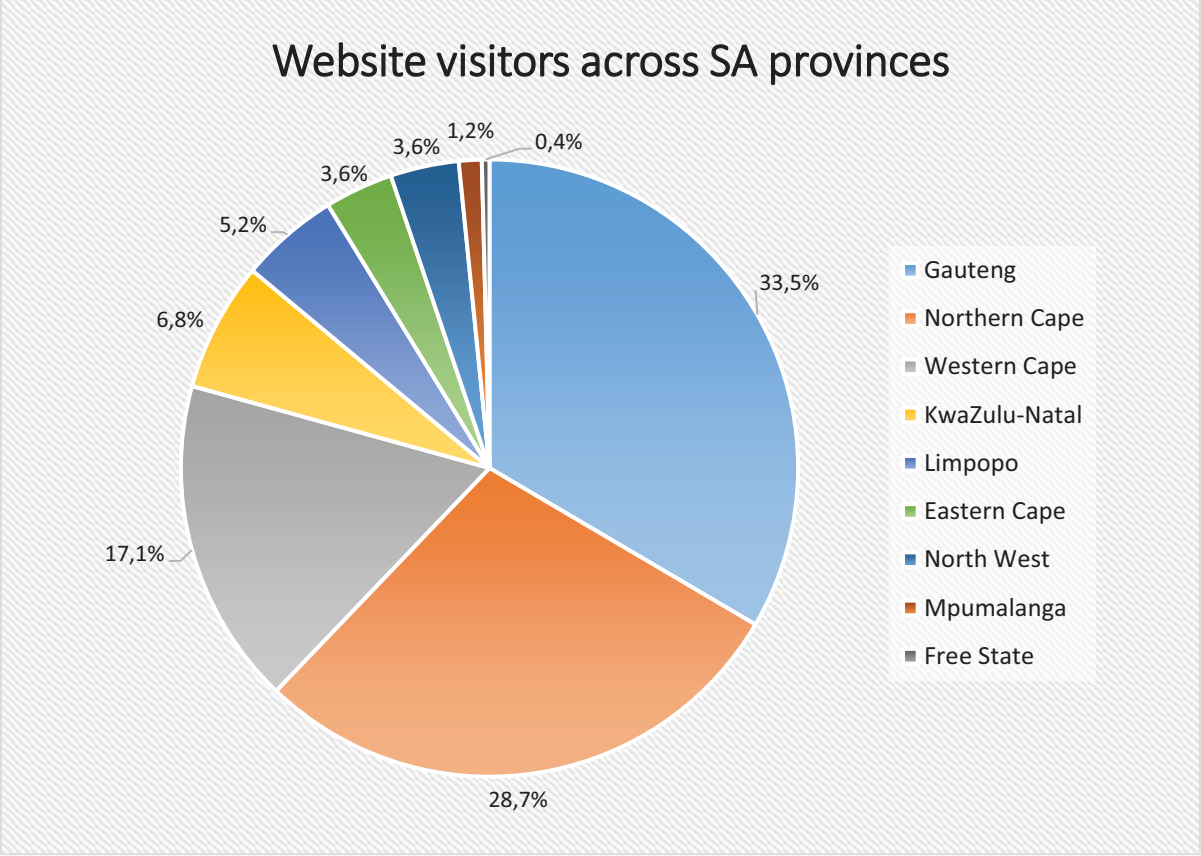


Figure 3.1: Website visitors across South Africa's provinces

Most of the visitors were in Gauteng (84 visitors), the Northern Cape (72 visitors) and the Western Cape (43 visitors). Only one person visited the webpage from the Free State and three from Mpumalanga.

Figure 3.2 shows the pages with the most visitors (excluding the home page).

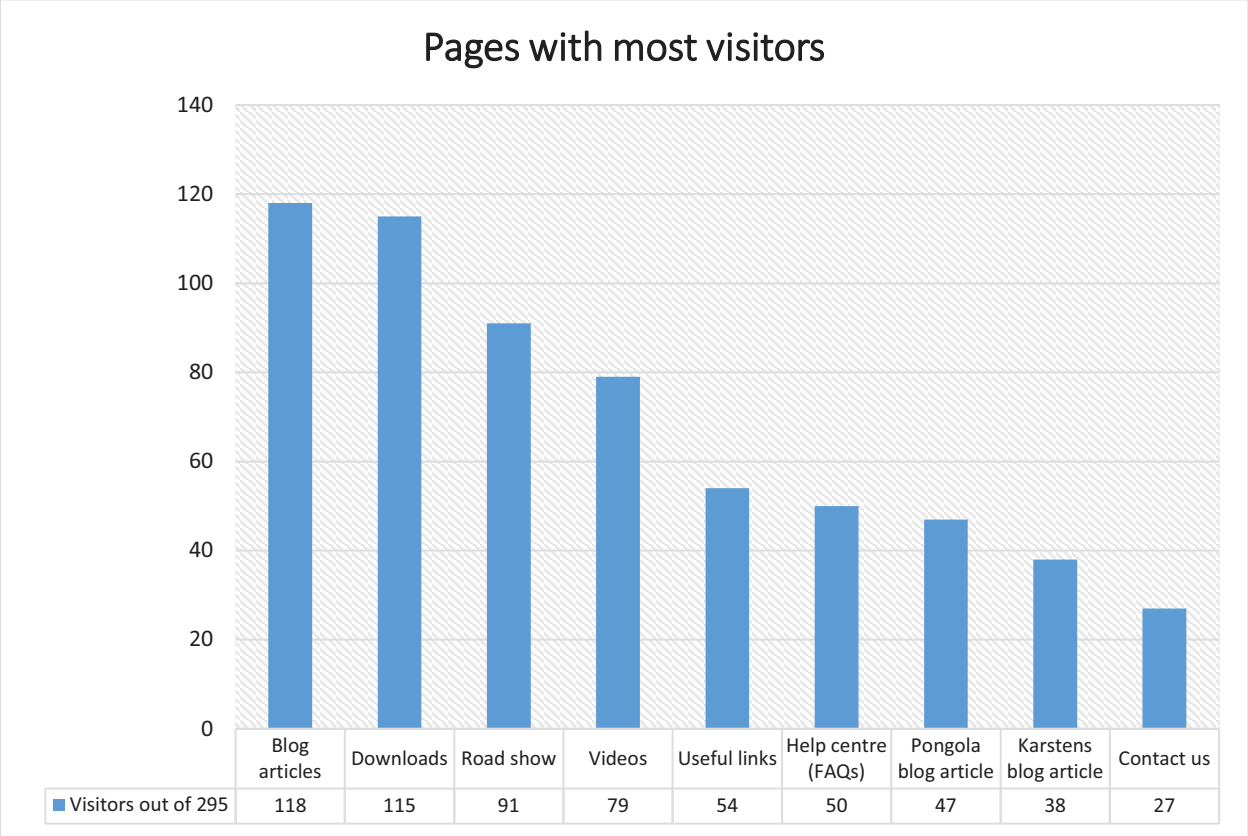


Figure 3.2: Pages with the most visitors

The blog articles and the downloads pages received the most views with 118 and 115 visitors, respectively. The roadshow, videos, useful links and help centre pages were also popular.

The most popular blog articles were “Watergebruik en monitering in Pongola” (47 views) and “Installing water meters at withdrawal points along the Orange River: The experience of the Karsten Group” (38 views). The latest blog on verifying and recalibrating water meters received 10 views. This blog article was only added to the website on 12 November 2019 so more views are likely in future.

The supplier pages received between 19 and 25 views, with the exception of GWK, which received 10 views. However, GWK was only added to the website on 26 November 2019. The other suppliers had been on the website since it went live.

3.6 EXIT STRATEGY

Google Analytics proves that the website has been very successful and that it meets a real need in the agricultural sector. It is therefore recommended, as an exit strategy, that the watermeter website be continued, and new content added regularly.

The marketing methodology to contact stakeholders when new content is posted worked exceptionally well. This shows that the website needs an administrator who can regularly update and manage the website. The project team has explored several alternatives to the WRC to manage the website, but it could not find another suitable organisation that has both the capacity and the enthusiasm. It is therefore proposed that the WRC, with the support of the project team as administrator, continues the website for the next year. The future of the website can be reassessed at the end of March 2021.

The budget for 2020/21 is estimated to be as follows:

Afrihost hosting fees:	R948 (including VAT) – fees may increase for 2020
Administration fees:	R69,000 (including VAT) (R5,000 per month excluding VAT)
Cell phone and internet costs:	R3,000 (including VAT)
Total	**R72,948 (including VAT)**

Administration includes the following:

- Sourcing new content
- Sourcing new blog articles
- WordPress updates
- Responding to visitors' questions and requests for information
- Sourcing responses from experts
- Moderating comments on the blogs
- Uploading new content
- Removing old content
- Updating contact lists
- Email correspondence with stakeholders
- Updating social media
- Exploring new social media avenues

The cost of the website is small; its impact, however, is considerable.

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APPENDIX A: WORKSHOP PROGRAMME

"To measure is to know"

Sundays River Water Users Association, Sunlands, 16 July 2019, 10:00

GPS: 33°30'08.85"S 25°37'40.66"E

Tea, coffee and sandwiches		09:30–10:00
Welcome and introductions	Facilitator: Lower Sundays River Water User Association	10:00–10:10
Background to the project and the WRC	Sarlet Barnard	10:10–10:20
Background and aim of Government Notices 538 (2016), 131 (2017) and 141 (2018)	DWS official	10:20–10:40
Questions and discussion		10:40–10:50
Water meters: types, cost, installation, calibration, maintenance	Sarlet Barnard	10:50–11:50
Questions and discussion		11:50–12:00
Making water measuring and metering work for me	A grower from the area	12:00–12:20
Questions and discussion		12:20–12:30
Progress of the establishment of CMAs and WUAs	SAAFWUA	12:30–12:50
Questions and discussion		12:50–13:00
Closing remarks	Board Chair of Lower Sundays River Water User Association	13:00–13:05
Exhibition of suppliers and lunch		13:05–13:30

APPENDIX B: INVITATION TO SAAFWUA'S 2019 AGM

SOUTH AFRICAN ASSOCIATION FOR WATER USER ASSOCIATIONS (SAAFWUA)

INVITATION TO SAAFWUA'S ANNUAL GENERAL MEETING

DATE : 15 NOVEMBER 2019
TIME : 09:00
VENUE : ERINVALE ESTATE; HOTEL AND SPA; 1 ERINVALE AVENUE; SOMERSET WEST

PROGRAMME

TIME	ITEM	PRESENTER
09:00-09:10	Opening and Welcoming	Mr Andries Labuscagne (Chairperson SAAFWUA)
09:10-09:45	Keynote address	Ms Lindiwe Sisulu (Minister of Human Settlements, Water and Sanitation)
09:45-10:15	Flow Measurement Management System	Ms Sariet Barnard (WRC) & Mr Christiaan Olivier
10:15-10:30	Tea Break	
10:30-11:15	Training of Water Control Officers	Mr Michael Kriel (DWS)
11:15-11:45	Capacity Building and Succession Planning	Mr Andries Labuscagne (Chairperson SAAFWUA) & Mr Nic Knoetze (CEO SAAFWUA)
11:45-12:30	Due Diligence / Assessment of LWMI's	Mr Hanke du Toit
12:30-13:15	Lunch	
13:15-15:00	SAAFWUA Annual General Meeting	
15:00	Closure	

APPENDIX C: WORKSHOP PRESENTATIONS

The workshop presentations are available on www.watermeter.org.za.

The following presentations can be downloaded from the website:

- DWA: Regulations for taking measurements: 11 July 2019
- Flow measurement
- SAAFWUA information session