Hydrogeological Report on NW Aboriginal Lands well monitoring – October 1998 to April 1999

REPORT BOOK 2000/00005

by

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PRIMARY INDUSTRIES AND RESOURCES
SOUTH AUSTRALIA

REPORT BOOK 2000/00005

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HYDROGEOLOGICAL REPORT ON NW ABORIGINAL LANDS WELL MONITORING – OCTOBER 1998 TO APRIL 1999

Sandy Dodds and Lloyd Sampson

Monitoring equipment is now in place in 29 wells, which supply all groundwater to 8 major communities in the Anangu Pitjantjatjara lands. The equipment provides standing water level (SWL) and pumping rates on an hourly basis for each well; information which should give a good indication of the sustainability of the water supply. Additionally, one rain gauge at each community gives similar information on precipitation and provides guidance on recharge.

INTRODUCTION

This report comprises brief comments on the current download of data. A more comprehensive report covering all monitoring data to date and the results of geophysical logging of the wells is in the process of compilation and should be ready within two months.

ANALYSIS OF LOGGING DATA

INDULKANA

Well 19. While there is no indication of depletion in this period, the well is showing a high response to the pumping rate of ~0.6 L/s. This has long term implications. The slow recovery of the well in the second half of December is caused by pumping at such a low rate as to be invisible on the graph (0.001–0.002 L/s).

Well 19A. The failure of the logger in November 1998 resulted in too small a data set to show long term trends. However, the well is evidently being pumped dry within two hours at the currently used rate of 0.8 L/s and never fully recovers in the intervening 12 hours. The long term effects of this may be evident in the next download of data over a full 6 months.

Well 25. This well, the major water supplier in the area, is showing evidence of slow depletion, but has stood up well to steady pumping. Prior to recovery in April 1999 in response to a week without pumping, the water levels had declined by over a metre for the period. The well appears capable of sustaining current pumping rates.

Well 26. No depletion; the well seems satisfactory so long as pumping rates are kept low. The well shows a high response to pumping rates of ~0.6 L/s, but minimal response to rates of 0.1 L/s.

Well 27. The well is bottoming out in spite of low and intermittent pumping rates. The water level fell by over 5 m over the monitoring period.

Rainfall. The rainfall gauge on 19 shows significant falls intermittently through this period, but no sustained periods of rain such as would be ideal for recharge. There is no obvious recharge indication in any well.

MIMILI

Well M1. No sign of depletion at these pumping rates.

Well M3. No sign of depletion at these pumping rates.

Rainfall. As for Indulkana.

FREGON

Well 1. The well is gradually depleting, even at these low pumping rates and sparse intervals. The water level declined by 0.3 m over the monitoring period.

Well 7. Only the first half of this record is valid, as the equipment failed in mid January. From the data available there is no sign of depletion.

Well 14. It does appear that this well is depleting, but the time span of the data and irregular pumping intervals make the conclusion unsure. Analysis of more data will clarify the picture. The water level fell by 0.4 m over the monitoring period.

Well E4. Slow depletion appears to be taking place, as for well 14 above. The water level fell by 0.2 m over the monitoring period.

Rainfall. There were intermittent falls in this period, but less than occurred at Indulkana or Mimili.

KENMORE PARK

Well 6. No sign of depletion, but SWL figures are evidently wrong at times (November-December), and look illogical at other times (January-February). While this data is not to be trusted, the later data between mid-February and April appears better and indicates that the well is capable of sustaining current pumping rates.

Well 7. Pumping has been of short duration and the well appears to have a fragile supply. The water level has declined by 0.2 m over the monitoring period.

Rainfall. Intermittent low falls in this period.

PUKATJA (ERNABELLA)

Well 1. In spite of the lack of pumping this well shows a steady drop of 0.3 m over the period, as a result of either pumping in adjacent wells or movement of water downstream. There is no evidence of recharge.

Well 12. The well was pumped well nigh continuously over the period with no sign of aquifer depletion.

Well 42. This well was not pumped much in this period. In the absence of pumping the SWL shows a general drop of 0.2 m, but also some indications of rises that might indicate recharge, even though the correspondence with rainfall events is poor. The data warrants further study, especially when more data is available.

Well 44. Shows a steady drop of 0.4 m in the absence of pumping, as for well 1. No evidence of recharge.

Well 45. While depletion seems to be taking place, the erratic pumping rates make accurate determination difficult. The SWL seems to have dropped about 2 m

Well 97B. Insufficient data.

Well 97L. Insufficient data.

Rainfall. There was scattered, appreciable rainfall during the period.

AMATA

Well 15. There are possible indications of depletion, but these are somewhat obscured by variations in pumping rate and duration. A greater data time window will clarify it.

Well 17. As for 15. The best estimate is a decline in water level of 0.3–0.5 m.

Well 26. The indications of gradual depletion are fairly clear but the rate is, again, slow.

Rainfall. Heavier intermittent falls of rain.

KALKA

Well 1. No sign of depletion.

Well 2. No sign of depletion.

Well 3. No sign of depletion.

Rainfall. Similar to Amata.

PIPALYATJARA

Well 95. No sign of depletion.

Well 96. No sign of depletion.

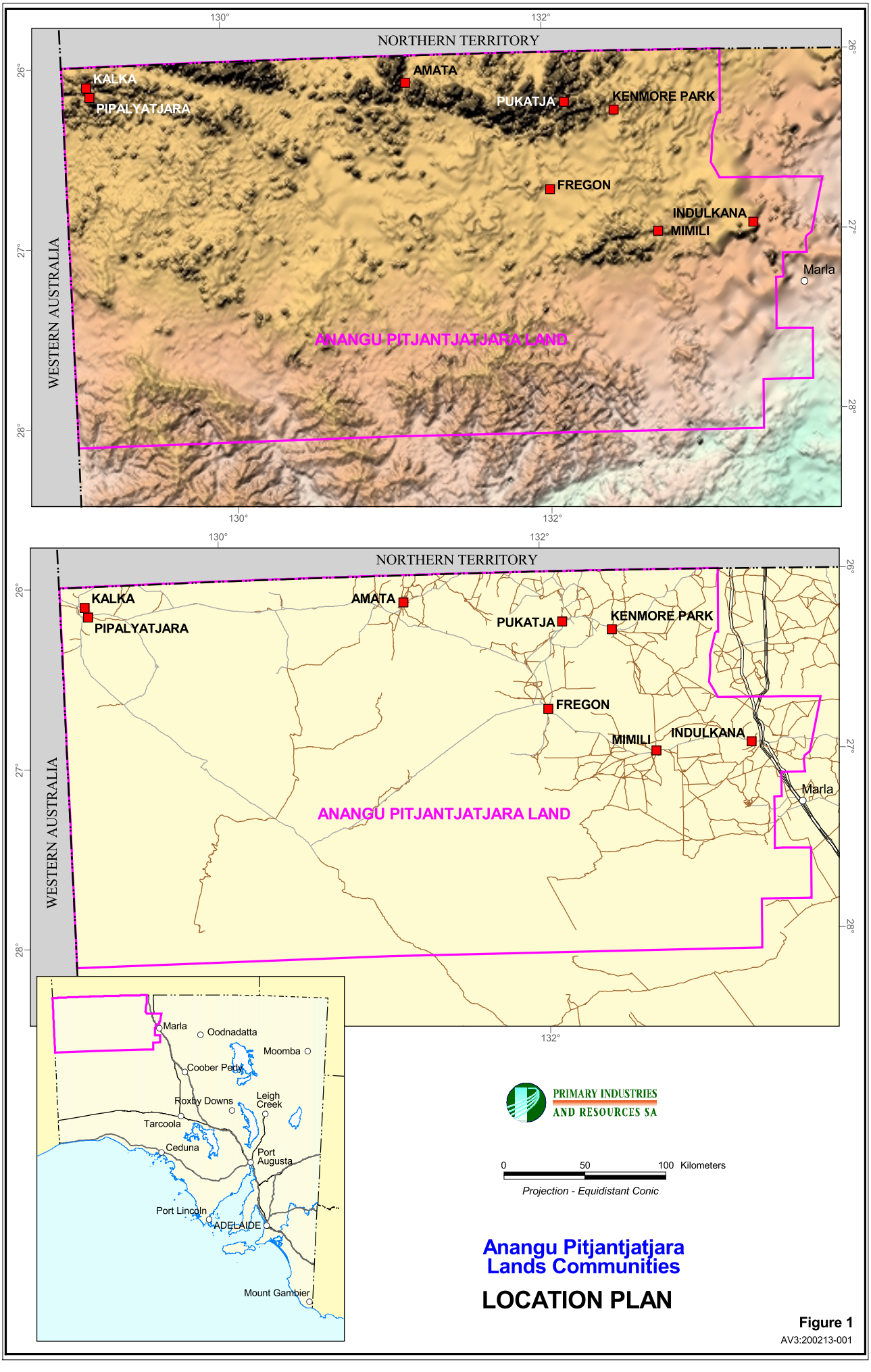
Rainfall. Similar to Kalka.

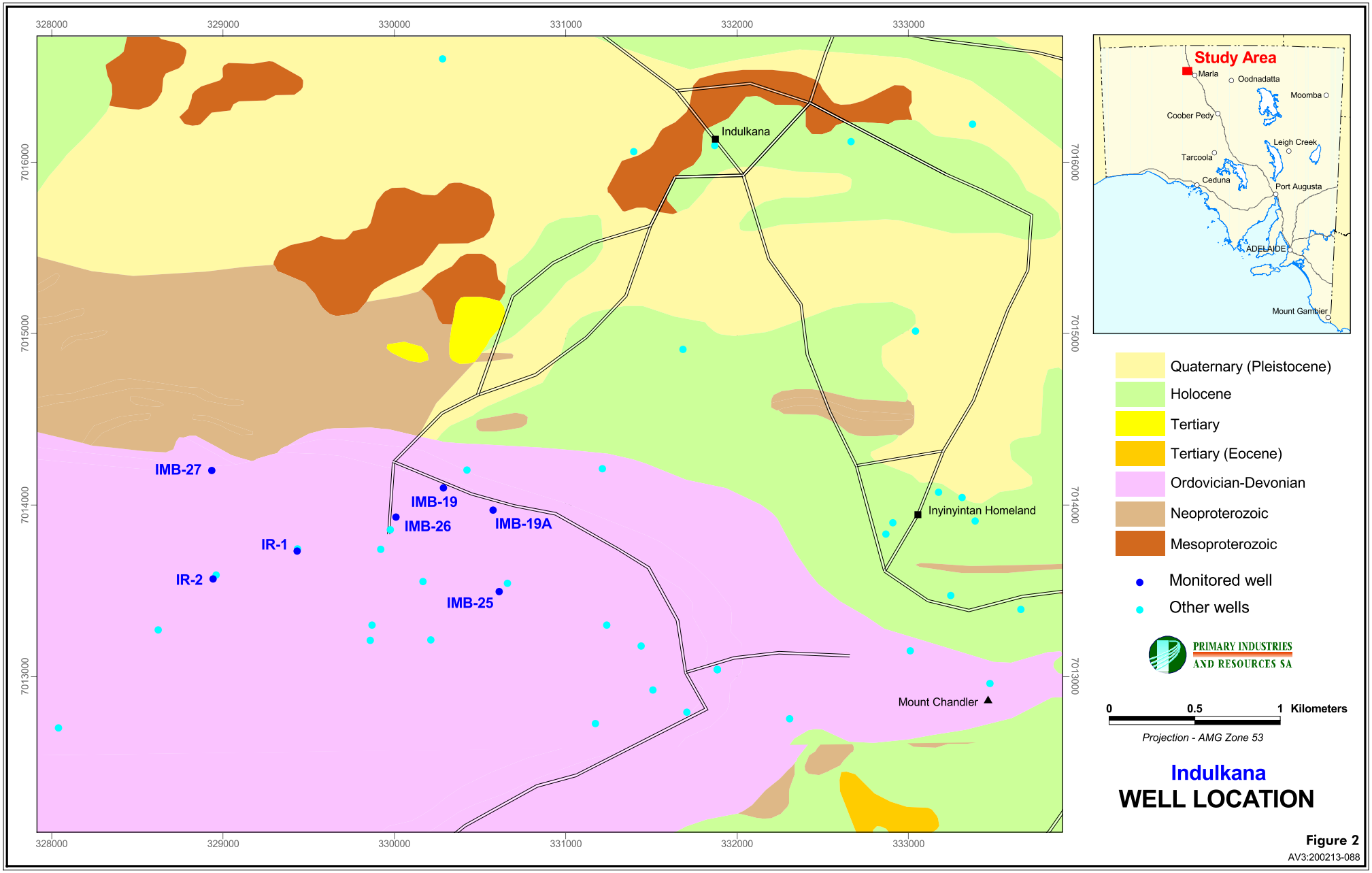
SUMMARY

On a community basis, wells at Mimili, Kalka and Pipalyatjara show no sign of stress or depletion. Those at Fregon, Kenmore Park and Amata show possible signs of depletion, but not such as to be sure over this time period. Indulkana did not show significant depletion (except IMB–27), but all wells have a high drawdown for relatively low pumping rates over short intervals, which has long term sustainability implications. At Ernabella three wells, which were either not pumped or were used very little, all showed a small but significant lowering of SWL, indicating that supplies are limited in this area. Well E–12 went against this trend, showing no depletion in spite of long term pumping at over 1 L/s. There is insufficient information on the two new wells.

It is worth noting the wide range in rainfall figures over this period, from 97.2 mm at Fregon to 342 mm at Pipalyatjara. Overall rainfall was higher in the west than in the east. It will be interesting to note whether this distribution persists in other time periods.

Figures


130°
132°
NORTHERN TERRITORY
WESTERN AUSTRALIA
26°
27°
28°
KALKA
PIPALYATJARA
AMATA
PUKATJA
KENMORE PARK
FREGON
INDULKANA
MIMILI
Marla
ANANGU PITJANTJATJARA LAND
Marla
Oodnadatta
Moomba
Coober Pedy
Roxby Downs
Leigh Creek
Tarcoola
Ceduna
Port Augusta
Port Lincoln
ADELAIDE
Mount Gambier
PRIMARY INDUSTRIES AND RESOURCES SA
0
50
100 Kilometers
Projection - Equidistant Conic
Anangu Pitjantjatjara Lands Communities
LOCATION PLAN
Figure 1
AV3:200213-001


328000
329000
330000
331000
332000
333000
7016000
7015000
7014000
7013000
Indulkana
IMB-27
IMB-19
IMB-26
IMB-19A
IR-1
IR-2
IMB-25
Inyinyintan Homeland
Mount Chandler
Study Area
Marla
Oodnadatta
Moomba
Coober Pedy
Leigh Creek
Tarcoola
Ceduna
Port Augusta
ADELAIDE
Mount Gambier
Quaternary (Pleistocene)
Holocene
Tertiary
Tertiary (Eocene)
Ordovician-Devonian
Neoproterozoic
Mesoproterozoic
Monitored well
Other wells
PRIMARY INDUSTRIES AND RESOURCES SA
0
0.5
1 Kilometers
Projection - AMG Zone 53
Indulkana
WELL LOCATION
Figure 2
AV3:200213-088

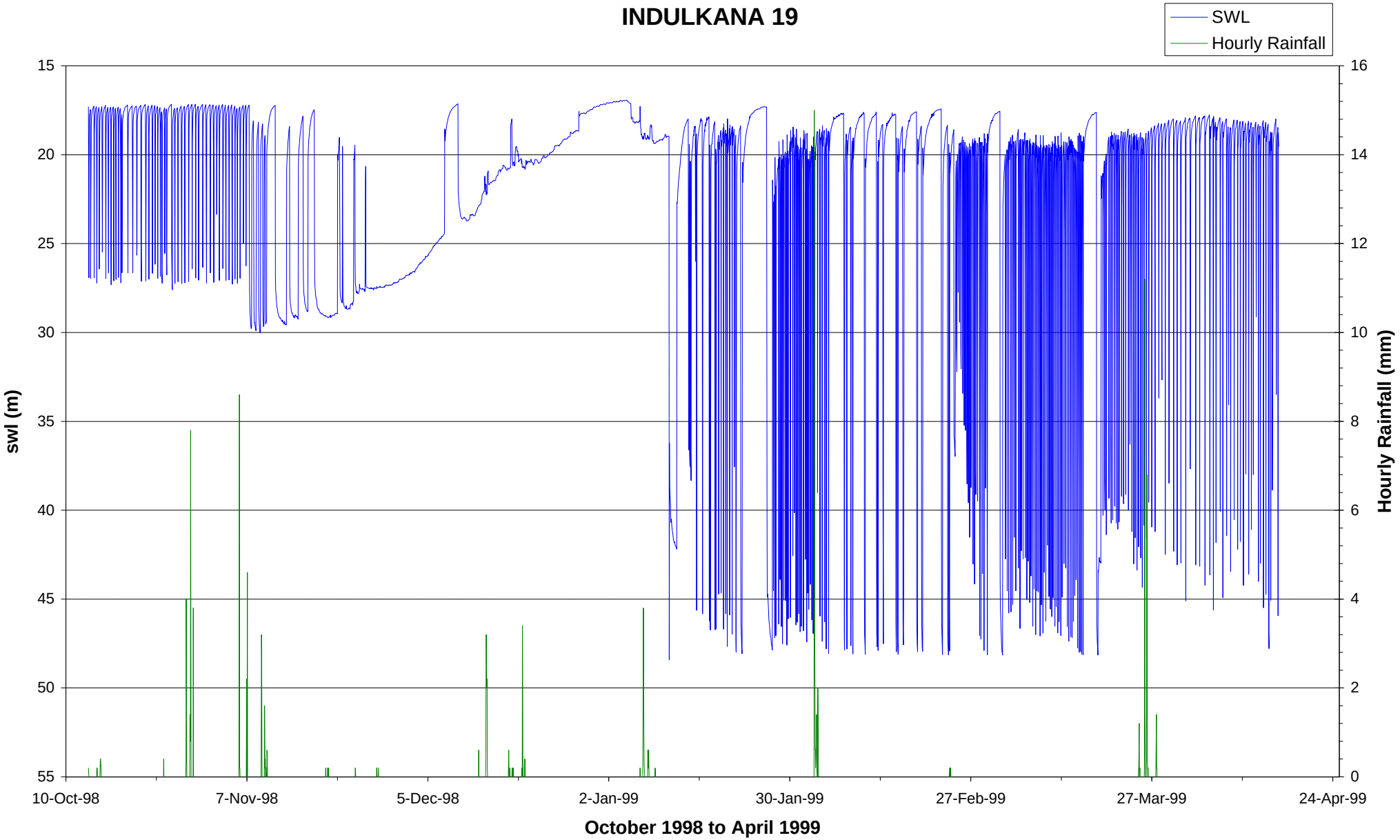


Figure 3 *Indulkana Rainfall - October 1998 to April 1999*

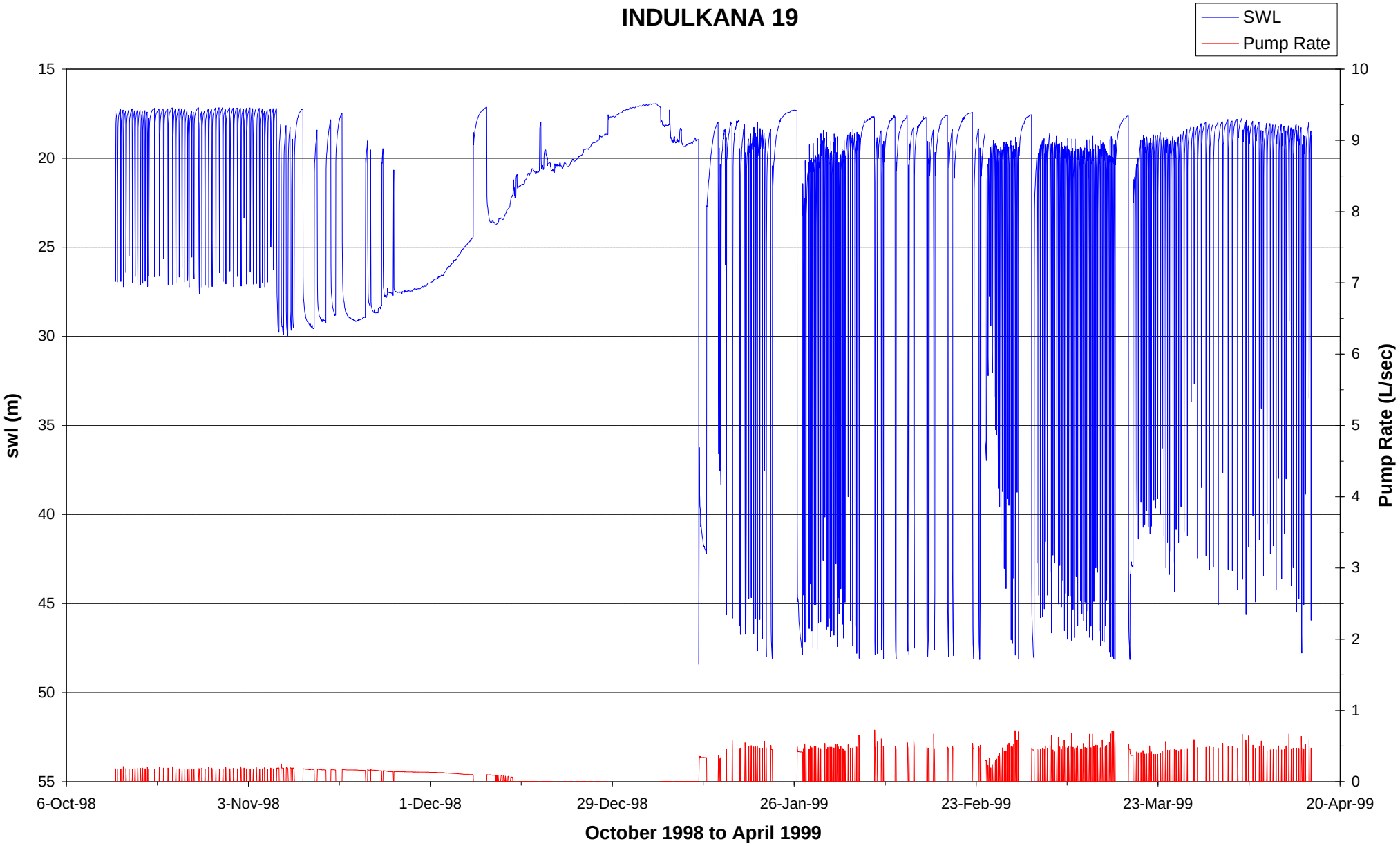


Figure 4 *Indulkana IMB-19; Hourly SWL and Pump Rate*

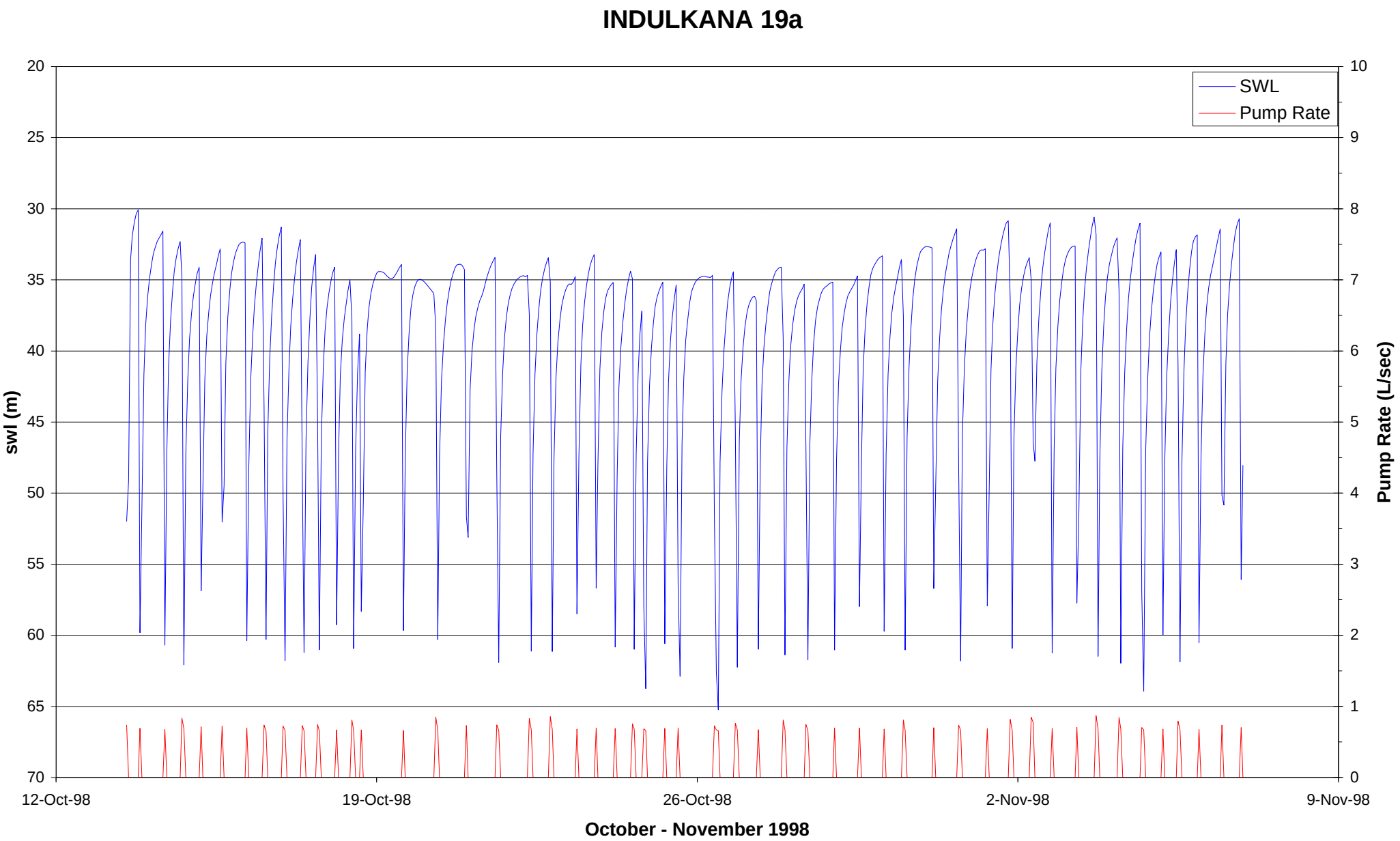


Figure 5 *Indulkana IMB-19A; Hourly SWL and Pump Rate*

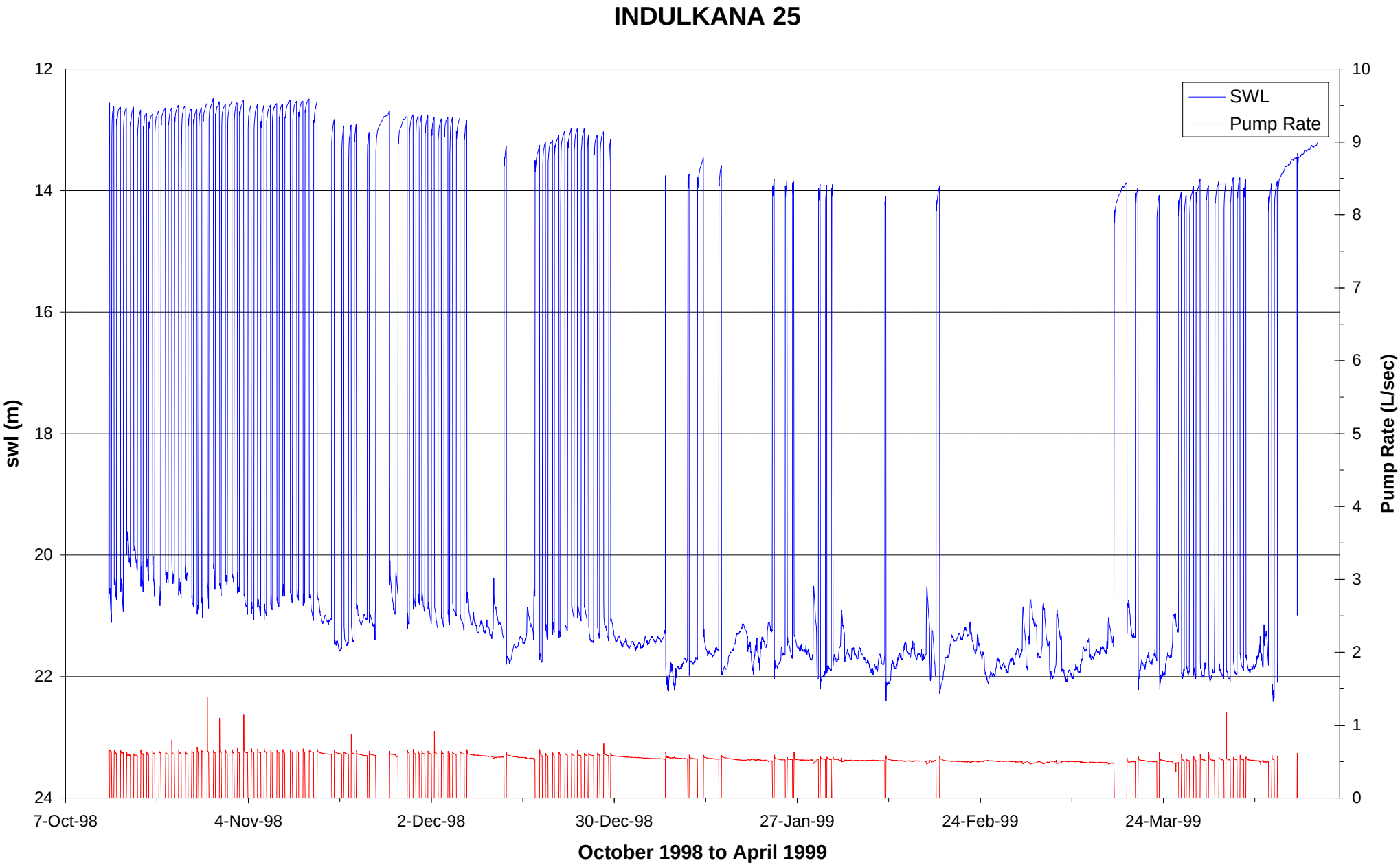


Figure 6 *Indulkana IMB-25; Hourly SWL and Pump Rate*

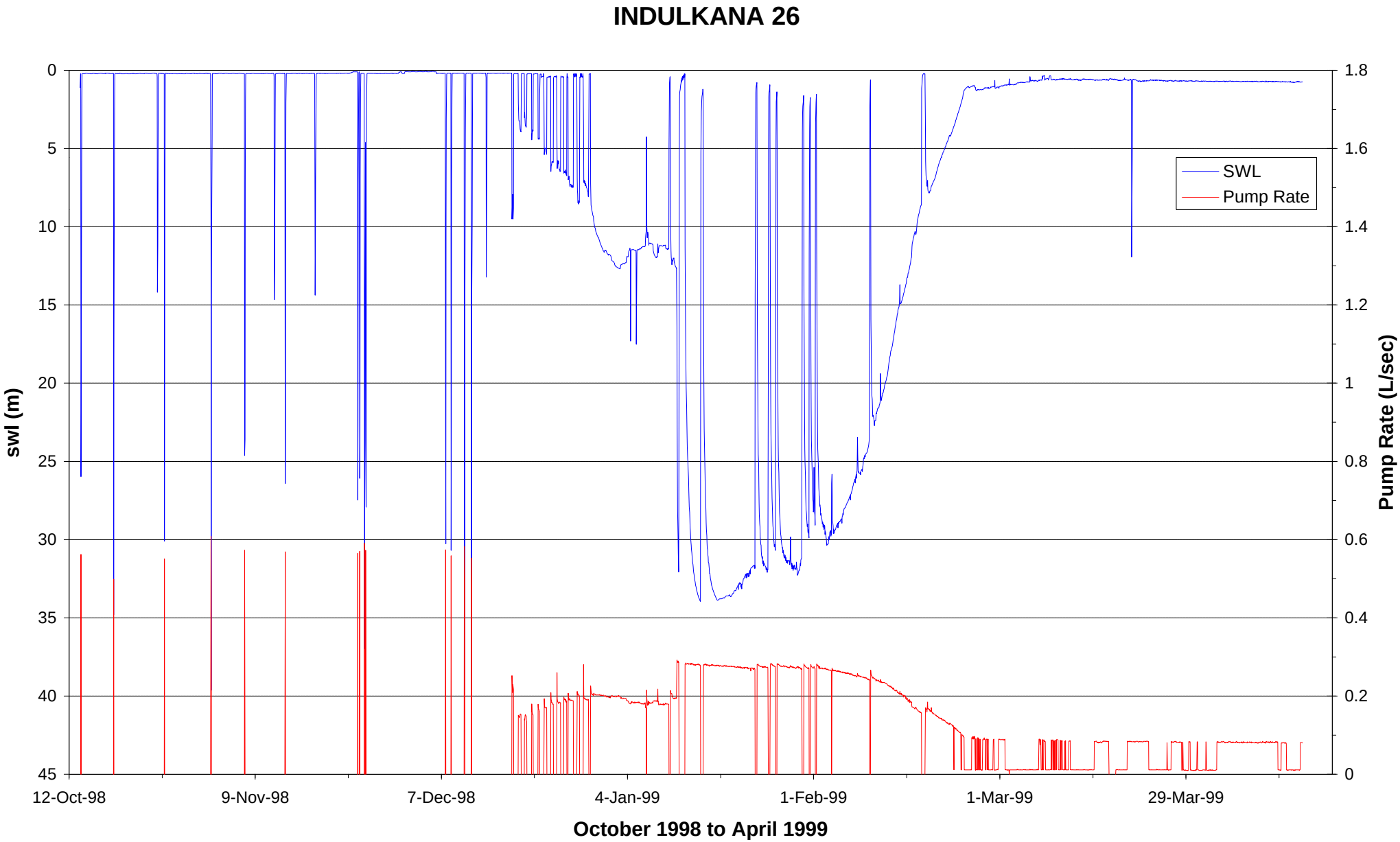


Figure 7 *Indulkana IMB-26; Hourly SWL and Pump Rate*

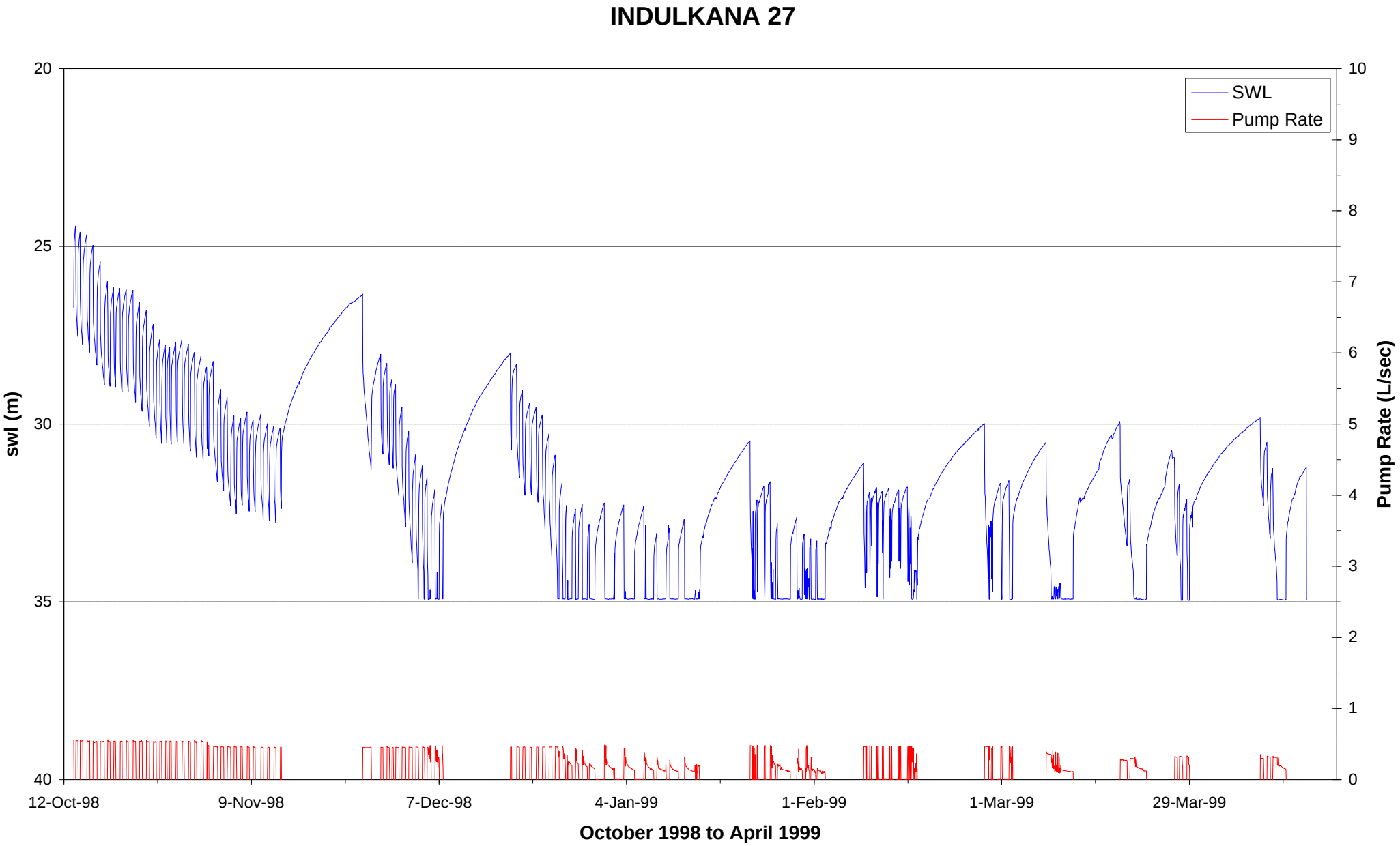
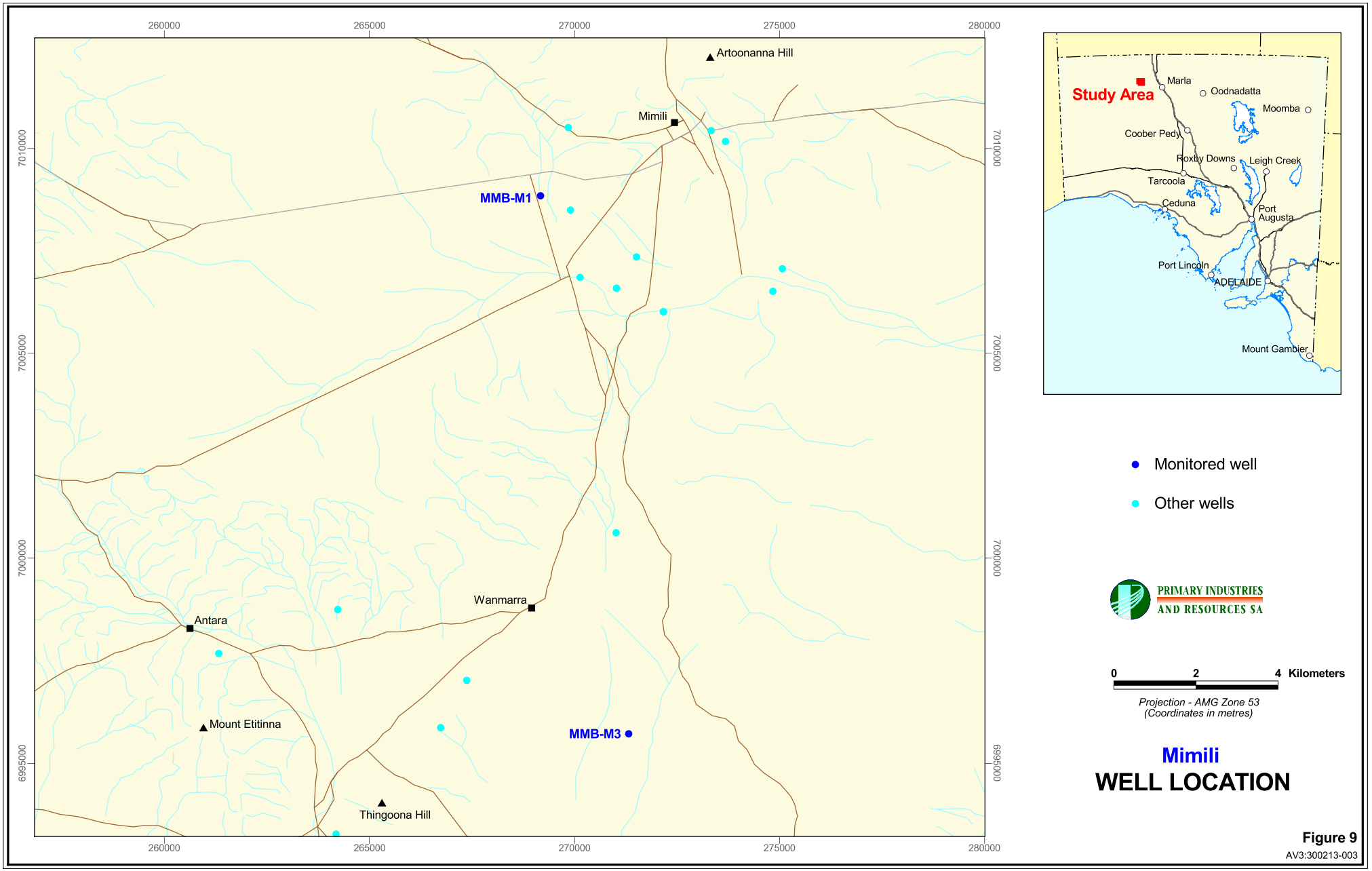


Figure 8 *Indulkana IMB-27; Hourly SWL and Pump Rate*


260000
265000
270000
275000
280000
7010000
7005000
7000000
6995000
Artoonanna Hill
Mimili
MMB-M1
Wanmarra
Antara
Mount Etitinna
MMB-M3
Thingoona Hill
Study Area
Marla
Oodnadatta
Moomba
Coober Pedy
Roxby Downs
Leigh Creek
Tarcoola
Ceduna
Port Augusta
Port Lincoln
ADELAIDE
Mount Gambier
Monitored well
Other wells
PRIMARY INDUSTRIES AND RESOURCES SA
0
2
4 Kilometers
Projection - AMG Zone 53
(Coordinates in metres)
Mimili
WELL LOCATION
Figure 9
AV3:300213-003

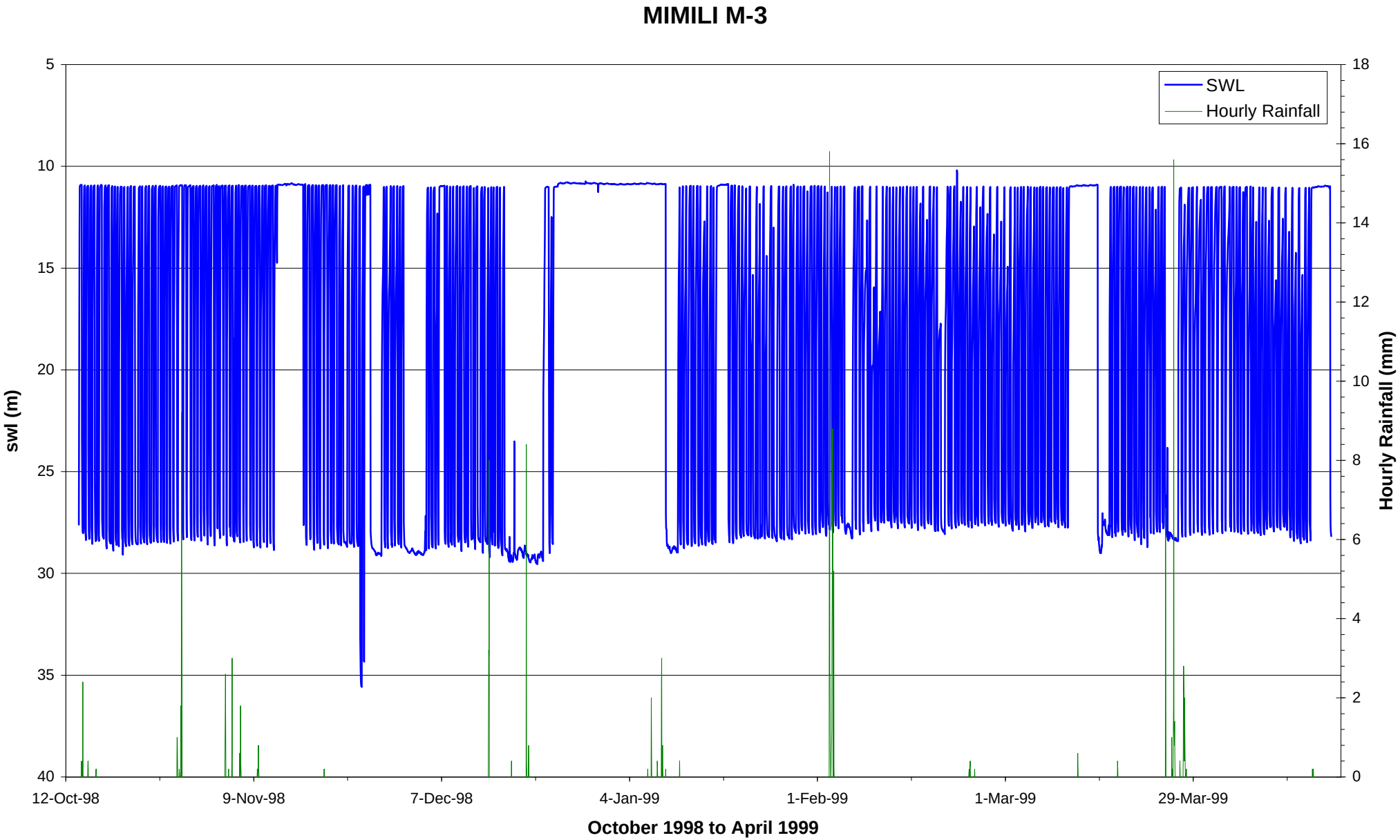


Figure 10 *Mimili Rainfall - October 1998 to April 1999*

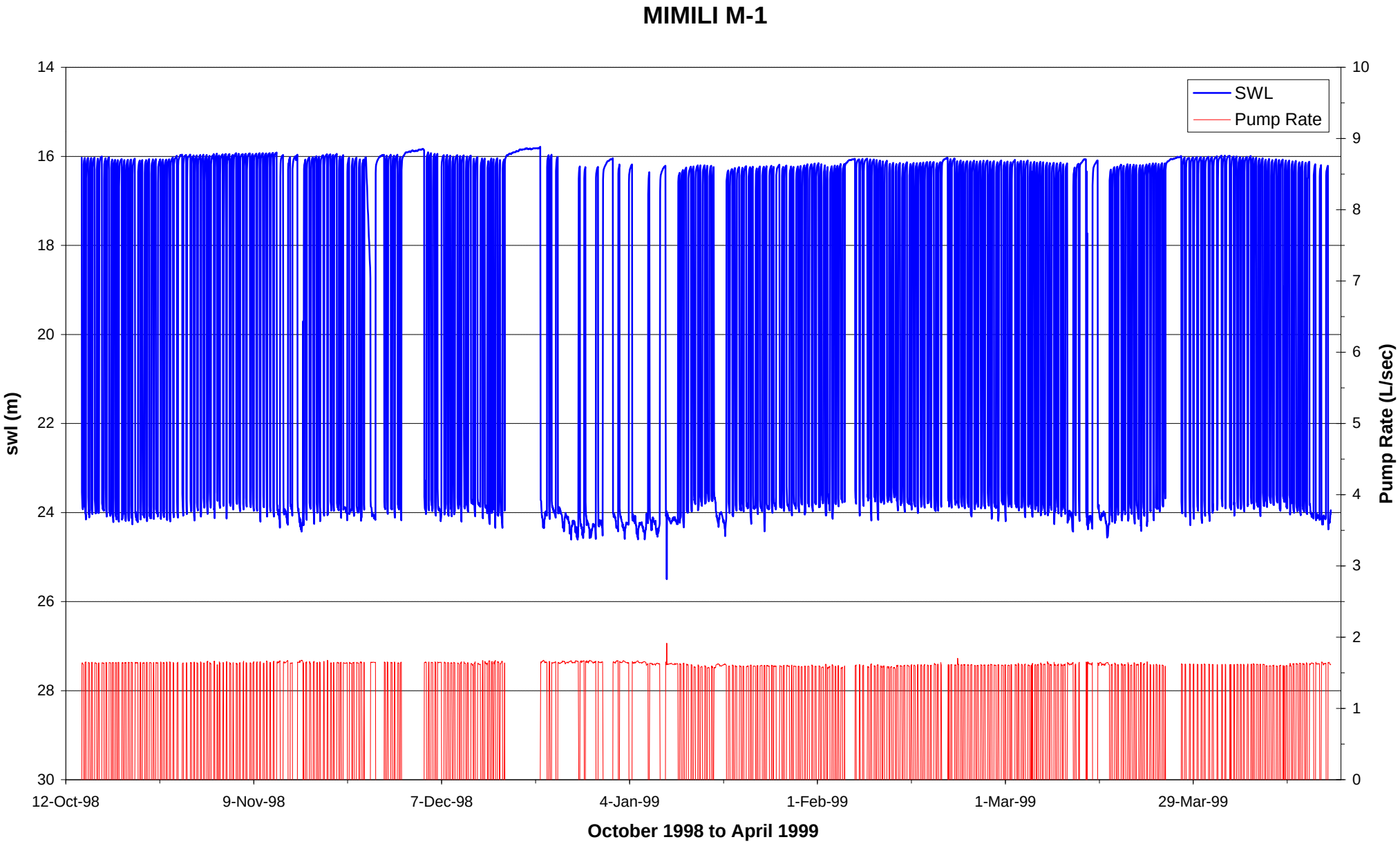


Figure 11 *Mimili M-1; Hourly SWL and Pump Rate*

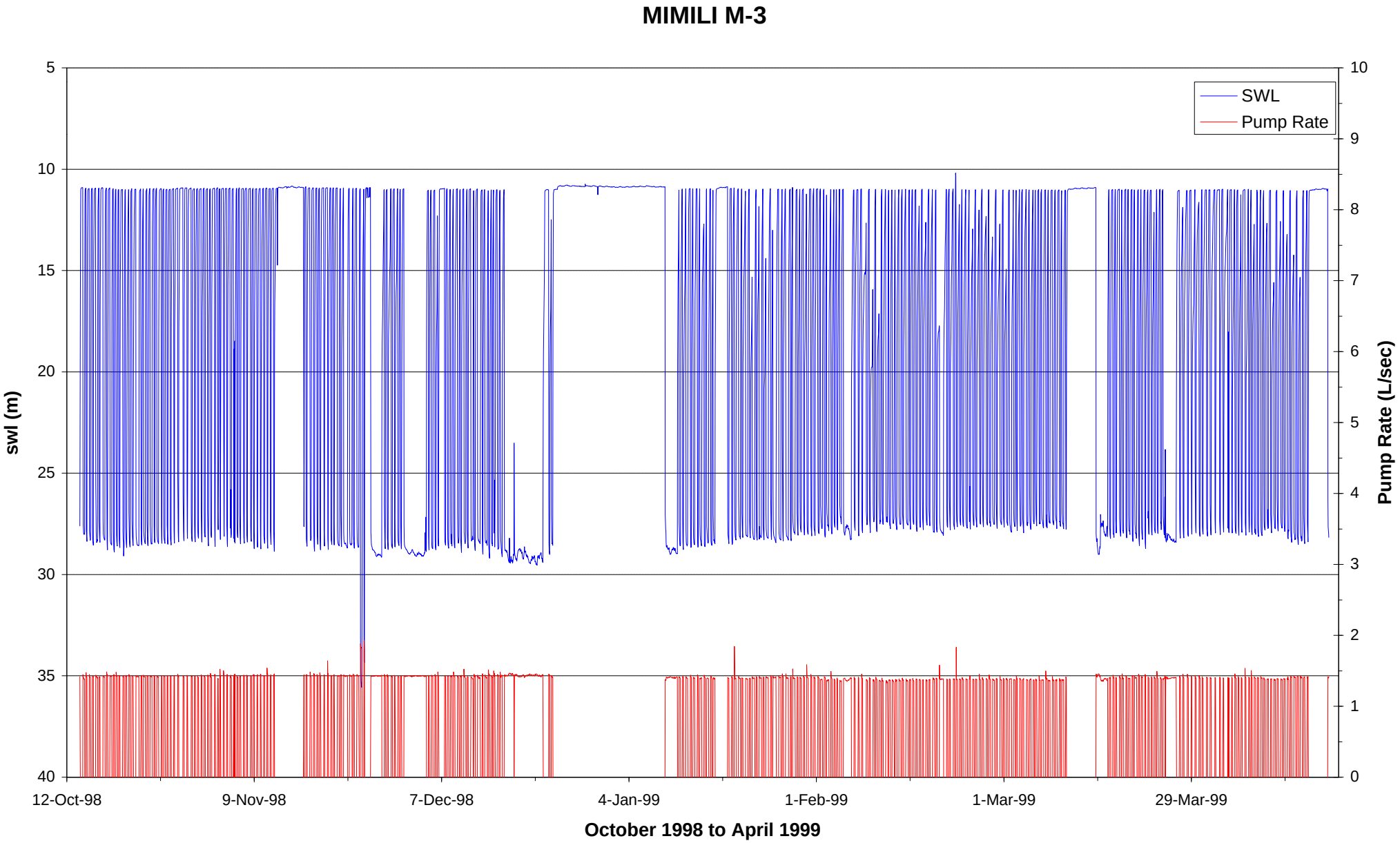
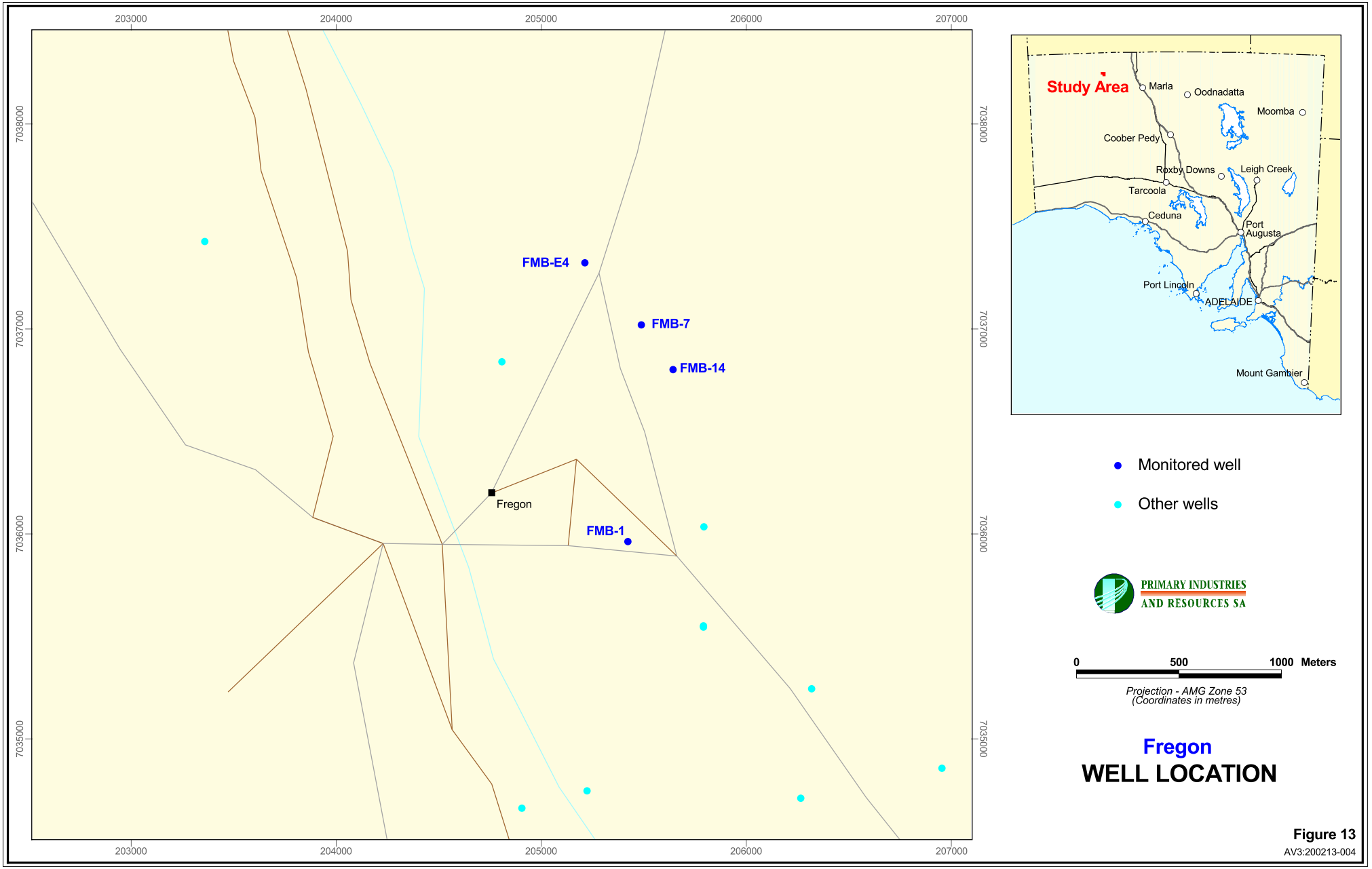


Figure 12 *Mimili M-3; Houlry SWL and Pump Rate*


203000
204000
205000
206000
207000
7038000
7037000
7036000
7035000
FMB-E4
FMB-7
FMB-14
FMB-1
Fregon
Study Area
Marla
Oodnadatta
Moomba
Coober Pedy
Roxby Downs
Leigh Creek
Tarcoola
Ceduna
Port Augusta
Port Lincoln
ADELAIDE
Mount Gambier
Monitored well
Other wells
PRIMARY INDUSTRIES AND RESOURCES SA
0
500
1000 Meters
Projection - AMG Zone 53
(Coordinates in metres)
Fregon
WELL LOCATION
Figure 13
AV3:200213-004

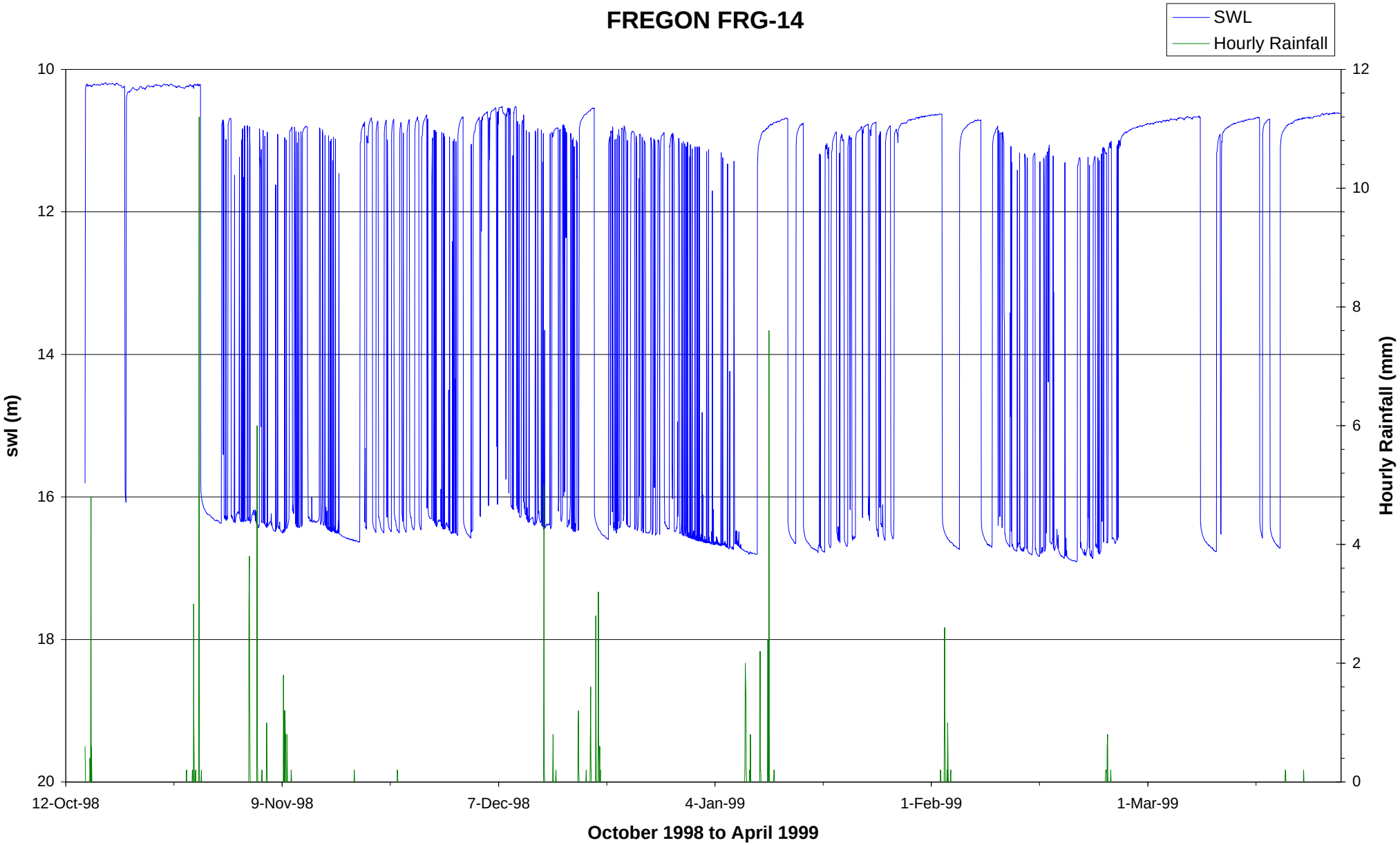


Figure 14 *Fregon Rainfall - October 1998 to April 1999*

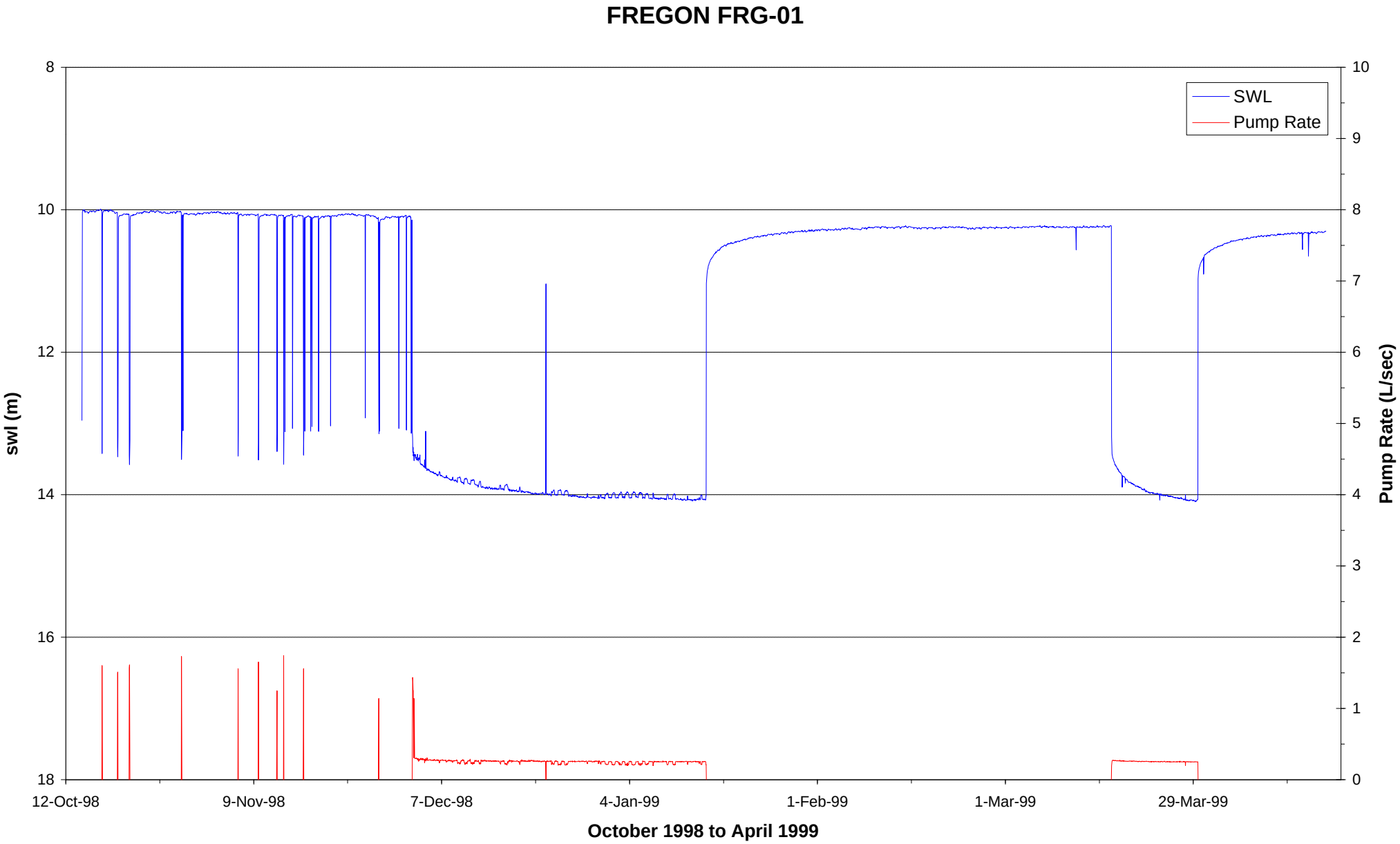


Figure 15 *Fregon FRG-1; Hourly SWL and Pump Rate*

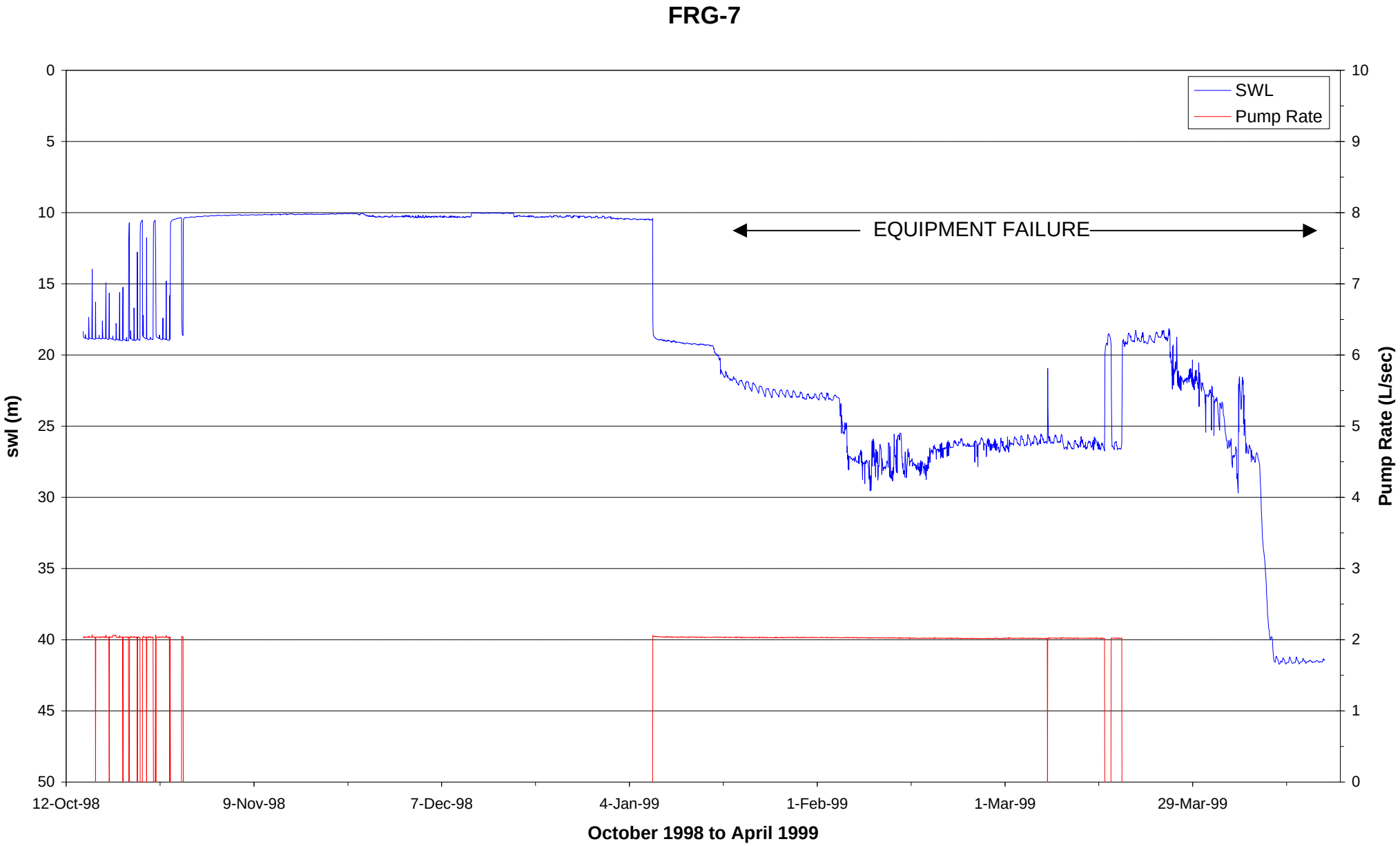


Figure 16 *Fregon FRG-7; Hourly SWL and Pump Rate*

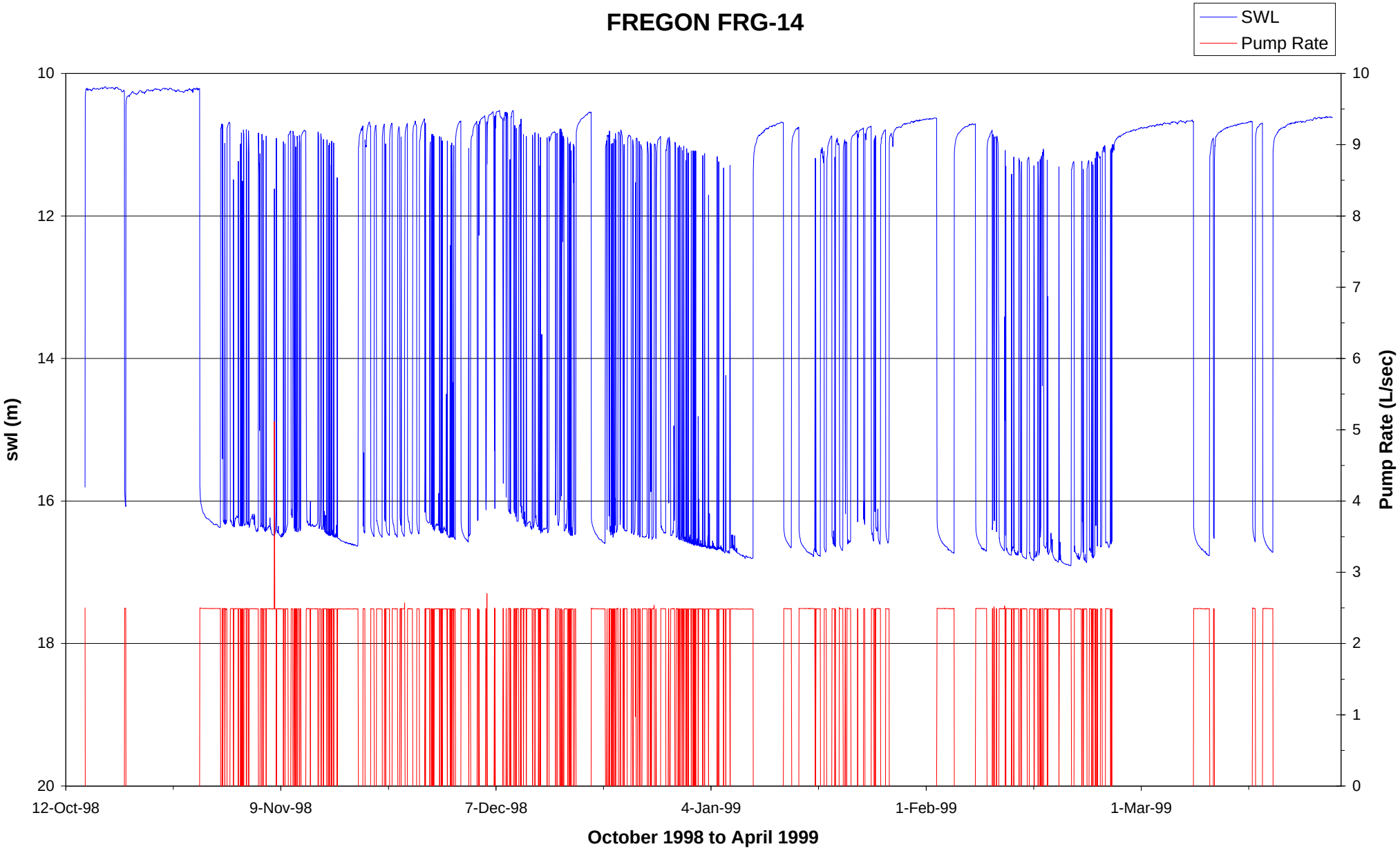


Figure 17 *Fregon FRG-14; Hourly SWL and Pump Rate*

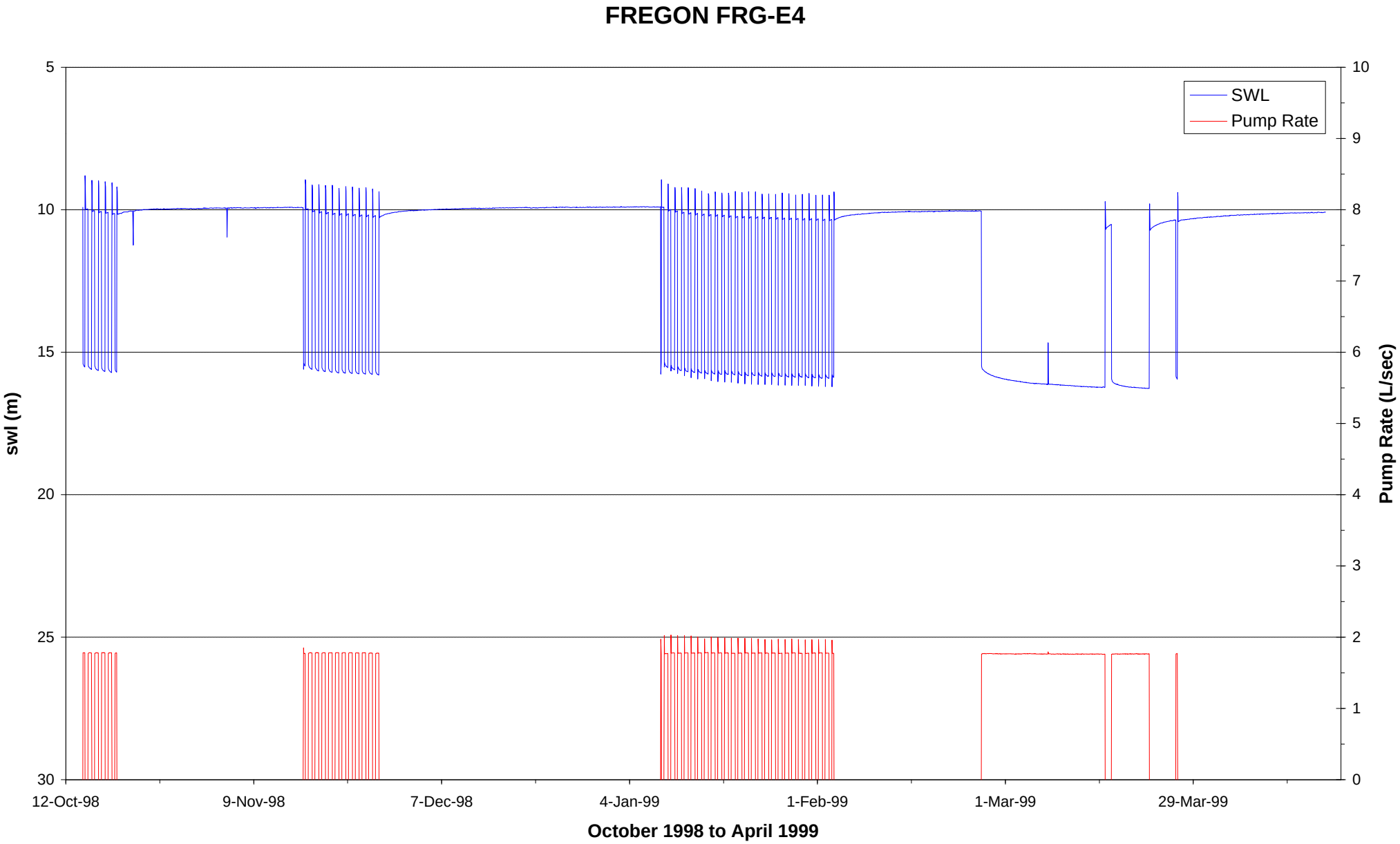
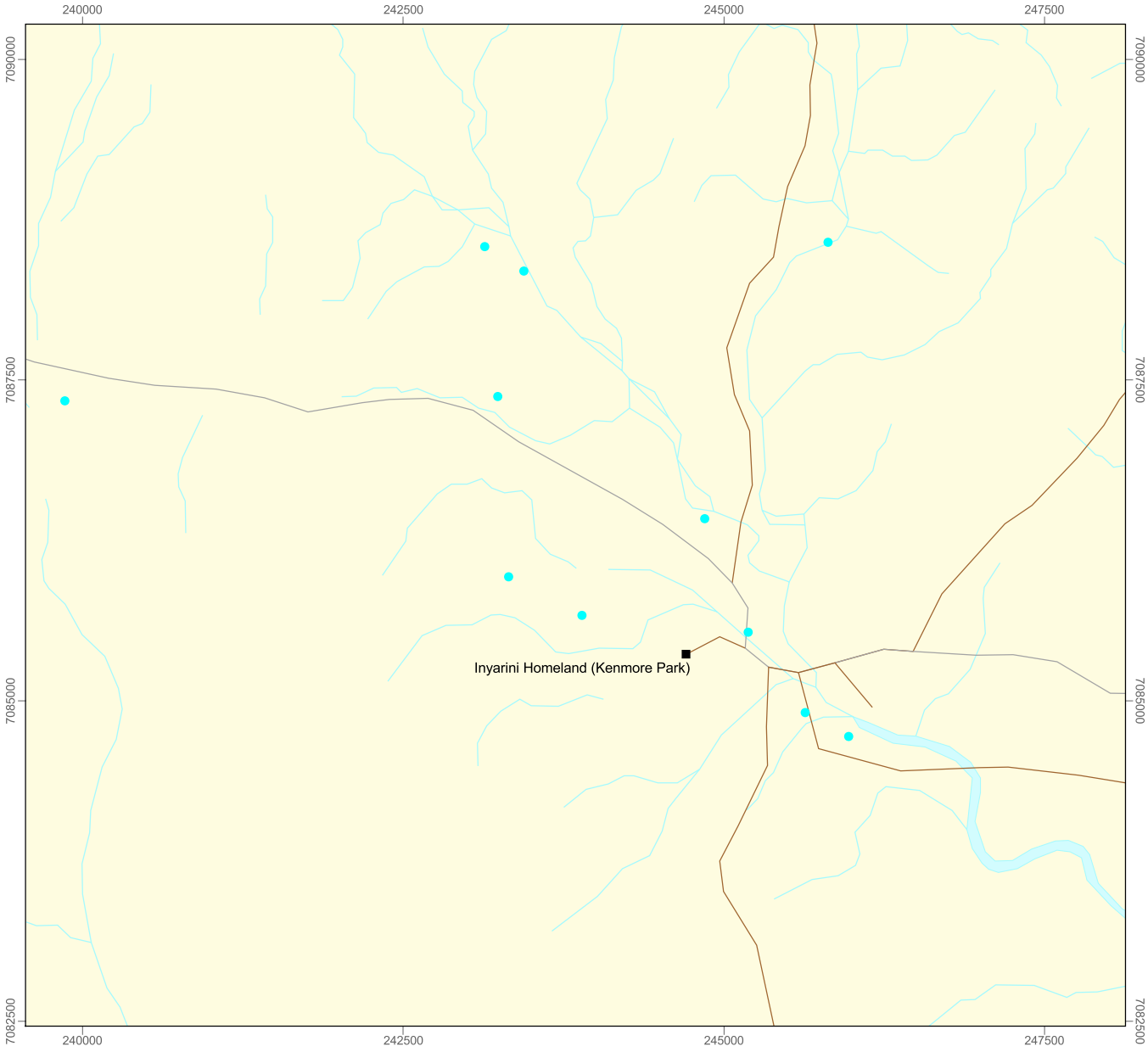


Figure 18 *Fregon FRG-E4; Hourly SWL and Pump Rate*



- Monitored well
- Other wells

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0 1 2 Kilometers

Projection - AMG Zone 53
(Coordinates in metres)

Kenmore Park
WELL LOCATION

Figure 19

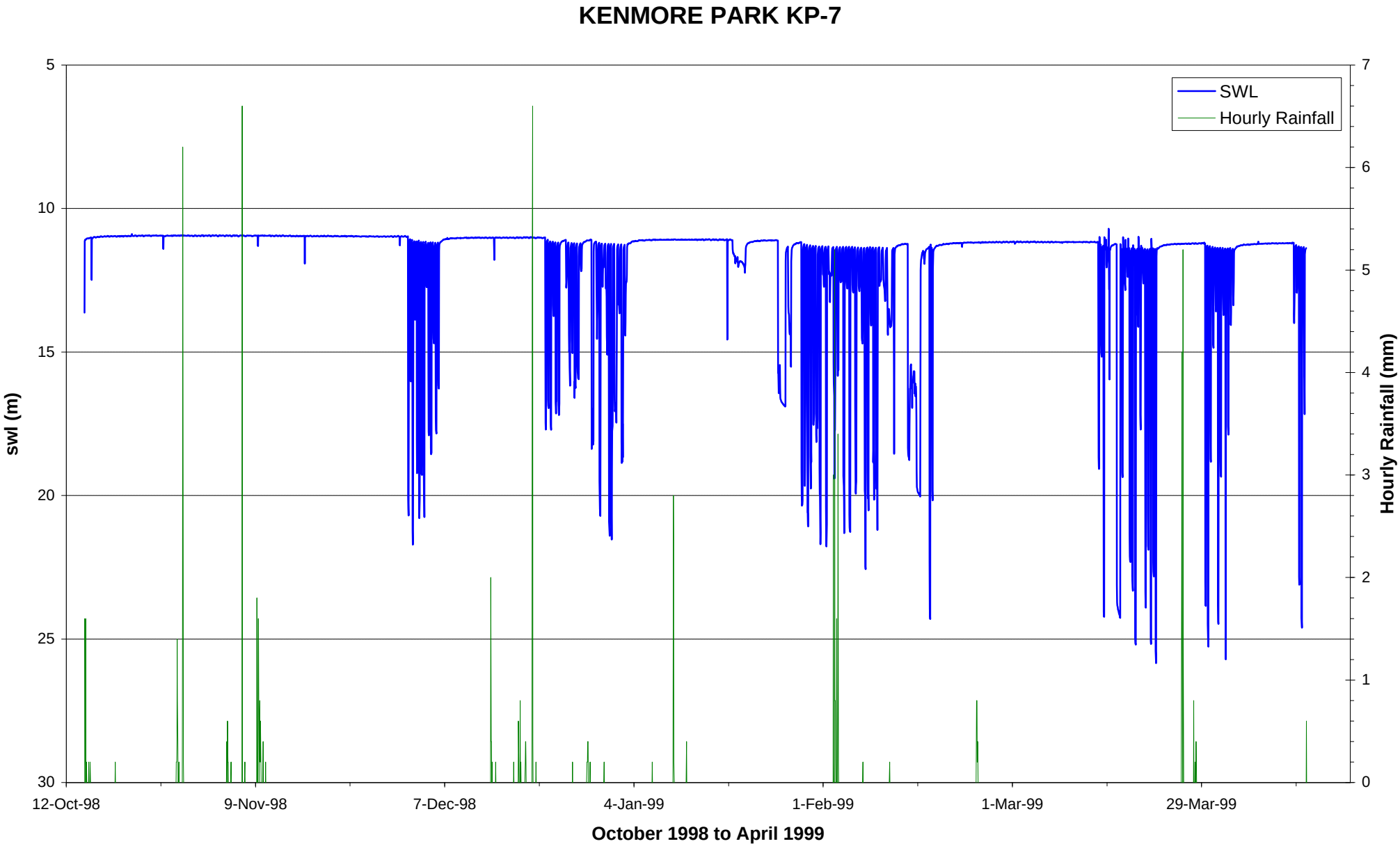


Figure 20 *Kenmore Park Rainfall - October 1998 to April 1999*

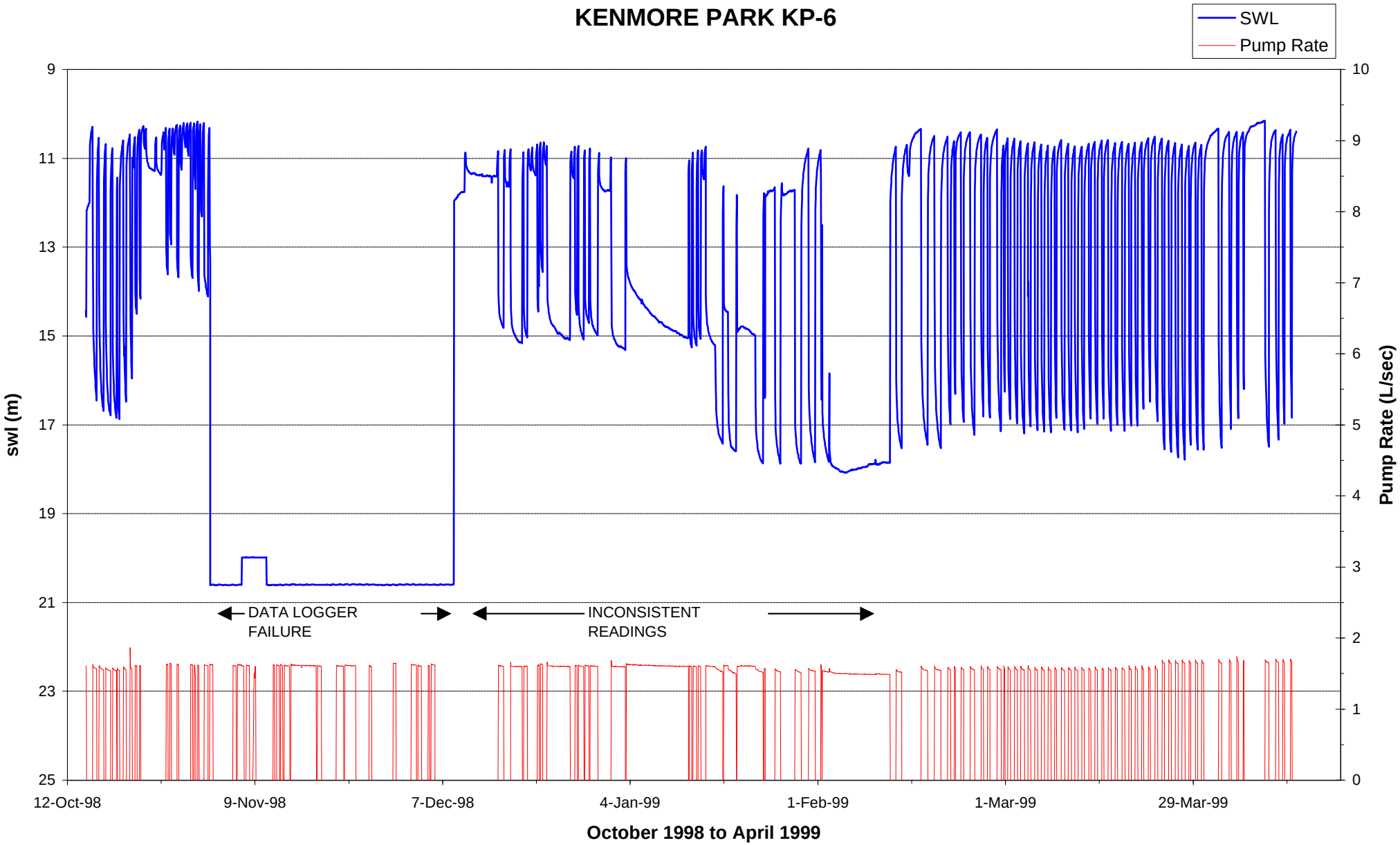


Figure 21 *Kenmore Park KP-6; Hourly SWL and Pump Rate*

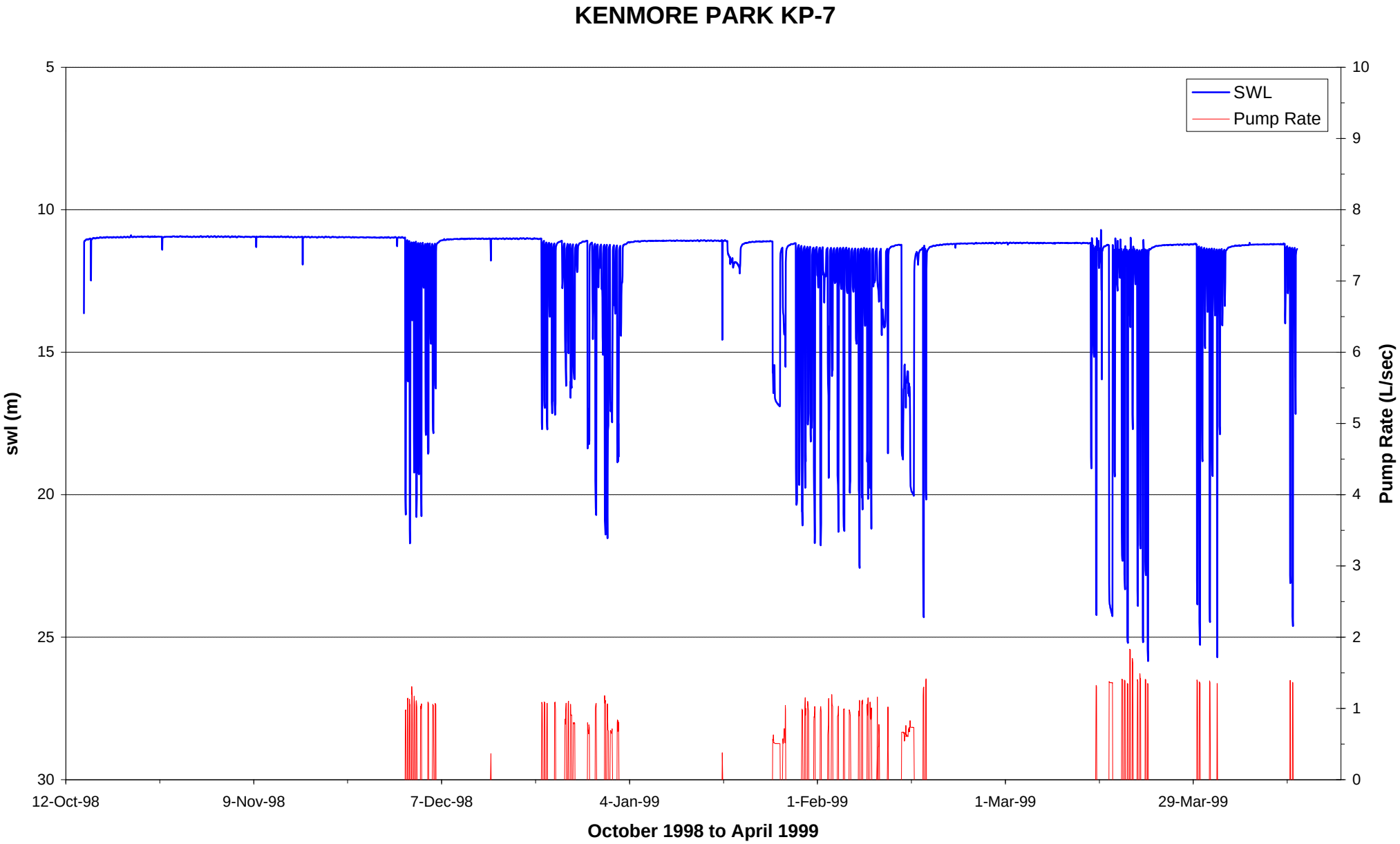
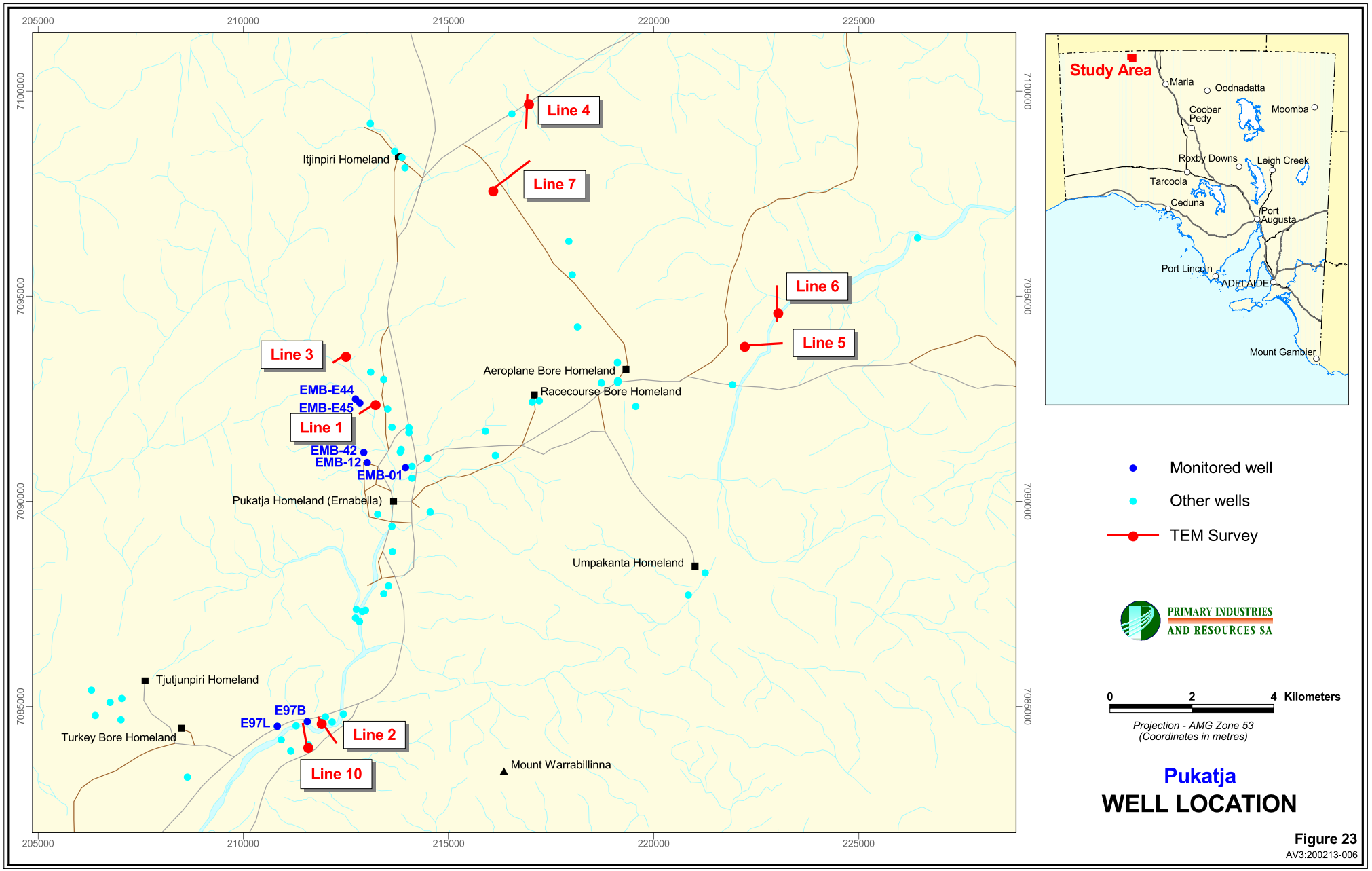


Figure 22 *Kenmore Park KP-7; Hourly SWL and Pump Rate*



Pukatja
WELL LOCATION

Figure 23
AV3:200213-006

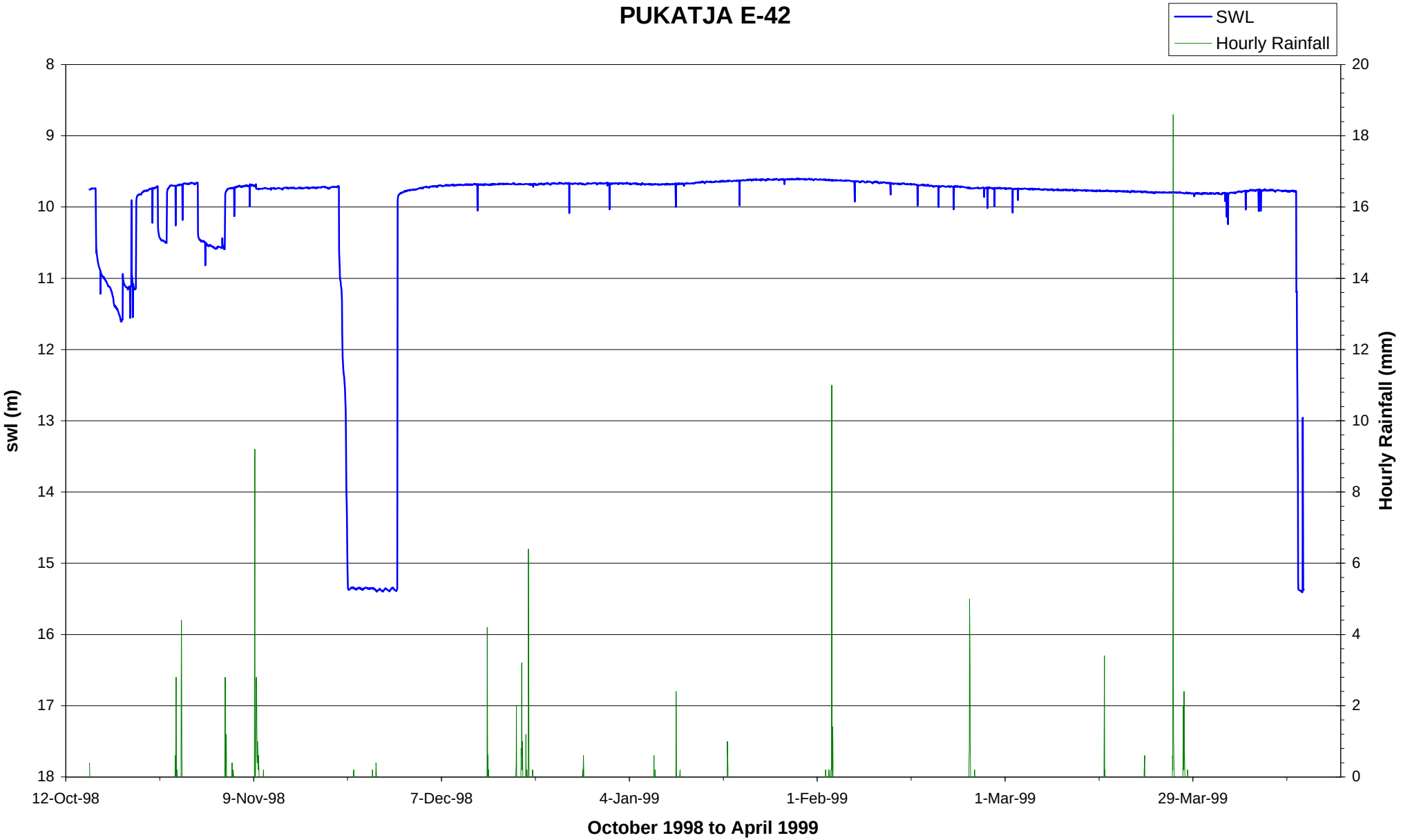


Figure 24 *Pukatja Rainfall - October 1998 to April 1999*

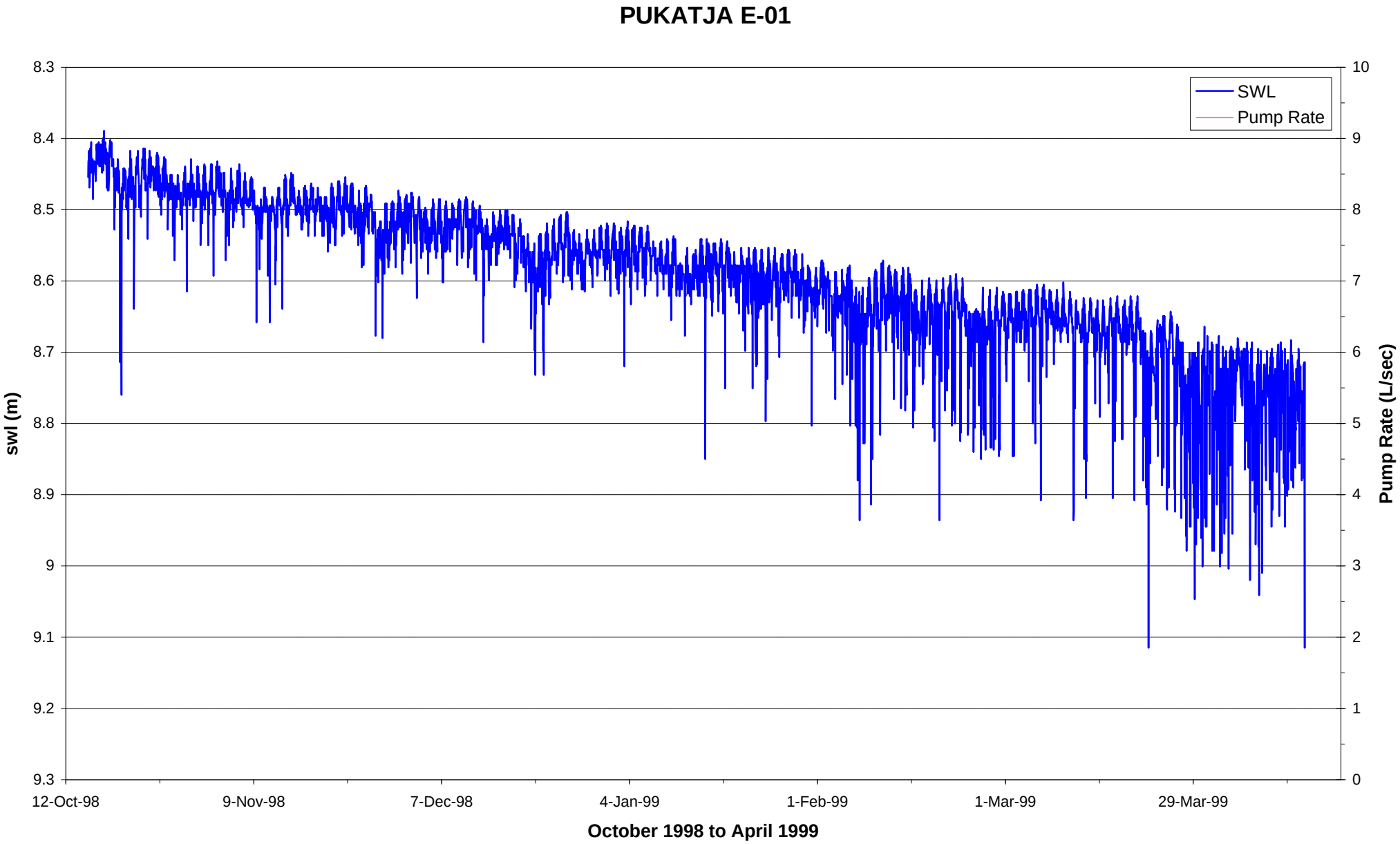


Figure 25 *Pukatja E-1; Hourly SWL and Pump Rate*

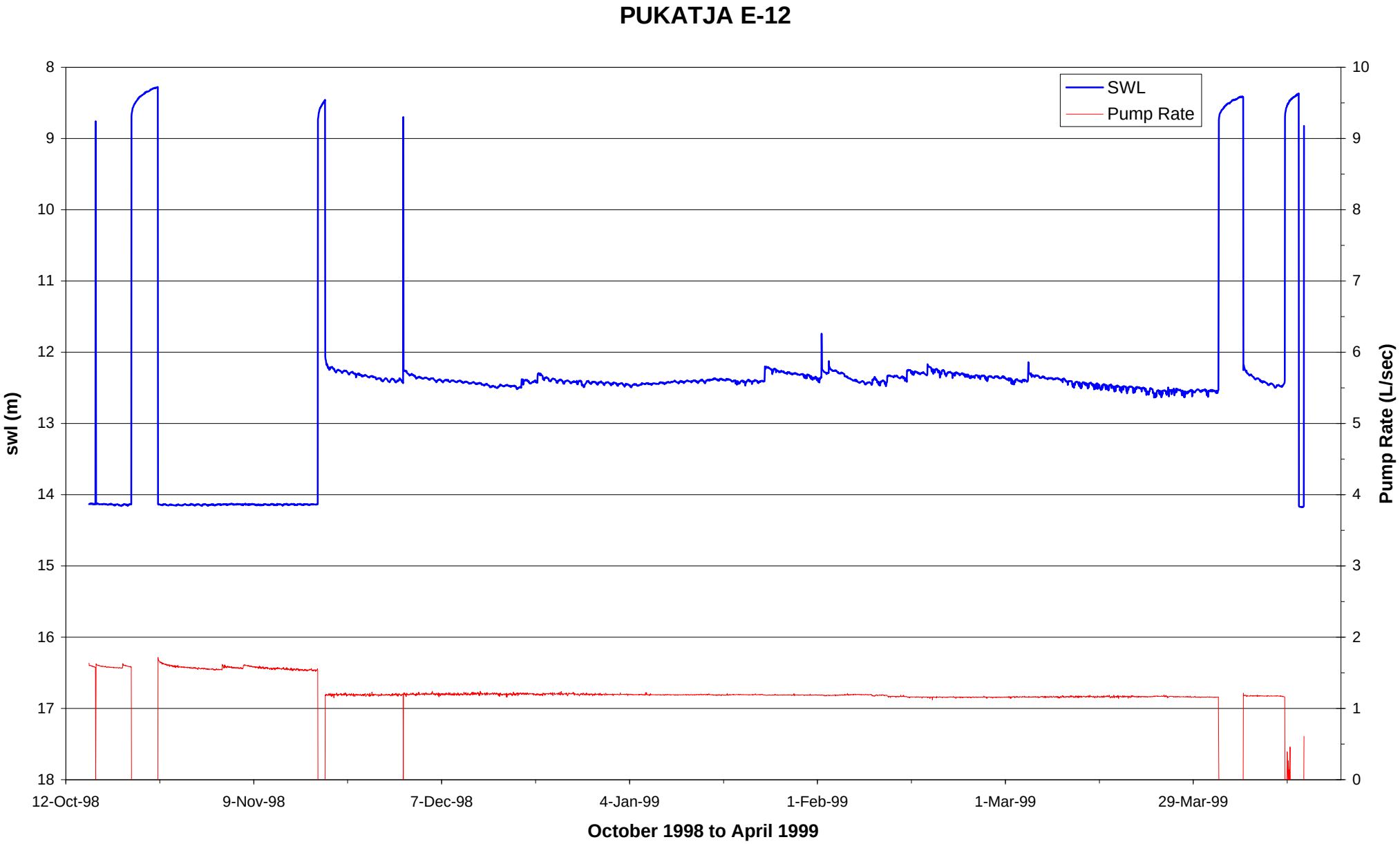


Figure 26 *Pukatja E-12; Hourly SWL and Pump Rate*

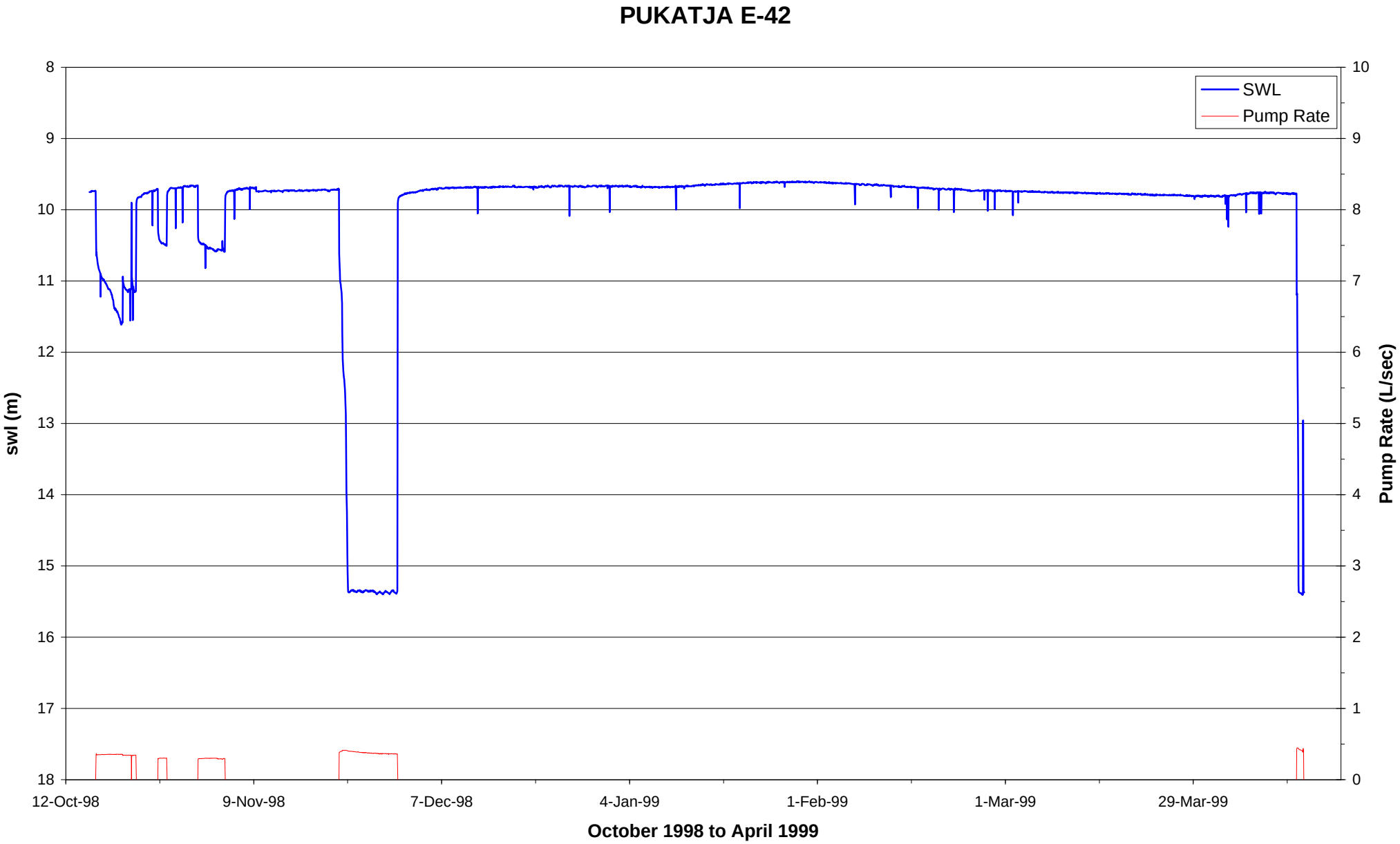


Figure 27 *Pukatja E-42; Hourly SWL and Pump Rate*

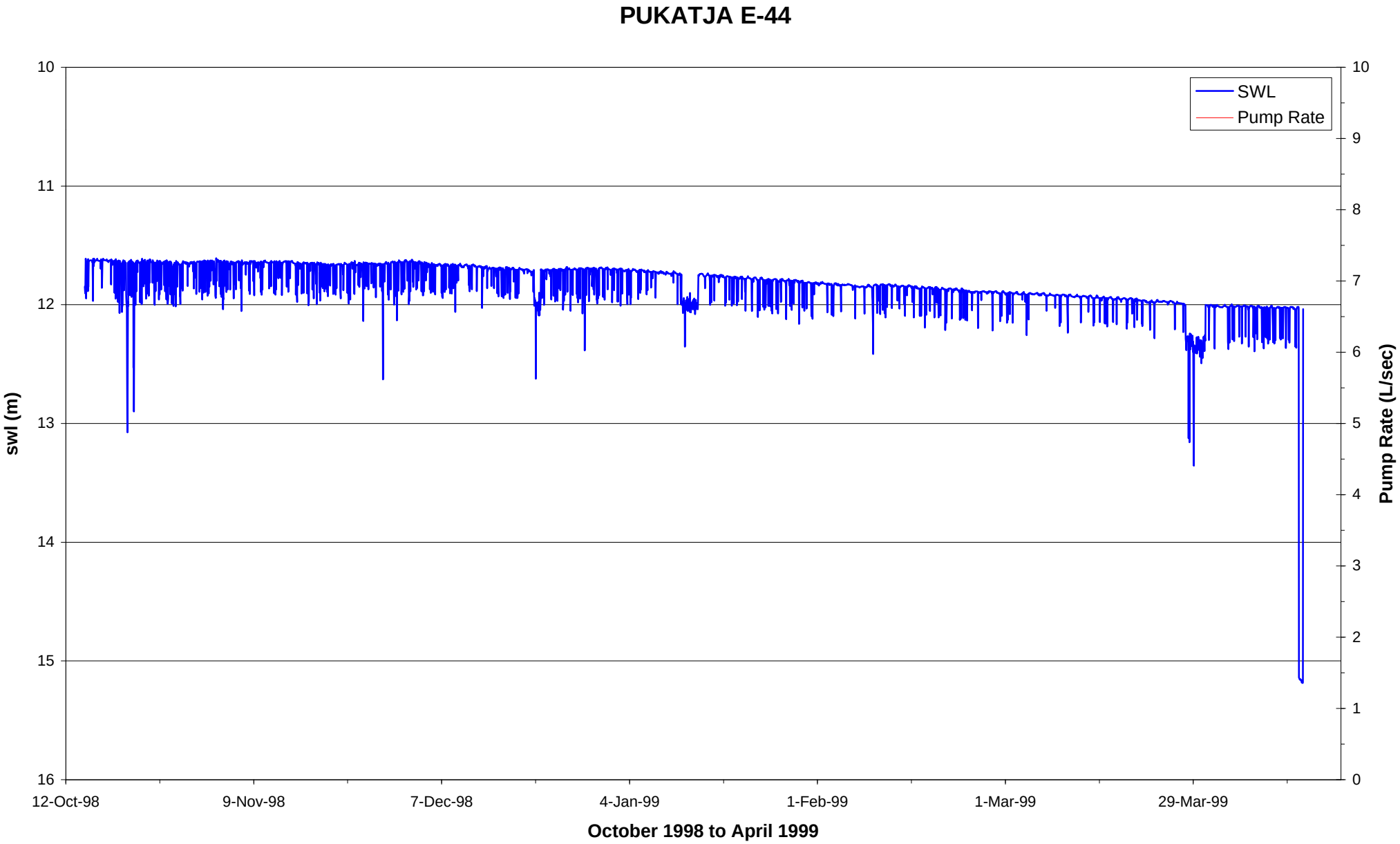


Figure 28 *Pukatja E-44; Hourly SWL and Pump Rate*

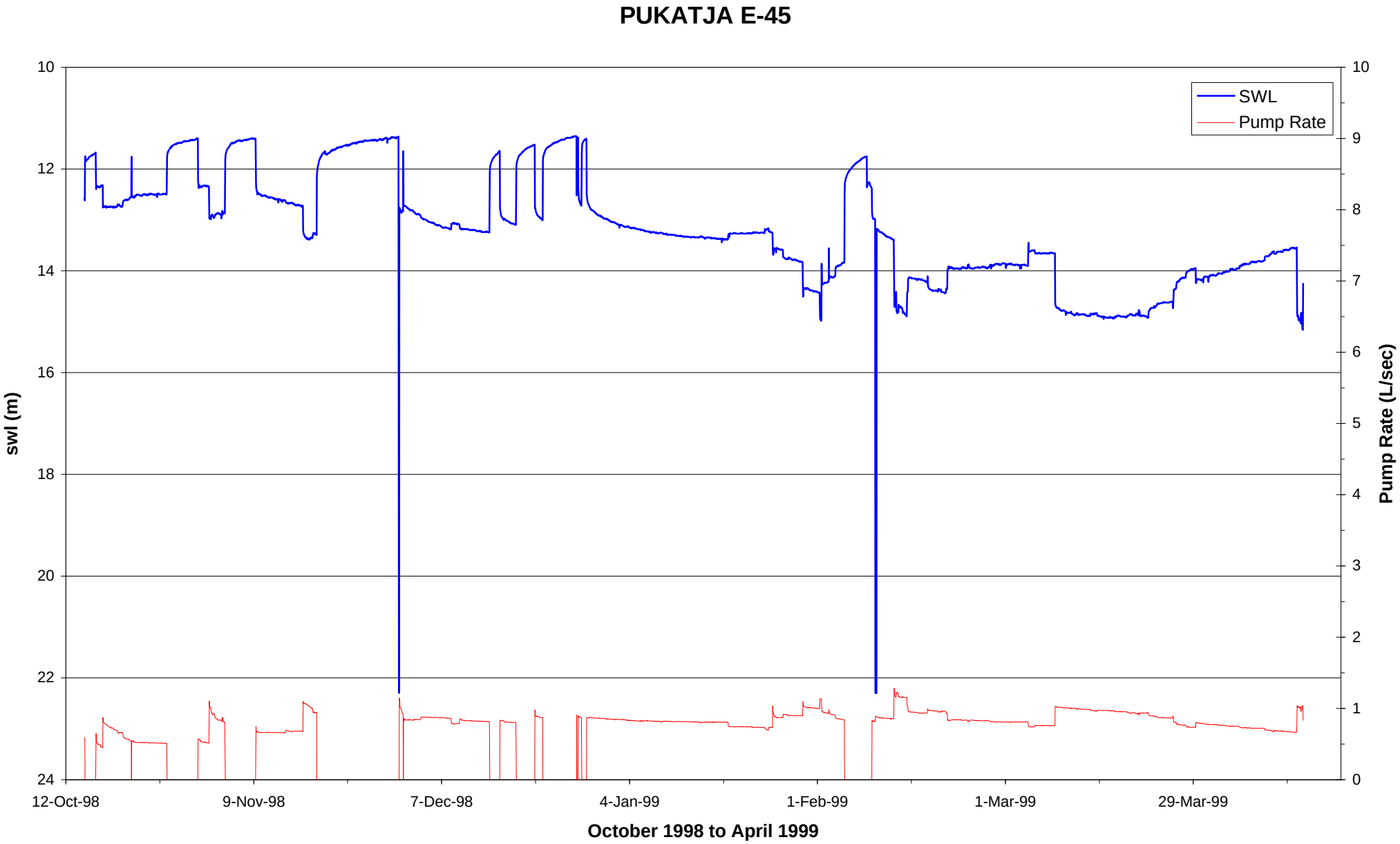


Figure 29 *Pukatja E-45; Hourly SWL and Pump Rate*

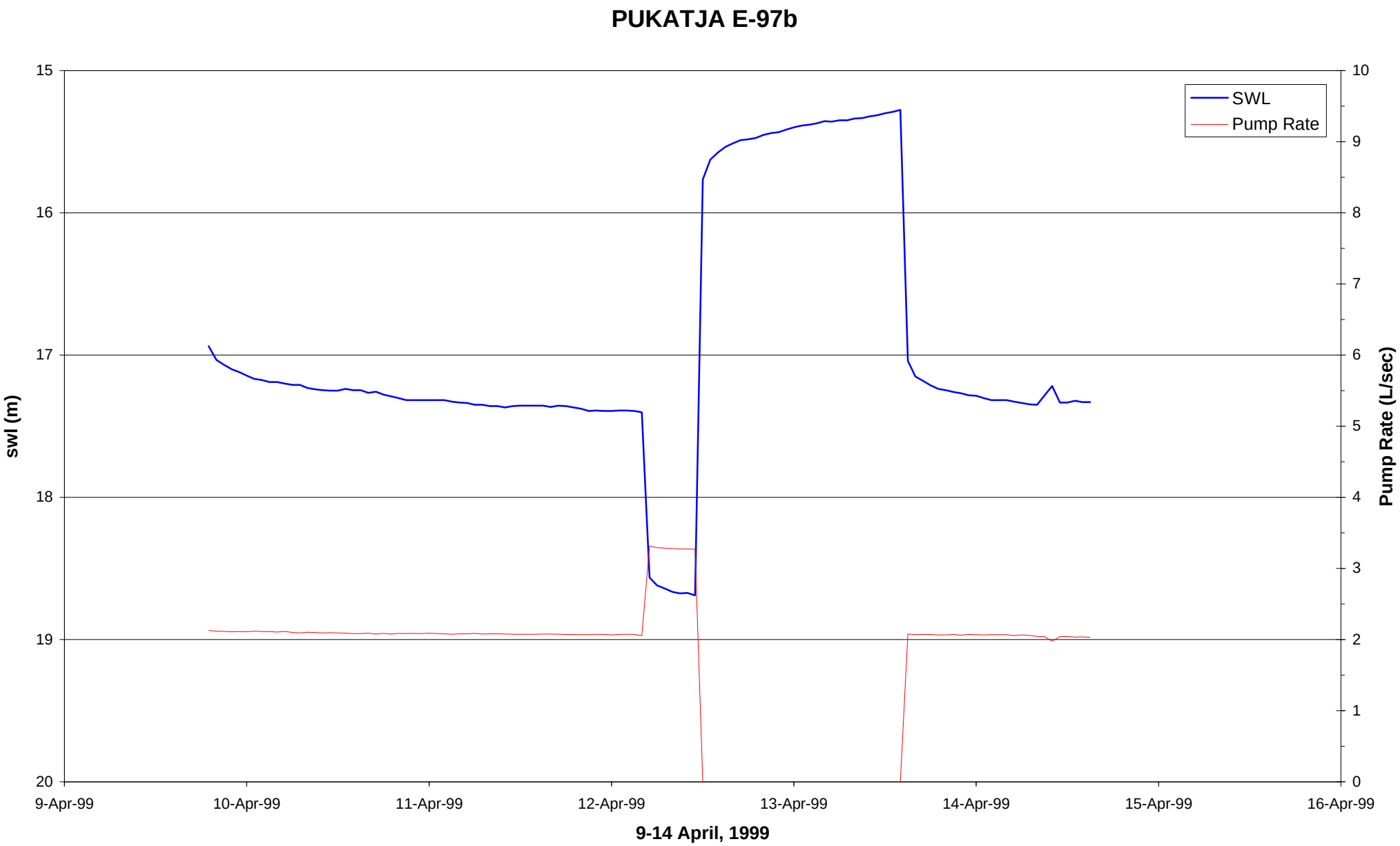


Figure 30 *Pukatja E-97B; Hourly SWL and Pump Rate*

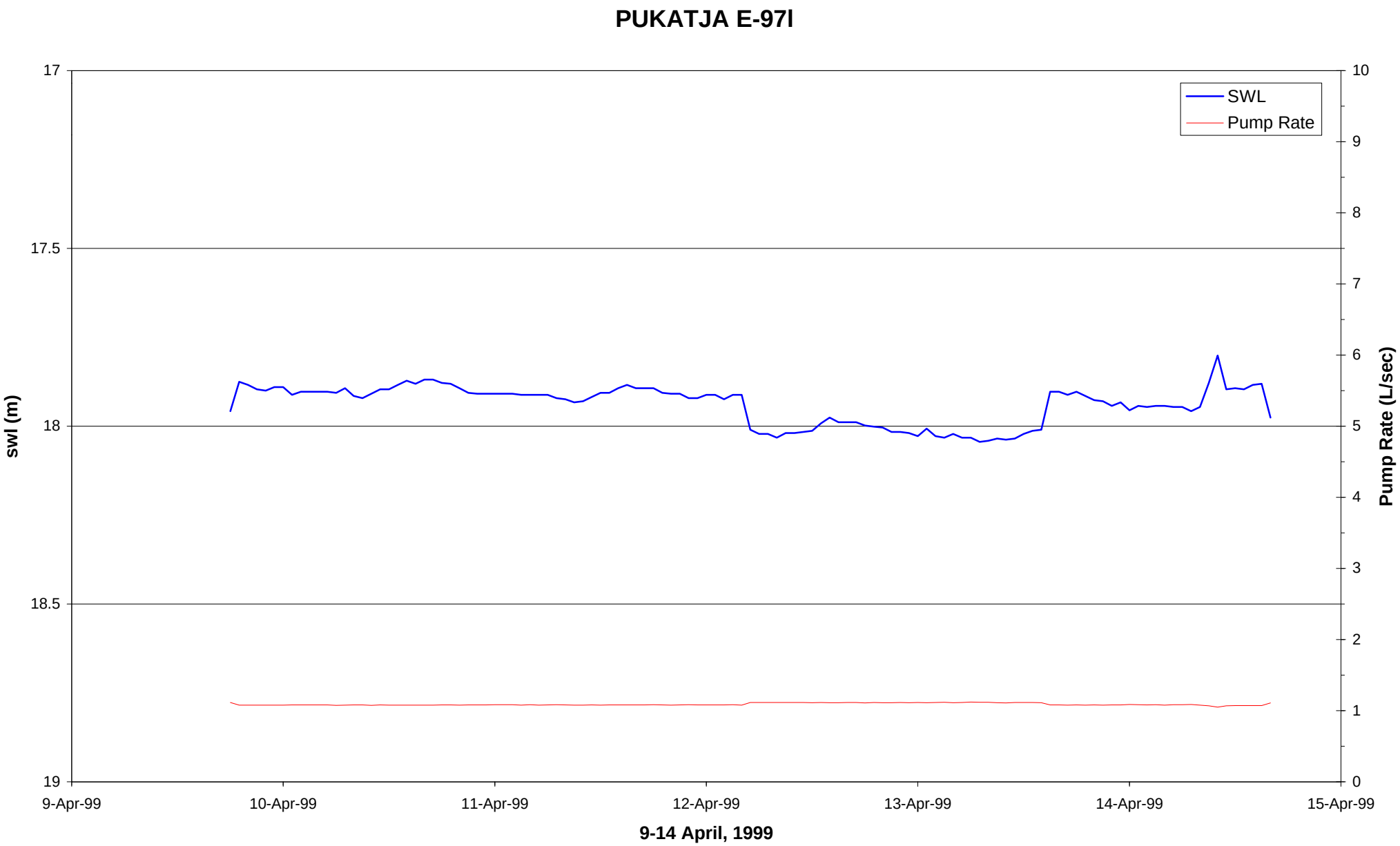


Figure 31 *Pukatja E-97L; Hourly SWL and Pump Rate*

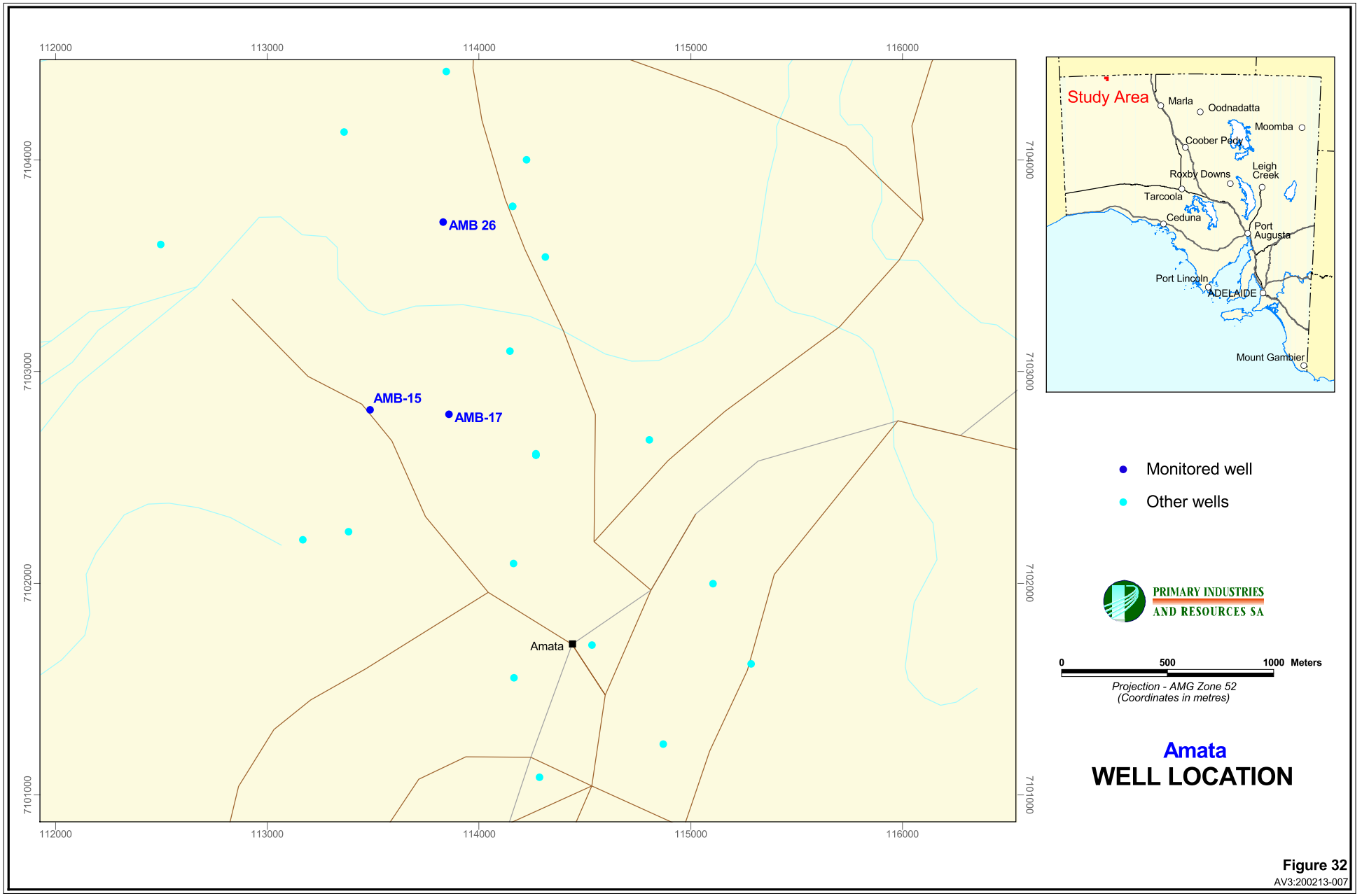


Figure 32

AV3:200213-007

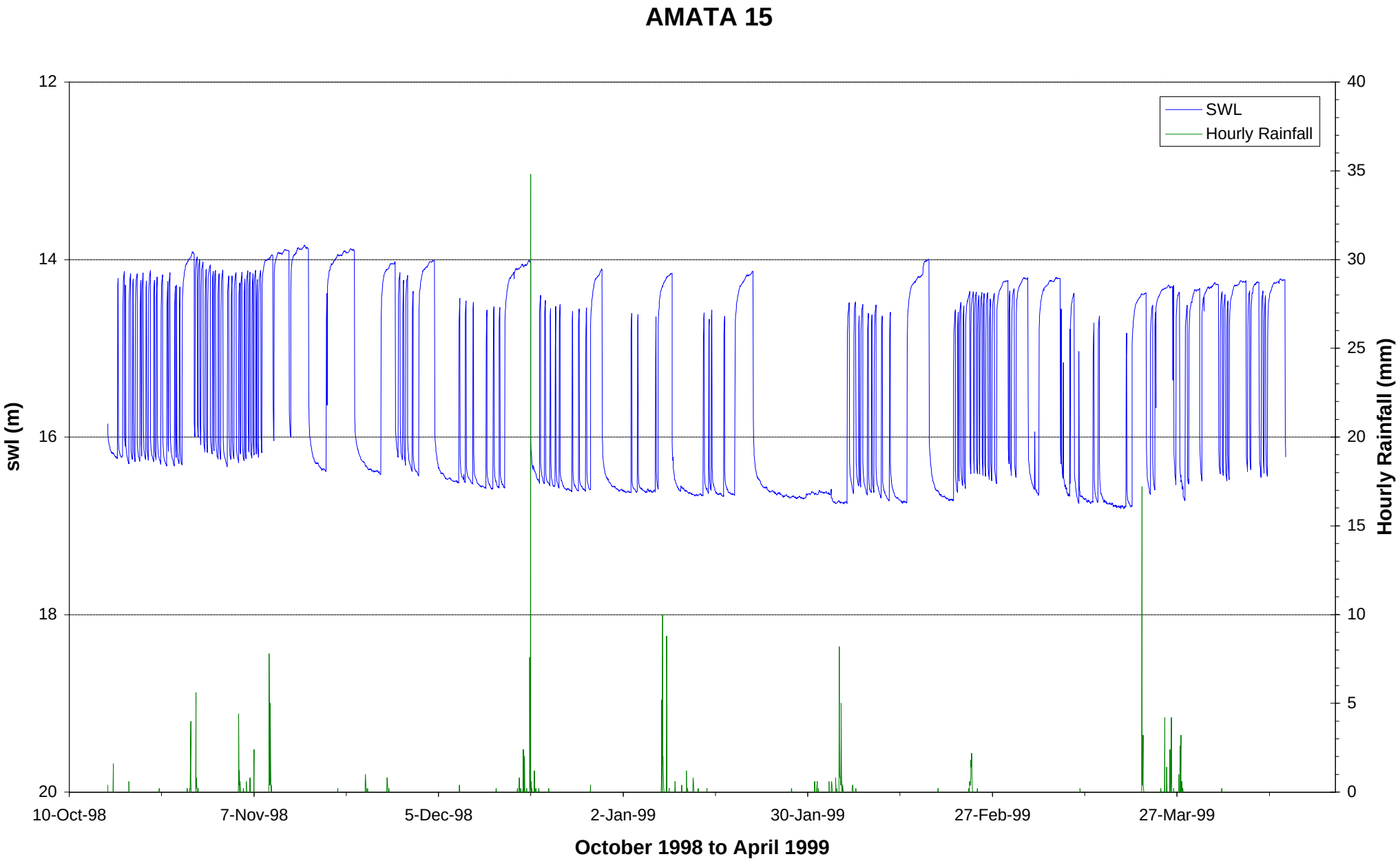


Figure 33 *Amata Rainfall - October 1998 to April 1999*

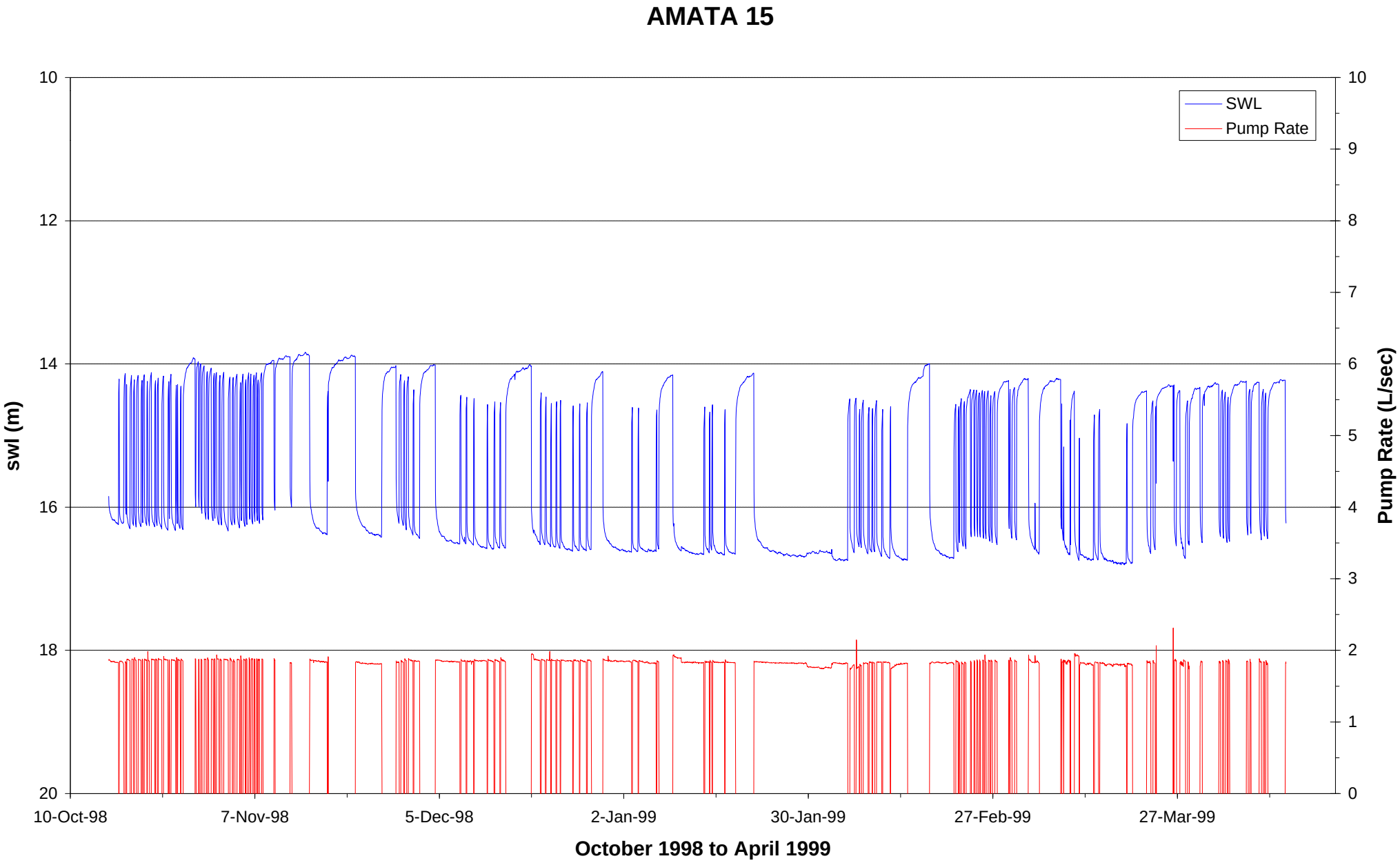


Figure 34 *Amata A-15; Hourly SWL and Pump Rate*

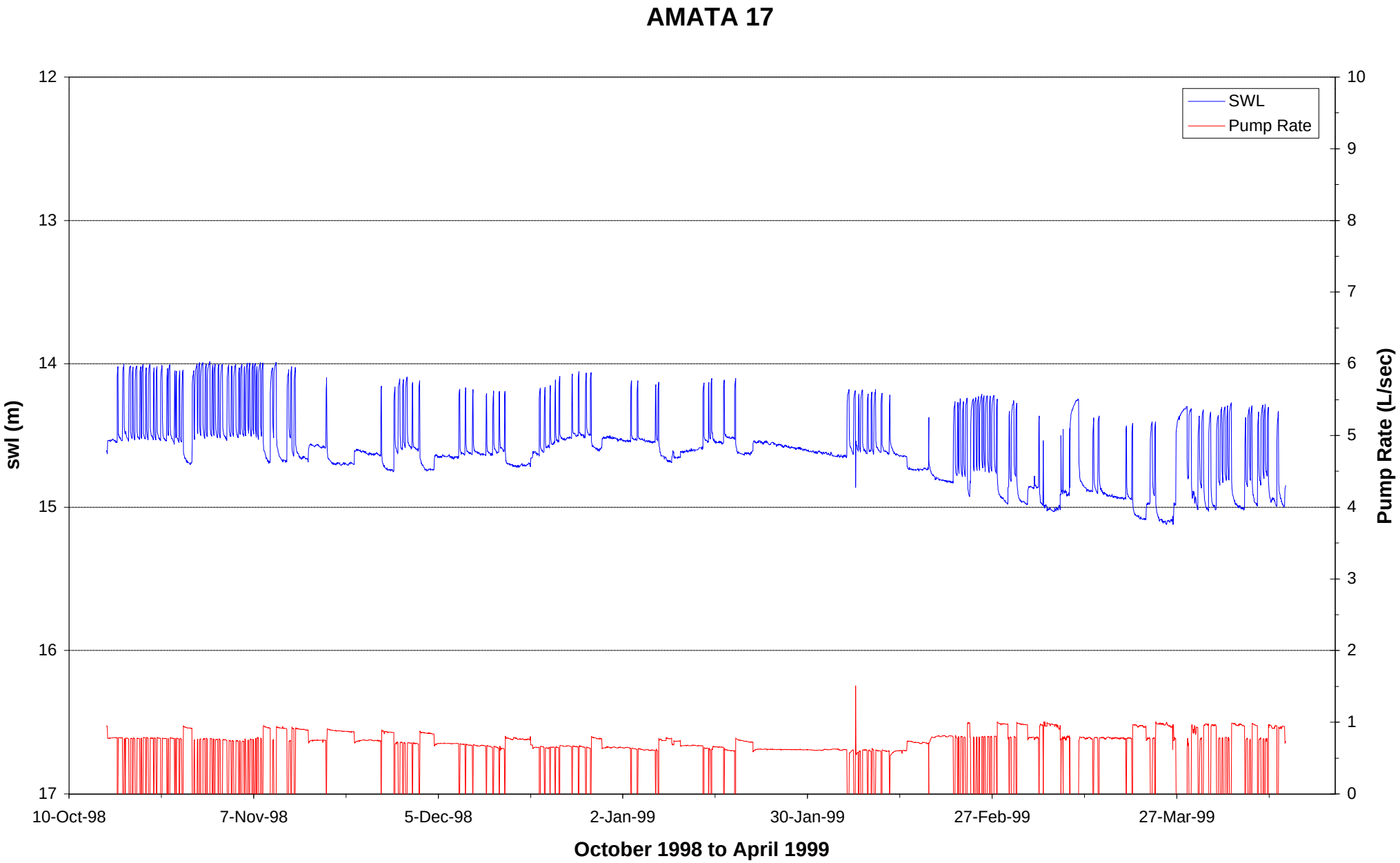


Figure 35 *Amata A-17; Hourly SWL and Pump Rate*

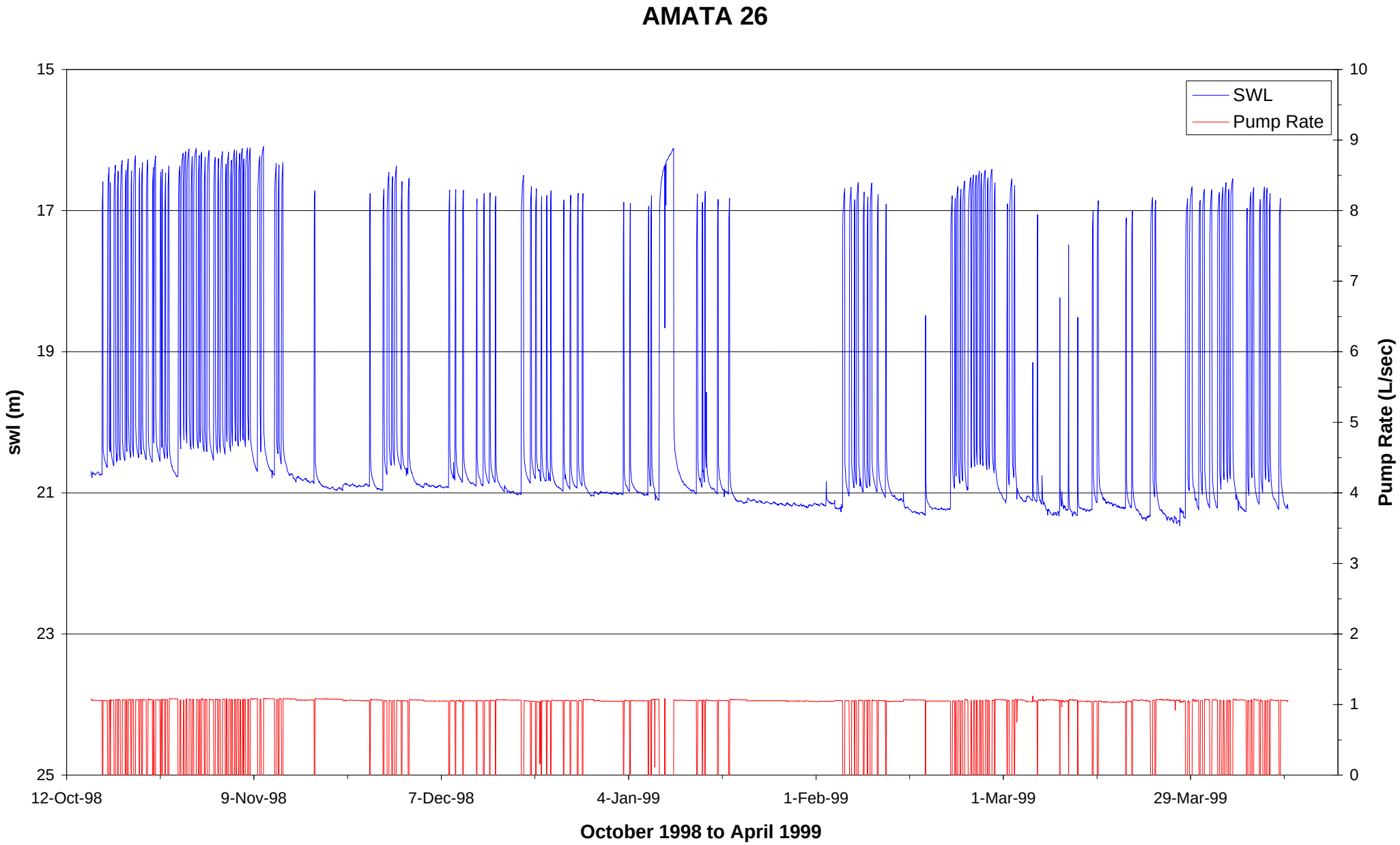
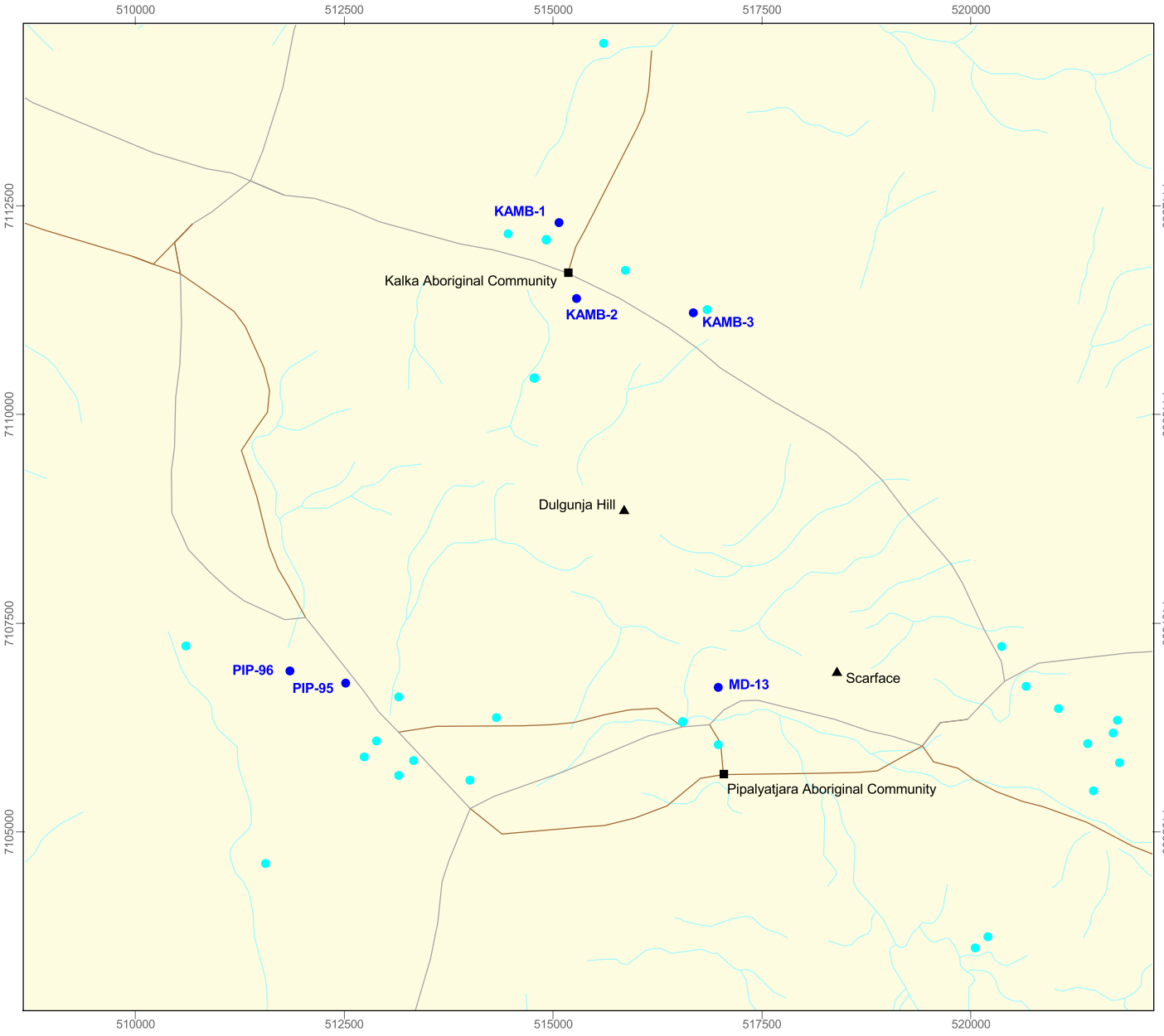


Figure 36 *Amata A-26; Hourly SWL and Pump Rate*



- Monitored well
- Other wells

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0 1 2 Kilometers

Projection - AMG Zone 52
(Coordinates in metres)

Kalka and Pipalyatjara
WELL LOCATION

Figure 37
AV3:200213-008

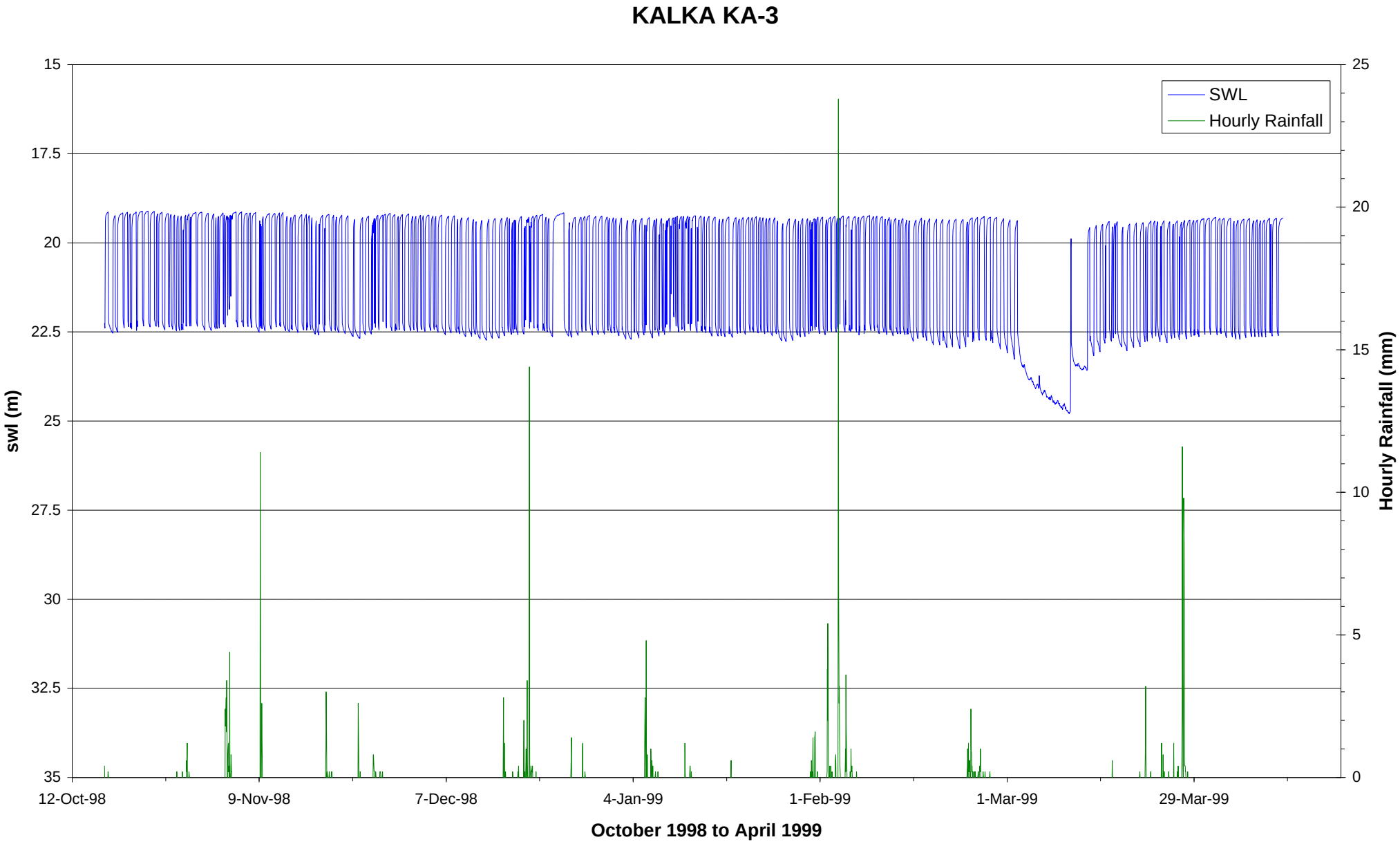

Figure 38 *Kalka Rainfall - October 1998 to April 1999*

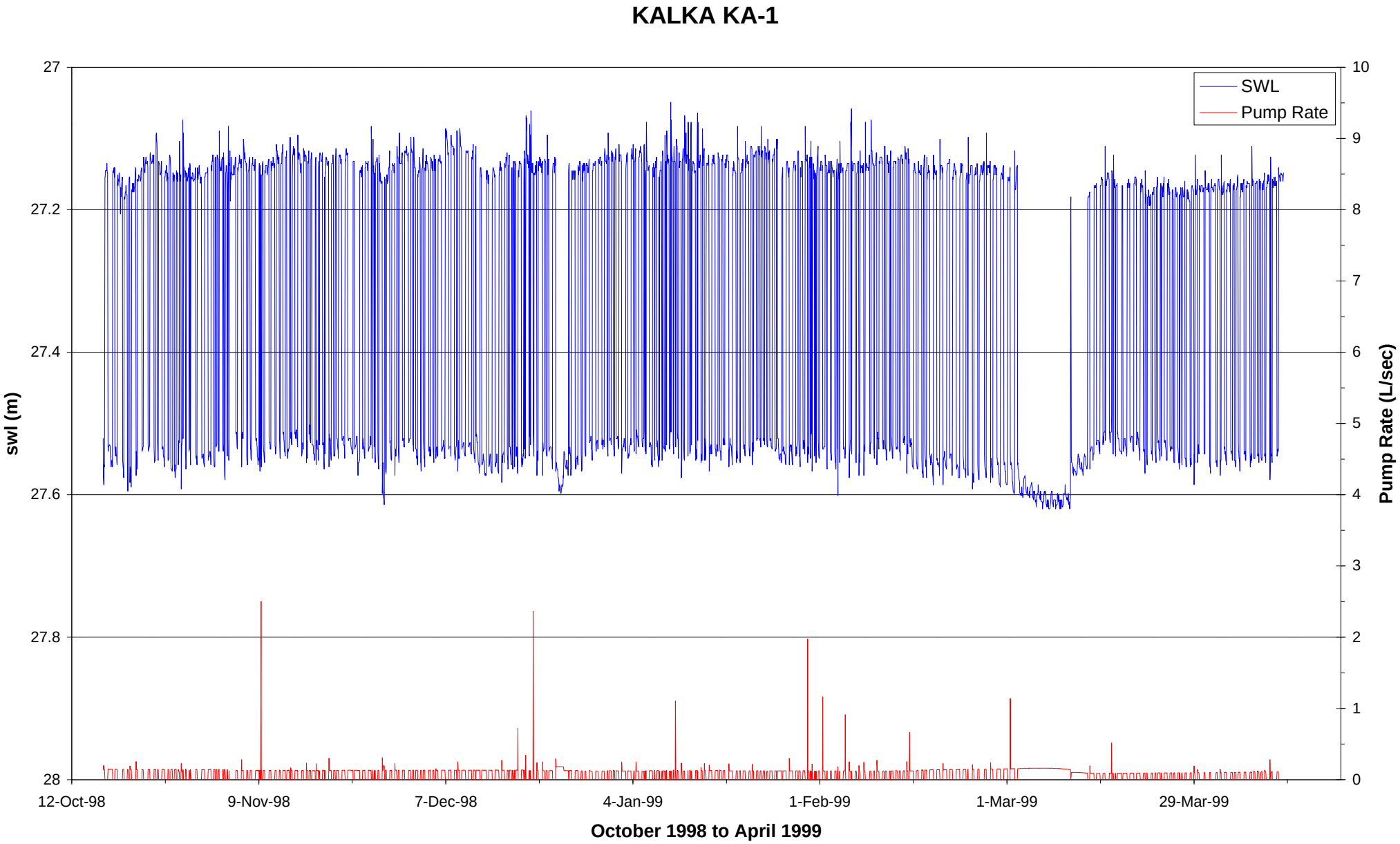

Figure 39 *Kalka KA-1; Hourly SWL and Pump Rate*

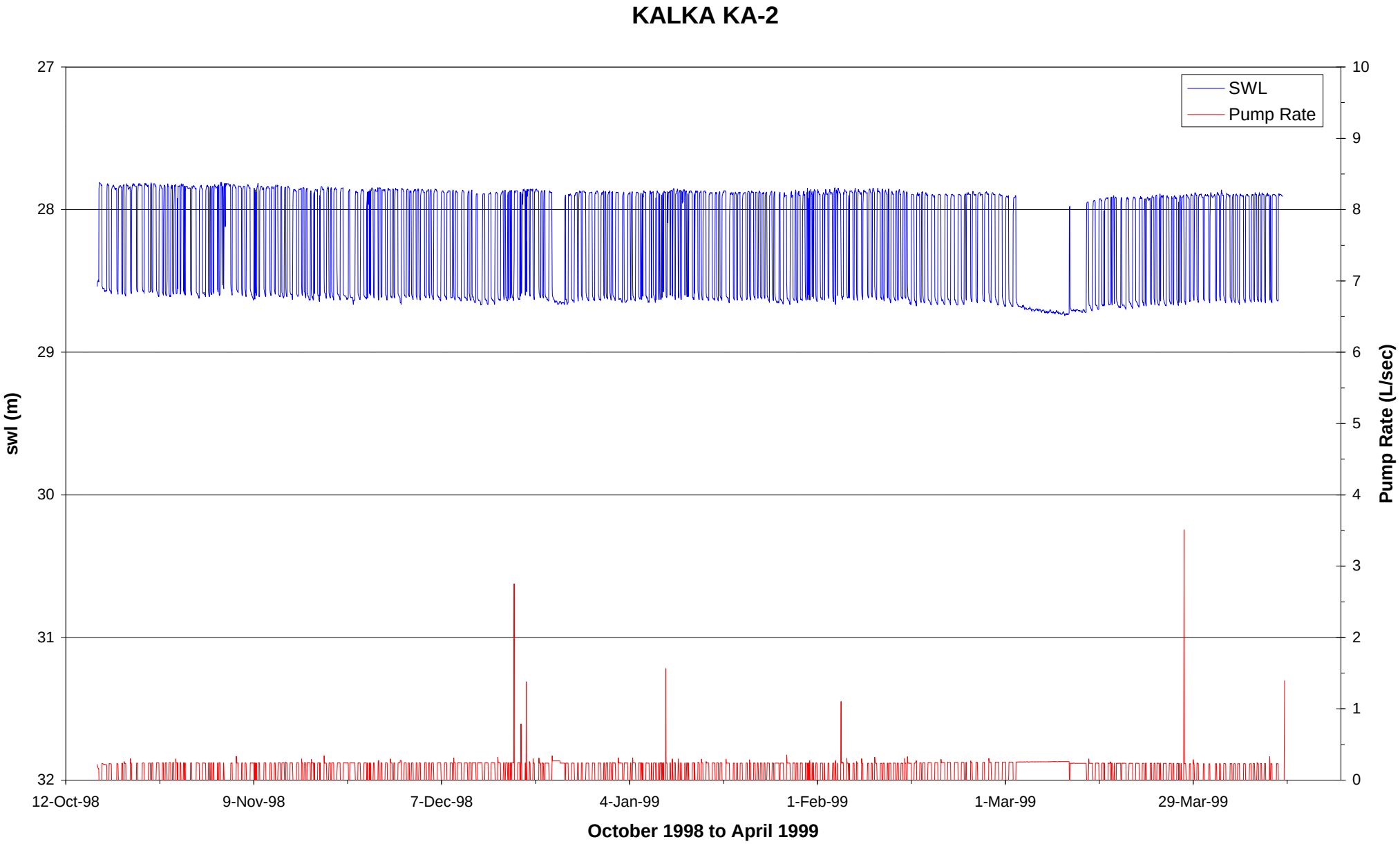

Figure 40 *Kalka KA-2; Hourly SWL and Pump Rate*

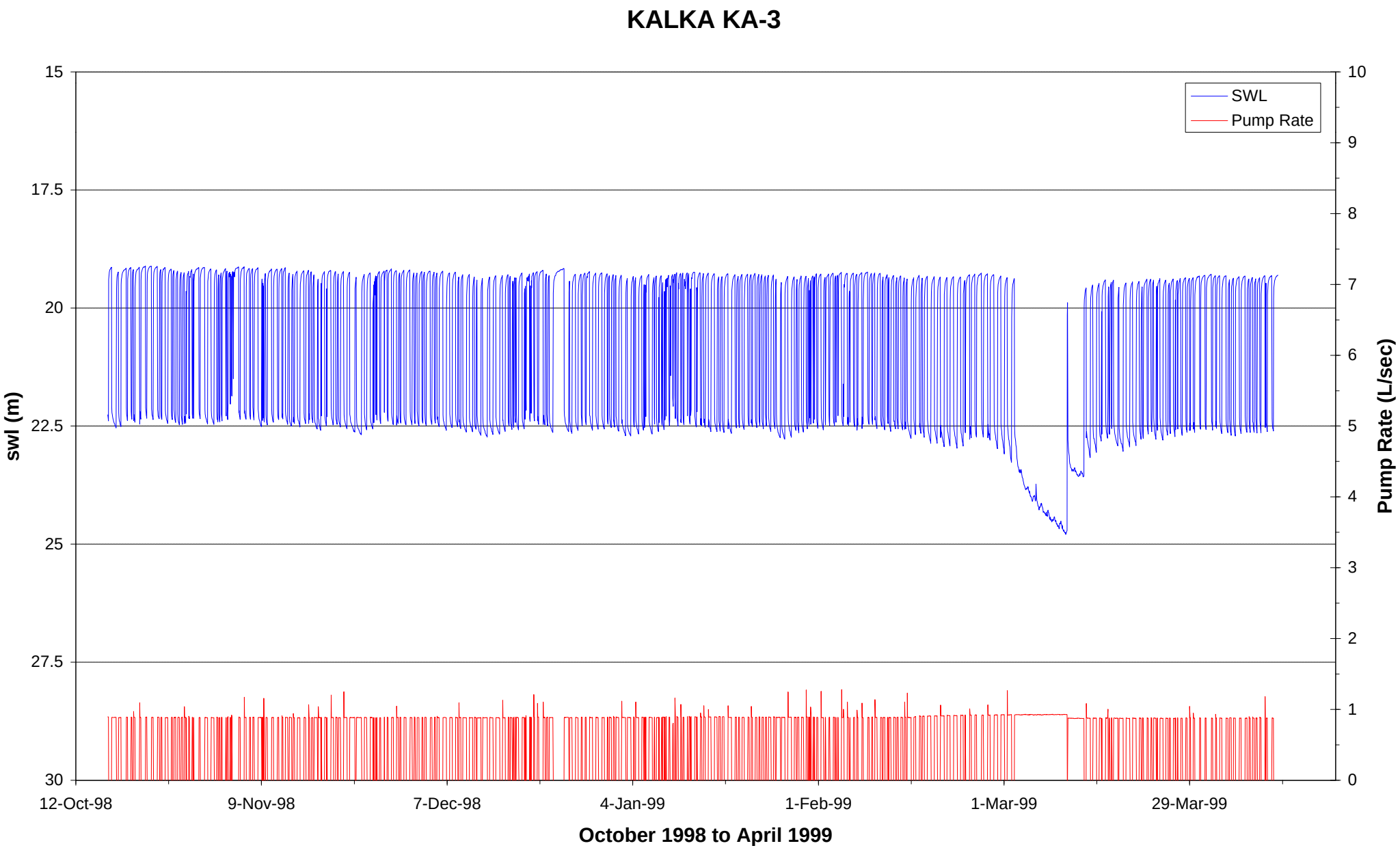

Figure 41 *Kalka KA-3; Hourly SWL and Pump Rate*

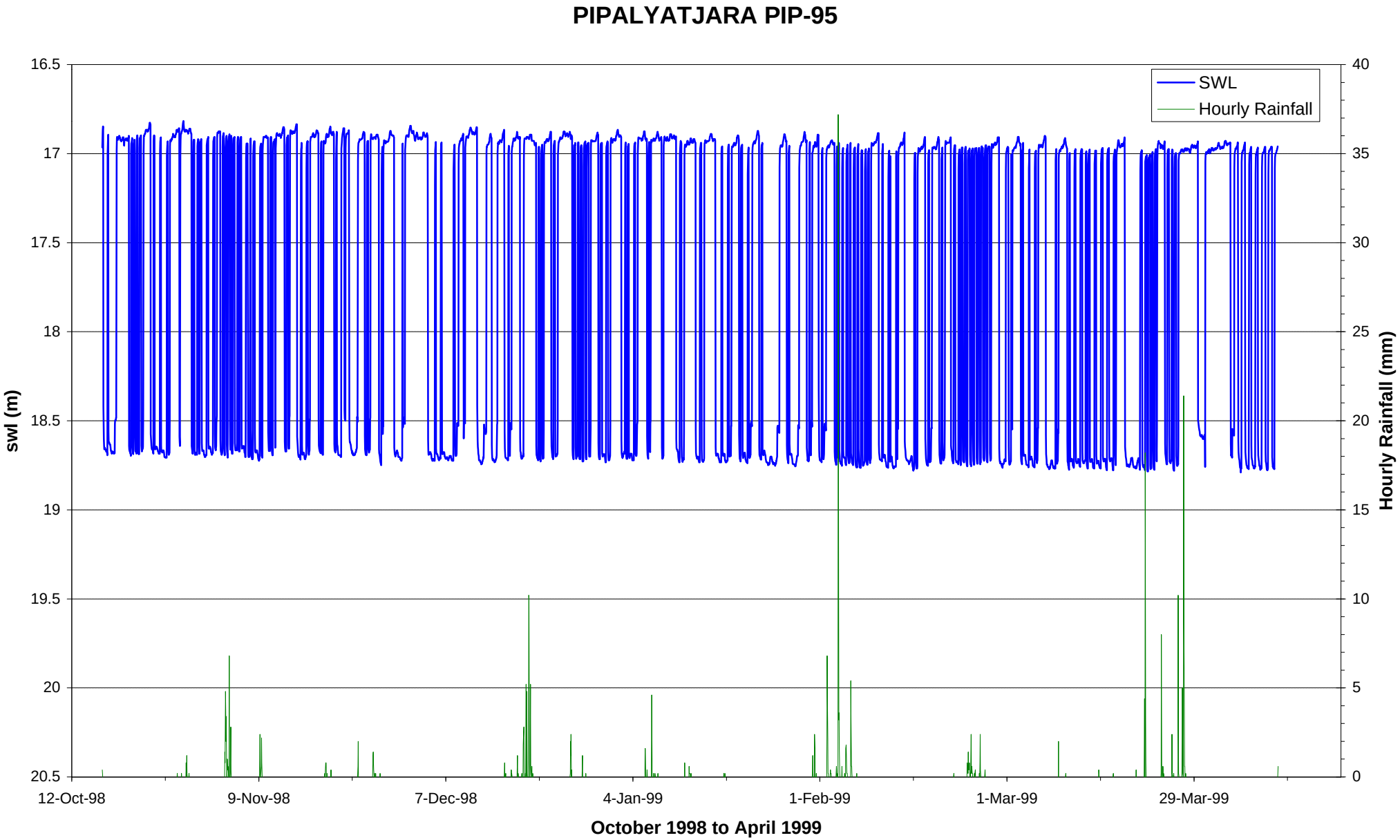

Figure 42 *Pipalyatjara Rainfall - October 1998 to April 1999*

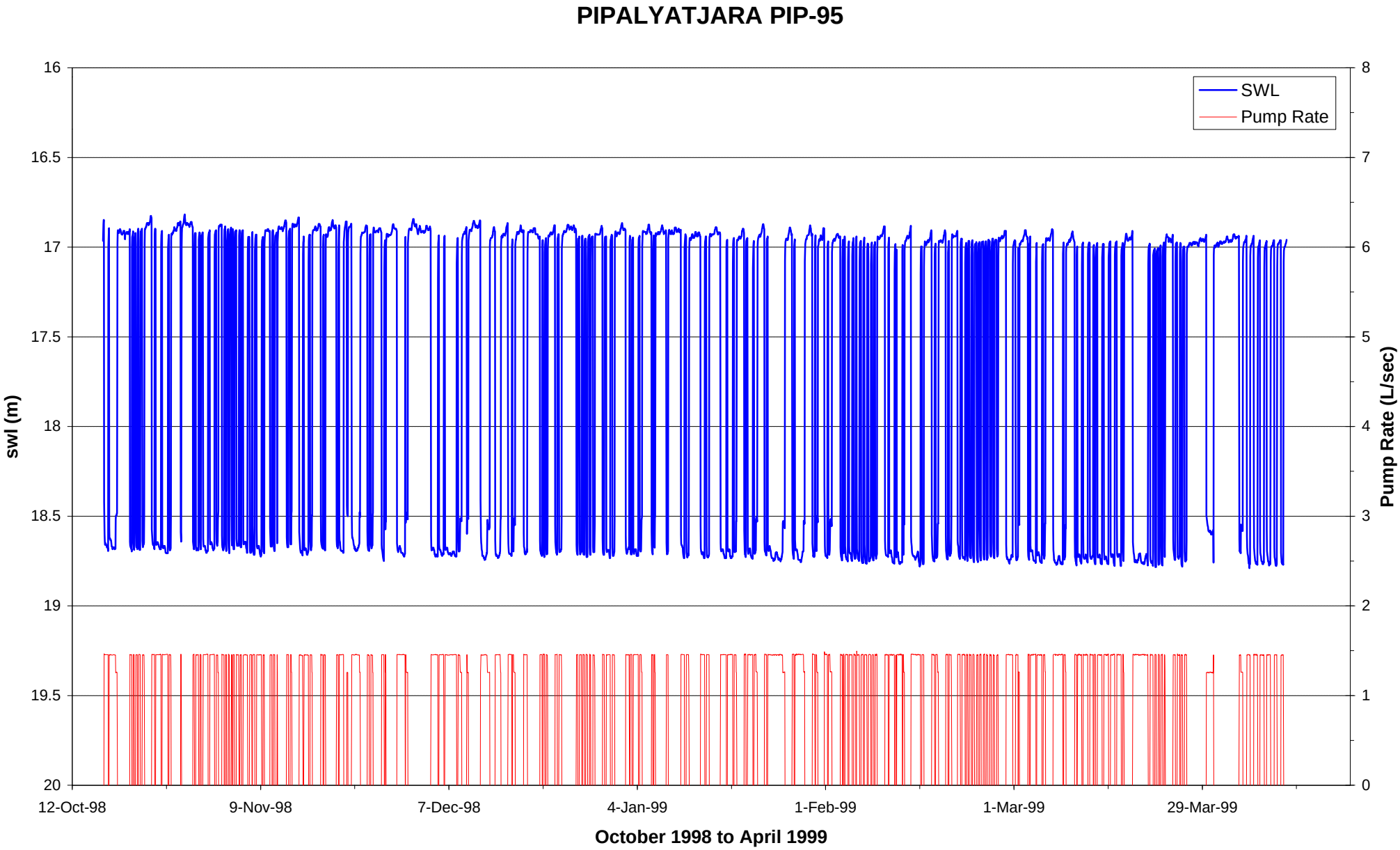

Figure 43 *Pipalyatjara PIP-95; Hourly SWL and Pump Rate*

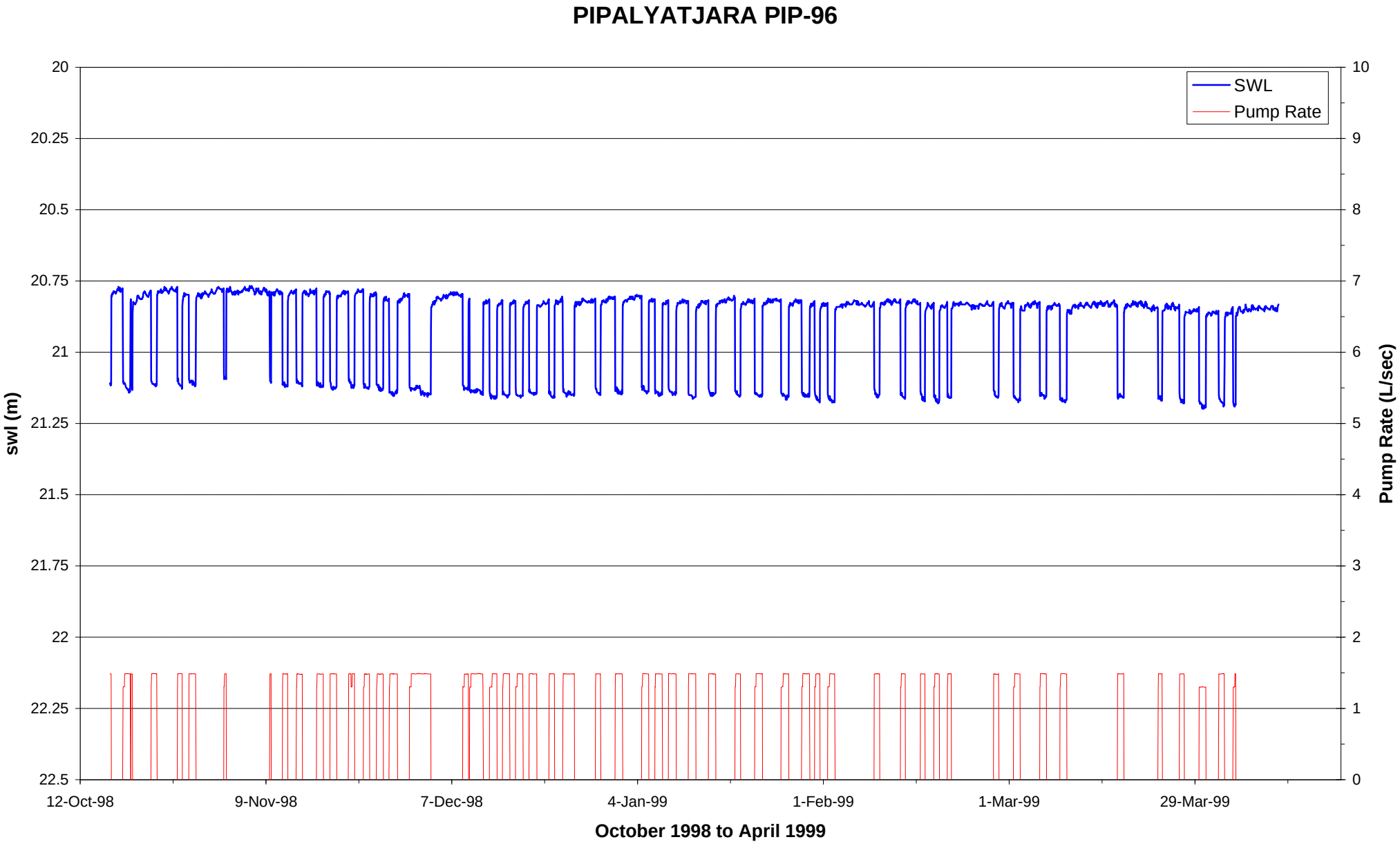

Figure 44 *Pipalyatjara PIP-96; Hourly SWL and Pump Rate*

Appendix A

Operational Report

B.J. Traeger

To:- J. Alvey, M. Goodchild, S. Dodds.
From:- B. Traeger
Date:- 10 May, 1999
SUBJECT:- N.W. Aboriginal Lands Data loggers.

The following report relates to results down loaded in April 1999.

INDULKANA (15 and 16 April 1999)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
25	13.01	13.010	N/A	6039.0
19A	26.640	26.640	N/A	1828.67
19	16.660	16.660	0.64	954.133
26	Flowing		N/A	1145.59
27	31.075	31.030	0.0163	1528.68
IR1	37.890			
IR2	55.500			

Notes:-

19A Data logger was unable to communicate. Data logger S/N 311183 was removed and replaced with logger S/N 311208.
The flow meter was also faulty with no 4–20mA output. The faulty unit S/N A97–79248 was removed and replaced with spare S/N 912498 D.
The data logger had stopped logging after 2200 hours on the 6 November 1998, this corresponds to the commencement of rainfall at bore 19 and may well have been caused by a lightning strike.

26 SWL datum may have been set to 39.097 m, the set up of this bore will need to be closely checked at the next site visit. The pump in this bore has deteriorated substantially since February 1999 which can be seen by the drop off in flow rate. I understand the pump has recently been replaced.

27 SWL datum was reset by 0.045 m.
It appears that this bore has been over pumped and should be isolated and given time to recover.

IR1 The new bore Indulkana Range 1 SWL was measured but there is no monitoring equipment installed. The bore has a temporary power supply and pipe line to the community system.

IR2 SWL was not measured but from the geophysical logging the SWL is 55.5 m.
Accumulated flow for all Indulkana bores was from 13 October 1998 to 15 April 1999
Rain gauge reading at bore 19 was147.4 mm.

MIMILI (18 April 1999)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
M1	16.180	16.180	1.6	11502
M3	10.950	10.950	1.2	8126

Notes:-

Accumulated flow for all Mimili bores was from 13 October 1998 to 18 April
Rain gauge reading at bore M3 was 165.6 mm.

FREGON (18 April 1999)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
FRG 1	10.115	10.115	1.82	8583
FRG 14	11.030	11.030	2.54	18325
FRG 7	10.340	10.340	N/A	14178
FRG E4	10.050	10.050	1.8	7258.94

Notes:-

FRG 1 Flow rate may have been read in error, the normal logged pump rate is 0.25 L/s, this will need a closer look at the next visit.

FRG 14 Data logger was unable to communicate. Fault was found to be a blown fuse in the logger, after replacement the logger was successfully down loaded. The logger had been operational until the 25 March 1999, however after that date no data was recorded. There is no obvious reason which caused the logger to fail.

FRG 7 The 2100P pressure transducer (S/N 210359) was found to faulty and was replaced with a spare unit S/N 210 435. From the data recorded it would appear that the pressure transducer began to fail during mid January 1999.

Accumulated flow for all Fregon bores was from 14 October 1998 to 18 April 1999.
Rain gauge reading at bore FRG 14 was 97.2 mm from 14 October 1998 to 25 March 1999 when the logger failed.

KENMORE PARK (14 October 1998)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
KP 6	10.095	10.345	1.74	10529
KP 7	11.290	11.290	1.45	978.134
KP 98	10.660			

Notes:-

KP 6 SWL reset by 0.250 m. The reading recorded for SWL for the period 2 November 1998 to 8 December 1998 are false. It appears that either the air line was disconnected or the valves in the 2100P transducer did not seal. The situation appears to have corrected its self but this will be reported to the manufacturer and the equipment checked at the next down load trip.

KP98 473.89 hours at 13 April 1999
320.5 hours at 14 October 1998
153.39 hours total use.

Accumulated flow for all Kenmore Park bores was for the period 14 October 1998 to 13 April 1999.
Rain gauge reading at bore KP 7 was 99 mm.

ERNABELLA (13/14 April 1999)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
E01	8.635	8.717	0	NIL
E12	8.515	8.830	1.225	18280
E42	9.890	9.833	0.469	638.44
E44	12.170	15.150	0	NIL
E45	12.550	12.488	0.829	9802
E97B	15.325		2.1	
E97L	17.850		1.085	

Notes:-

E01 SWL datum reset by 0.082 m. The bore has not been used for the monitoring period.

E12 SWL datum reset by 0.315. Pump was running but no flow. It was found that the pump had broken away from the black poly pipe pump column. The data shows that the pump connection broke away after 1500 hrs. on 11 April 1999.

E42 SWL datum reset by 0.057

E44 SWL datum reset by 2.980. No flow data because the pump has not been replaced.
This site will require a close check at the next visit as the SWL datum may have been in-correctly reset with the air tube out of water.

E45 SWL datum reset by 0.062

E97B New installation of equipment on 10 April 1999

E97L New installation of equipment on 10 April 1999.

Both new sites were checked on 14 April 1999 and found to be operating correctly.
Accumulated flow for all other Ernabella bores was from 14 October 1998 to 14 April 1999
Rain gauge reading at bore E42 was 133.8 mm

AMATA (12 April 1999)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
A15	14.250	14.502	1.924	16300
A17	14.405	14.350	0.900	9685.14
A26	16.905	16.895	1.020	1361.2

Notes:-

A15 SWL datum was reset by 0.252 m.

A17 SWL datum was reset by 0.055 m.

A26 SWL datum was reset by 0.010 m.

Accumulated flow for Amata bores was from 15 October 1998 to 12 April 1999.
Rain gauge reading at bore A15 was 238.4 mm.

KALKA (16 October 1998)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
KA 1	27.125	27.197	0.102	928.94
KA 2	27.955	27.895	0.122	1733.75
KA 3	19.250	19.281	1.103	6310.3

Notes:-

KA 1 SWL datum was reset by 0.072 m.

KA 2 SWL datum was reset by 0.060 m. The flow rate was reduced to approx. 0.125 L/s.

KA 3 SWL datum was reset by 0.020 m.

Accumulated flow for all Kalka bores was from 16 October 1998 to 11 April 1999
Rain gauge reading at bore KA 2 was 268.4 mm for the same period.

PIPALYATJARA (16 October 1998)

BORE	SWL(Actual)	SWL(logger)	Flowrate	Accumulated Flow m^3
PMB 95	16.910	16.959	1.45	9902.99
PMB 96	20.820	20.830	1.45	6564.090
MD 13	14.510	N/A	N/A	

Notes:-

PMB95 SWL datum was reset by 0.040 m.

PMB96 SWL datum was reset by 0.010 m.

MD13 SWL was measured and a note of hours run meter read,
9193.37 hours at 10 April 1999
9193.37 hours at 16 October 1998
0.00 hours total use.

Accumulated flow for all Pipalyatjara bores was from 16 October 1998 to 10 April 1999.
Rain gauge reading at bore PMB 95 was 342 mm from 16 October 1998 to 10 April 1999.

CONCLUSIONS AND OBSERVATIONS

This down load trip was made in conjunction with the geophysical logging and video survey of all the communities water supply bores and the establishment of monitoring equipment at two new bores in the Turkey Bore area. To achieve the work load in a reasonable period of time I gave instruction to Richard Martin (Technical Officer) regarding the down loading of the loggers, this allowed me to undertake the geophysical logging and video surveys. M. Goodchild and S. Wurst removed and replaced the 31 pump systems.

Generally the monitoring equipment is operating extremely well, there were a few situations worth mentioning.

- Equipment failures resulted in some lost data at:
    - Indulkana 19A data logger required a replacement fuse, but the flow meter was removed and returned for repair, the failures were probably caused by a lightning strike.
    - Fregon 7 were a pressure transducer failed and was found to have a significant amount of condensate in the 2100P. The unit has been returned for repair.
    - Fregon 14 were a logger stopped logging for no apparent reason, the fault was a blown fuse which was replaced.
    - Kenmore Park 6 were a pressure transducer appears to have failed for a period of time but corrected itself, possibly due to a sticking valve. No action taken at this stage.
- A number of sites had variations of SWL between the logged values and the actual measured values. Most variations were minor with the exception of three sites, Amata A15, Ernabella E44, and Kenmore Park KP6. The 2100P pressure transducers at these sites will require close scrutiny during the next field visit.
- It appears that two sites may have had SWL datum set incorrectly due to operating errors and will also have to checked during the next trip. Ernabella E44, and Indulkana I26 bores.

It should be noted at this point that because the pumps have all been disturbed, removed and replaced, the SWL measurements during the next trip may have numerous variations between logged and measured values due to the settling of the pump columns.

During the trip the two new sites at Turkey Bore area for supply to Ernabella have been equipped and are now being monitored. The equipment used at these sites was in stock, and now leaves the minimum amount of equipment considered necessary for operating spares. To equip the two new bores at Indulkana Range new equipment will have to be purchased.

Appendix B

Tables of wells and equipment

Area	Well identification	Well unit number	Flowmeter	SWL transducer and logger	Logger format	Comments
Indulkana	IMB–19	5544–101	Dec 1997	Dec 1997	1	Also rainguage
	IMB–19A	5544–132	Dec 1997	Dec 1997	2	
	IMB–25	5544–157	Pre 1997	Pre 1997	2	
	IMB–26	5544–158	Dec 1997	Dec 1997	2	
	IMB–27	5544–159	Dec 1997	Dec 1997	2	
	IR–1	5544–172				To be equiped late 1999
	IR–2	5544–169				To be equiped late 1999
	IR–3	5544–170				To be equiped late 1999
Pukatja	E–01	5345–06	Dec 1997	Dec 1997	2	
	E–12	5345–12	Dec 1997	NONE	2	
	E–42	5345–33	Dec 1997	Dec 1997	1	Rainguage
	E–44	5345–85	Dec 1997	Dec 1997	2	
	E–45	5345–84	Pre 1997	Pre 1997	2	Transducer replaced 12/97
	E97B	5345–114	Apr 1998	Apr 1998	2	
	E97L	5345–124	Apr 1998	Apr 1998	2	
Kenmore Park	KP–6	5345–67	Pre 1997	Pre 1997	2	
	KP–7	5345–68	Dec 1997	Dec 1997	1	Rainguage
Mimili	M–1	5443–25	Jan 1998	Jan 1998	2	
	M–3	5443–28	Pre 1997	Pre 1997	1	Transducer replaced 12/97
						Rainguage
Fregon	FRG–01	5344–09	Pre 1997	Pre 1997	2	Transducer replaced 12/97
	FRG–07	5344–31	Jan 1998	Jan 1998	2	
	FRG–14	5344–47	Jan 1998	Jan 1998	1	Rainguage
	FRG–E4	5344–19	Jan 1998	Jan 1998	2	
Amata	A–15	5145–55	Pre 1997	Pre 1997	1	Rainguage
	A–17	5145–84	Jan 1998	Jan 1998	2	
	A–26	5145–19	Jan 1998	Jan 1998	2	
Pipalyatjara	PIP–95	4745–95	Jan 1998	Jan 1998	1	Rainguage
	PIP–MD13	4745–92	Jan 1998	NONE		Rarely used – run for 31
	PIP–96	4745–96	Pre 1997	Pre 1997	2	Hours Mar-Oct/98
Kalka	KA–1	4745–78	Jan 1998	Jan 1998	2	
	KA–2	4745–94	Jan 1998	Jan 1998	2	
	KA–3	4745–85	Jan 1998	Jan 1998	1	Rainguage