

**DEVELOPMENT OF TRAINING MATERIAL AND PROVIDING TRAINING FOR
IMPLEMENTATION OF THE WATER USE EFFICIENCY ACCOUNTING REPORT OF
THE WATER ADMINISTRATION SYSTEM**



**Report to the
WATER RESEARCH COMMISSION**

by

**N Benadé
NB Systems**



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EXECUTIVE SUMMARY

Introduction

The Directorate of Water Use Efficiency of the Department of Water Affairs (DWA) is tasked to improve agricultural water management guided by the Water Conservation and Water Demand Management strategy (WCWDM) in the agricultural sector. In the management of water loss control, one of the major responsibilities of the sub-directorate is water accounting and auditing. This function requires the sub-directorate (Water Loss Control) to report on water use on government irrigation schemes, indicating both beneficial and non-beneficial water uses, with the objectives of reducing the unaccounted-for water component. Another important responsibility of the sub-directorate is the training of water control officers to effectively deliver against their water management responsibilities.

At the end of 2008 a Water Use Efficiency and Accounting (WUEA) report was developed as part of the Water Administration System (WAS) through funding by DWA and project management by the Water Research Commission (WRC). This WUEA report was successfully implemented at thirteen irrigation schemes and training was done on the different schemes and at a number of workshops.

Experience from this project has shown that the newly developed WUEA report is easy to use and that everybody prefers the new report over the previous Excel-based report. To build on the successes of this project and to ensure that the WUEA report is actively being used in a sustainable manner, it was recommended that much more should be done in terms of training courses and training material. This follow-on project funded by the WRC, is an extension of the previous project and the main focus of this project is the development of training material and documentation.

Objectives of the project

The objectives for this project are to:

- Develop step-by-step training documentation for WAS focusing on the generation of the WUEA report.
- Continue with the implementation and training of the Water Use Efficiency Accounting (WUEA) report in WAS at schemes that participated in the previous project and where additional training was required.
- Do a WAS training course through the Continuing Education department at the University of Pretoria (CE at UP).

Plan of action

Three different training methods are planned for this project which include:

- The development of step-by-step training documentation will be an ongoing process throughout the duration of this project. The training documentation will also be available on the WAS website at www.nbsystems.co.za.
- Training will be done onsite at the selected irrigation schemes. The training will be done much more intensively at a slower pace and where possible on a one-on-one basis.
- At least one WAS training course will be done during the duration of the project through the Continuing Education department at the University of Pretoria (CE at UP).

Training

A total of eight schemes were included as part of this project and all the training sessions at the different irrigation schemes are recorded. All training sessions were done at a slower pace as planned and, where possible, done on a one-on-one basis. The final test for success is whether a scheme can generate and submit a Water Use Efficiency Accounting Report (WUEAR) independently without any help.

The results have been excellent except for two of the eight schemes which include the Lower Sundays River WUA (LSRWUA) and Sandvet WUA. At LSRWUA the WAS is installed but not operational which made the use of the WUEAR therefore impossible. At Sandvet WUA the Water Use Efficiency Accounting Report (WUEAR) has been implemented successfully but problems have been experienced with the measuring of the inflow into the scheme. Demo runs of the WUEAR have been done successfully and the training has been completed so that management personnel will be able to generate the reports on their own. New measuring equipment has been installed and it should be operational early 2011.

Training course at CE at UP

A short-hands course on the implementation, operation and maintenance of the Water Administration System (WAS) was held over a period of two days at the Continuing Education department at the University of Pretoria (CE at UP).

The training course at CE at UP was successfully completed in June 2010. A total of 24 people attended the course that was held in a computer training laboratory at the University of Pretoria. The training facility was really up to standard and it was possible to demonstrate WAS from a central computer over a network where each student could follow on his/her own computer screen.

All the marketing and registrations were done by CE at UP. A brochure was compiled which was used to market the course. A brochure was also distributed to the Department of Water Affairs (DWA) regional offices, irrigation schemes and potential candidates by Mr. J. Fourie from DWA.

WAS online training documentation

The online step-by-step training documentation that was developed and put on the NB Systems website turned out to be a huge success and a number of compliments have been received. Lower Olifants WUA successfully used the step-by-step documentation on the web without additional training to setup and generate their WUEA reports. Further development and improvements will be made to the documentation on a continuous basis. The development of training video clips have also been investigated and will definitely be added as part of the WAS training suite on the Web in the near future.

Conclusions and recommendations

The step-by-step training documentation has proven to be successful, easy to use and it will definitely be expanded in the future. The implementation of the WUEA report has also shown that it is a straight-forward and simple procedure to generate a useful report on water losses on irrigation schemes.

Although there is a place for basic training of larger groups (10 and more), better results were obtained when focusing on intensive one-on-one training. A well trained individual on a scheme means a lot more on a scheme than a group of half trained people.

In summary it can be stated that the correct tools are available but the focus needs to be directed to:

- Implementation of water loss control through WAS;
- Selected personnel to do the job;
- Identifying and training of core individuals that can train other people;
- Measuring stations (specifically the inflows into the scheme);
- Updating the step-by-step training documentation continuously and adding video clips.

ACKNOWLEDGEMENTS

The Water Research Commission (WRC), since the successful development and implementation of the Water Administration System (WAS) on almost all the major irrigation schemes throughout South Africa can mainly be contributed to the on-going financial support from the WRC. This project on training material and documentation concludes research that has been done over a period of 25 years.

A special word of thanks to Dr GR Backeberg (Director: Water Utilisation in Agriculture, WRC) for his on-going encouragement and support over many years that assisted to make the WAS the success that it is today.

Irrigation scheme personnel, for their input and support to develop and implement the WAS successfully.

To my wife Helena, who is always there to support me in everything that I do.

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1. Introduction

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Experience from this project had shown that the newly developed WUEA report is easy to use and that everybody prefers the new report over the previous Excel-based report. To build on the successes of this project and to ensure that the WUEA report is actively being used in a sustainable manner, it was recommended that much more should be done in terms of training courses and training material. This follow-on project funded by the WRC, is an extension of the previous project and the main focus of this project is training and the development of training documentation.

The objectives of the project are listed in the next paragraph followed by information on the WAS, the plan of action, the deliverables and the budget of the project.

2. Objectives

The objectives for this project are to:

- Develop step-by-step training documentation for WAS focusing on the generation of the WUEA report.
- Continue with the implementation and training of the Water Use Efficiency Accounting (WUEA) report in WAS at schemes that participated in the previous project and where additional training was required.
- Do a WAS training course through the Continuing Education department at the University of Pretoria (CE at UP).

3. Water Administration System (WAS)

3.1 Purpose of the was program

The Water Administration System (WAS) is designed to be a water management tool for irrigation schemes, Water User Associations (WUA's), Catchment Management Agencies (CMA's) and water management offices that want to manage their water usage, water distribution and water accounts.

The main aim during the development of the WAS program was to minimize water losses for irrigation schemes that work on the demand system and that distribute water through canal networks. Currently the WAS program is in use at all the major irrigation schemes cross South Africa and it manages an irrigated area of more than 142 000 ha including 9 500 farmers. The main benefits of using the WAS program is:

- The minimizing of water distribution losses.
- The excellent management of water allocations and water usage per farmer.
- The management of date and time related flow data collected from electronic loggers or mechanical chart recorders.
- The availability of an extensive list of water reports on farm and scheme level.
- The increased productivity of scheme management personnel.
- An integrated debit accounting system that improves debit management.
- The improvement of the overall water administration management on irrigation schemes.

Table 1: Irrigation schemes where the WAS program is used

Irrigation Scheme	Area (ha)	Water allocation (m³/ha)	Total allocation (m³)	Abstraction points	Years in use
Impala Water Users Association	17,012	10,000	170,120,000	423	10
Gamtoos Irrigation Board	7,408	6,000	44,448,000	808	3
Groenland Irrigation Board	5,864	6,000	35,184,000	146	6
Hartbeespoort Irrigation Board	13,915	6,200	86,273,000	1,721	9
Hereford Irrigation Board	3,425	7,700	26,372,500	53	3
Korentte Vetteriver Irrigation Board	852	7,000	5,964,000	121	4
Lower Olifants River WUA	9,212	12,200	112,386,400	1,415	10
Loskop Irrigation Board	16,135	7,700	124,239,500	794	15
Groot Marico Government Water Scheme	2,523	5,300	13,371,900	309	5
Moorriver Government Water Scheme	4,954	7,700	38,145,800	603	12
Orange Riet WUA	15,941	11,000	175,351,000	679	6
Sandvet Government Water Scheme	10,542	1,080	11,385,360	616	10
Vaalharts WUA	35,060	9,140	320,448,400	1,873	12
Totals	142,843		1,163,689,860	9,561	

The WAS database can handle any number of abstraction points and measuring stations on canal networks, pipelines and rivers.

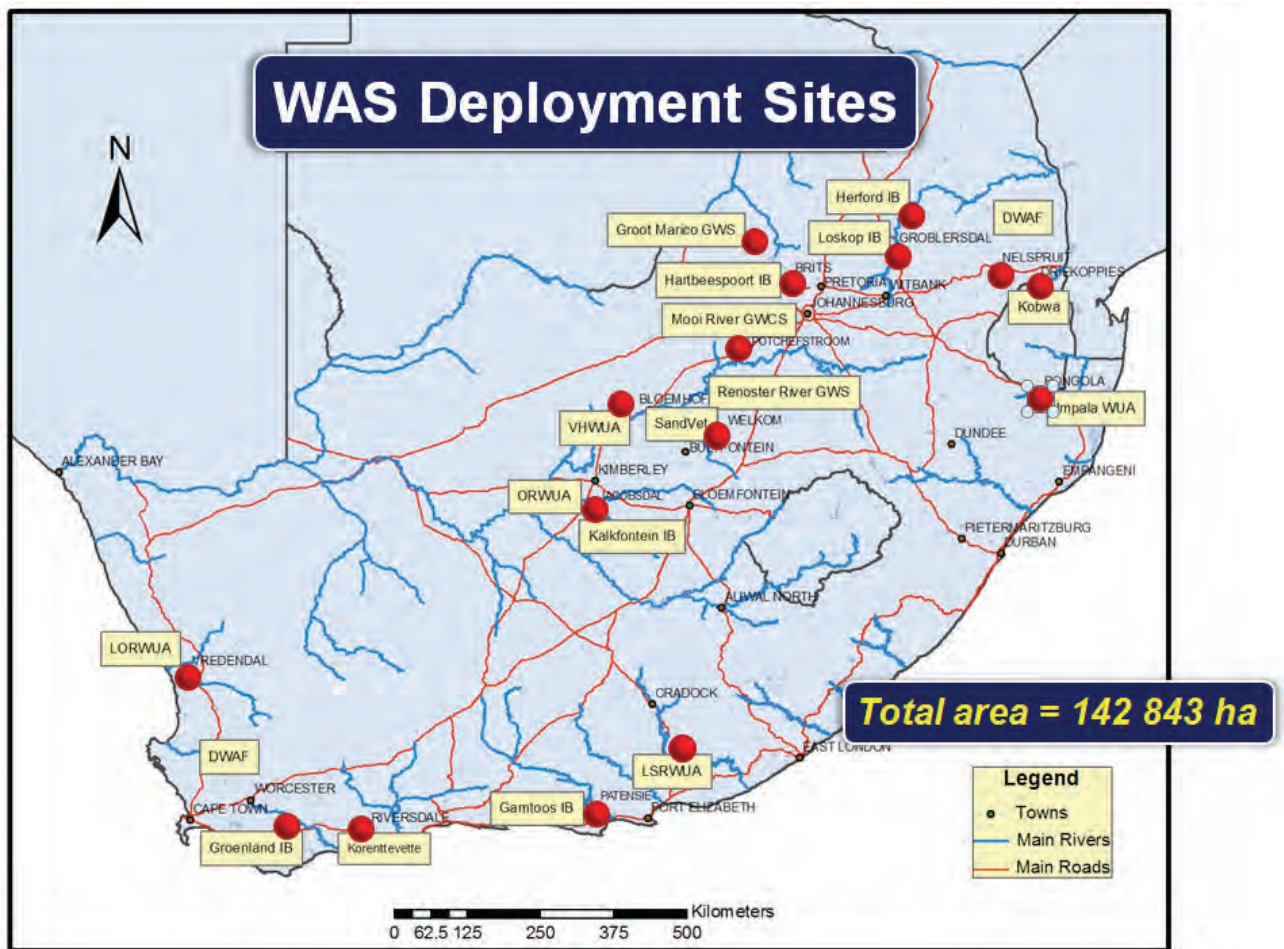


Figure 1 WAS Deployment Sites

3.2 Types of Application

WAS is an integrated database driven system with many water management capabilities. WAS can be implemented in a small water office that manages a few abstractions and measuring stations up to a CMA level that manages thousands of abstractions and measuring stations. WAS is used for the efficient administration of:

- Address information.
- Scheduled or ratable areas.
- Water allocations.
- Water delivered through pressure-regulated sluice gates, measuring structures and water meters.
- Water reporting including the WUEA report.
- Water transfers between users (Automatic and manually).
- Water use calculations for planted areas based on crop water use data.
- Date and time related flow data collected from electronic loggers or mechanical chart recorders.
- Discharge tables (DT) to do conversions between water depth and flow rate for measuring structures or vice versa.
- List of ratable areas (LRA) information.

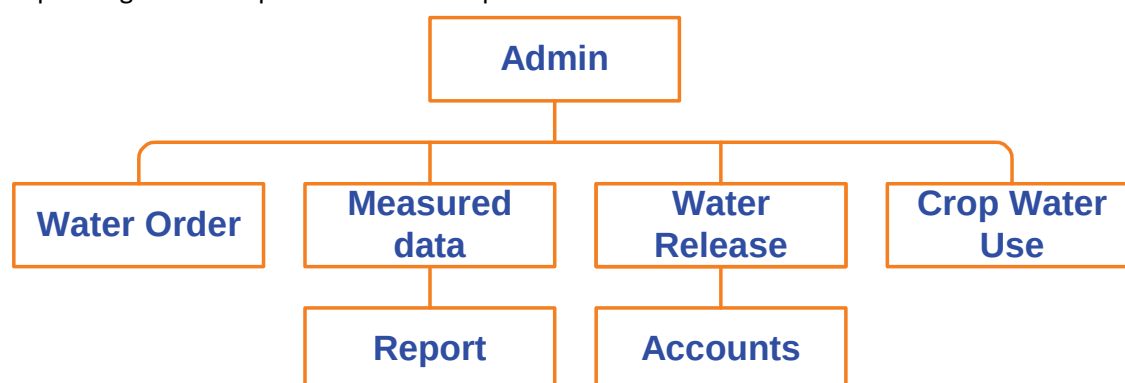
- Calculation of water releases for water distribution through canal networks, pipelines and rivers taking lag times, evaporation, transpiration and seepage into account.
- Billing system that links to the water usage information.
- E-mailing of invoices.
- Flexible user charges based on water usage, a flat rate or scheduled area.
- Images and photos that can be linked to different types of information in the database.

The WAS program saves all information in a Firebird database that can be installed on a single PC or on a server for use over a network. This makes it possible for the scheme manager, accounts personnel and water office personnel to access the database from PC's in their own offices. There is no limitation on the number of PC's that can be linked to the database.

What makes the WAS program unique is the fact that it is an integrated system that includes the water allocations, water use, water distribution and billing information. WAS will generate monthly invoices automatically using water usage or scheduled areas information captured in the database. Different user names and passwords can be used to control access to certain information in the database.

3.3 WAS modules

WAS consists of seven modules that are integrated into a single program that can be used on a single PC or a multi-user environment. These modules can be implemented partially or as a whole, depending on the requirements of the specific scheme or office. The seven modules are:



4. Plan of action

Three different training methods are planned for this project which includes:

- Develop step-by-step training documentation. The development of this documentation will be an ongoing process throughout the duration of the project. The training documentation will also be available on the WAS website at www.nbsystems.co.za/was.php.
- Training will be done onsite at the schemes listed in Table 2. The training will be done much more intensively at a slower pace and where possible one-on-one.
- At least one WAS training course will be done during the duration of the project through the Continuing Education department at the University of Pretoria (CE at UP).

5. Deliverables

The deliverables associated with this project are as follows.

- (i) Development of step-by-step training documentation: R40 000 by 31 August 2009
- (ii) Training given per training session at each individual scheme:
 - a) Phase 1: R63 000 by 30 November 2009
 - b) Phase 2: R56 000 by 28 February 2010
- (iii) CE at UP training course: R21 000 by 30 April 2010
- (iv) Final report: R20 000 by 30 June 2010.

6. WUEA report estimated training budget

The development and implementation of the WUEA report during the previous project was successful at all the participating schemes. The main problem at many of the schemes is the lack of trained personnel. The following table shows the estimated budget for onsite training for the participating schemes, the development of training documentation and giving a WAS course through CE at UP.

Table 2 Training budget for participating schemes

	Irrigation Scheme	Description	Estimated cost per visit (Excl)	No	Total
1	Sandvet GWS	Training	R 7 000.00	3	R 21 000.00
2	Lower Olifants River WUA	Training	R 13 000.00	2	R 26 000.00
3	Hartbeespoort IB	Training	R 3 500.00	2	R 7 000.00
4	Moorriver GWS	Training	R 4 500.00	2	R 9 000.00
5	Groot Marico GWS	Training	R 4 500.00	2	R 9 000.00
6	Lower Sundays River WUA	Training	R 11 000.00	2	R 22 000.00
7	Njelele GWS	Training	R 8 000.00	3	R 24 000.00
8	Levubu GWS	Training	R 7 000.00	3	R 21 000.00
		Training documentation			R 40 000.00
		CE at UP course			R 21 000.00
	Total				R 200 000.00

7. Training

A total of eight schemes were included as part of this project and all the training sessions at the different schemes are shown in Table 1. All training sessions were done at a slower pace as planned and where possible done on a one-on-one basis. The final test for success is whether a scheme can generate and submit a Water Use Efficiency Accounting Report (WUEAR) independently without any help.

The results have been excellent except for two of the eight schemes which include the Lower Sundays River WUA (LSRWUA) and Sandvet WUA. At LSRWUA the WAS is installed but not operational which made the use of the WUEAR therefore impossible. At Sandvet WUA the Water Use Efficiency Accounting Report (WUEAR) has been implemented successfully but they have problems with the measuring of the inflow into the scheme. Demo runs of the WUEAR have been done successfully and the training has been completed so that they will be able to generate the

reports on their own. New measuring equipment has been installed and it should be operational early 2011.

Table 3 Training sessions completed

WUEA Report Training			
Scheme	Present	Date	WUEAR
Lower Olifants River WUA	Johan Matthee	19-Aug-09	Successful
	Cliff	4,5-Feb-10	
Sandvet WUA	Adel van der Merwe	5,6-Oct-09	Will be on line Jan 2010
	Marietjie Venter	23-Apr-10	
	Mothobe Vala	26-Oct-10	
	V.C. Amsterdam		
	W. Myburg		
	J. van der Walt		
	M.K. Mphlenyana		
	André		
Hartbeespoort IB	Sheila		
	Vaughan	08-Oct-09	Successful
	Annalien	12-Oct-10	
Groot Marico GWS	Martin Lamprecht	21-Oct-09	Successful
	Niklaas Plaatjies		
	Pieter du Toit		
Levuvhu & Njelele GWS	A. Padi	28-Oct-09	Successful
	J. Fourie	21,22-Jul-10	
	C. Lusenga		
	J.Maluleke		
	J. Moloto		
	W. Magidimisha		
	L.Padima		
Groot Marico GWS	Martin Lamprecht	10-Nov-09	Successful
	Niklaas Plaatjies	19-Oct-10	
	Pieter du Toit		
	Jannie Fourie		
Mooi River GWS	Chris du Plessis	24-Nov-09	Successful
	Japie	29-Nov-10	
Lower Sundays River WUA	H du Plessis	1-Feb-10	

7.1 Sandvet GWS

All training has been completed at Sandvet WUA and they are in a position to generate their WUEAR once they have sorted out the measuring stations issues at the inflow of the two main canals. Measuring station equipment has been installed and is operational. The only problem lies with the downloading of the data by means of a cable that are apparently missing at the moment.

A digitizing tablet has been installed at Sandvet to assist them with the processing of the data from chart recorders. Chart recorders are available at the inflow of the main canals, but they were unable to provide weekly release data to generate realistic WUEA reports.

Everything is ready at Sandvet at the moment except for the outstanding cable to download the data. They should be able to generate the WUEA reports by early 2011.

7.2 Lower Olifants River WUA

Lower Olifants River WUA (LORWUA) has a competent person who knows how to generate their WUEAR successfully. They have managed to setup and generate WUEA reports successfully by using the WAS step-by-step manual on the internet only. All the training sessions have been completed at LORWUA.



Figure 2 Lower Olifants River WUA offices

7.3 Hartbeespoort Irrigation Board

All the training sessions at Hartbeespoort irrigation board have been completed and they are currently generating their monthly WUEA reports successfully.

7.4 Mooiriver GWS

Mooi River GWS already generated and e-mailed the WUEAR successfully to Mr Fourie for the past couple of months. There is still one follow up training session available for them on this project.

7.5 Groot Marico GWS

Worth mentioning is that the newly appointed Pieter du Toit at Groot Marico GWS turned out to be an excellent WAS operator who managed to, not only, implement the WUEAR successfully, but also other modules of WAS as well. It is people like him that need to be identified and given more advanced training to build a strong WAS knowledgebase within DWA.



Figure 3 Measuring station: left bank main canal at Groot Marico

7.6 Lower Sundays River WUA

Lower Sundays River is the only scheme that did not receive any training as part of this project. Their WAS was however updated and the training will be done once they are ready to start using it.



Figure 4 Lower Sundays River Offices

7.7 Njelele & Levubu GWS

Special attention has been given to Njelele and Levubu GWS. Training has been given and both schemes already managed to send reports successfully to Mr Fourie at DWA head office. Their progress will however be monitored closely due to changes in personnel and getting the right person to operate the system.



Figure 5 Njelele offices

Table 4 Olifants River WUE 2009 WUEA report

Lower Olifants River WUA 2009															
Year	Mnth	Agriculture (x10 ³ m ³)	Industrial (x10 ³ m ³)	Municipality (x10 ³ m ³)	Household (x10 ³ m ³)	Downstream (x10 ³ m ³)	Other (x10 ³ m ³)	Total (x10 ³ m ³)	Released (x10 ³ m ³)	Loss (x10 ³ m ³)	% Loss	Used (x10 ³ m ³)	Avail (x10 ³ m ³)	% Used	% Avail
2009	Jan	11 153	895	0	152	0	0	12 200	16 690	4 490	26	42 423	88 137	33	68
2009	Feb	11 238	1 093	0	152	0	0	12 484	17 284	4 800	27	54 754	75 805	42	58
2009	Mar	11 884	1 139	0	190	0	0	13 214	20 888	7 674	36	67 778	62 782	52	48
2009	Apr	8 434	960	0	152	0	0	9 547	13 680	4 133	30	77 173	53 387	59	41
2009	May	5 666	617	0	190	0	0	6 473	8 573	2 100	24	83 455	47 104	64	36
2009	Jun	2 693	645	0	152	0	0	3 490	4 317	827	19	86 793	43 766	67	34
2009	Jul	2 826	684	0	152	0	0	3 662	4 116	454	11	90 303	40 256	69	31
2009	Aug	4 713	642	0	190	0	0	5 545	6 598	1 052	15	95 658	34 901	73	27
2009	Sep	7 817	171	0	152	0	0	8 141	10 411	2 270	21	103 647	26 913	79	21
2009	Oct	6 990	881	0	151	0	0	8 022	9 943	1 921	19	7 871	122 726	6	94
2009	Nov	11 263	967	0	189	0	0	12 419	17 504	5 086	29	20 101	110 496	15	85
2009	Dec	11 167	1 003	0	151	0	0	12 321	16 890	4 570	27	32 271	98 327	25	75
		95 844	9 697	0	1 973	0	0	107 518	146 894	39 377	27				

Table 5 Olifants River WUE 2010 WUEA report

Lower Olifants River WUA 2010															
Year	Mnth	Agriculture (x10 ³ m ³)	Industrial (x10 ³ m ³)	Municipality (x10 ³ m ³)	Household (x10 ³ m ³)	Downstream (x10 ³ m ³)	Other (x10 ³ m ³)	Total (x10 ³ m ³)	Released (x10 ³ m ³)	Loss (x10 ³ m ³)	% Loss	Used (x10 ³ m ³)	Avail (x10 ³ m ³)	% Used	% Avail
2010	Jan	14 546	1 152	0	189	0	0	15 887	21 246	5 359	25	47 969	82 628	37	63
2010	Feb	11 295	1 147	0	151	0	0	12 593	17 268	4 674	27	60 411	70 186	46	54
2010	Mar	9 480	1 062	0	151	0	0	10 693	15 151	4 458	29	70 953	59 644	54	46
2010	Apr	9 442	1 123	0	151	0	0	10 716	14 028	3 312	23	81 518	49 079	62	38
2010	May	4 047	637	0	189	0	0	4 872	5 670	798	14	86 202	44 396	66	34
2010	Jun	2 130	370	0	151	0	0	2 651	3 365	714	21	88 702	41 896	68	32
2010	Jul	3 938	757	0	151	0	0	4 845	7 270	2 424	33	93 396	37 201	72	29
2010	Aug	4 796	864	0	189	0	0	5 849	6 189	340	5	99 057	31 541	76	24
2010	Sep	8 452	265	0	151	0	0	8 868	11 277	2 409	21	107 773	22 824	83	18
2010	Oct	2 609	48	0	0	0	0	2 657	3 258	601	18	110 430	20 167	85	15
		70 735	7 425	0	1 473	0	0	79 631	104 722	25 089	24				

Table 6 Mooiriver GWS 2009 WUEA report

Mooiriver GWS 2009															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2009	Jan	1 467	12	0	33	0	0	1 512	1 852	340	18	6 483	173 927	4	96
2009	Feb	283	5	0	33	0	0	321	405	84	20	6 771	173 638	4	96
2009	Mar	747	16	0	41	0	0	804	1 002	199	19	7 534	172 875	4	96
2009	Apr	577	19	0	33	0	0	629	765	137	17	8 146	172 263	5	96
2009	May	201	14	0	41	0	0	256	313	57	18	8 361	172 048	5	95
2009	Jun	223	6	0	33	0	0	262	319	57	17	8 633	171 776	5	95
2009	Jul	519	2	0	33	0	0	554	672	117	17	9 108	171 301	5	95
2009	Aug	1 095	20	0	41	0	0	1 155	1 390	235	16	10 222	170 187	6	94
2009	Sep	1 552	5	0	33	0	0	1 590	1 849	259	14	11 731	168 678	7	94
2009	Oct	1 766	19	0	33	0	0	1 818	2 186	368	16	1 785	178 624	1	99
2009	Nov	898	11	0	41	0	0	949	1 151	202	17	3 028	177 382	2	98
2009	Dec	1 102	11	0	33	0	0	1 145	1 349	204	15	4 045	176 364	2	98
		10 430	140	0	428	0	0	10 995	13 253	2 259	17				

Table 7 Mooiriver GWS 2010 WUEA report

Mooiriver GWS 2010																
Year	Mnth	Agriculture (x10 ³ m ³)	Industrial (x10 ³ m ³)	Municipality (x10 ³ m ³)	Household (x10 ³ m ³)	Downstream (x10 ³ m ³)	Other (x10 ³ m ³)	Total (x10 ³ m ³)	Released (x10 ³ m ³)	Loss (x10 ³ m ³)	% Loss	Used (x10 ³ m ³)	Avail (x10 ³ m ³)	% Used	% Avail	
2010	Jan	902	7	0	33	0	0	942	1 109	167	15	4 954	175 455		3	97
2010	Feb	230	6	0	33	0	0	269	308	39	12	5 179	175 194		3	97
2010	Mar	837	10	0	33	0	0	880	1 055	175	16	6 275	174 099		4	97
2010	Apr	119	5	0	33	0	0	157	171	14	8	6 399	173 974		4	97
2010	May	137	1	0	41	0	0	179	213	34	15	6 509	173 865		4	96
2010	Jun	261	2	0	33	0	0	296	353	57	16	6 770	173 604		4	96
2010	Jul	335	2	0	33	0	0	369	430	61	14	7 156	173 218		4	96
2010	Aug	1 264	5	0	41	0	0	1 311	1 525	215	14	8 426	171 948		5	95
2010	Sep	1 458	9	0	33	0	0	1 500	1 790	290	16	9 839	170 530		6	95
2010	Oct	2 078	12	0	33	0	0	2 123	2 467	345	13	2 079	178 356		1	99
		7 621	59	0	346	0	0	8 026	9 421	1 397	15					

Table 8 Njelele GWS 2009 WUEA report

Njelele GWS 2009															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2009	Apr	1 314	0	0	0	0	0	1 314	2 078	764	36	1 002	16 509	6	94
2009	May	1 370	0	0	0	0	0	1 370	2 428	1 058	43	2 498	15 013	14	86
2009	Jun	1 037	0	0	0	0	0	1 037	1 716	679	39	3 329	14 182	19	81
2009	Jul	968	0	0	0	0	0	968	1 498	530	35	4 293	13 218	25	76
2009	Aug	1 631	0	0	0	0	0	1 631	2 062	431	20	5 778	11 734	33	67
2009	Sep	1 552	0	0	0	0	0	1 552	2 042	491	24	7 320	10 191	42	58
2009	Oct	2 261	0	0	0	0	0	2 261	2 963	702	23	9 052	8 460	52	48
2009	Nov	716	0	0	0	0	0	716	928	212	22	10 525	6 986	60	40
2009	Dec	1 311	0	0	0	0	0	1 311	1 864	553	29	11 209	6 303	64	36
		12 160	0	0	0	0	0	12 160	17 579	5 420	31				

Table 9 Levubu GWS 2009 & 2010 WUEA report

Levubu GWS 2009															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2009	Apr	174	0	0	0	0	0	174	286	113	39	174	5 902	3	97
2009	May	259	0	0	0	0	0	259	482	223	46	433	5 643	7	93
2009	Jun	199	0	0	0	0	0	199	355	156	43	632	5 443	10	90
2009	Jul	240	0	0	0	0	0	240	384	144	37	872	5 203	14	86
2009	Aug	351	0	0	0	0	0	351	520	169	32	1 223	4 853	20	80
2009	Sep	317	0	0	0	0	0	317	471	154	32	1 539	4 536	25	75
2009	Oct	307	0	0	0	0	0	307	507	201	39	1 846	4 229	30	70
2009	Nov	264	0	0	0	0	0	264	416	152	36	2 110	3 965	35	65
2009	Dec	97	0	0	0	0	0	97	169	72	42	2 208	3 868	36	64
		2 208	0	0	0	0	0	2 208	3 590	1 384	38				

Levubu GWS 2010															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2010	Apr	44	0	0	0	0	0	44	64	20	31	44	20 207	0	100
2010	May	100	0	0	0	0	0	100	150	50	33	144	20 107	1	99
2010	Jun	156	0	0	0	0	0	156	224	69	30	300	19 951	2	99
2010	Jul	180	0	0	0	0	0	180	279	99	35	480	19 771	2	98
2010	Aug	238	0	0	0	0	0	238	361	124	34	717	19 534	4	97
		718	0	0	0	0	0	718	1 078	362	33				

Table 10 Hartbeespoort Irrigation Board: Eastern Canal 2009 & 2010 WUEA report

Hartbeespoort Irrigation Board: Eastern Canal 2009																
Year	Mnth	Agriculture (x10 ³ m ³)	Industrial (x10 ³ m ³)	Municipality (x10 ³ m ³)	Household (x10 ³ m ³)	Downstream (x10 ³ m ³)	Other (x10 ³ m ³)	Total (x10 ³ m ³)	Released (x10 ³ m ³)	Loss (x10 ³ m ³)	% Loss	Used (x10 ³ m ³)	Avail (x10 ³ m ³)	% Used	% Avail	
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)			
2009	Oct	4 253	0	0	9	0	0	4 262	8 814	4 552	51	668	7 378		8	92
2009	Nov	2 650	648	0	11	0	0	3 310	6 970	3 660	52	1 444	6 601		18	82
2009	Dec	735	0	0	7	0	0	742	2 617	1 874	71	1 913	6 132		24	76
		7 638	648	0	27	0	0	8 314	18 401	10 086	55					

Hartbeespoort Irrigation Board: Eastern Canal 2010															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2010	Jan	701	203	0	9	0	0	911	2 480	1 569	63	2 206	5 839	27	73
2010	Feb	2 607	268	0	9	0	0	2 884	6 654	3 770	56	2 722	5 323	34	66
2010	Mar	3 091	0	0	9	0	0	3 100	7 402	4 303	58	3 284	4 761	41	59
2010	Apr	718	391	0	9	0	0	1 118	2 712	1 594	58	3 486	4 560	43	57
2010	May	469	505	0	11	0	0	985	1 800	816	45	3 612	4 433	45	55
2010	Jun	1 846	0	0	9	0	0	1 854	4 731	2 877	60	3 971	4 074	49	51
2010	Jul	2 228	307	0	8	0	0	2 543	5 456	2 912	53	4 380	3 665	54	46
2010	Aug	3 447	330	0	10	0	0	3 787	9 304	5 517	59	5 026	3 019	63	38
2010	Sep	4 032	386	0	8	0	0	4 427	9 355	4 928	52	6 051	1 995	75	25
		19 139	2 390	0	82	0	0	21 609	49 894	28 286	57				

Table 11 Hartbeespoort Irrigation Board: Western Canal 2009 & 2010 WUEA report

Hartbeespoort Irrigation Board: Western Canal 2009											
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	
2009	Oct	4 021	0	0	5	0	0	4 026	8 455	4 429	52
2009	Nov	2 269	69	0	7	0	0	2 345	5 376	3 030	56
2009	Dec	282	0	0	4	0	0	286	863	577	66
		6 572	69	0	16	0	0	6 657	14 694	8 036	55

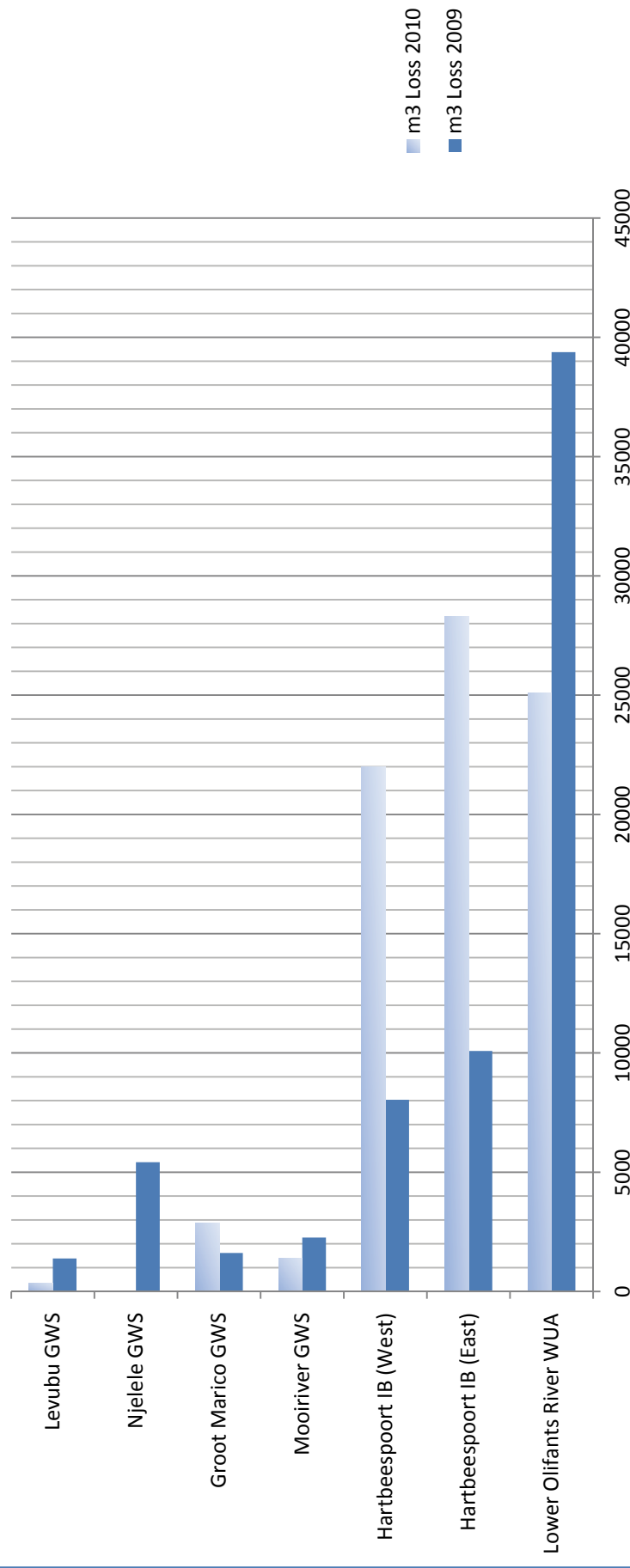
Hartbeespoort Irrigation Board: Western Canal 2010											
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	
2010	Jan	125	99	0	5	0	0	229	948	719	75
2010	Feb	2 773	143	0	5	0	0	2 921	5 640	2 720	48
2010	Mar	3 508	0	0	5	0	0	3 513	6 715	3 202	47
2010	Apr	513	181	0	5	0	0	699	1 836	1 136	61
2010	May	607	236	0	7	0	0	850	1 590	740	46
2010	Jun	2 538	0	0	5	0	0	2 544	4 984	2 440	48
2010	Jul	2 372	206	0	5	0	0	2 583	4 504	1 922	42
2010	Aug	4 011	135	0	7	0	0	4 153	9 396	5 243	55
2010	Sep	5 477	206	0	5	0	0	5 689	9 572	3 883	40
		21 924	1 206	0	49	0	0	23 181	45 185	22 005	49

Table 12 Groot Marico GWS 2009 WUEA report

Groot Marico GWS 2009															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2009	Nov	1 160	0	0	16	0	0	1 177	2 052	875	42	1 647	11 727	12	88
2009	Dec	1 233	0	0	13	0	0	1 246	1 986	740	37	2 880	10 494	22	79
		2 393	0	0	29	0	0	2 423	4 038	1 615	40				

Groot Marico 2010															
Year	Mnth	Agriculture	Industrial	Municipality	Household	Downstream	Other	Total	Released	Loss	% Loss	Used	Avail	% Used	% Avail
		(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)	(x10 ³ m ³)		(x10 ³ m ³)	(x10 ³ m ³)		
2010	Jan	572	0	0	16	0	0	588	1 104	516	46	3 452	9 922	26	74
2010	Feb	1 074	0	0	13	0	0	1 087	2 180	1 093	50	4 526	8 848	34	66
2010	Mar	1 144	0	0	13	0	0	1 157	2 259	1 102	48	5 670	7 704	42	58
2010	Apr	143	0	0	13	0	0	156	300	144	48	5 813	7 561	44	57
2010	May	66	0	0	16	0	0	82	100	18	18	5 878	7 496	44	56
		2 999	0	0	71	0	0	3 070	5 943	2 873	48				

m³ Loss per Scheme



	m3 Loss 2010	m3 Loss 2009	Lower Olifants River WUA	Hartbeespoort IB (East)	Hartbeespoort IB (West)	Moorriver GWS	Groot Marico GWS	Njelele GWS	Levubu GWS
	25089	39377	25089	28286	22005	1397	2873	5420	362
	39377	10086	39377	10086	8036	2259	1615	5420	1384

m³ (x1000)

Figure 6 m³ Loss per Scheme

% Loss per Scheme

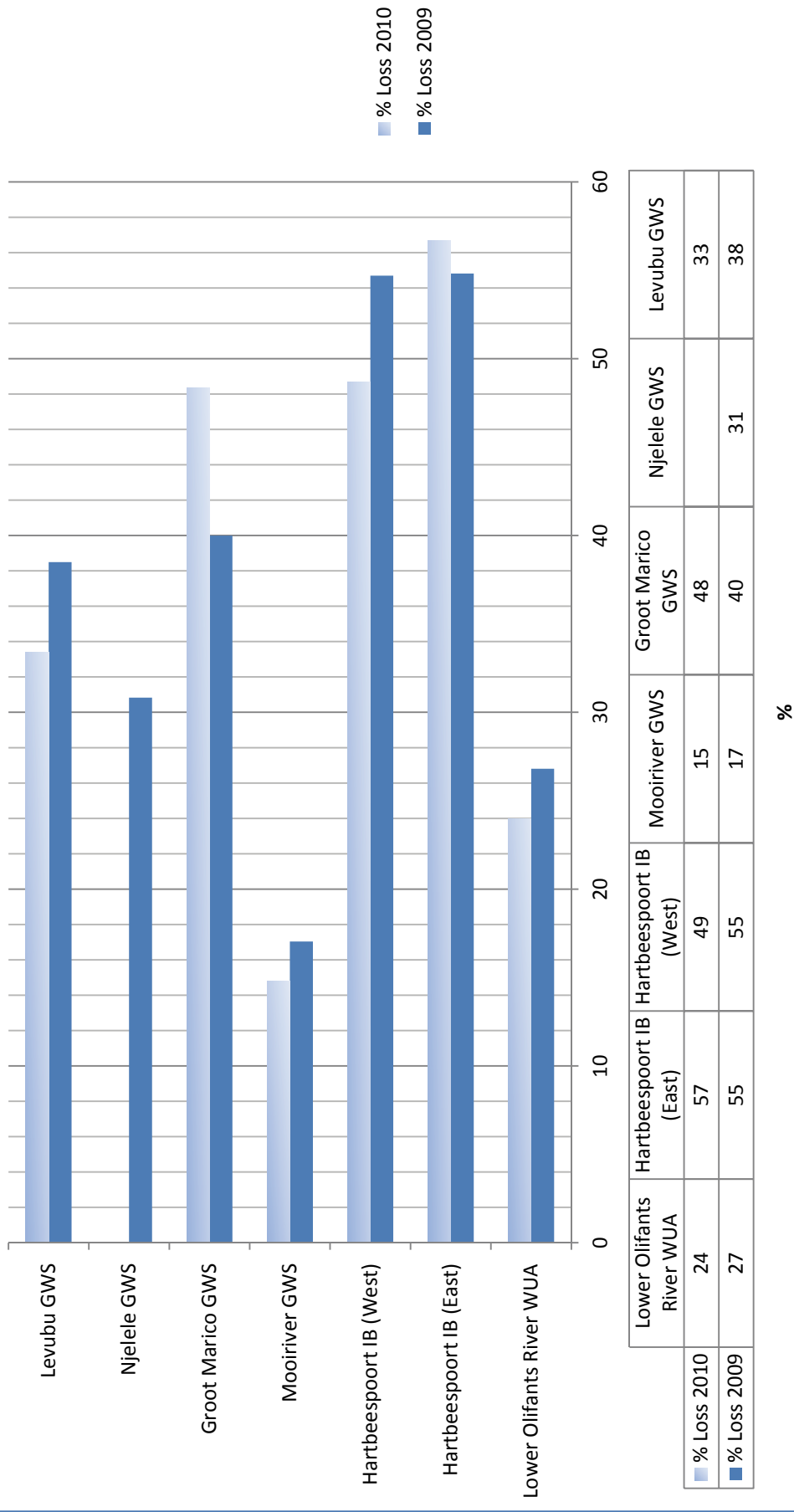


Figure 7 % Loss per Scheme

8. Web based training documentation

The step-by-step training documentation on the NB Systems website turned out to be a huge success and a number of compliments have been received so far. Special mentioning should be made about Lower Olifants WUA where they successfully used the step-by-step documentation on the web without additional training to setup and generate their WUEA reports. The core documentation to generate WUEA reports with WAS has been completed and is available on the website. Further development and improvements will be made on a continuous basis. The development of training video clips have also been investigated and will definitely be added as part of the WAS training suite on the Web in the near future.

9. Training at CE at UP

A short hands on course on the implementation, operation and maintenance of the Water Administration System (WAS) was held over a period of two days at the Continuing Education department at the University of Pretoria (CE at UP).

The training course at CE at UP was successfully completed on the 23rd and 24th of June 2010 and detailed feedback on the course is attached. A total of 24 people attended the course that was held in a computer training laboratory at the University of Pretoria. The training facility was really up to standard and it was possible to demonstrate WAS from a central computer over a network where each student could follow on his/her own computer screen.

All the marketing and registrations were done by CE at UP. A brochure was compiled by them which were used to market the course. Mr. J. Fourie from the Department of Water Affairs (DWA) also distributed the brochure to their regional offices, irrigation schemes and potential candidates.

LIST OF ATTENDEES			
Short Course on the Implementation, Operation and Maintenance of WAS			
Name	City	e-mail	Cell
Petrus Johannes Beyleveld	Hartbeespoort	beylevj@dwaf.gov.za	828 075 383
Nobubele Boniwe	Pretoria	boniwen@dwa.gov.za	833 140 514
Joseph Cocks	Hartbeespoort		829 015 330
Pieter Machiel du Toit	Hartbeespoort		829 078 268
Marius Francois Hendriks	Groblersdal	hendrim@dwaf.gov.za	828 031 886
Andries Labuscagne	Welkom	alabuscagne@sandvet.co.za	788 005 045
Martin Louis Lamprecht	Hartbeespoort	lamprem@dwaf.gov.za	828 004 557
Neo Vincent Leburu	Pretoria	leburun@dwa.gov.za	829 584 494
Christopher Petrus Lusenga	Tzaneen	chrislusenga@vodamail.co.za	823 216 700
William Fredereck Matsabe	Lydenburg	matsabw@dwaf.gov.za	828 023 447
Unathi Mila	Pretoria	milau@dwa.gov.za	849 830 791
Cosmas Qinisela Mnguni	Pretoria	mngunic@dwa.gov.za	735 029 024
Phiki Amos Molalasi	Hartbeespoort		828 870 627
Livhuwani Mutobvu	Tzaneen		823 205 903
Willie Myburgh	Welkom	wmyburgh@mtn.blackberry.com	788 003 546

Eunice Sibongile Nkosi	White River		828 707 170
Elizabeth Jacoba Oosthuizen	Vanderkloof	oosthuizen@dwaf.gov.za	828 097 043
Andries Maubane Padi	Pretoria	padia@dwaf.gov.za	828 065 448
Niklaas Plaatjies	Hartbeespoort		828 020 541
Mosotho Jane Qhaki	Groblersdal	qhakij@dwa.gov.za	829 410 877
Nhlamulo Rita Shiluvana	Pretoria	shiluvanan@dwa.gov.za	723 347 935
Vukani Nobleman Tshabalala	Pretoria	tshabalalav@dwa.gov.za	838 628 063
André van der Merwe	Welkom		828 874 330
Lourens Serfontein van Niekerk	Hartbeespoort	vanniekerkl@dwa.gov.za	828 881 229

The WAS course was done hands on with each participant using his/her own computer. The course mainly focused on the entry to mid-level WAS operator.

The feeling of most of the current WAS operators is that there should be an advance course available to candidates that have reached a certain skill level. Beginners tend to down grade the course standard and it is therefore important to separate the advanced WAS operators from the beginners to get the most out of a course.

The feedback was all positive except for the concern that the course covered too much information in a short space of time. The current thinking is to keep the course content as it is and then do advance training on site and address scheme specific issues.

10. Course Information on the CE at UP website

The following is the information on the WAS course which is available on the CE at UP website (<http://scarlacc.up.ac.za/CEatUP/>):

Short Course on the Implementation, Operation and Maintenance of WAS:

Number: P001951
Catalogue Category: Natural Sciences
Catalogue Sub-Category: Environment Management

Brief Description:

This course is designed to give participants an understanding of the practical application of the Water Administration System (WAS) to enhance water distribution management skills. It will also provide the participant with the tools to increase productivity and save water. This course is aimed at individuals from irrigation boards, government water schemes, water user associations and all regions of the Department of Water Affairs.

The Water Administration System (WAS) is designed to be a management tool for irrigation schemes, Water User Associations (WUA's), Catchment Management Agencies (CMA's) and water management offices that want to manage their water usage, water distribution and measuring stations.

Learning Outcomes:

Successful completion of the course will:

- Allow a water control officer to use WAS for efficient water distribution management on a water scheme.
- Enable database administrators to install, administrate and maintain the WAS database.
- Equip scheme managers to generate useful water distribution management reports.

Course Content:

- Overview of WAS
- WAS interface
- Administration module
- Water order module
- Measured data module
- Water release module
- Crop water use module
- Report module
- Installation
- Data base administration
- Data base maintenance

Who Should Attend:

- Water control officers using WAS or wanting to use WAS.
- Irrigation scheme managers where WAS is already implemented or where it is planned to be implemented.
- Database administrators who will be responsible to install, administrate and maintain the WAS database.

Entry requirements: None

Other Entry Requirements: None

Assessment Type: Assignment(s)

E-mail address: info.ce@up.ac.za

Telephone number: +27(0) 12 420 5015/5051

Fax number: +27 (0) 866 359 219

Website: www.ceatup.com or www.ceatup.co.za

11. WAS: Short Course Evaluation

EVENT TITLE: Short Course on the Implementation, Operation and Maintenance of WAS

2010/07/21

11:10:37

Event Number: P001951-01-2010

Event Start Date: 2010/06/23

Number of Evaluations: 22

Genders: NOT 1
FEMALE 5
MALE 16

Course Leader: Nico Benade

Event Coordinator: Nadia Noome

Age Group

1
21-30 7
31-40 6
41-50 5
50+ 3

PART 1 Questions related to the COURSE ENVIRONMENT

Average

1. Accessibility and parking	3.95
2. Cleanliness	4.62
3. Learning environment	4.41
4. Comfort & convenience	4.29
5. Safety & security	4.62
Average :	<u>4.37</u>

-5 = Worse than Expected, 5 = Better Than Expected

PART 2 Questions related to COURSE CONTENT

Average

1. Relevant	4.27
2. Appropriate	4.27
3. Fresh/up-to-date	4.38
4. Thought provoking	4.00
5. Practical/applicable	4.65
6. Difficult and confusing	3.38
7. As advertised or promoted	4.19
8. Important information	4.48
9. Stimulated student participation	4.24
10. I learnt something I didn't know before	4.59
11. It was structured logically and clearly	4.23
12. Aligned to my level of skill and experience	4.05
13. Tried to cover too much in too little time	3.20
14. I can apply what I learnt in my current job	3.86
Average :	<u>4.13</u>

-5 = I disagree, 5 = I agree



PART 3 Questions related to the PRESENTATION of the course content

Average

1. Encouraged student participation	4.27
2. Professional presentation	4.57
3. Effective use of multimedia	4.50
4. Colourful and stimulating presentation	4.18
5. Technology used supported the content	4.32
6. Good presentation skills	4.29
Average :	<u>4.35</u>

-5 = I disagree, 5 = I agree

PART 4 Questions related to the LECTURE NOTES OR COURSE MATERIALS provided

Average

1. Neat and well presented	4.32
2. Logically structured and easy to follow	3.50
3. Good reference source for future use	4.24
4. Supported the course content	4.18
5. Fair and manageable workload	3.90
Average :	<u>4.03</u>

-5 = I disagree, 5 = I agree

PART 5 The following deal specifically with matters relating to CATERING

Average

1. Quality of the food (lunch)	4.00
2. Presentation of lunch	3.86
3. Day-to-day variety & appeal	3.91
4. Value for money	4.00
5. Service quality	3.91
6. Refreshments other than lunch	3.77
Average :	<u>3.91</u>

-5 = Worse than expected, 5 = Better than expected

PART 6 OVERALL SATISFACTION RATINGS

Average

Excellent / Poor	4.24
High quality / Low quality	4.30
High standards / Low Standards	4.35
One of the best / One of the worst	4.20
Superior / Inferior	4.05
What is the probability that you would attend a course like this at the University again in future?	4.45
What is the likelihood that you would recommend such a course to a friend or colleague?	4.52
Thinking of your most recent course experience at the University please rate and express your personal overall level of satisfaction.	4.14
Average :	<u>4.28</u>

-5 = Very Low/Unlikely/Poor, 5 = Very High/Likely/Excellent



Lecturer Mr Nico Benade

1. Engaging and interesting	4.32
2. Well prepared and confident	4.55
3. Knowledgeable about the subject	4.82
4. Generally a good teacher	4.59
5. Used good practical examples	4.68
6. Presented at a realistic pace	4.36
7. Encouraged participation	4.36
8. Enthusiastic and creative	4.50
9. Able to explain abstract concepts	4.41
10. Used language I could understand	4.64
11. The degree of care that went into the preparation	4.76
12. The enthusiasm with which it was presented	4.50
13. The measure of success in transferring knowledge	4.45
14. The degree of rapport with the class as a whole	4.41
15. The lecturer's ability to make material practically relevant	4.59
Average :	<u>4.53</u>



12. WAS: Course Brochure



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Course Brochure

Short Course on the Implementation, Operation and Maintenance of the Water Administration System (WAS)

Presented by the Department of Plant Production and Soil Science

23-24 June

BRIEF DESCRIPTION

This course is designed to give participants an understanding of the practical application of the Water Administration System (WAS) to enhance water distribution management skills. It will also provide the participant with the tools to increase productivity and save water. This course is aimed at individuals from irrigation boards, government water schemes, water user associations and all regions of the Department of Water Affairs.

The Water Administration System (WAS) has been designed to be a management tool for irrigation schemes, Water User Associations (WUA's), Catchment Management Agencies (CMA's) and water management offices that want to manage their water usage, water distribution and measuring stations.

LEARNING OUTCOMES

Successful completion of the course will:

- allow a water control officer to use WAS for efficient water distribution management on a water scheme;
- enable data base administrators to install, administrate and maintain the WAS database; and
- equip scheme managers to generate useful water distribution management reports.

OUTLINE OF COURSE CONTENT

The WAS development and training documentation was done mainly with Water Research Commission funding:

- Overview of WAS
- WAS interface
- Admin module
- Water order module
- Measured data module
- Water release module
- Crop water use module
- Report module
- Installation
- Data base administration
- Data base maintenance



WATER
RESEARCH
COMMISSION

WHO SHOULD ATTEND?

The course is beneficial to people from Irrigation Boards, Government Water Schemes, Water User Associations and the Department of Water Affairs (including all regions).

COURSE STRUCTURE

The course will be presented over 2 days.

COURSE FEE (CE at UP IS EXEMPT FROM VAT)

The course fee is R 2 800 per person and covers all course material, lunch and refreshments on campus.

ACCREDITATION

2 credits on a NQF level 5.

COURSE CONTENT ENQUIRIES

Dr Nico Benade
Tel: +27 (0)12 548 1005
E-mail: nicob@mweb.co.za

REGISTRATION & ENQUIRIES

Client Service Centre
Tel: +27 (0)12 420 5015
Fax: +27 (0)12 420 5465
E-mail: info.ce@up.ac.za
www.ceatup.com

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13. WAS: Course contents



Water Administration System (WAS)

Short Course

CE@UP (23 & 24 June 2010)

Acknowledgment: The development of the Step-by-step documentation was funded by the Water Research Commission

Wednesday 23 June 2010

07:30 – 08:00	Registration
08:00 – 08:10	Welcome
08:15 – 09:00	Overview of WAS (presentation)
09:00 – 10:00	Install, start and register WAS
10:00 – 10:30	Tea
10:30 – 12:30	Session 1 (hands on)
12:30 – 13:30	Lunch
13:30 – 15:00	Session 2 (hands on)
15:00 – 15:15	Tea
15:15 – 16:00	Session 3 (hands on)

Thursday 24 June 2010

08:00 – 08:30	Revision of previous day (discussion)
08:30 – 10:00	Session 4 (hands on)
10:00 – 10:30	Tea
10:30 – 12:30	Session 5 (hands on)
12:30 – 13:30	Lunch
13:30 – 15:00	Session 6 (hands on)
15:00 – 15:15	Tea
15:15 – 16:00	Evaluation & Closing

14. Conclusions and recommendations

The step-by-step training documentation has proven to be successful and really easy to use and it will definitely be expanded in the future. The implementation of the WUEA report has also shown that it is a straight forward and simple procedure to generate a useful report on water losses on irrigation schemes.

Although there is a place for basic training of larger groups (10 and more), better results were obtained when focusing on intensive one-on-one training. A well trained individual on a scheme means a lot more on a scheme than a group of half trained people.

In summary it can be stated that the correct tools are available but the focus needs to be directed to:

- Implementation of water loss control through WAS;
- Correctly selected personnel to do the job;
- Identifying and training of core individuals that can train other people;
- Measuring stations (specifically the inflows into the scheme);
- Updating the step-by-step training documentation continuously and adding video clips.

15. WAS: Online documentation

A comprehensive step-by-step manual of the WAS is available on the NB Systems website at the link www.nbsystems.co.za. There are cross reference links on every page which are used to explain subject matter in more detail or to jump to relevant information easily. The following printed information doesn't do any justice to the online documentation because of the cross reference links that's not available.

The online documentation will be expanded and updated continuously and features like video clips will also be added in the near future. The main aim of the online documentation is to develop it in a way that virtually no support is needed to install, run and maintain the WAS.

Home of the Water Administration System (WAS)

NB SYSTEMS

- Water Administration System
- WAS-client
- Support
- Downloads
- Other links
- WATSAVE Awards
- Potato Guidelines
- Irrigation System Evaluation Software

Introduction

NB Systems is a South African based software solutions company established in 1997 that specializes in the development, implementation, training and support of the Water Administration System (WAS). WAS is used for water distribution management on irrigation schemes through canal networks and for the calculation of dam operating procedures for a given downstream demand.

NB Systems is active in various water research projects funded by the Water Research Commission (WRC) and some of the software developed by NB Systems is based on the outcome of that research.

Visitors

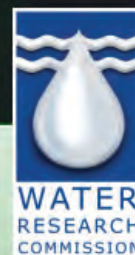
218	7
65	6
13	5
12	4
10	3
9	3

FLAG counter

Figure 8 Access to WAS online manual through the NB Systems' website



Step-by-step manual



1. [WAS installation](#)
2. [Open the WAS database](#)
3. [Registering WAS](#)
4. [WAS Main form](#)
5. [Select Scheme & Year](#)
6. [Create a new Water Year](#)
7. [Create a new User](#)
8. [Capture address information](#)
9. [Capture scheduled areas](#)
10. [Capture household pipes on canals](#)
11. [Capture water orders](#)
12. [Capture meter readings](#)
13. [Capture water transfers](#)
14. [Create a measuring station](#)
15. [Capture measuring station data](#)
16. [Import measuring station data](#)
17. [Generate a weekly time table](#)
18. [Generate a Water Use Efficiency Accounting Report](#)
19. [Run SQL script](#)
20. [Set the Firebird bin path](#)
21. [Make a Snapshot](#)
22. [Restore a Snapshot](#)



Figure 9 WAS on line documentation contents

WAS

1. Introduction...

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1. Introduction

The Water Administration System (WAS) is designed to be a management tool for irrigation schemes and water management offices that want to manage their water accounts and water supply to users through canal networks, pipelines and rivers. WAS is developed and maintained by [NB Systems cc](#). Financial contributions for the development of WAS were made by the [Water Research Commission](#) (WRC) and the Department of Water Affairs and Forestry (DWAF).

The WAS program is currently in use at all the major irrigation schemes and a number of smaller irrigation boards throughout South Africa. (User list and contact details)

- [Application areas](#)
- [Benefits](#)
- [Modules](#)
- [Features](#)
- [User requirements](#)

1.1 Purpose

The Water Administration System (WAS) is designed to be a management tool for irrigation schemes, Water User Associations (WUA's), Catchment Management Agencies (CMA's) and water management offices that want to manage their water usage, water distribution and water accounts. WAS can handle any number of abstraction points and measuring stations on canal networks, pipelines and rivers.

1.2 Application areas

WAS is an integrated database driven system with many water management capabilities. WAS can be implemented

in a small water office that manages a few abstractions and measuring stations up to a CMA level that manages thousands of abstractions and measuring stations. WAS is used for the efficient administration of:

- Address information.
- Scheduled areas.
- Water quota allocations.
- Water delivered through pressure-regulated sluice gates, measuring structures and water meters.
- Water transfers between users (Automatic and manually).
- Water use calculations for planted areas based on crop water use data.
- Date and time related flow data collected from electronic loggers or mechanical chart recorders.
- Discharge tables (DT) to do conversions between water depth and flow rate for measuring structures or visa versa.
- List of rateable areas (LRA) information.
- Calculation of scheme water balances.
- Calculation of water releases for water distribution through canal networks, pipelines and rivers taking lag times, evaporation, transpiration and seepage into account.
- Billing system that links to the water usage information.
- Flexible tariff sets based on water usage, a flat rate or scheduled area.
- Images and photos that can be linked to different types of information in the database.
- Mail merge facility for sending letters to clients.

Figure 10 Introduction p1



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1.3 Benefits

The WAS program saves all information in a Firebird database that can be installed on a single PC or on a server for use over a network. This makes it possible for the manager, accounts personnel and water office personnel to access the database from PC's in their own offices. There is no limitation on the number of PC's that can be linked to the database.

What makes the WAS program unique is the fact that it is an integrated system that includes the water allocations, water use, water distribution and billing information. WAS will generate monthly invoices automatically using water usage or scheduled areas information captured in the database.

Different user names and passwords can be used to control access to certain information in the database.

Using the WAS program have many benefits including:

- Minimise water losses
- Maximise water usage
- Saving time and improve productivity
- Better financial control
- Improve overall management of a scheme

1.4 Modules

WAS consists of seven modules that are integrated into a single program that can be used on a single PC or a multi-user environment. These modules can be implemented partially or as a whole, depending on the requirements of the specific scheme or office. The seven modules are:



Administration module

This module is used to administer the details of all water users on an irrigation scheme. Information managed by this module includes addresses, notes, cut-off list,

images/photos, list of ratable areas, scheduled areas, household and livestock pipes installed on canals, industrial water quotas, crops and areas planted and crop yields. The administration module must be implemented before any other module.

Water order module

This module is used to administer water abstractions from canal networks, pipelines and rivers and it keeps track of water quota allocations and water usage. Water abstractions can be captured in three different ways.

- Standard water order forms such as the ones currently used by the Department of Water Affairs and a few irrigation boards and water user associations. Provides for original orders, additional orders and cancellation of water.
- Water orders based on a flow rate, starting date and time and duration.
- Meter readings that can be captured on a weekly or monthly basis. The end reading of the previous period is automatically transferred to the start reading of the current period.
- Date and time related data that can be imported from electronic data loggers. Water usage can be calculated between specified date and time ranges.

The water order module also has extensive water reporting capabilities such as:

- Water balance sheet per abstraction.
- Water balance report that can summarise the water usage per abstraction and all the abstractions per farmer.
- Water usage per month report.
- Operator defined water reports to compile weekly, monthly, quarterly and yearly water usage reports.

Most of the water reports have extensive find, sort and filtering capabilities. Abstraction points can be linked in such a way that water is transferred from a master to an extension automatically. There is no limit to the number of extensions that can be linked to a master.



Figure 11 Introduction p2



1. Introduction...

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Crop water use module

The main function of the Crop water use module is to calculate the water usage per crop between two specified dates for all the planted crops on a scheme based on the plant date, the area planted and the crop water use curve. The crop yield (ton/ha) can be captured at the end of a growing season which is used to calculate the total yield (ton) and the yield in (g/m²). A summary of water used for a specified period can easily be generated per crop type. All the crop water use information can easily be linked to a geographic information system (GIS) via ODBC and the Land ID field in the crop water use module.

Measured data module

The measured data module is used to capture date and time data into the WAS database. The data can be from graphs, electronic loggers, measuring plate readings, dam levels or meter readings. Integrated into this module are discharge tables that are used to convert water levels to discharges and vice versa. Data can also be imported electronically into the WAS database.

This module is also used to capture inflows and outflows for river systems and to generate discharges for stations that are linked to an indicator site. Volumes can easily be calculated between dates and converted to meter readings if necessary. Measure station data also integrates with the user defined water reports and the disposal report in the WAS program. All readings and discharges can be represented graphically with user-defined date and time ranges.

Report module

The report module includes an extensive range of water and financial reports. Water balance sheets, distribution sheets, disposal reports and various other operated defined reports can be generated.

Accounts module

This module links with the administration and water order modules and administers all water accounts for an irrigation scheme or water management office. The water accounts module is a full debit system, from which monthly reports

can be printed, including invoices on pre-printed stationery, reconciliation reports, age analysis and audit trail reports.

Water release module

This module links with the water order module and calculates water releases for the main canal or river and all its branches and tributaries allowing for lag times and any water losses and accruals. A schematic layout of the total canal network or river system is captured with detail such as the cross-sectional properties, positioning of sluices or pumps, canal or river slope, structures and canal or river capacities. Discharges are converted to the corresponding measuring plate readings where needed. Water distribution sheets and water loss analysis reports can be printed for canal or river systems.

1.5 Special features

- Data capturing screens are consistent and easy to use
- WAS combines water management, water distribution and an accounting system
- The Firebird database is robust and easy to maintain
- The data handling capacity is only limited to the size of the hard drive
- WAS can be used in a multi-user environment
- Extensive error checking capabilities for data capturing are standard
- Where possible data or results are represented graphically
- WAS was developed for users, by users
- Additional features are included as part of an ongoing development, installation and training programme

1.6 User requirements

WAS requires at least a 486-PC running Windows 95/98/NT/XP/Vista. At least 512Mb RAM must be available to run the program, but 1024 MB is recommended.

WAS is written in Delphi and uses Firebird (SQL-based) as the underlying database. Firebird is a relational database management system (RDBMS) that provides rapid transaction processing and data sharing in a single- or multi-user environment.



Figure 12 Introduction p3

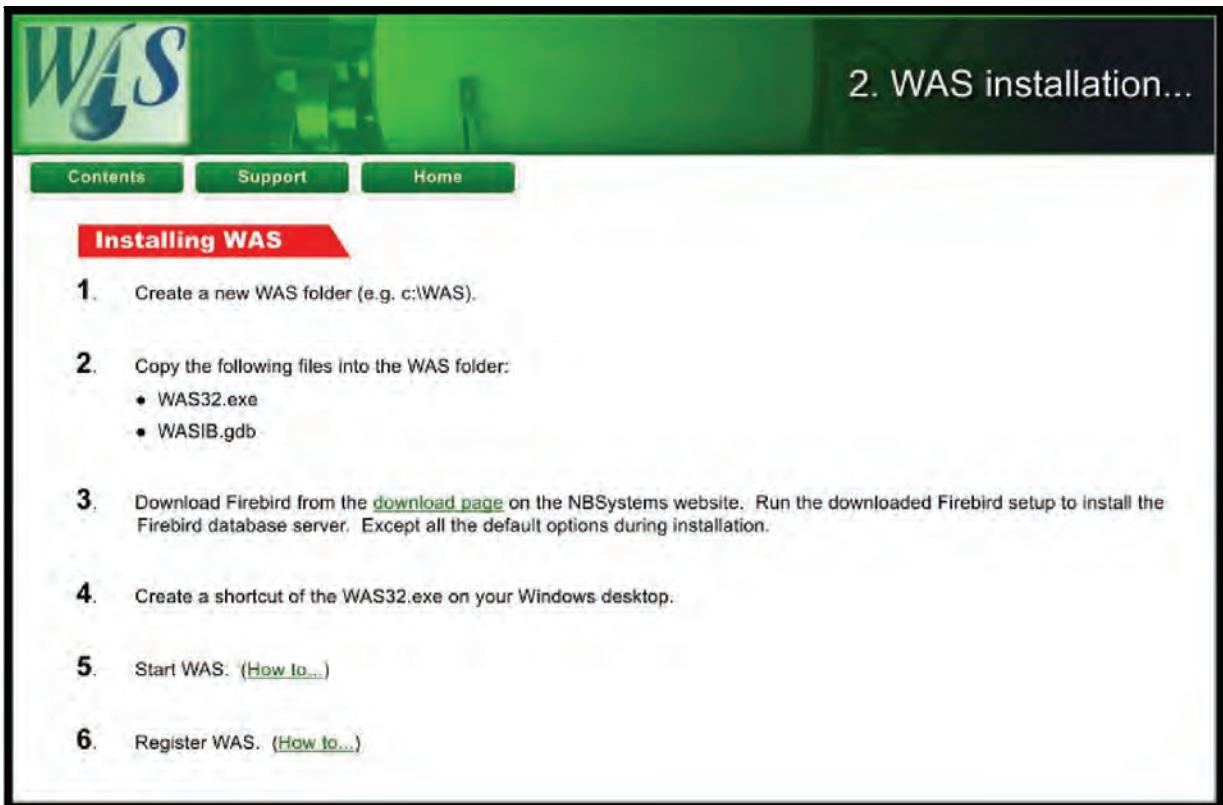


Figure 13 WAS installation



3. Open the WAS database...

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Open the WAS database

The name of the WAS executable file is WAS32.EXE and the database filename is WASIB.GDB. After starting WAS the following login form appears.

1 Server name: localhost

2 Database: c:\was\wasib.gdb

3 User name: SYSDBA

4 Password:

5 Role: FINANCE

Browse button

1 Server name

The server name. Use **localhost** as a server name to make a local connection when running WAS on a Windows Vista operating system.

2 Database

The default installation path to the WAS database is c:\was\wasib.gdb. Use the Browse button to browse to the wasib.gdb file on local hard drives if necessary.

A common mistake is made when using the Browse button over a Windows network, which will return an incorrect database path.

3 User name

Enter the user name assigned by the system administrator. The default user name is "SYSDBA" in uppercase.

4 Password

Enter the password. The default password is "masterkey" in lowercase.

If the server accepts the username and password, the [main form](#) appears with a popup calendar to verify the current date. It is important to specify the correct date as the financial modules and the water release module in WAS depends on it.

If the login was unsuccessful, WAS will start up with most of the menu options and speed buttons disabled. After selecting the date on the popup calendar, the user can retry the login procedure by clicking the Open speed on the [WAS main form](#).

5 Role

Select the Role which was assigned to the specific User name. The Role setting controls the access to the different modules in the WAS database. The database administrator assigns a Role to a specific User name.

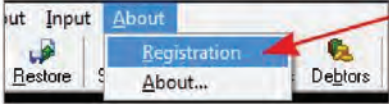
Figure 14 Open the WAS database

WAS

4. Registering WAS...

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1. WAS is distributed and maintained on a monthly subscription basis. To register WAS click on About->Registration from the WAS main menu.


2. The following registration form will be displayed.

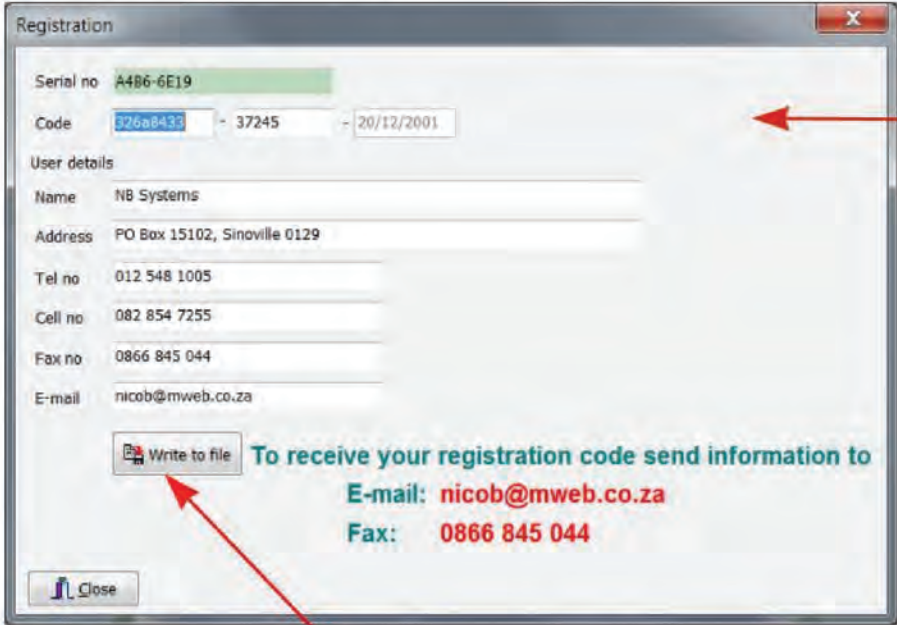

3. Fill in the details and click on the Write to file button which will create a file named "WASRegister.txt".
4. E-mail this file to **nicob@mweb.co.za**
5. You will receive a code which must be captured in the corresponding Code boxes on the registration form.

Figure 15 Registering WAS

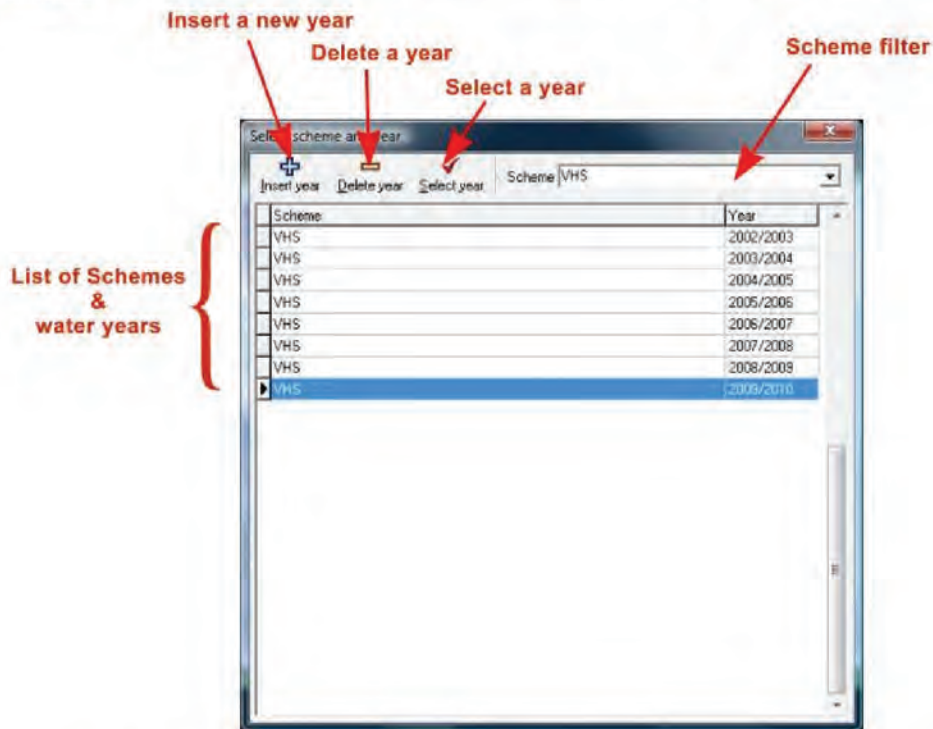


Figure 16 WAS Main form

Select Scheme & Year

The scheme and year form is used to select the current scheme and water year to be worked on. On this form, a new year for a given scheme can be created or a specific year for a scheme can be deleted with all the associated data for that year.

To open the Select scheme & year form, select **Database->Scheme & water year** or click on the  button on the [main form](#).



To select a specific Scheme & water year, Double click on the specific record or highlight the record and click on the Select year button.

Notes:

See [Create a new water year](#) for more details on how to insert a new water year.

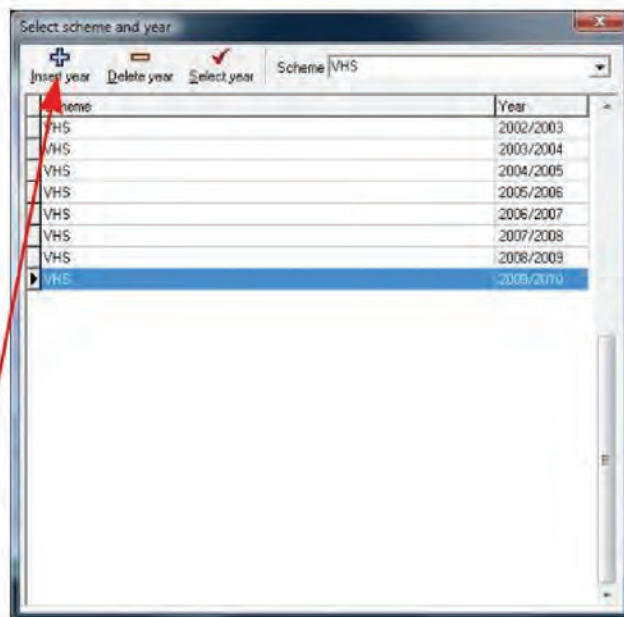
A password is needed to delete an existing water year which is available on request from [WAS support](#).

Figure 17 Select scheme and Year

Create a new Water Year

The scheme and year form is used to create a new water year for a given scheme.

To open the Select scheme & year form, select **Database->Scheme & water year** or click on the  **Scheme** button on the [main form](#).



The dialog box titled "Select scheme and year" contains a toolbar with three buttons: "Insert year" (plus icon), "Delete year" (minus icon), and "Select year" (checkmark icon). A dropdown menu labeled "Scheme" is set to "VHS". Below is a table with two columns: "Scheme" and "Year".

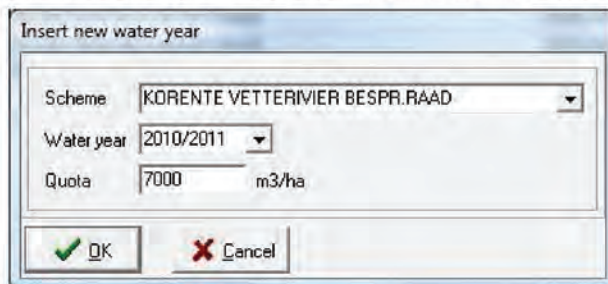
Scheme	Year
VHS	2002/2003
VHS	2003/2004
VHS	2004/2005
VHS	2005/2006
VHS	2006/2007
VHS	2007/2008
VHS	2008/2009
VHS	2009/2010

1. Click on the **Insert year** button to open the following Password input form. Enter the password which is **"Superman"** with a capital "S" and click on the Ok-button.



The "Password" dialog box has a title bar with a close button. It contains a label "Enter password" and a text input field. A red arrow labeled "Superman" points to the input field. At the bottom are "OK" and "Cancel" buttons.

2. The following Insert new water year will open. Capture the required information and click on the **OK-button** which will create and initialize the new water year. The quota can be captured afterwards if it is unknown at this stage.



The "Insert new water year" dialog box contains the following fields:

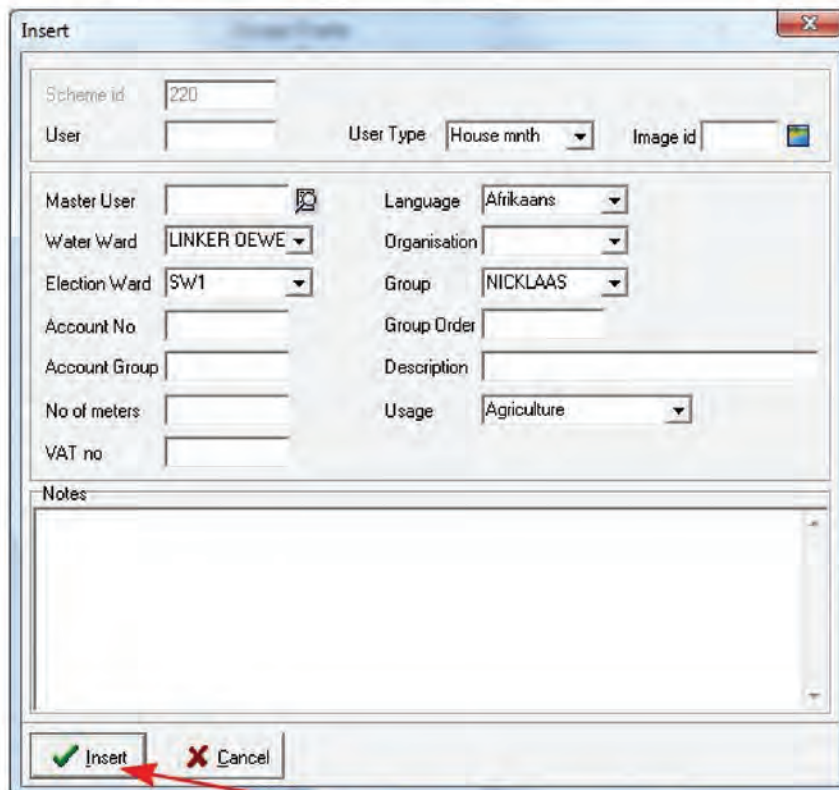
- Scheme:** A dropdown menu showing "KORENTE VETTERIVIER BESPR.RAAD".
- Water year:** A dropdown menu showing "2010/2011".
- Quota:** A text input field containing "7000" followed by the unit "m3/ha".

At the bottom are "OK" (with a green checkmark icon) and "Cancel" (with a red X icon) buttons.

Figure 18 Create a new Water year

Create a new User

1. Open the Users form by clicking on the  **Users** button on the WAS [main form](#).
2. Click on the  **Insert** button on the Users form to open the following Insert form.



3. Capture the information on the Insert form and Click the **Insert button** to save the information to the WAS database. Read the following paragraphs to get a description of the information that can be captured.



Figure 19 Create a new User p1

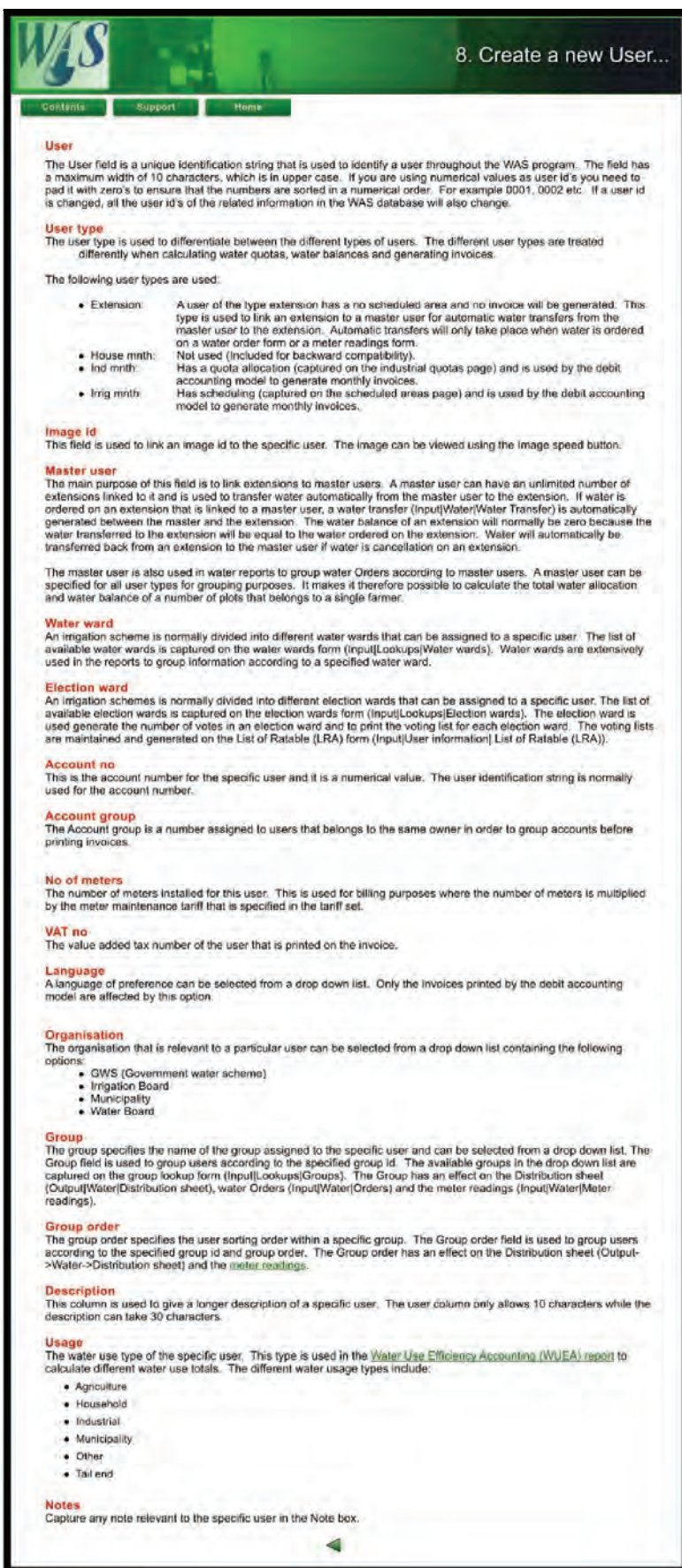


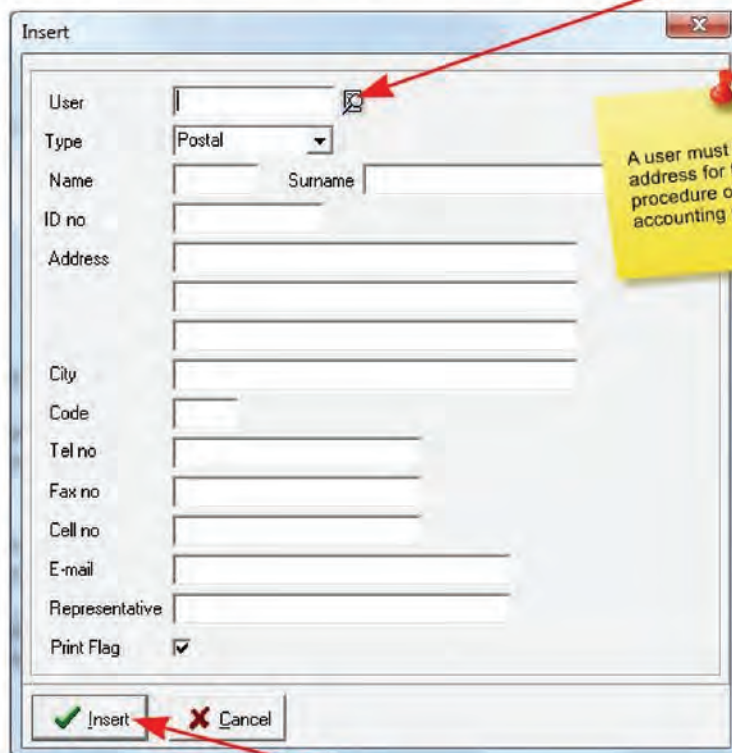
Figure 20 Create a new User p2

Capture address information

The address form is used to capture User address information which is used throughout the WAS database. A User must have a postal address for the month end procedure of the debit accounting model to work.

1. Open the Addresses form by clicking on the  **Address** button on the WAS [main form](#).

2. Click on the  **Insert** button on the Addresses form to open the following Insert form.



3. Capture the address information and click on the **Insert** button to save the information in the WAS database.

Notes

The Type field specifies the address type that can be selected from a drop down list. The following types are available:

- Owner
- Postal
- Tenant

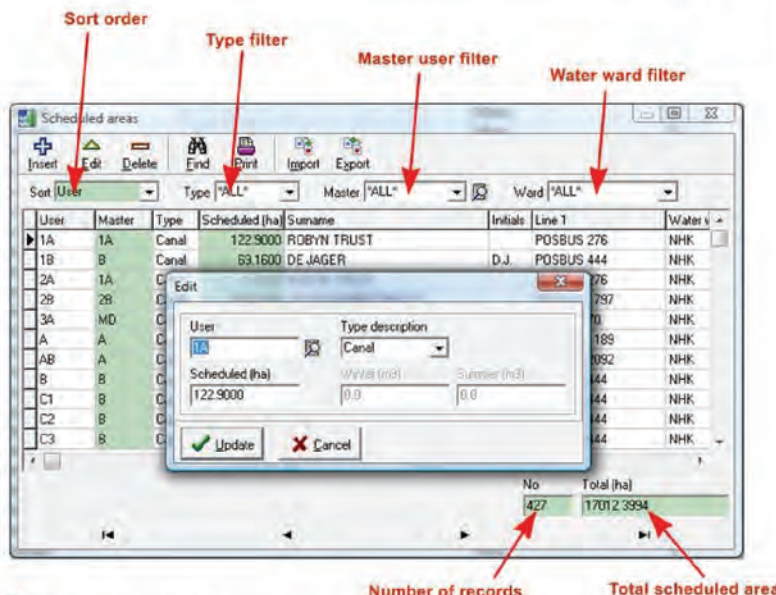
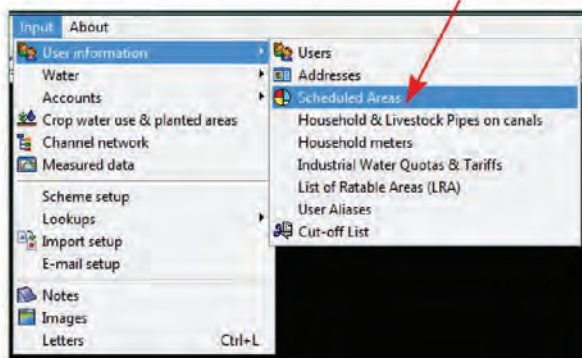
It is important to capture at least the **Postal Address** of a User.

Figure 21 Capture address information

Scheduled Areas

The scheduled areas form is used to capture and maintain scheduled areas which are used throughout the WAS database. Scheduled areas are linked to a specific water year which means that the scheduled area for a specific User can change from one water year to another. The scheduled areas are automatically copied from the previous water year to the next when a [new water year](#) is created.

Open the Scheduled areas form from the WAS main menu selecting **Inut->User information->Scheduled Areas**.



User

This is the unique number or reference number identifying a specific irrigator. This number can be selected from the user lookup table by clicking on the **lookup button**.

Type

The Type field specifies the scheduled area type that can be selected from a drop down list. A user can receive water from either a river or a canal for irrigation purposes.

Scheduled (ha)

This specifies the number of scheduled hectares that a user has with the specific scheme. The water quota (m3) per user in a specific water year is calculated by multiplying the scheduled area with the water quota allocation (m3/ha) for that year.

Winter (m3)

The winter quota is used when the season parameter is set to winter on the irrigation scheme form (*Input->Irrigation schemes*).

Summer (m3)

The summer quota is used when the season parameter is set to summer on the irrigation scheme form (**Input->Irrigation schemes**).

Year

This indicates the water year when the scheduled area was captured or changed. Only one scheduled area value per water year can be saved by WAS.

Water ward

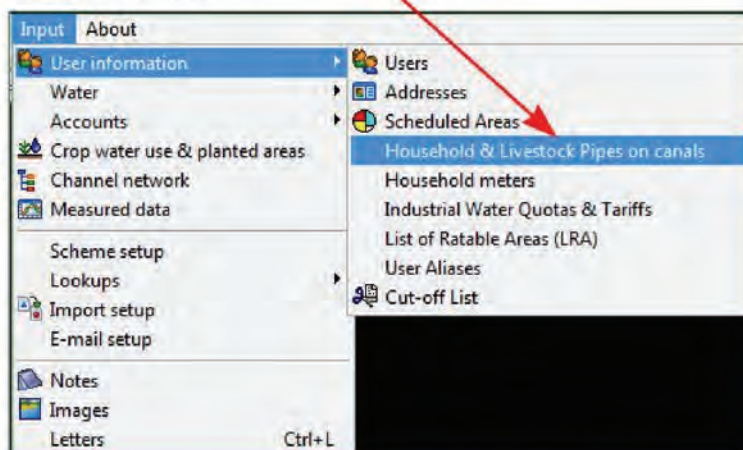
The water ward to which the user belongs is automatically shown. The Ward drop down box can be used to filter the data according to the specified water ward.

Figure 22 Capture scheduled areas

Household pipes on canals

The Household & Livestock Pipes form is used to capture household and livestock pipe details for pipes installed on the canal the network. The pipe sizes are fixed and include 19mm, 25mm, 32mm, 38mm and 50mm pipe diameters.

Click on the **Input->User information->Household & Livestock Pipes on canals** option from the WAS main menu to open the Household & Livestock Pipes on canals form.



The screenshot shows the 'Household & Livestock Pipes on canals' form. The form has a toolbar with buttons for Insert, Edit, Delete, Find, Print, Delivery, and Summary. Below the toolbar are dropdowns for 'Sort' (set to User) and 'Ward' (set to *ALL*). A title bar above the table displays 'DU PREEZ J D, POSBUS 192, PATENSIE 6335'. The table lists pipe details for various users, including User, Alias, Pipe id, Type, Diameter (mm), Description, Delivery (m3/year), and Water Ward. A 'Total delivery (m3/year)' field at the bottom right shows a value of 1 180 800.

User	Alias	Pipe id	Type	Diameter (mm)	Description	Delivery (m3/year)	Water Ward
10/9		2	Household	25 mm		7200	WYK 1
10/9		3	Household	25 mm		7200	WYK 1
10/9		1	Household	38 mm		18000	WYK 1
106/24		1	Household	25 mm		7200	WYK 3
106/24		2	Household	25 mm		7200	WYK 3
106/7		1	Household	25 mm		7200	WYK 3
12/8		1	Household	25 mm		7200	WYK 1
12/8		2	Household	38 mm		18000	WYK 1
15/2		1	Household	25 mm		7200	WYK 1
15/2		2	Household	38 mm		18000	WYK 1
198/1		1	Household	25 mm		7200	WYK 1
2/1		1	Household	38 mm		18000	WYK 1

Total delivery (m3/year) 1 180 800

- Each pipe size has a fixed delivery rate, which can be changed using the [Delivery speed button](#).
- The Summary speed button displays a summary of the different pipe types and sizes.
- The title line above the grid displays the details of the current user.
- Displays the total delivery in m3 per year. The total also depends on the Water ward filter setting.

Figure 23 Capture household pipes on canals

WAS

Water use for different houthold & livestock pipe sizes...

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Water use for different household & livestock pipe sizes

1. From the Input menu on the WAS main form select **Input->User information->Household & Livestock Pipes on canals.**
2. Click on the  button to open the Pipe delivery form.
3. Change the delivery rates of the differnt pipe sizes.
4. Close all forms.

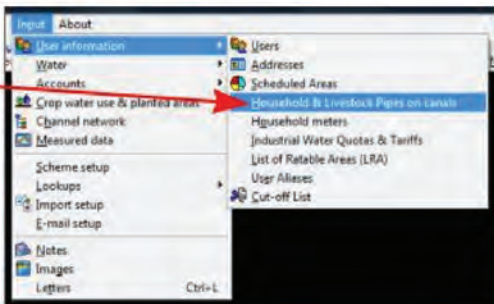
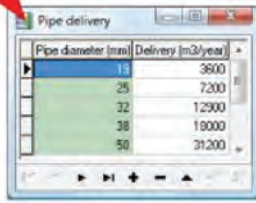
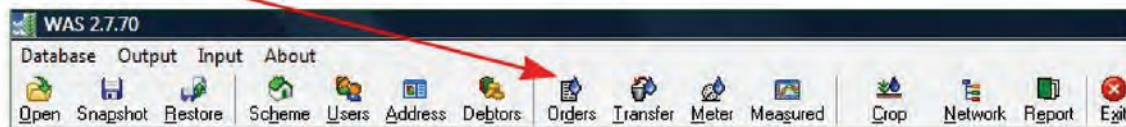



Figure 24 Water use for different household & livestock pipe sizes

Capture water orders

Click on the **Orders** button on the WAS main form to open the Water orders form.



The Water orders form is used to capture weekly water orders. The form displays a list of water orders depending on the filter settings. A set of water orders can be copied from one week to another by using the Copy button. The current list of water order records can be exported using the **Export** button. The cut-off list, weekly time table and water transfers are accessible from this form.

The screenshot shows the 'Water orders' form with the following elements:

- 1**: Capture button
- 2**: Delete button
- 3**: Copy button
- 4**: Import button
- 5**: Export button
- 6**: Cut-off list button
- 7**: Time table button
- 8**: Transfer button
- 9**: Filter settings (Sort, From week, To week, Water type, Usage, User, Master, Ward, Group)

User	Master user	Wk	Request type	Water type	A (m3/h)	B (m3/h)	C (m3/h)	Su	Sa	Su	Mo	Tu	We	Th	Fr	Sa	Su	Tot h	Tot Q (m3)
10A10		1	Original	Quota	150	0	0					A	A					24	3600
10A11		1	Original	Quota	150	0	0							A	A			24	3600
10A11		1	Additional	Quota	150	0	0						A	A				24	3600
10A13		1	Original	Quota	150	0	0				A	A	A		A			60	9000
10A4		1	Original	Quota	150	0	0				A	A			A			48	7200
10A7		1	Additional	Quota	150	0	0					A	A			A		48	7200
10A8		1	Additional	Quota	150	0	0				A	A	A	A	A	A		96	14400
10B1		1	Original	Quota	150	0	0				A	A		A	A			72	10800
10B1		1	Cancel	Quota	150	0	0									A		48	7200
10B3		1	Original	Quota	150	0	0					A	A		A			48	7200
10B4		1	Original	Quota	150	0	0					A	A		A			48	7200

- 1 Opens the Water orders [capture form](#) which is used to capture water orders.
- 2 Delete the current water order. Password = **Delete**.
- 3 Copy all the water orders from one week to another in the same water year.
- 4 Import water orders from a *.csv file that was created using the **Export** button.
- 5 Export water orders to a *.csv file.
- 6 Opens the cut-off list form.
- 7 [Opens the weekly time table form](#).
- 8 Opens the water transfers form
- 9 Filters which are used to display the water orders data according to the various filter settings. If a specific filter is set to **"ALL"** it will have no effect on the data displayed.



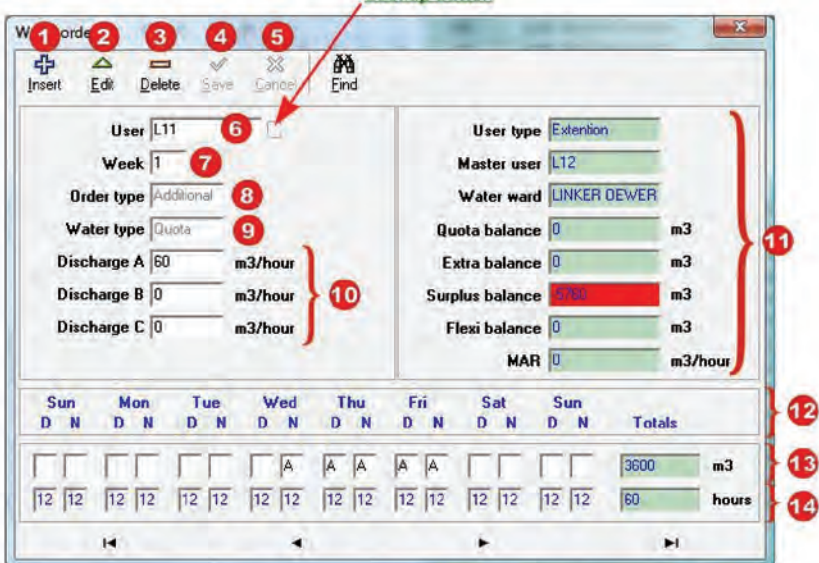
Figure 25 Capture water orders



Water order: Capture form...

Contents
Support
Home

Lookup button



- 1 Insert a new water order. (Click on the **Save** button when finished or press the **F2** key)
- 2 Edit an existing water order. (Click on the **Save** button when finished or press the **F2** key)
- 3 Delete the current water order. Password = **Delete**.
- 4 Save a water order (Use the **F2** key as a short cut).
- 5 Cancel transaction when in Insert or Edit mode.
- 6 Capture the User id or use the **Lookup** button to help and fill.
- 7 Capture the week number with values from 1 to 53.
- 8 Capture the water order type which includes **Original**, **Additional** and **Cancellation**. Use the **space bar** to toggle between the three options.
- 9 Capture the water order type which includes **Quota**, **Extra**, **Surplus** and **Flexi** types. Use the **space bar** to toggle between the four options.
- 10 Capture the different water order discharges A, B and C in m3/hour. The WAS has a limit of three changes in flow rate per week.
- 11
 - **User type** Displays the user type automatically.
 - **Master user** Displays the master user.
 - **Water ward** Displays the water ward of the current user.
 - **Quota balance** Displays the current Quota water balance for the specific user. A negative water balance is displayed in red.
 - **Extra balance** Displays the current Extra water balance for the specific user. A negative water balance is displayed in red.
 - **Surplus balance** Displays the current Surplus water balance for the specific user. A negative water balance is displayed in red.
 - **Flexi balance** Displays the current Flexi water balance for the specific user. A negative water balance is displayed in red.
 - **MAR** Displays the maximum abstraction right of a specific user as captured on the MAR form.
- 12 Day and Night titles for the specific week. The colour depends on the water order type setting which is: Original = White, Additional = **Blue** and Cancellation = **Red**
- 13 Capture the day and night flow rate values using the letters A, B or C for the corresponding flow rates. The total volume is automatically calculated.
- 14 Displays the day and night hourly values which defaults to 12 hours. To change the default value use the **Ctrl-S** and **Ctrl-D** keys on the keyboard to increment or decrement the specific day or night hourly value. The total number of hours are automatically calculated.



Figure 26 Water order capturing form



13. Capture meter readings...

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Home

Capture meter readings

To open the meter readings form click on the **Meter** button on the WAS main form.



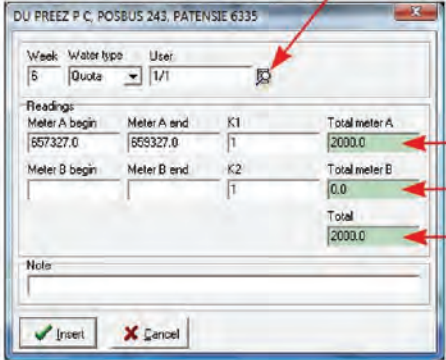
The Meter readings form is used to capture all the measured volumes of water by every user. Two meters can be used, meter A and meter B. The difference between the beginning and end meter readings multiplied by a meter factor converts the meter reading to cubic meters. This volume is calculated automatically. When new meter readings are inserted, the meter factor (K1 & K2) for that specific meter is retrieved automatically. These factors are captured on the Meter factors form, which is opened using the button on the Meter readings form. Modification of meter factors will not affect existing meter readings. If both meters A and B are used, the average volume is calculated.

The bottom area of the form displays the quota, extra, surplus and flexi water balances of the current record as well as the total volume of all readings displayed. A negative water balance is displayed in red. The meter readings form will not accept non-existent users and invalid week numbers will also be rejected. The name, surname and address of the current user are displayed on the information line below the menu.



- 1 Insert a new meter reading.
- 2 Edit an existing meter reading.
- 3 Delete the current meter reading. Password = **Delete**.
- 4 Import meter readings from a *.csv file that was created using the **Export** button.
- 5 Export meter readings to a *.csv file.
- 6 Opens the meter factors form which is used to capture the K1 and K2 meter factors.
- 7 Opens the cut-off list form.
- 8 Generates a list of User id's of meters that have not been captured in the current week. The week value in the To week box is used.
- 9 Opens the water transfers form which is used to capture water transfer volumes between users.
- 10 Filters which are used to display the meter readings according to the various filter settings. If a specific filter is set to **"ALL"** it will have no effect on the data displayed.
- 11 Displays the Quota, Extra, Surplus and Flexi volumes of the current user.
- 12 Displays the Total volume depending on the filter settings.

Lookup button



(A end - A begin) x K1 = Total A

(B end - B begin) x K2 = Total B

if Total B > 0 then
Total = (Total A + Total B)/2
else
Total = Total A

Figure 27 Capture meter readings

WAS
14. Capture water transfers...

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Capture water transfers

To open the water transfers form click on the **Transfer** button on the WAS main form.

WAS 2.7.70

Database Output Input About

Open Snapshot Restore Scheme Users Address Debtors Orders **Transfer** Meter Measured Crop Network Report Exit

The Water transfers form is used to capture water transfer volumes between users on a weekly basis. The bottom of the form displays the relevant 'From' and 'To' user information that cannot be edited. Any negative water balances are displayed in red.

Water can be transferred automatically between users where an extension user is linked to a master user. This link is created in the [Users form](#). Automatic transfers have a note 'AUTO' displayed in the Note column. There are no limits to the number of extensions that can be linked to a master user. The Water transfers form will not accept non-existent users and users that are listed on the Cut-off list. Invalid week numbers will also be rejected.

1 2 3 4

Sort Week From week 1 To week 53 Water type ALL

5

From user ALL To user ALL

Week	Type	From user	To user	Volume (m3)	Date	Note
1	Quota	10/1	10/6	12590	31/07/2009	AUTO
1	Quota	10/1	12/7	2417	31/07/2009	AUTO
1	Quota	10/1	13/3	1425	31/07/2009	AUTO
1	Quota	10/1	14/11	2739	31/07/2009	AUTO
1	Quota	10/1	BA/1	6075	31/07/2009	AUTO
1	Quota	10/9	B/1A	2310	31/07/2009	AUTO

From

User 10/1 Quota 569482 m3

Type Irrig mnth Extra 0 m3

Master 10/1 Surplus 0 m3

Ward WYK 1 Flexi 0 m3

To

User 10/6 Quota 0 m3

Type Extention Extra 0 m3

Master 10/1 Surplus 0 m3

Ward WYK 1 Flexi 0 m3

6

7

1 Insert a new water transfer.

2 Edit an existing water transfer.

3 Opens a dropdown menu with options to delete the current record or all records depending on the filter settings.

4 Export meter readings to a *.csv file.

5 Filters which are used to display the water transfers according to the various filter settings. If a specific filter is set to "ALL" it will have no effect on the data displayed.

6 Displays the detail of the From user.

7 Displays the detail of the To user.

Lookup button

Insert

Week Water type From user To user Volume (m3) Date

1 Quota

Note

From balance (m3)

To balance (m3)

Insert

Cancel

Figure 28 Capture water transfers



15. Create a measuring station...

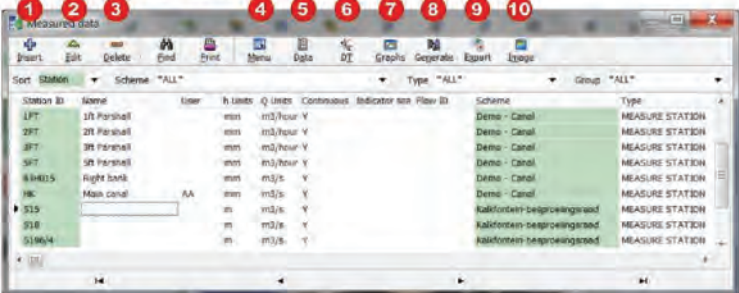
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Create a measuring station

To open the measuring station form click on the **Measured** button on the WAS main form.



The measured data form is used to capture time series data of water levels and flow rates. The data can be manually captured, digitized from chart recorders or imported from electronic loggers. Integrated into this form are discharge tables that are used to convert water levels to flow rates and vice versa. This form is also used to capture inflows and outflows for river systems and to generate discharges for stations that are linked to an indicator site. Volumes can easily be calculated between dates and exported to the meter readings if necessary. Measure station data also integrates with the Water Use Efficiency Accounting Report (WUEAR) in WAS. All readings and flow rates can be represented graphically with user-defined date and time ranges.



- 1 Insert a new measuring station.
- 2 Edit an existing measuring station record.
- 3 Delete the current measuring station record.
- 4 Opens a dropdown menu to capture the following data
 - Indicator site flow ratios
 - Types
 - Groups
- 5 Opens the Station data form which is used to capture, digitize or import the time series data.
- 6 Opens the Discharge table (DT) form which is used to capture and maintain discharge tables.
- 7 Opens the Measure station graphs form which is used to display the time series graphs.
- 8 Generates flow rates from indicator sites.
- 9 Exports the list of measuring stations to a *.txt file which can be imported into another WAS database.
- 10 Opens the Images form.



- **StationID**
- **Name**
- **User**
- **Scheme**
- **Type**
- **Group**
- **fi Units**
- **Q Units**
- **Continuous**
- **Indicator Site**
- **Image id**

Contains the measuring station identification string that is a maximum of 10 characters

A longer description of the station and can be 40 characters long.

Specifies the link between a measuring station and a user. This link is used to automatically send calculated volumes between a specified date and time range to the meter readings form. The meter readings are integrated with the debit accounting module and can be used to bill users on their water usage.

Capture the name of the scheme that is linked to the specific measuring station. The scheme name is selected from a dropdown list of available schemes.

Group measure stations according to different types. The different types can be specified selecting the Types option under the Menu button. The Type drop down box is used to filter the records according to the selected type.

Links a Group id to the specific measuring station record which is used to filter measuring station records according to the group specified in the Group filter box.

Capture the water depth units that can be selected from a drop down list. The available options are m or mm.

Capture the discharge or volume units that can be selected from a drop down list. The available options are m3, m3/s or m3/hour.

Select between a line and bar graph.

Used to link an indicator site to a Station ID that is used to generate data for a specific station for the specified date and time range. A site can be selected from a drop down list (containing indicator sites followed by the flow ID) on the capturing screen. Indicator site flow ratios can be captured by selecting the Indicator site flow ratios option under the Menu button.

Specifies an image id which is used to link an image to the measuring station.

Figure 29 Create a measuring station

WAS
16. Capture measuring station data...

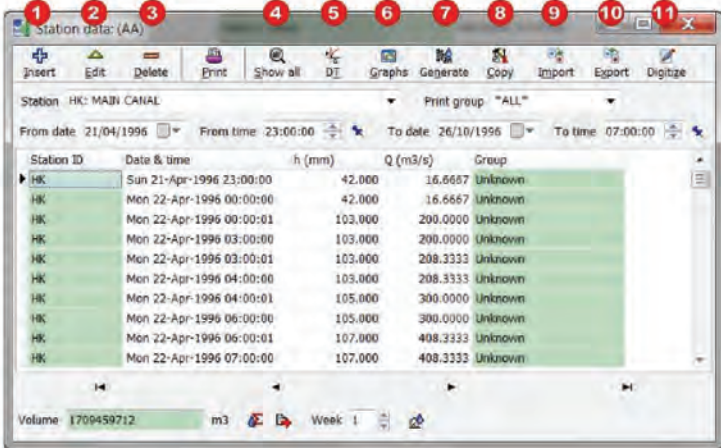
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Capture measuring station data

To open the measuring station data form first click on the **Measured** button on the WAS main form which will open the Measured data form.



The Station data form is opened by either a double click on the specific station record or by clicking on the **Data** button on the Measured data form.

Station ID	Date & time	h (mm)	Q (m ³ /s)	Group
HK	Sun 21-Apr-1996 23:00:00	42.000	16.6667	Unknown
HK	Mon 22-Apr-1996 00:00:00	42.000	16.6667	Unknown
HK	Mon 22-Apr-1996 00:00:01	103.000	200.0000	Unknown
HK	Mon 22-Apr-1996 03:00:00	103.000	200.0000	Unknown
HK	Mon 22-Apr-1996 03:00:01	103.000	208.3333	Unknown
HK	Mon 22-Apr-1996 04:00:00	103.000	208.3333	Unknown
HK	Mon 22-Apr-1996 04:00:01	105.000	300.0000	Unknown
HK	Mon 22-Apr-1996 06:00:00	105.000	300.0000	Unknown
HK	Mon 22-Apr-1996 06:00:01	107.000	408.3333	Unknown
HK	Mon 22-Apr-1996 07:00:00	107.000	408.3333	Unknown

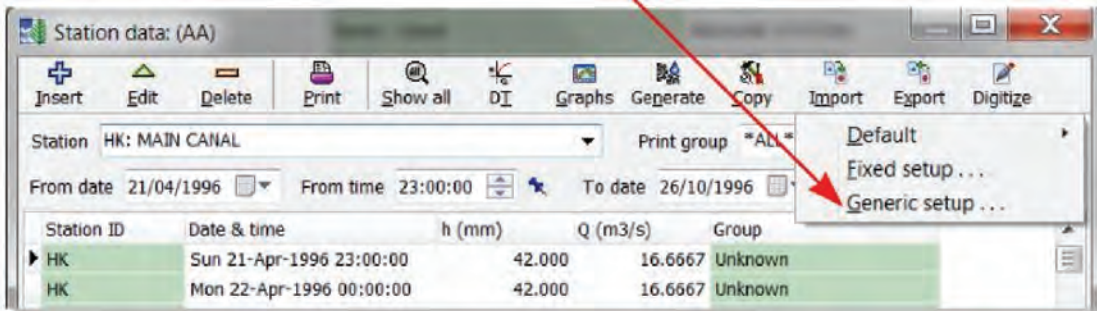
Volume: 1709459712 m3 Week: 1

- 1 Insert a new station data record.
- 2 Edit an existing station data record.
- 3 Delete the current station data record.
- 4 The **Show all** button is used to set the From and To date and time filters to the first and last record of the current measuring station. This ensures that all data records are shown. The Show all button is disabled when the Print group filter is not set to "ALL".
- 5 Opens the Discharge table (DT) form which is used to capture and maintain discharge tables.
- 6 The **Graphs** button opens the Measure station graphs form which is used draw the following graphs:
 - h vs Time
 - Discharge vs Time
 - Discharge table
- 7 The **Generate** button opens a dropdown menu with the following options:
 - Q using discharge table This option is used in cases where h is measured and you want to generate Q using the discharge table.
 - h using discharge table This option is used in cases where Q is measured and you want to generate h using the discharge table.
 - Recession curve Use this option to generate a recession curve for a given date and time range, a starting discharge (Q), an interval (hr) and the recession %. The current data records in the specified date and time range will be deleted before the generation.
 - Q from indicator site Generates the flow using the indicator site and corresponding flow ratios that is linked to the specific measuring station. The Indicator site and Flow ID fields on the Measure stations form for the specific station must have values for the generation procedure to work. The current data records in the specified date and time range will be deleted before the generation.
 - Set h = 0 where h is negative Sets all the records where h is negative in the current measuring station to zero.
- 8 Opens the Data copy toolbox which is used to copy, add and subtract data from one station to another.
- 9 The **Import** button opens a dropdown menu with two options:
 - Fixed setup: Used for backwards compatibility and will be removed in future versions. Different formats are supported and can be selected from the following list:
 - ABCDEFGHIJ 1234 yyyy/mm/dd hh:mm 0.000
 - yy/mm/dd hh:mm:ss AM 0.000
 - yyyy-mm-dd hh:mm 0.000
 - yyyy-mm-dd hh:mm:ss 0.000
 - yyyy/mm/dd hh:mm:ss AM 0.000
 - Generic setup: Opens the import data form which is used to import measure station data records of different formats into the current measure station.
- 10 The **Export** button is used to export the current set of records to a text file which can be imported into another WAS database. The Print group setting must be set to "ALL" to enable the Export button.
- 11 Opens the Digitize form which is used to digitize water levels from chart recorder graphs.

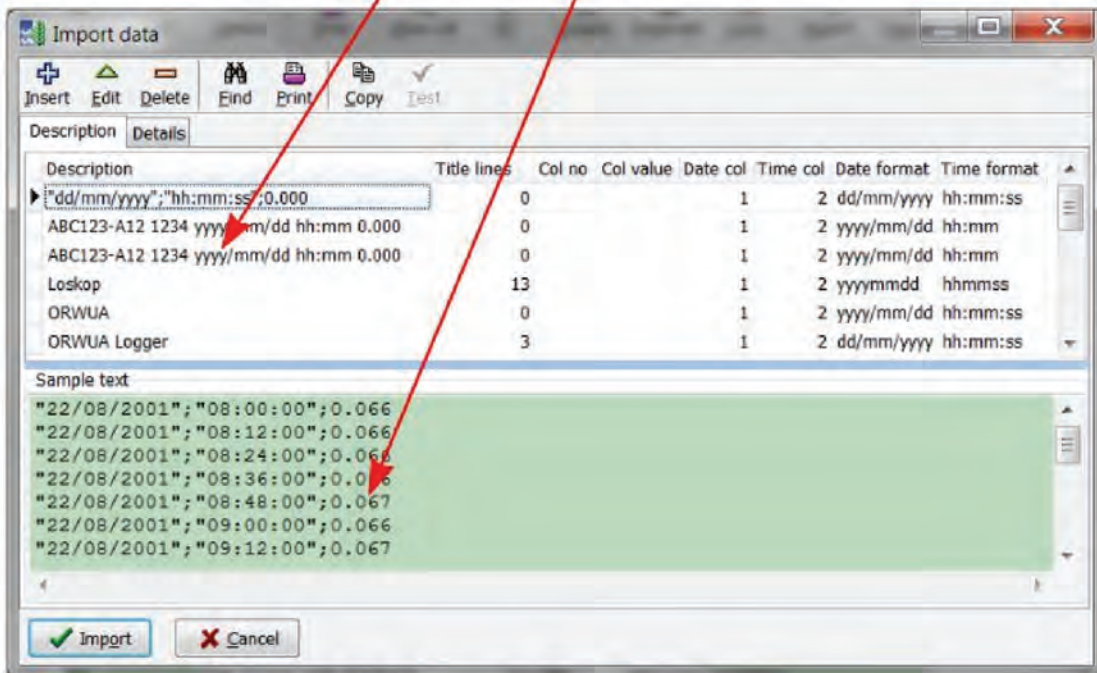
Figure 30 Capture measuring station data

Import measuring station data

- Go to the Station data form and click on the **Generic setup . . .** option under the Import button to open the Import data form.



- Select the import format of the list of available formats. A sample text will be shown of the specific format. If the specific format is not listed, then a new format will have to be created.



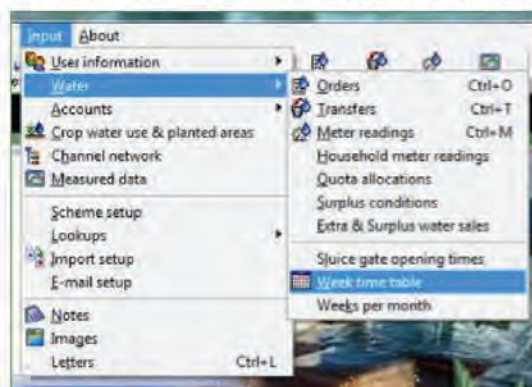
- Click on the Import button and select the import file.

Figure 31 Import measuring station data

18. Generate a weekly time table

The weekly time table is used to specify the starting and ending date for each week in a specific water year. The starting month for a water year can be different between irrigation schemes and it is therefore important to be able to link week numbers to a start and end date on a calendar. At the beginning of a new year a time table can be generated by clicking on the *Menu* button and then on *Generate time table* A popup calendar will appear where the start date can be selected. The date on the Water order form is obtained from the week time table. The week time table can be printed.

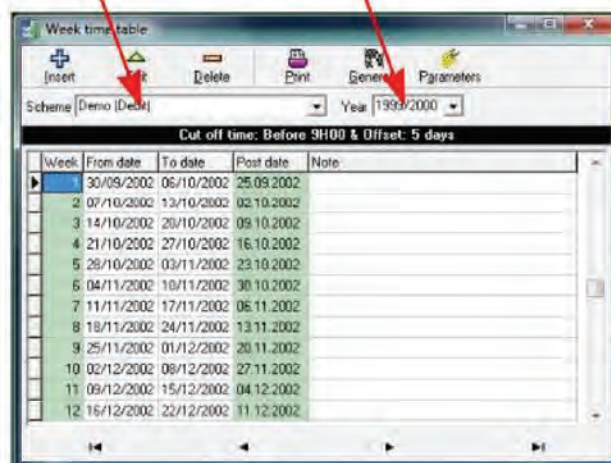
- 1 Open the week time table form from the main menu selecting **Input->Water->Week time table** as shown in the figure below.



- 2 The current scheme and water year will be selected by default. A different scheme and water year can be selected if needed.

Select Scheme

Select water year



- 3 Click on the Generate button and then on the yes button after which a calendar will appear. Select the start date of the water year on the calendar and click on the Ok button to generate the week time table.

Figure 32 Generate a weekly time table



19. Generate a Water Use Efficiency Accounting Report...

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19. Generate a Water Use Efficiency Accounting Report

1. Select the Scheme and Water year. ([How to...](#))
2. Open the Water Use Efficiency Accounting report (WUEA report). ([How to...](#))
3. Highlight the WUEA report you want to work on. If the report does not exist use the Insert button to create a new report.
4. Ensure the following has been done:
 - Water usage types have been assigned under user information. ([How to...](#))
 - Water use for different household and livestock pipe sizes has been captured. ([How to...](#))
 - Generation steps have been setup. ([How to...](#))
 - Weekly time table has been generated. ([How to...](#))
 - Water orders have been captured.
 - Meter readings have been captured.
 - Measuring station data has been imported or captured.
5. Select the weekly page. ([How to...](#))
6. Set the **From** and **To** week values.
7. Click on the Generate button to generate the report.
8. Use the Edit button to capture values that have not been generated automatically.
9. Set the From week value back to 1.
10. To print the report click on the Print button.

Remember that the manually captured values will be overwritten when a report is generated.

It is therefore important to set the from and to week values only for the weeks that you want to generate the report for.

Figure 33 Generate WUEA report

WAS

Assign water usage types...

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Assign water usage types

1. Click on the  button on the [WAS main form](#) to open the Users form.
2. Highlight a specific User.
3. Click on the  button to open the Edit form.
4. Select the usage from the dropdown list for the specific user.
5. Click on the Update button to update the user information

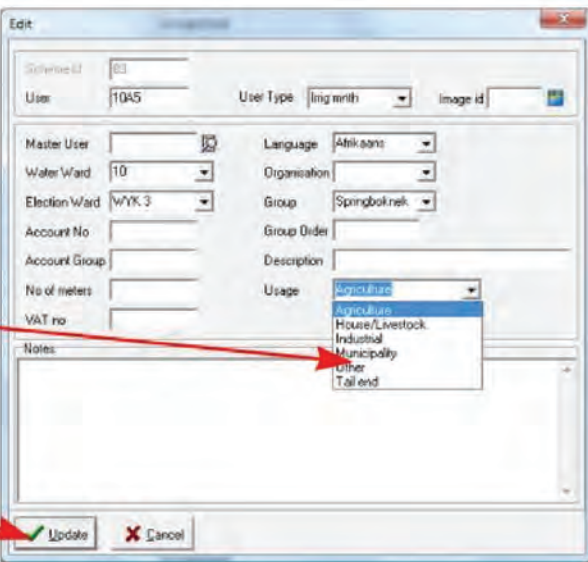


Figure 34 Assign water usage types

Water Use Efficiency Accounting Report...

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Water Use Efficiency Accounting Report

The Water Use Efficiency Accounting (WUEA) Report is used to compile a report which gives an account of water released and water usage by a specific irrigation scheme. Water orders, meter readings, crop water use and date and time based water usage can be included on the same report.

The WUEA report generates weekly totals for water released and water used volumes for a specified weekly range within a specific water year. A monthly summary is generated automatically from the weekly figures which can be exported to a comma delimited file. This file can then in turn be imported into an Excel spreadsheet (*.csv file) or into the iScheme database. One of the uses of iScheme is to archive WUEA reports for all schemes on a national basis.

A report can be re-generated at any time and water usage and water released volumes can be captured manually if necessary. There is no limitation on the number of reports that can be generated or captured. The WUEA report includes the following water usage types:

- Agricultural
- Industrial
- Municipal
- Household
- Other

A WUEA report can be generated automatically provided that the following information is captured in the WAS database:

- Water orders
- Meter readings
- Household pipes and delivery rates for different pipe sizes
- Date and time related data from all measuring stations
- Crops planted, areas planted and planting dates
- [Weekly Time table](#)

1 Open the Water use Efficiency Accounting report form from the main menu selecting **Output->Water->Water Use Efficiency Account report**.

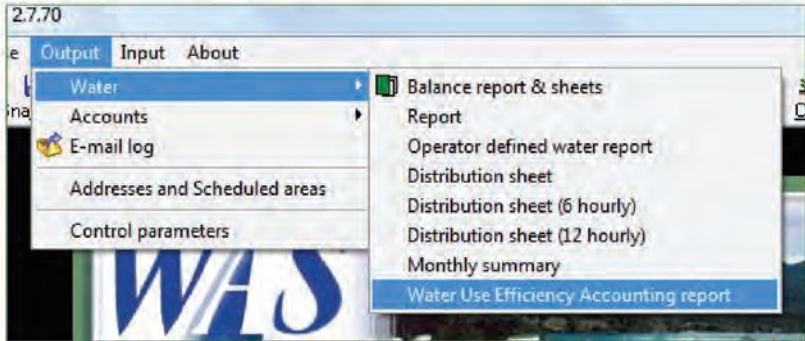


Figure 35 WUEA report p1

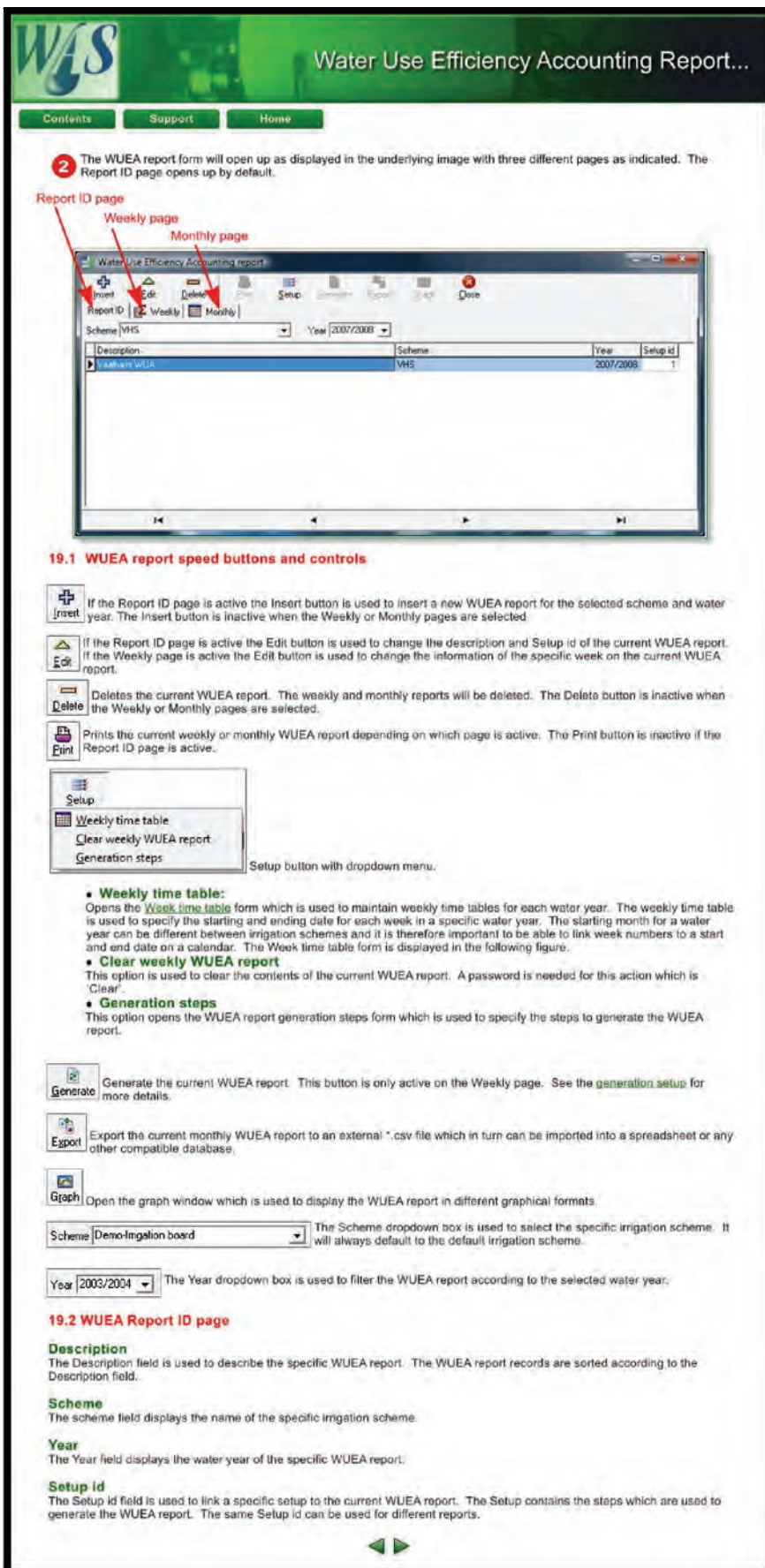


Figure 36 WUEA report p2

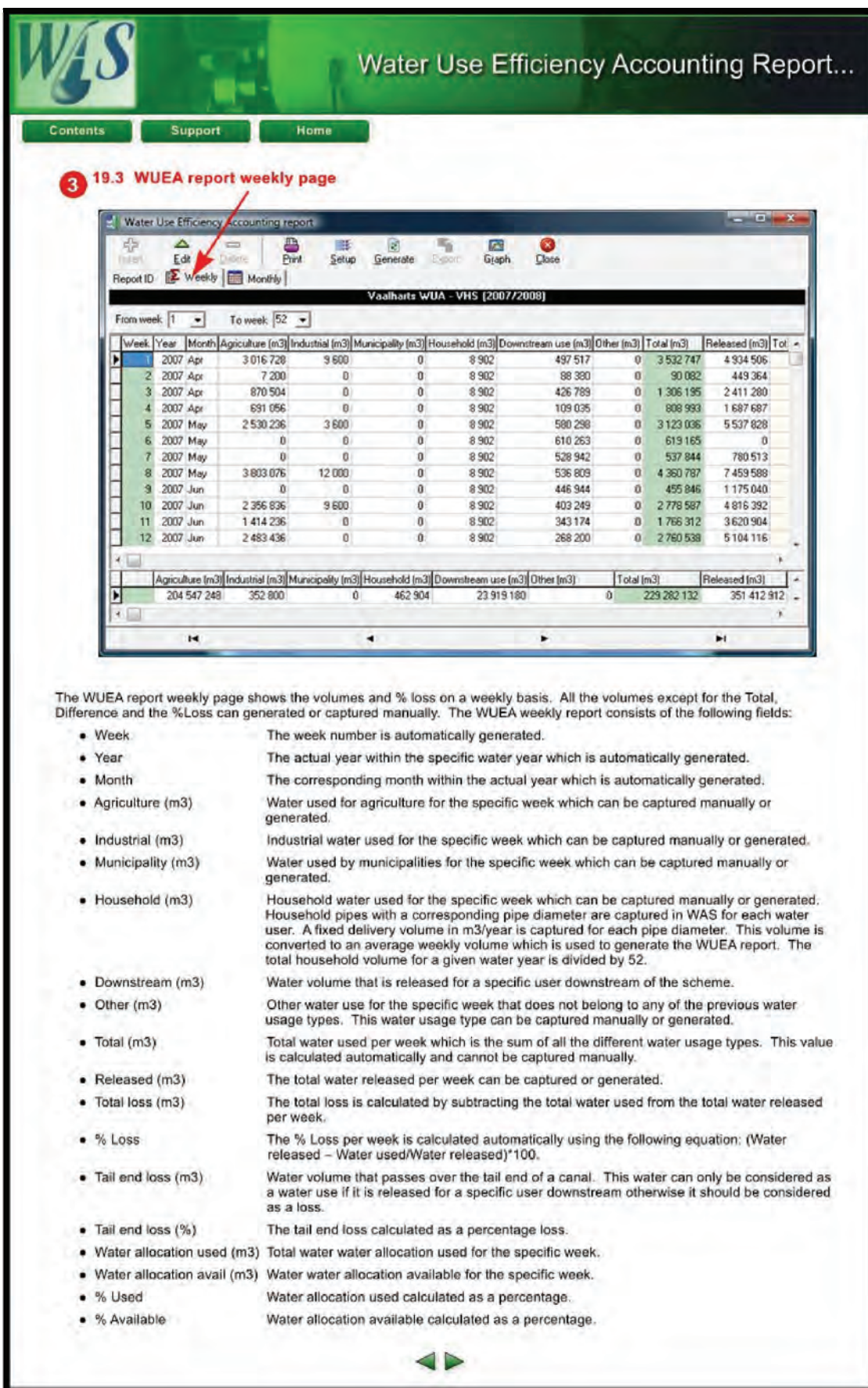


Figure 37 WUEA report p3

4 19.3 WUEA report Monthly page

Water Use Efficiency Accounting report

Insert Edit Delete Print Setup Generate Export Results Close

Report ID Weekly Monthly

vhs 2008/2009 - VHS (2008/2009) [x10³]

Year	Month	Agriculture (m3)	Industrial (m3)	Municipality (m3)	Household (m3)	Down stream (m3)	Other (m3)	Total (m3)	Released (m3)	Total loss (m3)	% Loss	
2008	Apr	13 639	35	122	82	4 639	36	18 553	25 773	7 219	28.0	
2008	May	2 265	80	1 284	82	2 346	11	6 066	7 105	1 039	14.0	
2008	Jun	6 738	22	1 329	102	3 140	18	11 949	15 541	3 592	23.0	
2008	Jul	13 474	23	95	82	4 321	36	18 031	25 168	7 137	28.0	
2008	Aug	21 093	222	1 699	102	6 091	32	29 239	37 085	7 846	21.0	
2008	Sep	31 300	49	167	82	6 721	36	38 356	49 421	11 065	22.0	
2008	Oct	34 782	160	1 178	82	6 798	32	43 032	53 093	10 061	18.0	
2008	Nov	22 167	265	2 426	102	7 232	34	32 229	38 868	6 639	17.0	
2008	Dec	15 110	0	164	82	5 243	32	20 632	28 146	7 515	26.0	
2009	Jan	24 378	10	1 202	82	6 150	34	31 957	38 914	7 057	18.0	
2009	Feb	15 237	14	1 082	82	5 317	23	21 756	27 155	5 400	19.0	
		Agriculture (m3)	Industrial (m3)	Municipality (m3)	Household (m3)	Downstream use (m3)	Other (m3)	Total (m3)	Released (m3)	Total loss (m3)	% Loss	Tail end
		227 904 380	898 526	13 292 440	1 063 192	65 740 608	371 040	309 270 586	392 521 803	83 251 217	21.2	3 421

The WUEA report monthly page shows the volumes (divided by 1000) and % loss on a monthly basis. The monthly totals are generated automatically from the weekly report. The WUEA monthly report consists of the following fields:

- Year: The actual year within the specific water year.
- Month: The corresponding month within the actual year.
- Agriculture (m3): Water used for agriculture for the specific month.
- Industrial (m3): Industrial water used for the specific month.
- Municipality (m3): Water used by municipalities for the specific month.
- Household (m3): Household water used for the specific month.
- Downstream (m3): Water volume that is released for a specific user downstream of the scheme.
- Other (m3): Other water use for the specific month that does not belong to any of the previous water usage types.
- Total (m3): Total water used per month which is the sum of all the different water usage types.
- Released (m3): The total water released per month.
- Total loss (m3): The total loss is calculated by subtracting the total water used from the total water released per month.
- % Loss: The % Loss per month is calculated using the following equation: (Water released – Water used/Water released)*100.
- Tail end loss (m3): Monthly water volume that passes over the tail end of a canal.
- Tail end loss (%): The tail end loss calculated as a percentage loss.
- Crop water use (m3): Total monthly crop water used.
- Water allocation used (m3): Total water water allocation used for the specific month.
- Water allocation avail (m3): Water water allocation available for the specific month.
- % Used: Monthly water allocation used calculated as a percentage.
- % Available: Monthly water allocation available calculated as a percentage.



Export the current monthly WUEA report to an external *.csv file which in turn can be imported into a spreadsheet or any other compatible database.

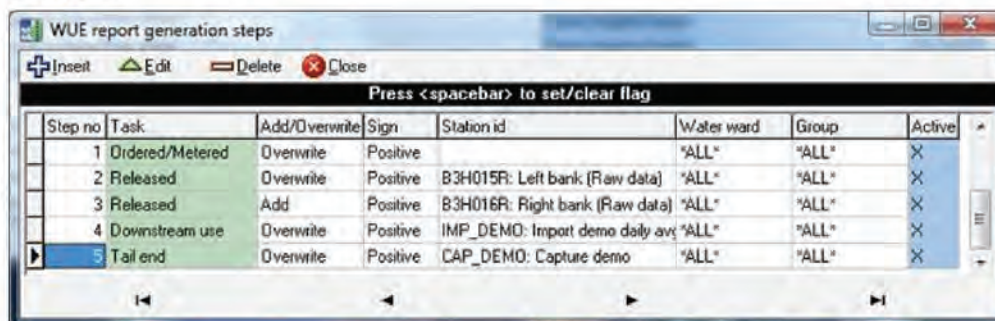


Figure 38 WUEA report p14

5 19.3 WUEA report generation setup

The WUEA report generation steps setup form is displayed in the following figure. This form is used to specify the steps that will be followed to generate the WUEA report. There is no limitation on the number of steps that can be created from the available tasks. The following list of tasks are available to choose from:

- Ordered/Metered
- Released
- Downstream use
- Other
- Tail end
- Crop used



Step no	Task	Add/Overwrite	Sign	Station id	Water ward	Group	Active
1	Ordered/Metered	Overwrite	Positive		"ALL"	"ALL"	X
2	Released	Overwrite	Positive	B3H015R: Left bank (Raw data)	"ALL"	"ALL"	X
3	Released	Add	Positive	B3H016R: Right bank (Raw data)	"ALL"	"ALL"	X
4	Downstream use	Overwrite	Positive	IMP_DEMO: Import demo daily av	"ALL"	"ALL"	X
5	Tail end	Overwrite	Positive	CAP_DEMO: Capture demo	"ALL"	"ALL"	X

The steps to generate the WUEA report are executed in the numeric order in which they are created. Each step has the following options:

- Step no: Specifies the execution order.
- Task: Gives the task description from the above mentioned list.
- Add/Overwrite: Specifies if the generated values from the specific step must be added to the corresponding existing values or whether the existing values must be overwritten.
- Sign: Specify the sign of the generated values. Values with a positive sign will be added and values with a negative sign will be subtracted.
- Station id: Specifies the measuring station id which will be used to generate weekly values. The date ranges in the [weekly time table](#) are used to calculate the corresponding weekly volumes. The station id is not used in the Ordered/Metered and Crop used tasks.
- Water ward: Is used to filter the generated values according to the specified Water ward. Use the "ALL" option to ignore this filter. Water wards are allocated to every user on the User information form.
- Group: Is used to filter the generated values according to the specified Group. Use the "ALL" option to ignore this filter. Groups are allocated to every user on the User information form.
- Active: Use the Active option to activate or deactivate a specific step. The space bar can also be used as a short cut.

Figure 39 WUEA report p5

WAS

User lookup...

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User lookup

The User lookup form is used throughout WAS to locate a User id where needed. A search can be done on:

- User
- Alias
- Surname

1. Open the User lookup by clicking on the  button which will normally be next to the User id field on capturing forms.
2. Change the **Sort order**, if needed, and type the search string in the **Find box**.

User lookup

⏮ ⏪ ⏩ ⏭

Find User

Sort order:
 ☒ User
 ☐ Alias
 ☐ Surname

User	Alias	Surname	Init	Address
▶ R12/5		THYS LOURENS TRUST		POSBUS 713
R12/6		THYS LOURENS TRUST		POSBUS 713
R13		VOSLOO	E.M.	POSBUS 236
R14		VAN RENSBURG	J	POSBUS 620
R14/1		HAVENGA	WJ	TEVREDE
R14/10		MULLER	B.L.	POSBUS 640
R14/10B		CONRADIE	H	HEIDESTRAAT 13
R14/11		KRIEL	M	3 @ 1 NR 2
R14/11A		THEUNISSEN HAASVLKTE FAM TRUST	MW	HAASVLAKTE
R14/12		CHAMBERLAIN	T H	POSBUS 109
R14/13		PECKTRUST		PO BOX 459

⏮
⏪
⏩
⏭

✓ OK
✗ Cancel

3. Click the **OK** button to select the specific user.

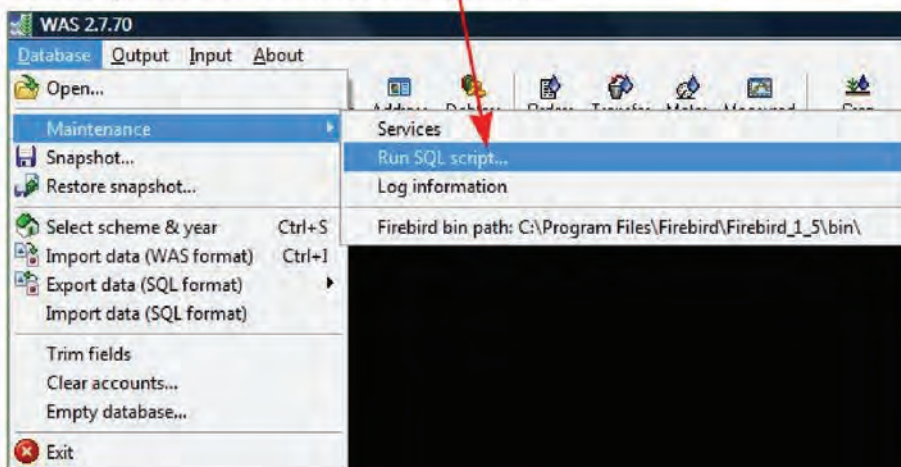
Figure 40 User lookup

Run SQL script

The Run SQL script function is used to update the WAS database using a SQL script file which is normally e-mailed to a client. The steps are as follows:

- 1 If WAS is used over a network. Ensure WAS is closed on all computers except the one which will be used to run the script on.
- 2 Make a snapshot of the WAS database. ([How to...](#))
- 3 From the WAS main menu select the **Database->Maintenance->Run SQL script** as shown in the figure below. Confirm if a snapshot was made or not.

Remember to copy the script file to the WAS folder before running the SQL script.



- 4 Brows to and highlight the specific **script file**. Click on the **Open button**. The script will run and a message will be displayed whether the script was successful or not.

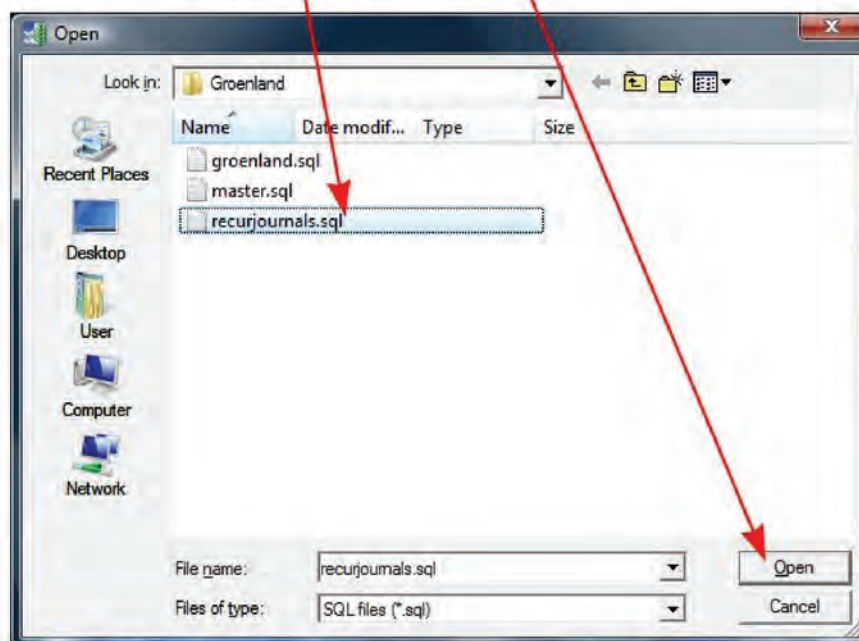


Figure 41 Run SQL script

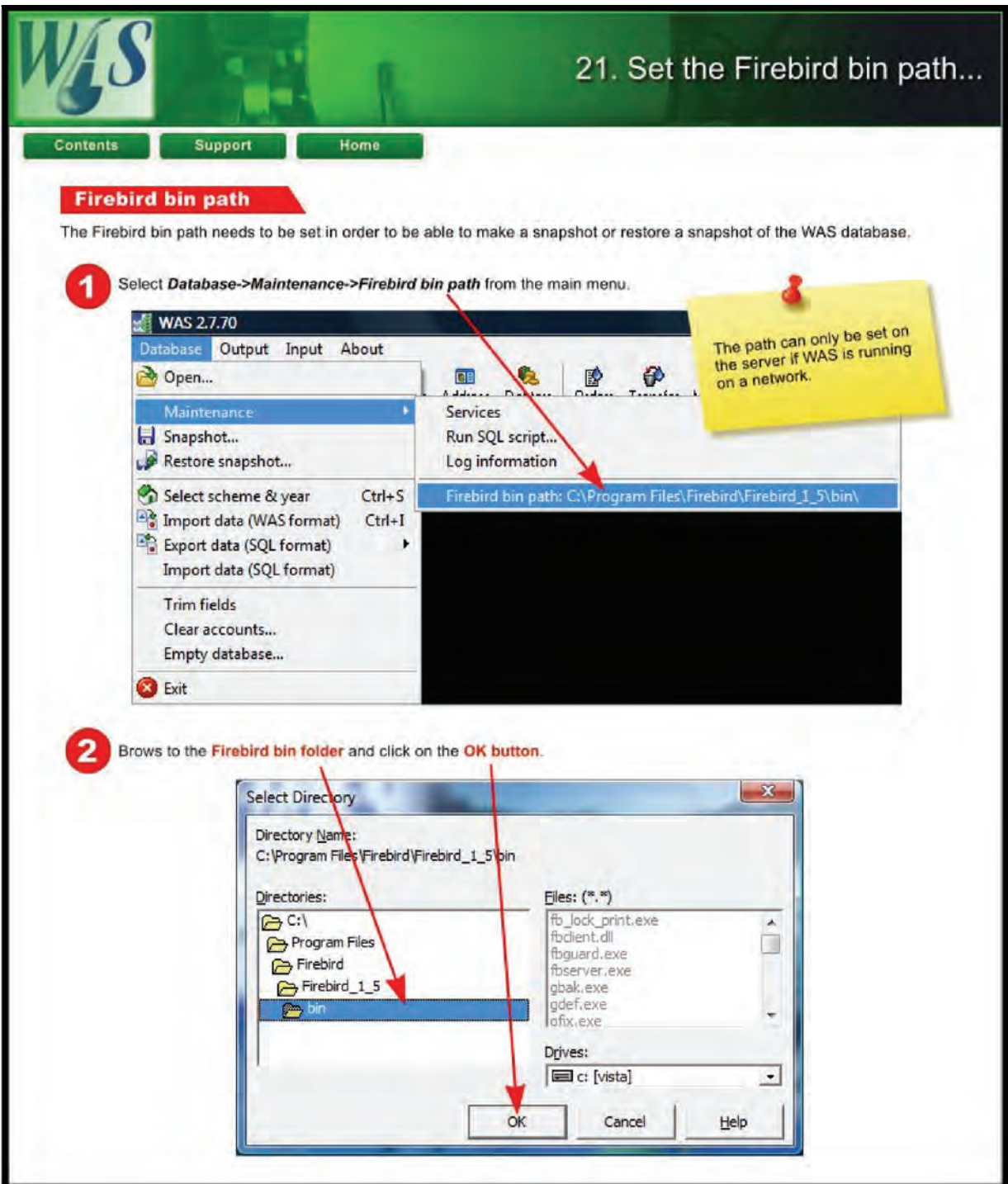


Figure 42 Set the Firebird bin path

WAS
22. Make a snapshot...

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Make a snapshot

The Snapshot routine runs concurrently with other users of the WAS database to make a copy of the database at a moment in time. In case of an error, this copy can be restored with the [Restore routine](#). This is quicker than making a backup, but it doesn't take away the importance of making other regular backups on media that can be stored in a safe place.

- Click on the **Snapshot button** on the WAS main form and click on the **Yes button** to confirm.



If WAS is running on a network a snapshot can only be done on the server.
- The following screen will appear displaying scrolling information of the backup process. If this screen opens and closes immediately without any scrolling lines, it means that the **Firebird bin path** is NOT setup correctly. [Show me how...](#) The screen will close automatically once the snapshot has been completed.

```

C:\Program Files\Firebird\Firebird_1.5\bin\gbak.exe
gbak:      writing column VAL
gbak:      writing column DATUM
gbak:      writing column ACT
gbak:      writing column ID
gbak:      writing column SETNR
gbak:      writing column SKEMA
gbak:      writing table LETTER
gbak:      writing column LET_ENG
gbak:      writing column LET_AFR
gbak:      writing column LET_ID
gbak:      writing column SKEMA
gbak:      writing column DESCRIP
gbak:      writing table LETLIST
gbak:      writing column LET_ID
gbak:      writing column PERSEELID
gbak:      writing column SKEMA
gbak:      writing table INVOICE
gbak:      writing column AMOUNT
gbak:      writing column SKEMA
gbak:      writing column PERSEELID
gbak:      writing column NAME
gbak:      writing column ADRES
gbak:      writing column TXT
gbak:      writing column PRNFLAG
          
```
- The snapshot of the WAS database will be created in the default WAS folder with a file name similar to

WASIB26_2_2009_9_1.gbk

File name
Date
Time
File extension

Figure 43 Make a snapshot

23. Restore a snapshot...

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Restore a snapshot

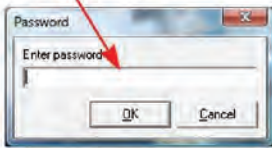
The Restore a snapshot routine is used to restore a previously made snapshot of the WAS database.

- Click on the **Restore** button on the WAS main form. A password and click on the **Yes** button to confirm.

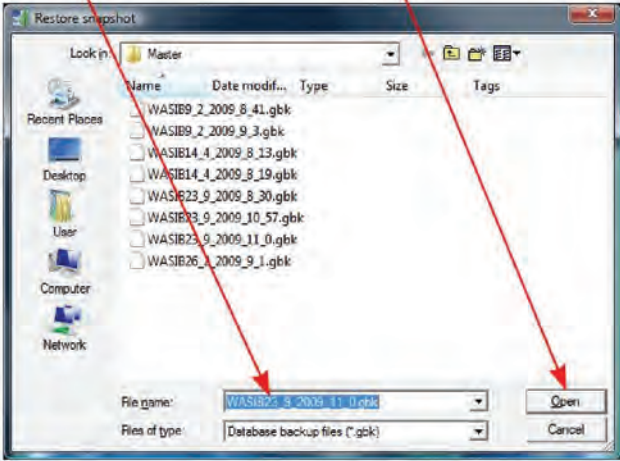


A snapshot can only be restored from the server if WAS is running on a network. Make sure everybody has logged out before trying to restore a snapshot.

- Enter the password which is **Restore** with a capital **R**.

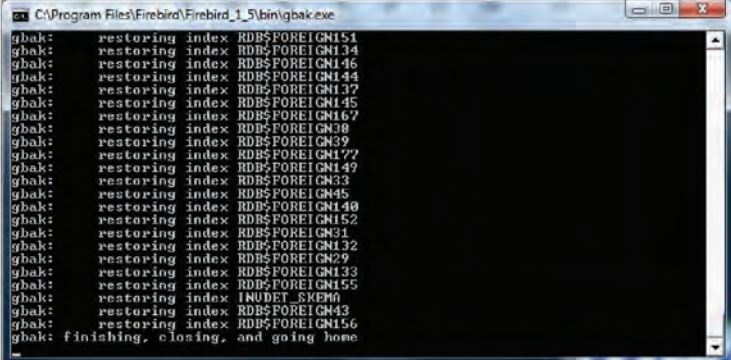


- The **last snapshot file name** will appear as default. Click on the **Open** button to restore or select any of the previous snapshots.



- The following screen will appear displaying scrolling information of the restore process. If this screen opens and closes immediately without any scrolling lines, it means that the **Firebird bin path** is NOT setup correctly. [Show me how...](#) The screen will close automatically once the restore process has been completed displaying the words...

....finishing, closing, and going home....



- Click on the **Open** button on the WAS main form to open the database again.

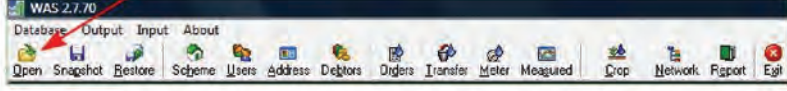


Figure 44 Restore a snapshot