STUDY ON THE GROUNDWATER POTENTIAL EVALUATION AND MANAGEMENT PLAN FOR THE SOUTHEAST KALAHARI (STAMPRIET) ARTESIAN BASIN IN THE REPUBLIC OF NAMIBIA

Japan International Cooperation Agency

Pacific Consultants International

BOREHOLE FINAL REPORT

Borehole

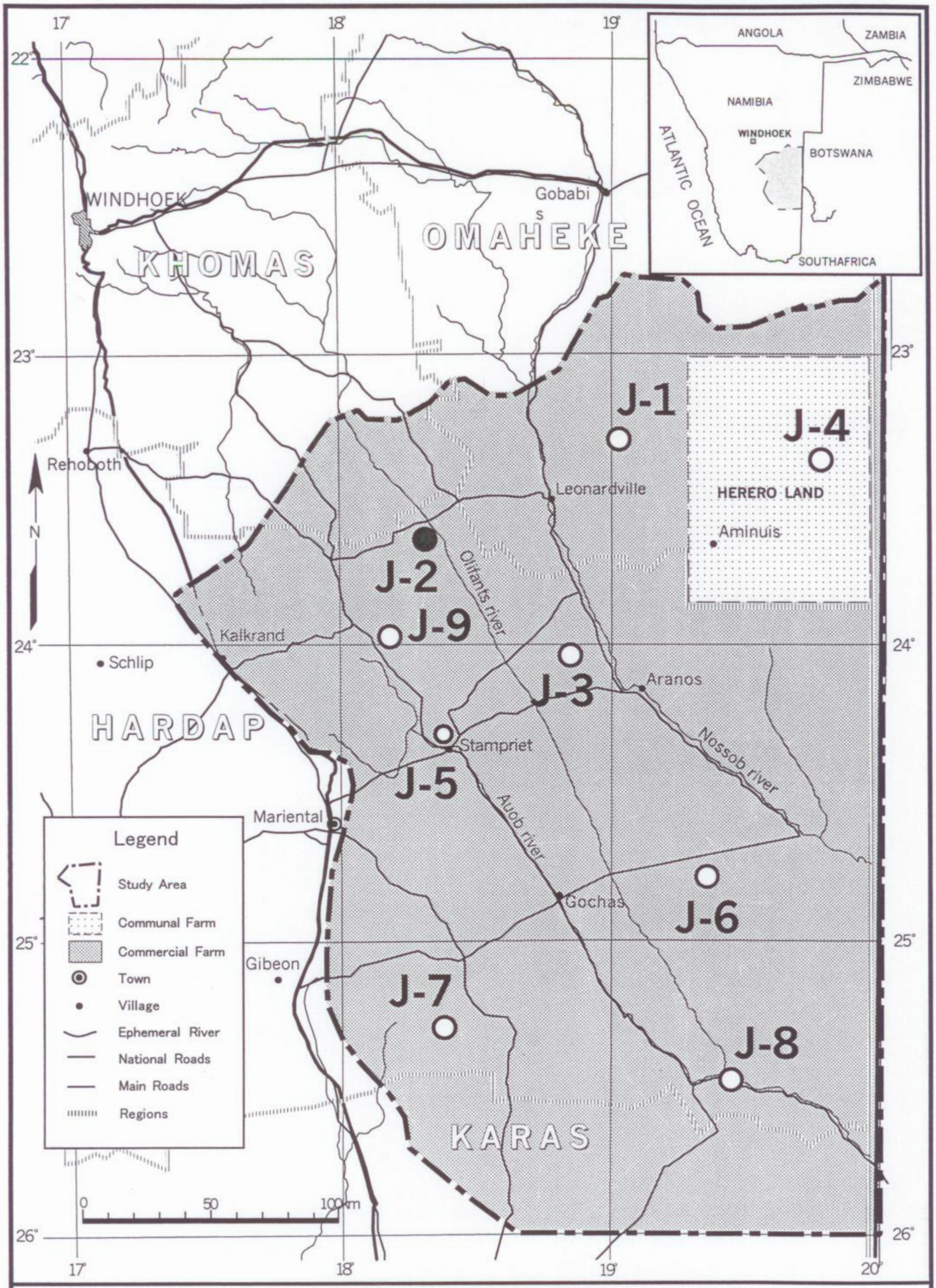
J2-N (WW 39841)

Olifantswater West

METZGER PM DRILLING
P.O.Box 11733
Windhoek
Namibia

Windhoek

October 2000



Location Map of Test Boreholes

THE STUDY ON THE GROUNDWATER IN THE STAMPRIET ARTESIAN BASIN	JICA

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5. Borehole Development Data
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1. Geological Borehole Log

THE STUDY ON THE GROUNDWATER POTENTIAL EVALUATION AND MANAGEMENT PLAN IN THE SOUTHEAST KALAHARI (STAMPRIET) ARTESIAN BASIN

GEOLOGICAL BOREHOLE LOG

Farm Olifantswater West — **WW 39841**
Jica Reference : J -2- N — **S 23,64808°**
Date completed : 18.05.2000 (final casing installed) — **E 18,38871°**
Collar elev.: 1270 m

Depth below surface (m)	Section (m)	Lithology	Stratigraphy
0 - 1	1	Light orange to reddish **sand**, fine to coarse grained, unsorted and unconsolidated. Quartz grains rounded to sub-rounded.	**KALAHARI**
1 - 3	2	White **calcrete**, massive and karsted. Karst cavities filled with unconsolidated red sand.	
3 - 11	8	White massive **calcrete** and calcretized sandstone	
11 - 12	1	White, slightly pinkish **calcretized sandstone**. Occasional clear to bluish quartz in drill cuttings.	
12 - 13	1	Light brown **micaceous calcareous sandstone**, fine to medium grained sub-rounded quartz.	**UPPER RIETMOND**
13 - 17	4	Light brown to brown medium grained **micaceous** (muscovite) **sandstone**, moderately porous and calcareous in places. A fine grained, light yellow horizon at 16 m.	
17 - 27	10	Fine to medium grained **sandstone**, yellowish to reddish brown. Calcareous at 21 m. Micaceous in horizons. Generally porous.	
27 - 40	13	Pale yellow fine to very fine micaceous **sandstone**, intercalated with pale yellow soft **shale**. Very fine grained esp. at 37 - 40 m.	
40 - 43	3	Reddish brown **sandstone**, fine grained, silica cemented with generally low porosity. Intercalations of yellow slightly calcareous **shale**.	
43 - 51	8	**Shale**, pale orange at top, changing to purplish grey at depth. Drill-cuttings preserved as pellets.	**LOWER RIETMOND**
51 - 57	6	**Shale**, pale grey, laminated at 53 m.	
57 - 65	8	**Shale**, pale yellow to yellowish green, turning gradually to a very pale grey. Muscovite in horizons. Laminated.	
65 - 81	16	**Shale**, pale grey, progressing to dark grey. Minor siltstone horizons.	
81 - 90	9	Grey micaceous (muscovite) **siltstone / shale** laminated with Fe-oxide staining on laminations at 89 m. (Shale = sandy shale ?)	
90 - 117	27	Pale brownish grey **sandstone**. One minor shale horizon at 92 m. Sandstone medium to coarse grained, sub-rounded, fining downwards with very fine, soft sandstone (siltstone ?) at 104 m and from 108 to 114 m. Medium grained , muscovite rich from 114 to 117	**AUOB****

		m. Calcareous horizons at 95 to 117 m with white calcareous concretions at 110 to 112 m. Sandstone friable and generally very porous.	
117 - 119	2	Light grey laminated **shale**, slightly sandy.	**UPPER MUKOROB**
119 - 123	4	Fine grained to very fine-grained **sandstone** with minor intercalated **shale**, very light grey. (Sandstone grading into siltstone) Calcite cemented with minor calcite filled veins at 121 m.	
123 - 127	4	Light grey very fine grained **sandstone**, calcareous with subordinate light grey **shale** layers.	
127 - 133	6	Light grey **shale** with minor horizons of **siltstone**.	
133 - 137	4	Sample lost due to change over to air-rotary drilling method.	
137 - 139	2	Light grey **shale**, well laminated.	
139 - 142	3	Light grey **shale**, intercalated with dark grey **shale** and thin horizons of light grey calcareous **siltstone**.	
142 - 151	9	Grey, slightly laminated **mudstone / shale** with thin horizons of piritiferous very fine grained sandstone	**LOWER MUKOROB**
151 -181	30	Grey, progressing to dark grey **carbonaceous shale** with depth. Thin +/- 0,1 m hard piritiferous sandstone at 151,8 m. From 157 m shale is predominantly carbonaceous.	
181 - 184	3	Grey medium grained biotite rich **sandstone**	**NOSSOB**
184 - 185	1	Dark grey **shale**	
185 - 191	6	Light grey fine grained (to medium grained) **sandstone**	
191 - 194	3	Light grey **siltstone** / very fine-grained **sandstone** with grey shale intercalated. Laminated grey **shale** dominant at 194 m.	
194 - 204	10	Light brown medium grained **sandstone**, fining downwards with intercalations of light grey shale. Biotite occasionally on laminae.	
204 - 207,5	3,5	Light grey **shale** with pebbly horizon at 207,5 m.	
207,5 - 209 EOH	1,5	Red to light purple **quartzite**, feldspathic.	**PRE - KARROO (KAMTSAS)**

General Comment:

1. Only 27 m of Auob Sandstone was intersected in this borehole. As this location is situated towards the northern edge of the sedimentary basin, it could be possible that this sandstone is continuous with either one or even all three of the elsewhere described sandstone layers and that the two shale horizons A2 and A4 are only present more towards the centre of the basin. It is therefore not possible to correlate this sandstone either with A1, A3 or A5.
2. This borehole was cased and pressure-grouted to a depth of 133 m, and both the Rietmond and Auob aquifers have been effectively sealed off.

This borehole was logged by F. Bockmuhl.

2. Penetration Record

Penetration Record

J 2 N

WW 39841

Penetration Record J 2 N	
DEPTH (m)	Pen. rate (min/m)
1	1.4
	2
	2.1
	5.4
	7.55
	6.3
	6.5
	6.4
	5.9
10	8.3
	7.7
	5.5
	6.5
	9.5
	5.3
	3.2
	3
	3.1
	3.3
20	3.2
	3.3
	3.3
	3.55
	3.5
	4
	5.5
	3.75
	5.35
	7.9
30	4.75
	5.5
	5.3
	3.45
	4.45
	3.8
	4.5
	8
	3
40	4.5
	5.5
	3.2
	4.3
	4.25
	5.6
	3.2
	2.75
	2.4
	3.25
50	3
	2

Penetration Record

J 2 N

WW 39841

	1.75
	2
	4.5
	5.85
	2.3
	6.5
	8.95
	9
60	8.25
	6.75
	2.75
	4
	3.25
	3.75
	3.3
	3.6
	2
	3.75
70	4.1
	4
	4.25
	5
	4.9
	5.2
	6.2
	4.25
	5.9
	10.85
80	12.3
	12.1
	8.9
	10.5
	8.25
	8.25
	2
	6.75
	6.9
	8.3
90	9.3
	5.1
	2.5
	5.25
	2
	4.3
	3.6
	3.75
	2
	2
100	2.2
	2.5
	2.6
	5.6
	4.25

Penetration Record

J 2 N

WW 39841

	3.25
	3.4
	3.8
	4.5
110	4.6
	5
	4.5
	4.2
	4.1
	6.15
	7.8
	11.95
	10.1
	7.75
120	4.5
	8.6
	8
	8.4
	6.75
	11.1
	9.35
	9
	6.2
	5.3
130	6.3
	6.4
	6.3
	6.9
	0.9
	0.95
	0.75
	1
	1.1
	1.55
140	1.5
	1.3
	1.75
	1.6
	1.4
	1.65
	1.9
	1.9
	2.1
	2
150	2
	2.5
	2.7
	2.6
	2.3
	1.75
	1.9
	1.7

Penetration Record
J 2 N
WW 39841

	1.5
	1.5
160	1.6
	1.5
	1.4
	1.3
	1.45
	1.25
	1.5
	1.8
	1.8
	1.6
170	1.75
	1.3
	1.65
	2
	3.2
	3.65
	3.7
180	5.8
	3.2
	4.7
	4.6
	4.6
	4.7
	2.8
	3.9
	3.8
190	3.4
	3.6
	3.75
	2.2
	3.25
	4.2
	1.75
	2.5
	2.2
	5.1
200	3.9
	3.65
	2.5
	4.6
	8.75
	11.2
	15.65
209	11.2

Penetration Record J 2 N

3. Mud Rotary Drilling Log

THE STUDY ON THE GROUNDWATER POTENTIAL EVALUATION AND MANAGEMENT PLAN IN THE SOUTHEAST KALAHARI (STAMPRIET) ARTESIAN BASIN

MUD ROTARY DRILLING LOG

JICA REFERENCE: J 2 N LOCALITY: Olifantswater West WW 39841 DATE: 10 to 16 May 2000

TIME	DEPTH mbgl	MARSH FUNNEL TEST 1000 ml (sec)	MARSH FUNNEL TEST 500 ml (sec)	E. C. mS/cm	DENSITY	pH	TEMPERATURE ° C	COMMENT
11:45	5	39	29	5.65	≤ 1.2	8	18.6	Add bentonite to counter fluid loss
	15	43	33	5.72		8	21.2	End drilling 10/05/00
08:30	30	42	31	5.5		8.5	19.2	
18:10	92	44	33	5.5		8	23.5	Last measurement 11/05/00
09:20	119	43	32	5.56	≤ 1.2	8	21.7	12/05/00
12:30	134	43 *29*	32	5.05 *4.30*		8 *8.5*	28.2 *16.9*	Drillfluid before logging *Water used for drillfluid*
	150	32	22	5.65		8	23.4	14/05/00
07:15	209	32 *29*	22	10.33 *4.30*		8 *8.5*	19.5 *16.5*	Add Sodium tri poli phosphate Drillfluid before logging *Water used for drillfluid*

GENERAL REMARKS :

1. This borehole was geophysically logged to depths of 134 m and finally to 209 m.
2. Diameters drilled were 12 ¼" during the first logging and finally 9 7/8".
3. Parameters of the drillfluid and for the water used for mixing were recorded from samples filtered through a fine sieve.
4. To determine the electrical resistivity of the samples as Ω-m., the E.C., expressed as S/m, should be inversed (1/x).
5. STPP (Sodium tripoliphosphate) was added to the final mix of drillfluid in order to help to break down the relatively thick wallcake developed during drilling the bituminous shales. This resulted in the increased final E.C. recorded.

4. Geophysical Log and Casing Design

Poseidon Geophysics

(Reg. No. 93550)

CO. Poseidon Geophysics
WELL J2N WW 39841
PROJ.
LCN. Olifantswater West
STE. J 2
FILING No. J2N

CONSULTANT PACIFIC CONSULTANTS INTERNATIONAL

COMPANY METZGER PM DRILLING

PROJECT The Study on the Groundwater Potential Evaluation and Management Plan in the Southeast Kalahari (Stampriet) Artesian Basin

WELL ID J2N WW39841

LOCATION OLIFANTSWATER WEST

COUNTRY REPUBLIC OF NAMIBIA

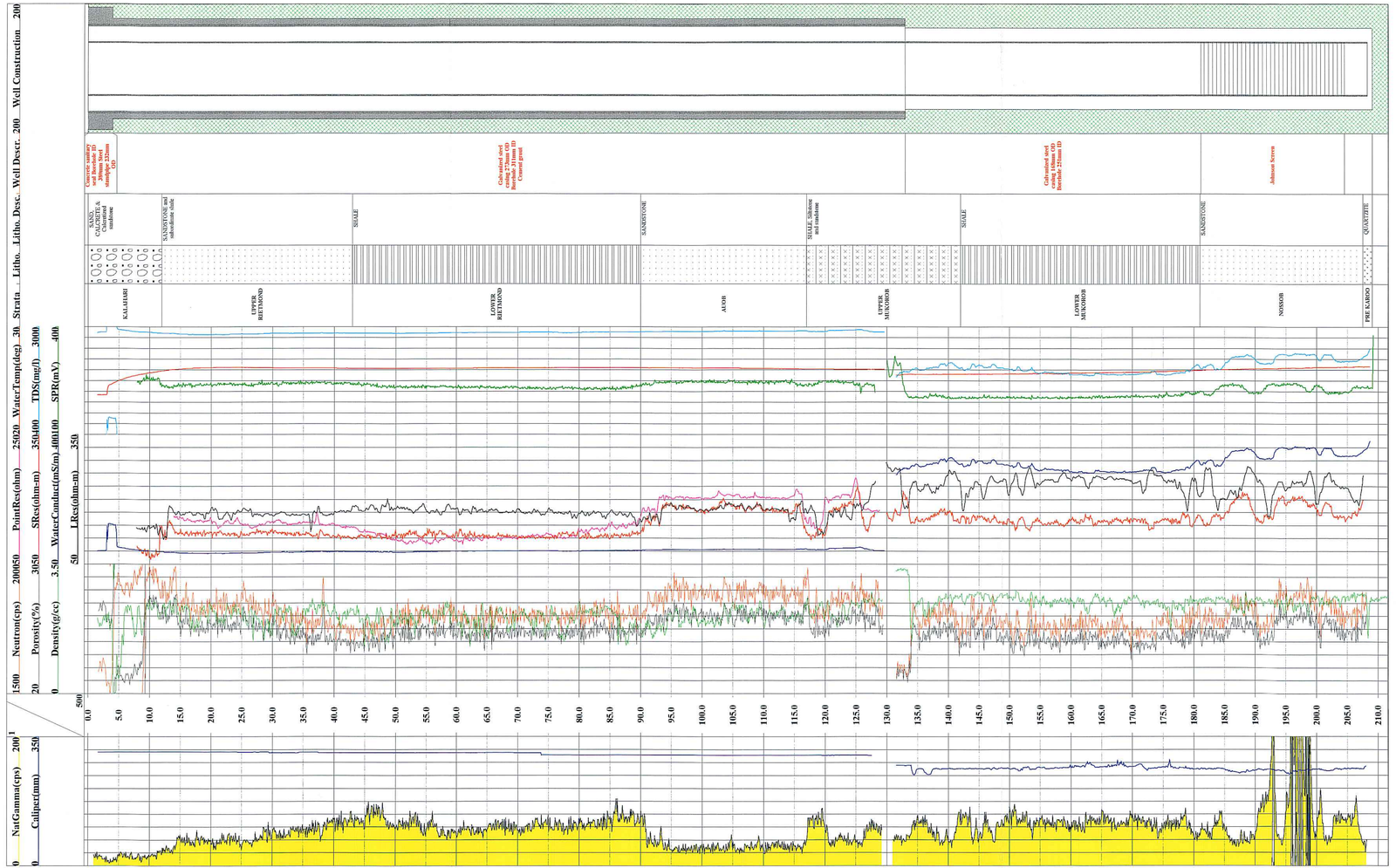
BH COORDINATES S 23.64808
E 18.38871

COLLAR ELEVATION 1272m
LOG MEAS. FROM Groundlevel

DRILLING MEAS. FROM Groundlevel

DATE	16 May 2000
TYPE LOG	Physical Properties
DEPTH-DRILLER	209m
DEPTH-LOGGER	208m
BTM LOGGED INTERVAL	208
TOP LOGGED INTERVAL	0.60m
PERMANENT DATUM	Groundlevel
RECORDED BY	Clemence Kambewu
WITNESSED BY	Frank Bokmuhl

JICA JAPAN INTERNATIONAL COOPERATION AGENCY



5. Borehole Development Data

THE STUDY ON THE GROUNDWATER POTENTIAL EVALUATION AND MANAGEMENT PLAN IN THE SOUTHEAST KALAHARI (STAMPRIET) ARTESIAN BASIN

BOREHOLE DEVELOPMENT DATA

JICA REFERENCE: J 2 N LOCALITY: Olifantswater West M 102 WW 39841 DATE: 18/05/2000 (starting)

TIME (actual)	Pump time (min)	Water Level (mbsu)	Yield (m^3/h)	E.C. (mS/m)	Remarks
12:00		39.03			Date 6/6/00. Start with submersible pump
12:12	12	63.61			
	14	65.42			
	16	67.73			
	18	68.99			
	20	70.53		126	
	23	73.06			
	26	74.61			
	30	76.31			
	35	78.92		111	
	40	80.73			
	45	83.48			
	50	84.25	4.89		
	55	85.62			
	60	87.00			
13:01	61	89.11			
	62	90.12			
	63	91.32			
	64	93.43			
	65	95.17			

TIME (actual)	Pump time (min)	Water Level (mbsu)	Yield (m^3/h)	E.C. (mS/m)	Remarks
	66	95.78			
	67	95.62			
	68	94.89			
	69	95.98			
	70	97.28			
	72	98.62			
	73	99.34	8		
13:14	74	98.78	3		
	75	98.18			
	76	97.90			
	77	97.45			
	78	96.66			
	79	95.71			
	80	95.12			
	81	93.37			
	82	92.82			
	83	92.39			
	85	91.33			
	87	90.29			
	89	87.85			
	91	87.84			
	93	87.02			
	96	85.82			
	99	84.56			
	103	83.10			
	108	81.80			

TIME (actual)	Pump time (min)	Water Level (mbsu)	Yield (m^3/h)	E.C. (mS/m)	Remarks
	113	79.70			
	118	79.52			
	123	78.89			
	128	78.11			
	133	77.42			
	143	75.43			
	153	75.85			
	163	75.43	3		Start to measure recovery.

Remarks:

This borehole was developed by means of the double-tube airlift method. Sodium Tri Poly Phosphates were introduced into the borehole in order to break down any wall cake, which might have developed during drilling of the more argillaceous shale horizons.

1. **Date 18/05/2000:** 8,5 hours of airlift development, during which the fluid pumped from the borehole was re-circulated, in order to effectively break down the wall cake.
2. **Date 19/05/2000:** 21 hours of airlifting at various depths. During this day water and drill fluid was also removed from the borehole, i.e. no re-circulation took place.
3. **Date 20/05/2000:** 21 hours of pumping by airlift. This was done at various depths, according to screen placements.
4. **Date 21/05/2000**: 6 hours of pumping by airlift from the bottom of the borehole.
5. Finally development was done by submersible pump: With varying pumping rates the reaction of the water level was also gauged. (Data tabulated above.)

6. Evaluation of Pumping Test

1. PUMPING TEST ANALYSIS

J2-N (WW39841) - Pumping well

J2-A (WW39840) - Observation well

1.1. Well Efficiency (Step Drawdown Test (Annex 1)

Well Efficiency was analysed by making use of the Jacob method for draw down data. Aquifer parameters used for the calculation of well efficiency were obtained from the evaluation results of the constant discharge test, which is discussed in **Section 1.2** below.

The well efficiencies at the range of pumping rates used during the step drawdown test are summarised in **Table 1** below. Only four of the five steps were accepted for the calculation of the borehole efficiency.

Table 1: J2-N; Borehole efficiency at various pumping rates

Borehole number	Step	Abstraction Rate [m^3/h]	Draw Down* [m]	Borehole Efficiency [%]
J2-N	1	1	7.89	83.8
	2	2	16.6	77.5
	3	3	27.5	72.0
	4	4	39.0	67.3

* at cut-of time Δt, after which well bore storage has no affect on the well performance

Data on the linear and non-linear well losses and skin factors as well as the efficient well radius are presented in **Annex 1.**

1.2. Constant Discharge Test Analysis (Annex 2 - 6)

The constant discharge draw down curve of abstraction borehole **J2-N** indicates leaky conditions. For leaky aquifers, the Walton Hantush analysis method with draw down and recovery data was used to calculate the hydraulic conductivity of the aquifer and the aquitard **(Annex 2 & 3**). Using the normal Theis or Cooper-Jacob analysis will result in the over estimation of the hydraulic conductivity of the leaky aquifer and an under estimation of the hydraulic conductivity of the aquitard. (Kruseman, De Ridder, 1992)

Aquifer storativity was estimated due to the fact that observation borehole **J2-A** is located in the Auob sandstone aquifer and not in the pumped Nossob sandstone aquifer. During the duration of the constant discharge test, a rise in the water level of observation borehole **J2-A** is observed, which indicates that the Auob sandstone aquifer was not influenced by abstraction over the period of testing (See **Annex 5**).

The occurrence of leakage could be due to water derived from storage within the overlying aquitard. The results of the constant discharge analysis are summarised in **Table 2** below.

Table 2: Aquifer Parameters calculated for J2-N; Nossob sandstone

Borehole number	Analysis Method	T	s	k	S	Simulation model	Comments
		[m^2/day]	[m]	[cm/sec]	[-]		
J2-N	Walton-Hantush - draw down	2,94	25	$1,4 \times 10^{-4}$	$*5 \times 10^{-6}$	Hantush	*Storativity estimated - Observation borehole not located in the tested aquifer
	Walton-Hantush - recovery	2,90	25	$1,3 \times 10^{-4}$	$*5 \times 10^{-6}$		

The Hantush model for leaky condition from aquitard storage was used to simulate and verify the actual data and analysis approach of the constant discharge test. Simulation parameters summarised in **Table 2** were used in simulation of the actual pumping test data (See **Annex 4** for simulation results).

Annex 6 compares the draw down results of the pumping borehole J2-N and observation borehole J2-A and it is clear that pumping from the Nossob sandstone did have any influence on the Auob sandstone aquifer.

The radius of influence (R) was estimated after SICHARDT (1928) using the equation:

$R = 3000 \times s \times K_f^{1/2}$

$R = 3000 \times 35.3 \times 1.14 \times 10^{-3} = \underline{121\ m}$

where

R = Radius of influence

s = Draw down in abstraction borehole at end of pumping

K_f = Permeability of the aquifer

The equation is approximately correct for unconfined aquifers. In case of a confined aquifer the radius of influence most probably larger and the 124 m are considered to be the minimum value.

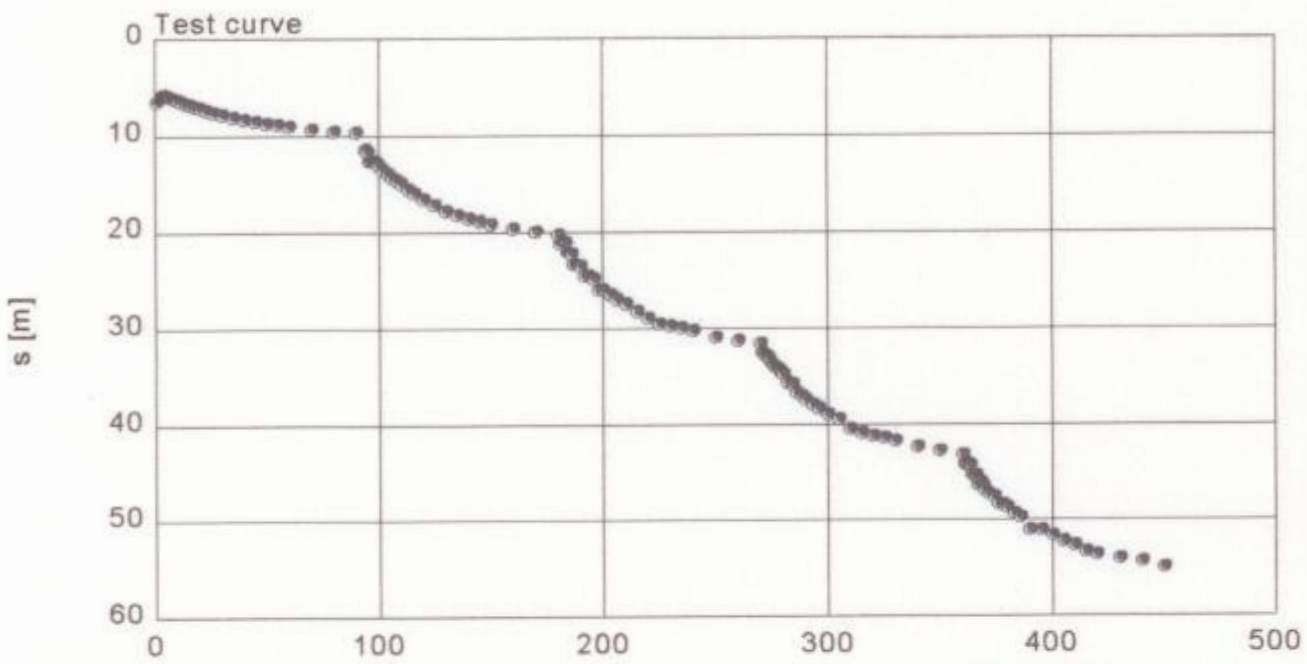
A proper evaluation of R (and storativity S) will only be possible once reliable data from observation wells, penetrating the same aquifer as the pumped well, are available.

Groundwater Study in the Stampriet Artesian Basin

Evaluation of Test Pumping Data

Step test analysis

Pumped well J2-N

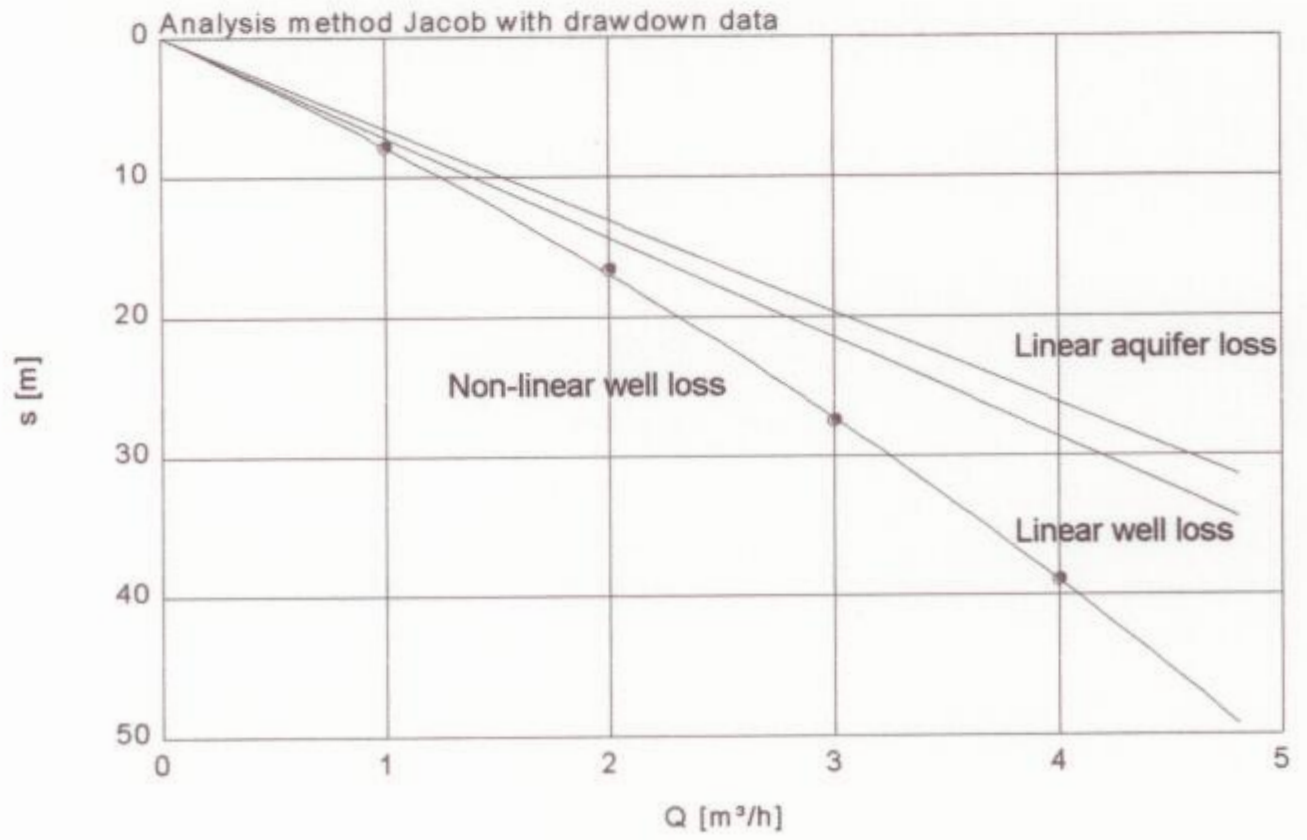


Borehole, well & aquifer

Drilled:	
Latitude:	
Longitude:	
Elevation:	1100 [m]
Depth:	
Stick up:	0.00 [m]
Bh. radius:	0.125 [m]
Casing radius:	
RWL:	40.17 [m]
max.drawdown:	54.96 [m]
Aq.type:	confined
Aq.thickness:	25.00 [m]
Stratigraphy:	Nossob Sandstone
Lithology:	Sandstone

Test running

Start:02/07/2000 16:45:43	
Dis.dur.:	450 [min]
Av.dis.:	3 [m³/h]
Max.dis.:	5 [m³/h]
Min.dis.:	1 [m³/h]
Total dis.:	22.5 [m³]
Crew:	Metzger_PM
Supervisior:	PCI



Results

Well performance:

s: (B1+B2)*Q+C*Q²

Linear aquifer loss B1:	5.91
Linear well loss B2:	1.27
Non-linear well loss C:	0.64

	Q [m³/h]	s [m]	Eff [%]
Step 1:	1.00	7.89	83.8
Step 2:	2.00	16.6	77.5
Step 3:	3.00	27.5	72.0
Step 4:	4.00	39.0	67.3

Linear skin factor:	0.99 [-]
Non-linear skin factor:	12.0 [d/m³]
Effective well radius:	6.2E-3 [m]

Date 00/10/06 prepared by BIWAC

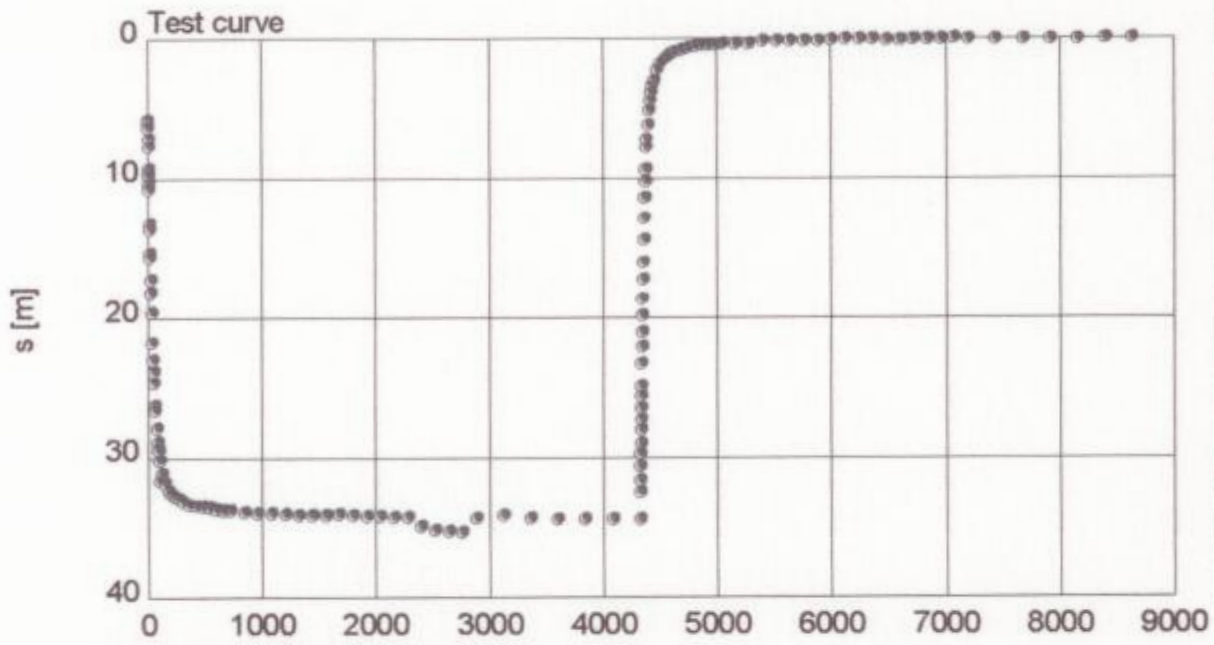
Annex 1

Groundwater Study in the Stampriet Artesian Basin

Evaluation of Test Pumping Data

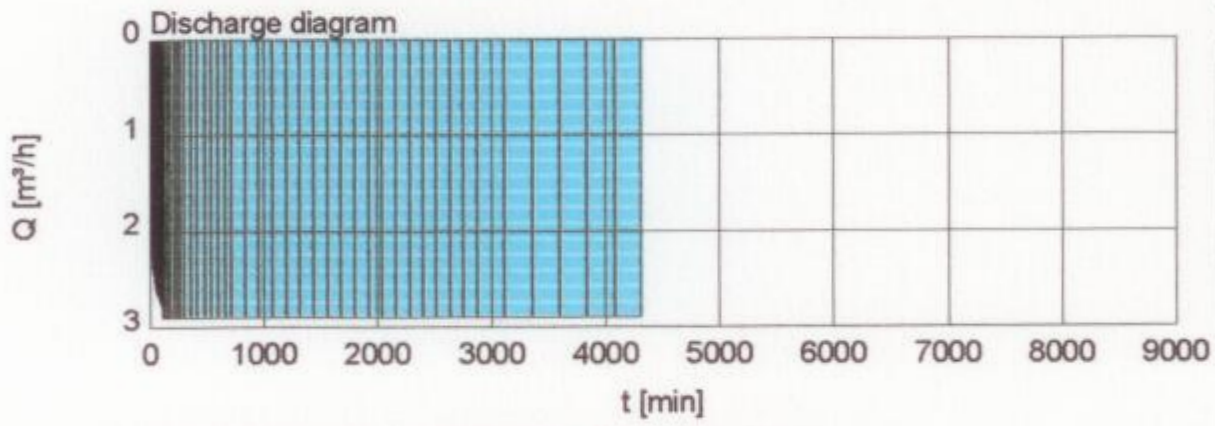
Test pumping analysis

Pumped well J2-N



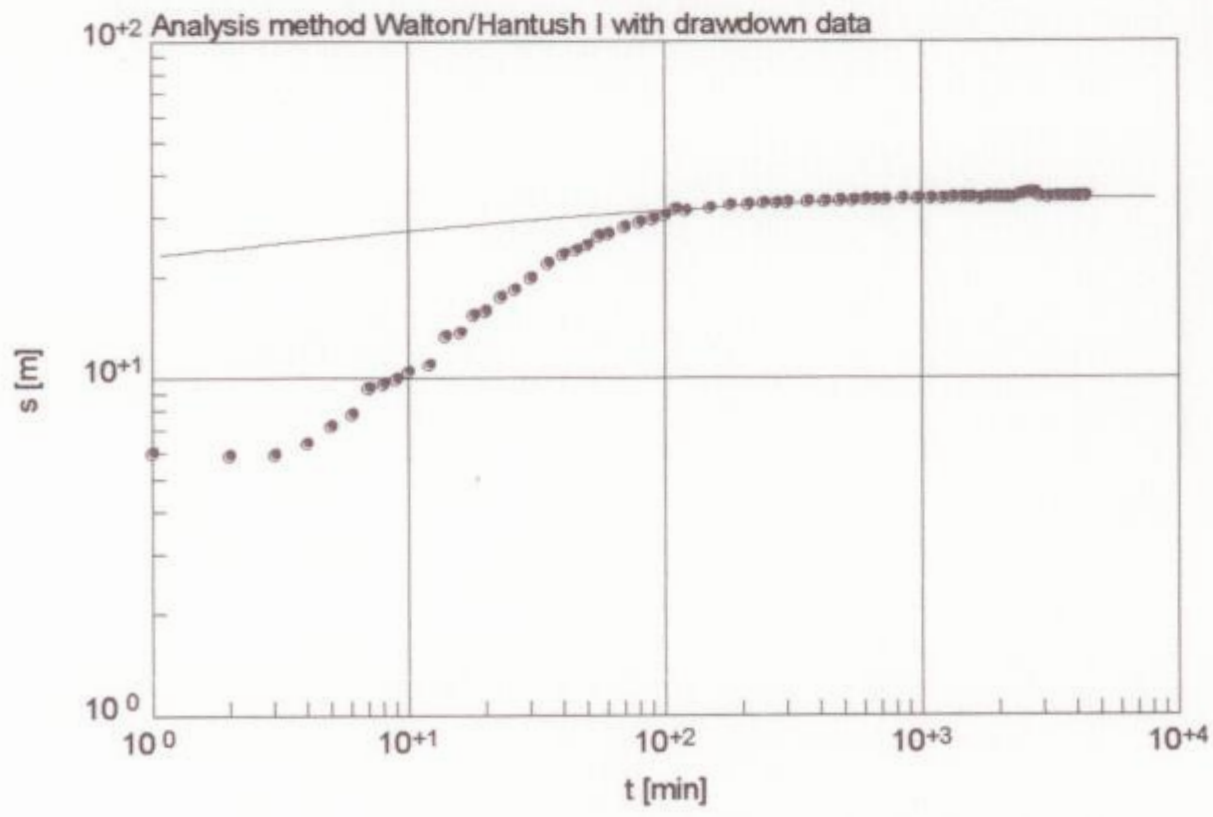
Borehole, well & aquifer

Drilled:	
Latitude:	
Longitude:	
Elevation:	1100 [m]
Depth:	
Stick up:	0.00 [m]
Bh. radius:	0.125 [m]
Casing radius:	
RWL:	40.17 [m]
max.drawdown:	35.30 [m]
Aq.type:	confined
Aq.thickness:	25.00 [m]
Stratigraphy:	Nossob Sandstone
Lithology:	Sandstone



Test running

Start:	02/07/2000 17:00:00
Dis.dur.:	4320 [min]
Av.dis.:	2.89 [m³/h]
Max.dis.:	2.9 [m³/h]
Min.dis.:	2 [m³/h]
Total dis.:	208 [m³]
Crew:	Metzger_PM
Supervisior:	PCI



Results

Match parameter:	
Q:	2.89 [m³/h]
t:	363 [min]
s:	9 [m]
1/u:	1.35E8 [-]
W(u,r/B):	4.79 [-]
Aquifer parameter:	
T:	2.94 [m²/d]
k:	0.117 [m/d]
Boundary parameter:	
B:	1E3 [m]
m´:	60 [m]
k´:	0.000176 [m/d]

Date 02/10/00 prepared by BIWAC

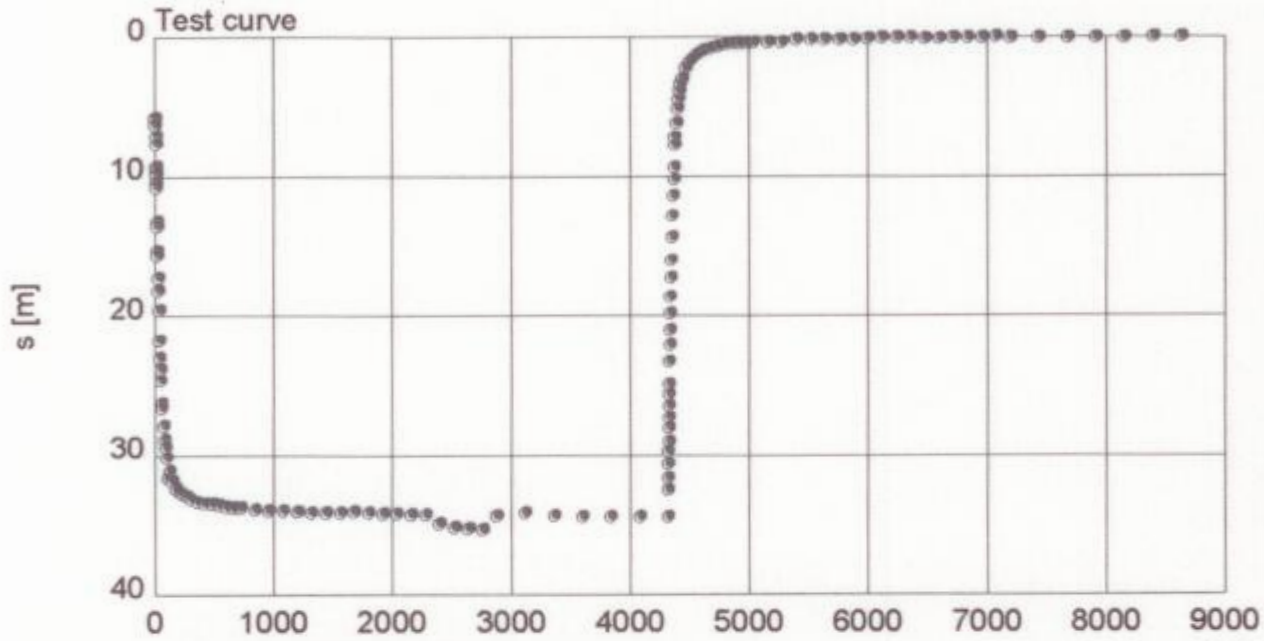
Annex 2

Groundwater Study in the Stampriet Artesian Basin

Evaluation of Test Pumping Data

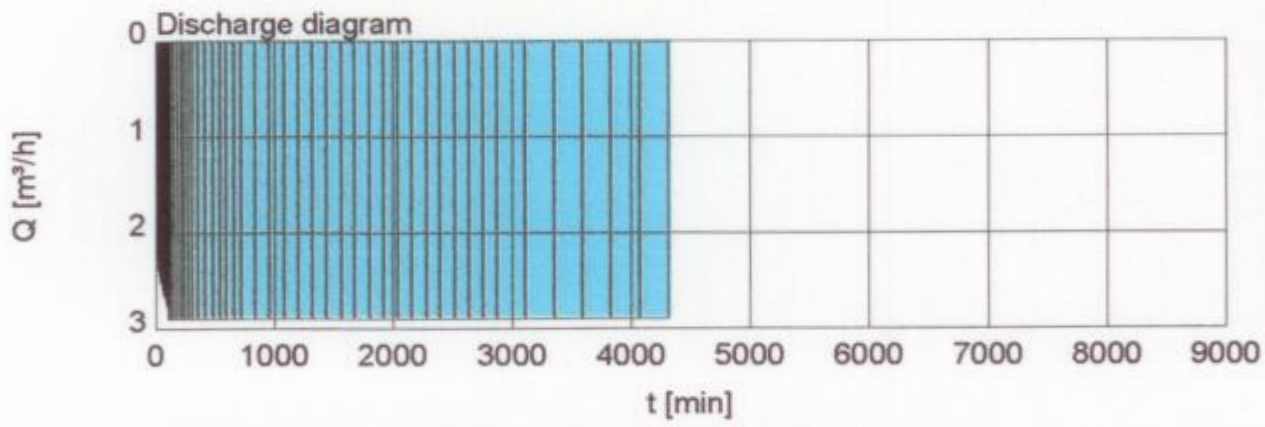
Test pumping analysis

Pumped well J2-N



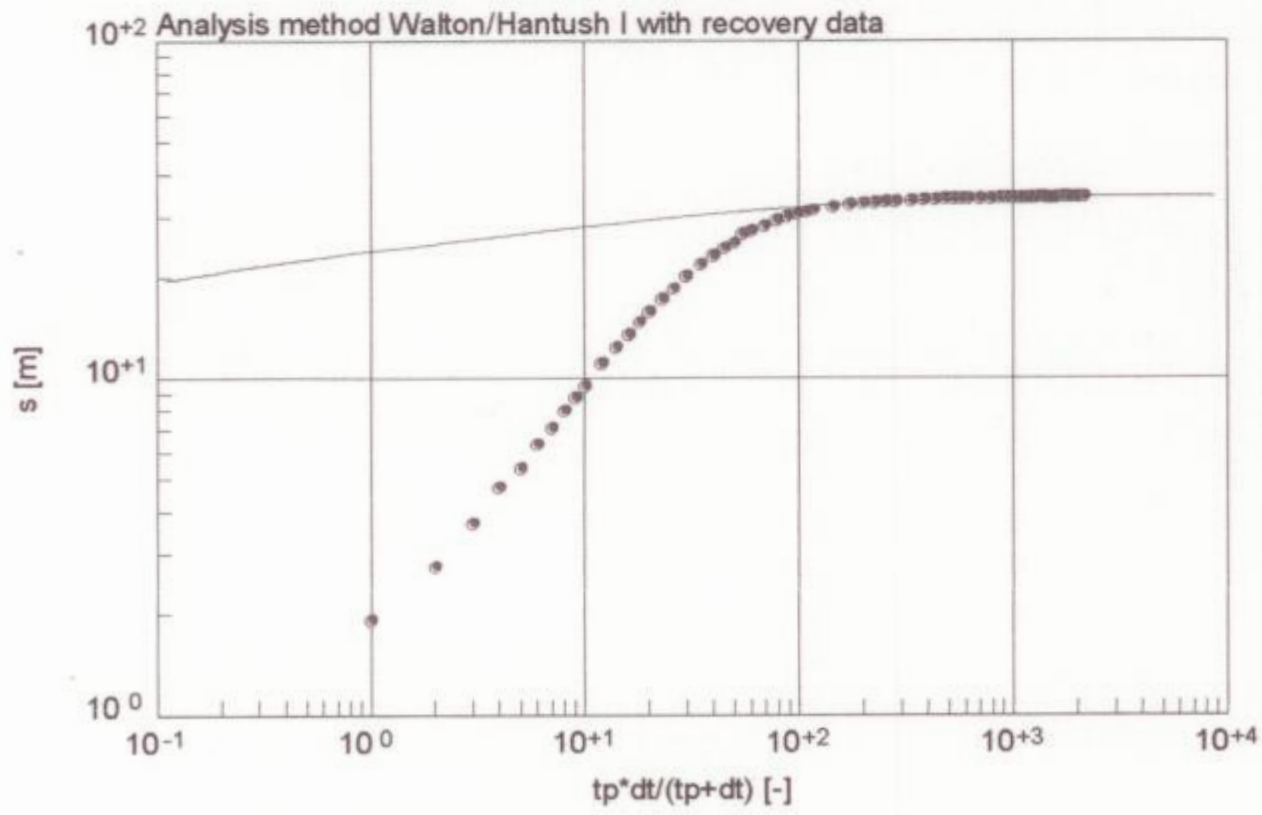
Borehole, well & aquifer

Drilled:	
Latitude:	
Longitude:	
Elevation:	1100 [m]
Depth:	
Stick up:	0.00 [m]
Bh. radius:	0.125 [m]
Casing radius:	
RWL:	40.17 [m]
max.drawdown:	35.30 [m]
Aq.type:	confined
Aq.thickness:	25.00 [m]
Stratigraphy:	Nossob Sandstone
Lithology:	Sandstone



Test running

Start:	02/07/2000 17:00:00
Dis.dur.:	4320 [min]
Av.dis.:	2.89 [m³/h]
Max.dis.:	2.9 [m³/h]
Min.dis.:	2 [m³/h]
Total dis.:	208 [m³]
Crew:	Metzger_PM
Supervisior:	PCI



Results

Match parameter:	
Q:	2.89 [m³/h]
t:	506 [min]
s:	18.1 [m]
1/u:	2.33E8 [-]
W(u,r/B):	9.49 [-]
Aquifer parameter:	
T:	2.9 [m²/d]
k:	0.116 [m/d]
Boundary parameter:	
B:	1E3 [m]
m':	60 [m]
k':	0.000174 [m/d]

Date 02/10/00 prepared by BIWAC

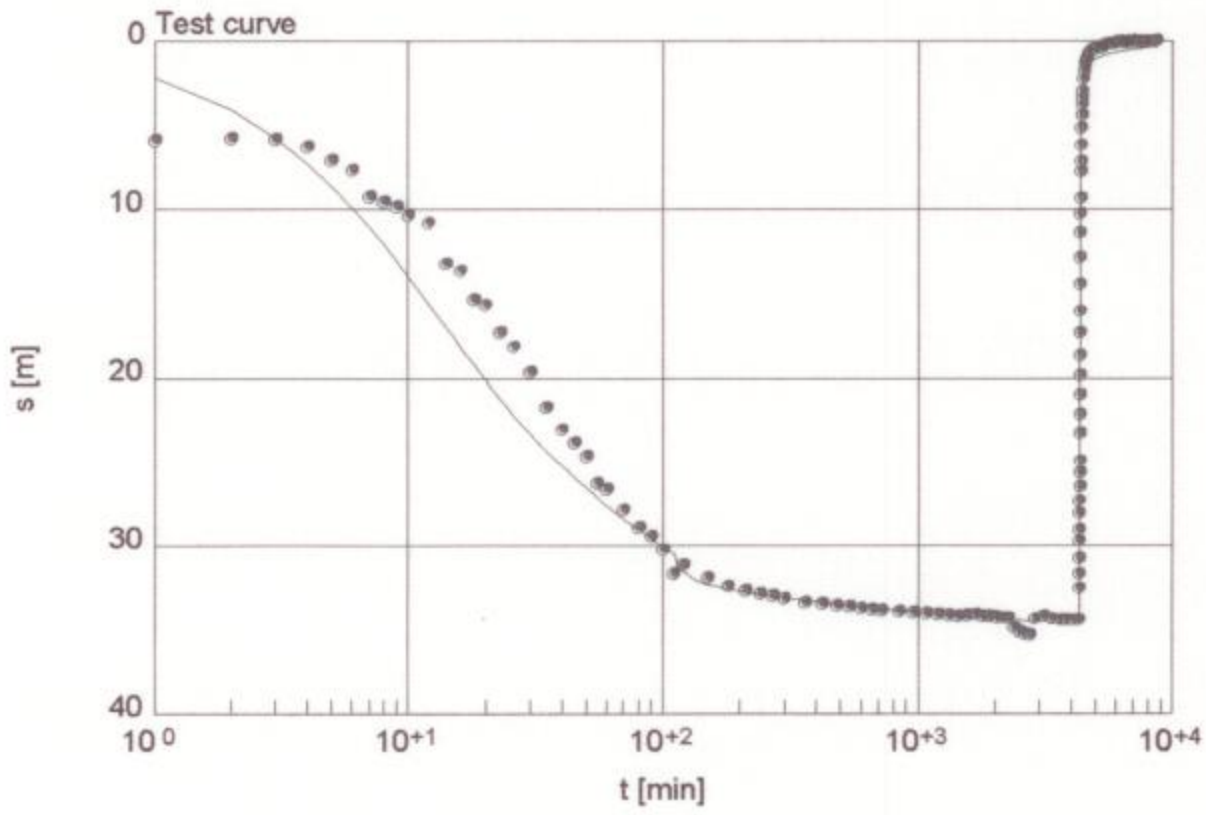
Annex 3

Groundwater Study in the Stampriet Artesian Basin

Evaluation of Test Pumping Data

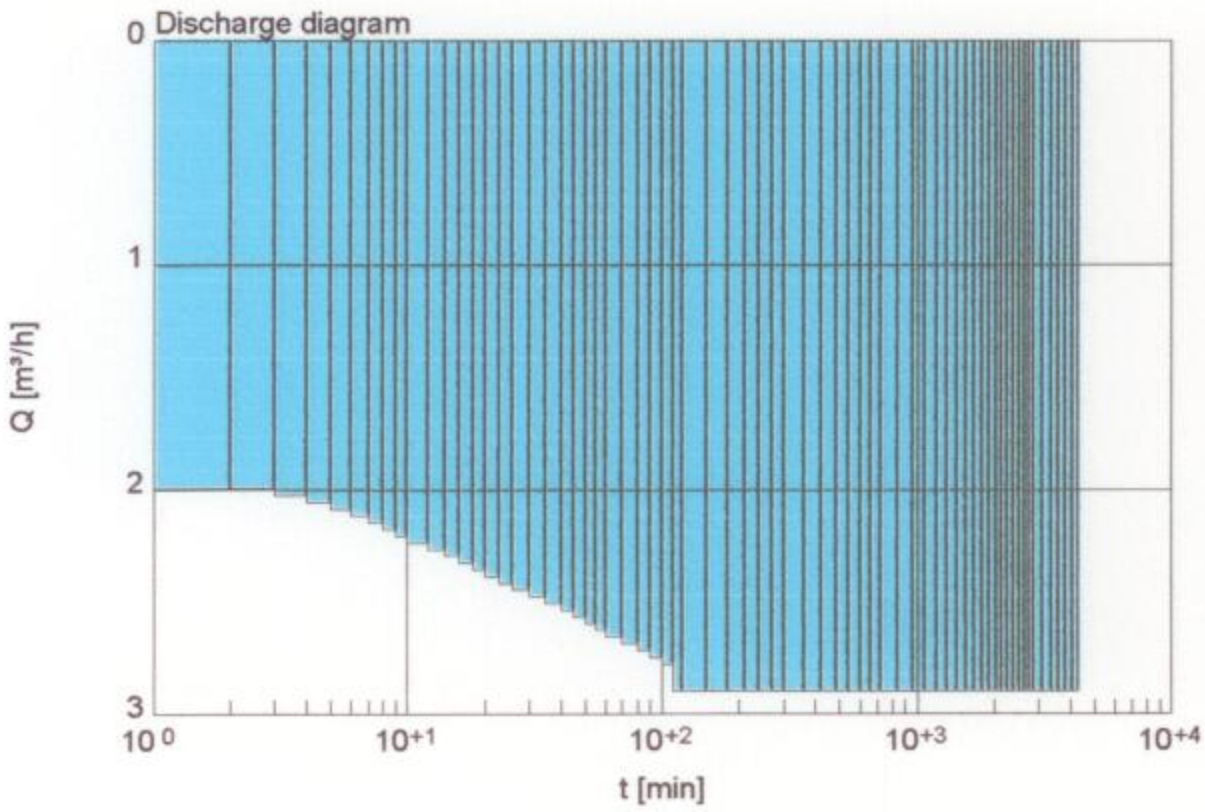
Test pumping diagnosis

Pumped well J2-N



Remarks

Simulation of the actual draw down during constant discharge test using the Hantush model for leaky aquifers.



Discharge info

Dis.dur.:4320 [min]
tcorr: 4307 [min]

Av.dis.: 2.89 [m³/h]
max.dis.:2.90 [m³/h]
min.dis.:2.00 [m³/h]
Qn: 2.90 [m³/h]

Dis.sum: 208 [m³]

Date 02/10/00 prepared by BIWAC

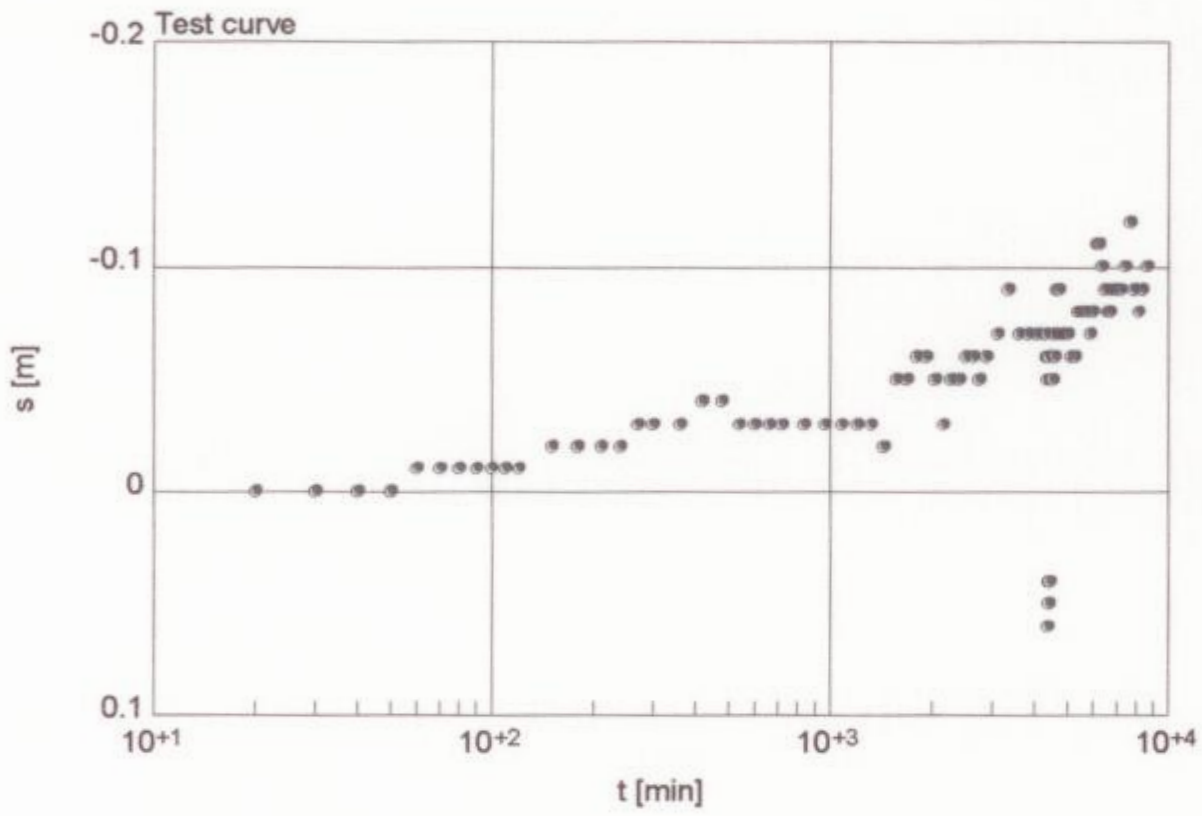
Annex 4

Groundwater Study in the Stampriet Artesian Basin

Evaluation of Test Pumping Data

Test pumping diagnosis

Observation well J2-A

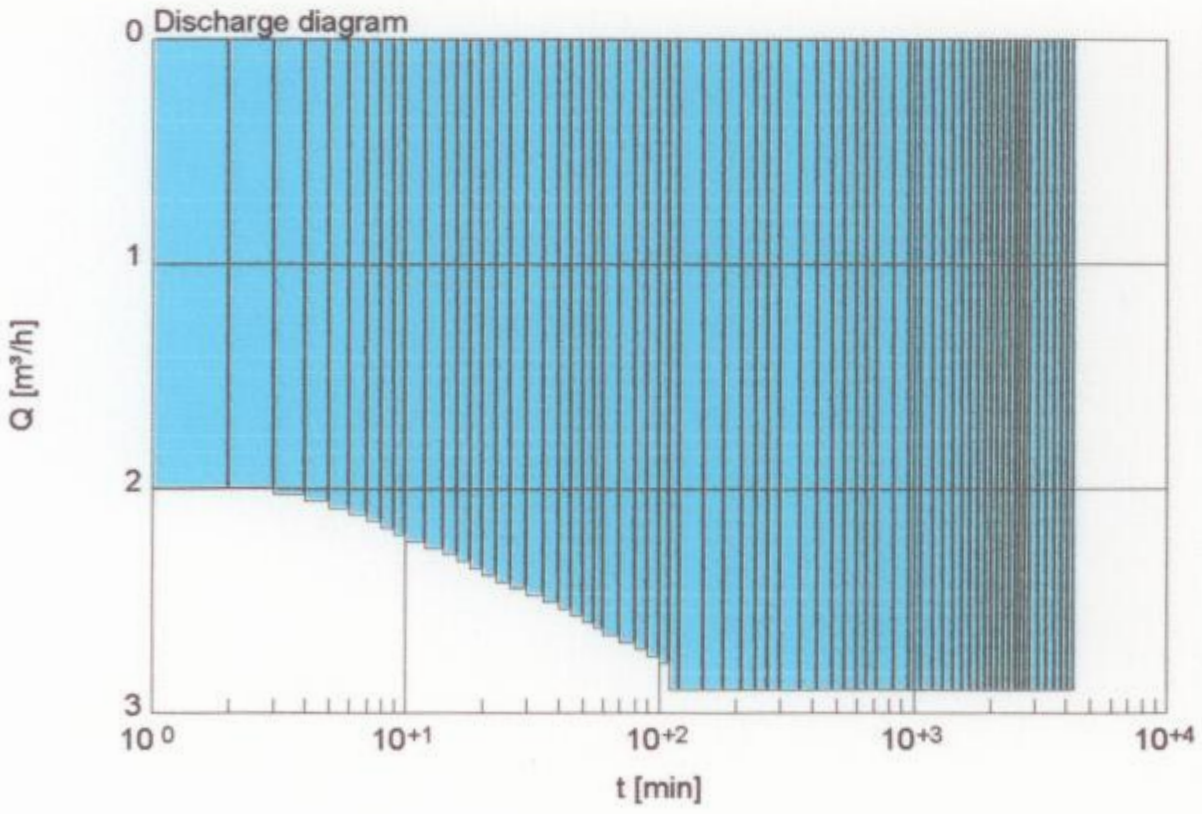


Remarks

Data from observation borehole J2-A could not be used for analysis of storativity or transmissivity.

Borehole does not penetrate the pumped aquifer system.

Recovery observed during the entire pumping test.



Discharge info

Dis.dur.:4320 [min]
tcorr: 4307 [min]

Av.dis.: 2.89 [m³/h]
max.dis.:2.90 [m³/h]
min.dis.:0 [m³/h]
Qn: 0.00E+00 [m³/h]

Dis.sum: 208 [m³]

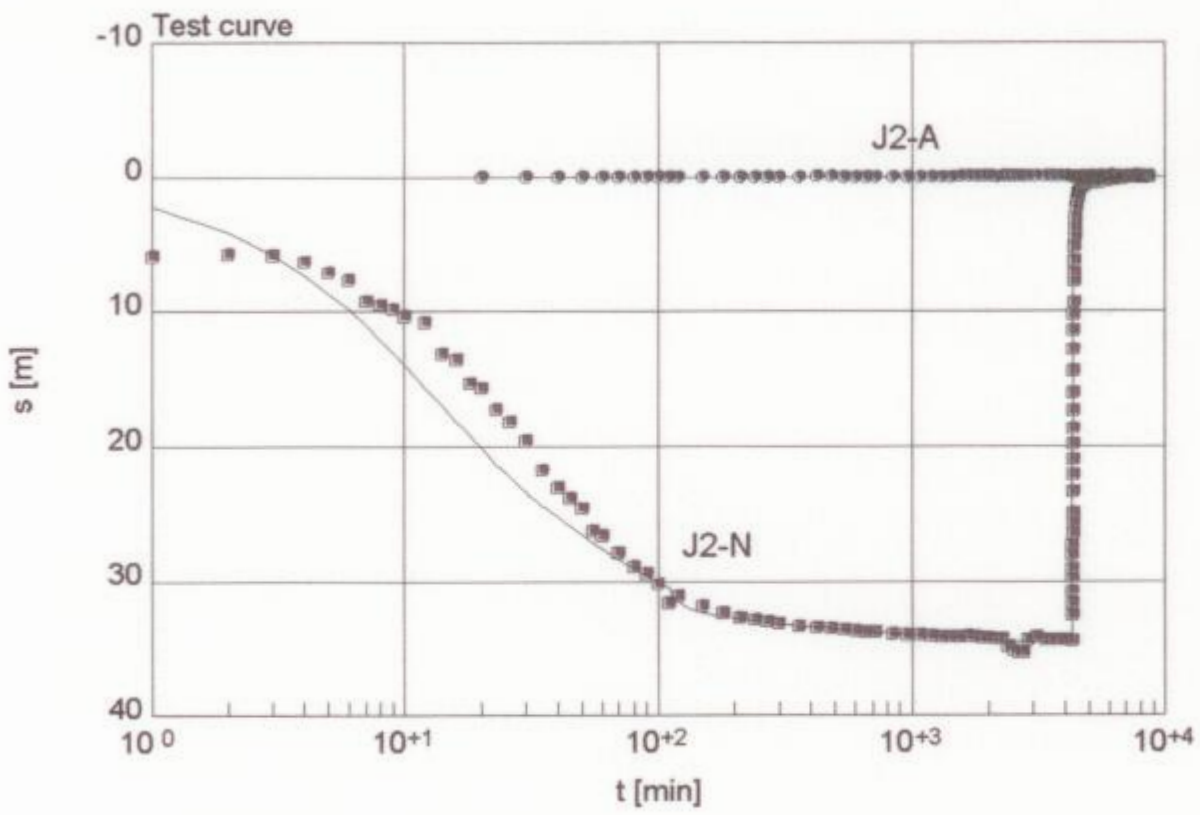
Date 02/10/00 prepared by BIWAC Annex 5

Groundwater Study in the Stampriet Artesian Basin

Evaluation of Test Pumping Data

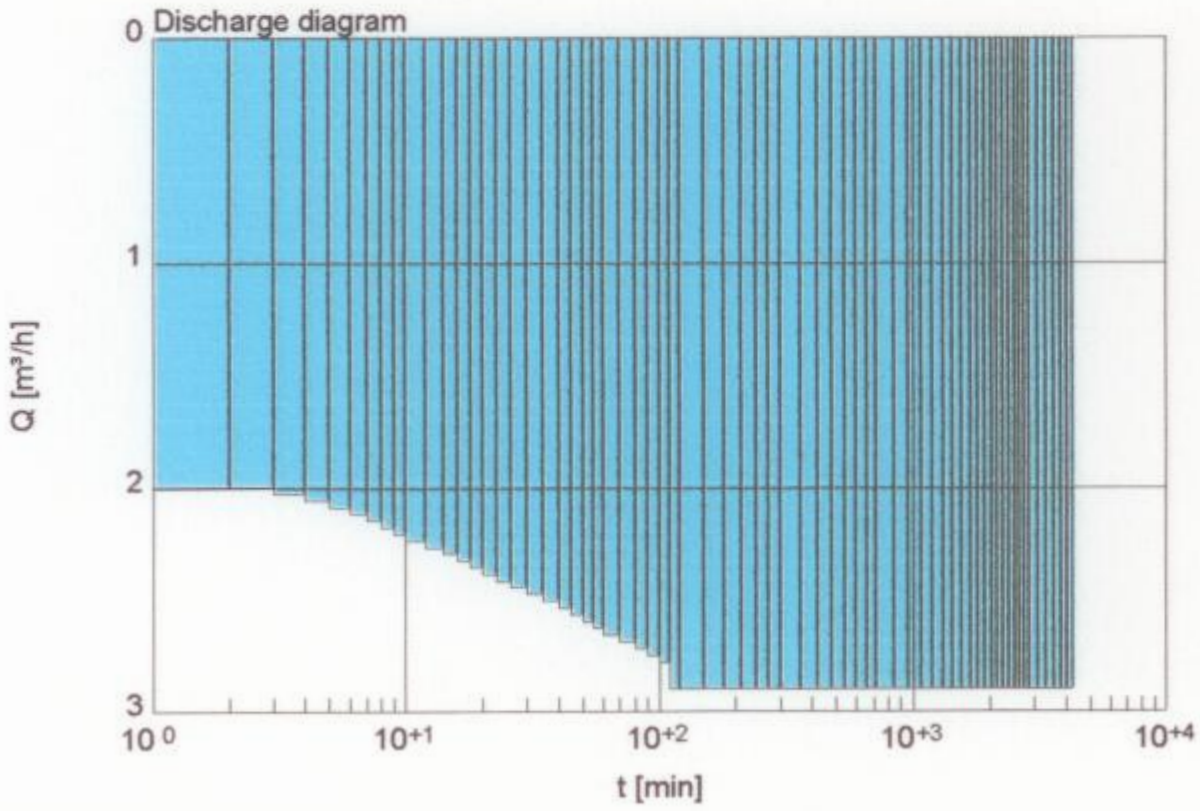
Test pumping diagnosis

Pumped well J2-N



Remarks

Merged data from observation borehole J2-A and abstraction borehole J2-N.



Borehole observation points

Dis.dur.:4320 [min]
tcorr: 4307 [min]

Av.dis.: 2.89 [m³/h]
max.dis.:2.90 [m³/h]
min.dis.:2.00 [m³/h]
Qn: 2.90 [m³/h]

Dis.sum: 208 [m³]

Distance to observation borehole: J2-A = 71.2 m

Date 02/10/00 prepared by BIWAC	Annex 6

7. Water Level Recorder Installation

THE STUDY ON THE GROUNDWATER POTENTIAL EVALUATION AND MANAGEMENT PLAN IN THE SOUTHEAST KALAHARI (STAMPRIET) ARTESIAN BASIN

INSTALLATION OF SEBA FLOATERS

JICA REFERENCE: J 2 N LOCALITY: Olifantswater West M 102

WW 39841

1. **Serial Number of floater**: 4556
2. **Date installed**: 19/09/00
3. **Rest Water Level when installed**: 40.79 mbsu
4. **Distance from stick-up to logger**: 36.00 m
5. **Distance from logger to water level**: 4.79 m
6. **Cut off**: 36.0 m (0.91 + 35.11)