LAKE TOOLIBIN CATCHMENT
STREAM MONITORING PROGRAMME
1990 WINTER

K. McIntosh

October 1990

ALCOA OF AUSTRALIA LIMITED
(Incorporated in Victoria)

Cnr. Davy and Marmion Streets, Booragoon, Western Australia

ALCOA
AUSTRALIA

6th November, 1990.

Mr. Dennis Hilder,
Department of Conservation
and Land Management,
P.O. Box 100,
NARROGIN, W.A. 6312

Dear Dennis,

Enclosed is a copy of Ken McIntosh's report on stream monitoring.

Other copies have gone to:

PHIL HAWKER
KEITH PARNELL
MARY TAYLOR (3 copies)
LYN CHADWICK

Yours faithfully,

JOHN COLLETT

Landcare Project
Manager

	ACT	NOTE
DM		
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FOR		
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TRO		
FR		
AA		
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O		
FILE		
DATE	7 - NOV 1990	

SG: For your comments & return to me by 19/11/90, pls. JC

It comprises KA's identified problems and solutions. eg Diversion drains. Ag 12/11.

Revegetation for 9617 presumably Ag 12/11. can be applied to 27287.

LNDCAR/120
Encls. (1)

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LAKE TOOLIBIN CATCHMENT

Summary Stream Water Quality Sampling Programme

1990 Winter

INTRODUCTION

Waterlogging of farm land and conservation reserves upstream of Lake Toolibin occurs after periods of significant rainfall. This combined with a rising groundwater table is causing land degradation and salinisation. Major drainage works have been put forward as a means of reducing the period of waterlogging. The design of a drainage network needs to consider the whole catchment system and any potential adverse impacts on Lake Toolibin. If practicable fresher stream water should be drained into Lake Toolibin and the more saline stream waters diverted away from Lake Toolibin.

A stream water quality monitoring programme was carried out over the 1990 winter to provide data for drainage design. This report summarises the results of the programme.

GENERAL

Stream sampling points were established in June 1990 with the first samples being collected on 7 June 1990. Sample point locations are shown on Figure 1.

During mid-July heavy rainfall over the catchment produced high stream flows in all streams. From 12/7/90 to 23/7/90 93mm of rain was recorded at John and Lyn Chadwick's property. By September all but the major streams had ceased to flow.

Table 1 summarises the results. Appendix 1 lists all data collected.

DISCUSSION

LT01 monitors all the major northern inflows to Lake Toolibin. More detailed salinity data is recorded continuously by the WAWA at gauging station No. 609010. This data is not presently available.

The number of samples collected over the 1990 winter was not great but gives an indication of the water quality of the various stream channels. Most stream sample points showed a great variability in water quality. Generally higher salinity values are recorded for the first flows of the winter and during low flow periods. During "flood" events the water quality is much fresher.

Stream sample points LT10, LT18, LT19, LT07, LT06, LT03 consistently carried good quality water of less than 600 mg/l TSS. Points LT04 and LT17 are saline but their catchments are small and flow rates even in floods are small.

Figure 2 is colour coded to group together streams of similar water quality.

CONCLUSION

From Figure 2 it can be seen that a drainage channel along Canal Road from LT10 to LT03 would collect mostly fresh water. Water from points LT08, LT11 and LT12 could also be directed to this drain without adversely affecting the water quality. A drain through reserve 9617 from LT02/LT03 to LT01 should also be considered to prevent the reserve becoming waterlogged.

Water from LT09 should be diverted east towards the salt lake bordering locations 8537 and 7347. No changes are recommended to drainage channels downstream of points LT13, LT14, LT15 and LT16 except that the culvert at LT15 should be increased in size.

LT05 flows are small and one low flow, very high TSS value sample during 1990 caused its average to be high. LT04 and LT17 are saline but only have small flows. No practicable diversions are apparent for points LT04, LT05 and LT17 but because of their low flow rates their total salt discharge to Lake Toolibin should not be great.

Figure 3 shows a possible drainage layout.

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RECOMMENDATIONS

The stream sampling programme has shown that the fresh and saline surface flows upstream of Lake Toolibin could be separated by a drainage network. A consultant should now be employed to design the drainage network and prepare an environmental impact assessment of that network on Lake Toolibin and areas upstream and downstream.

ACKNOWLEDGEMENT

The work of Lyn and John Chadwick in collecting the stream samples, sometimes under very wet and boggy conditions is acknowledged. Thank you also to Michael Elliott, Department of Agriculture, Narrogin for arranging sample analysis.

KEN McINTOSH
October 1990

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TABLE 1

SUMMARY 1990 STREAM SAMPLES

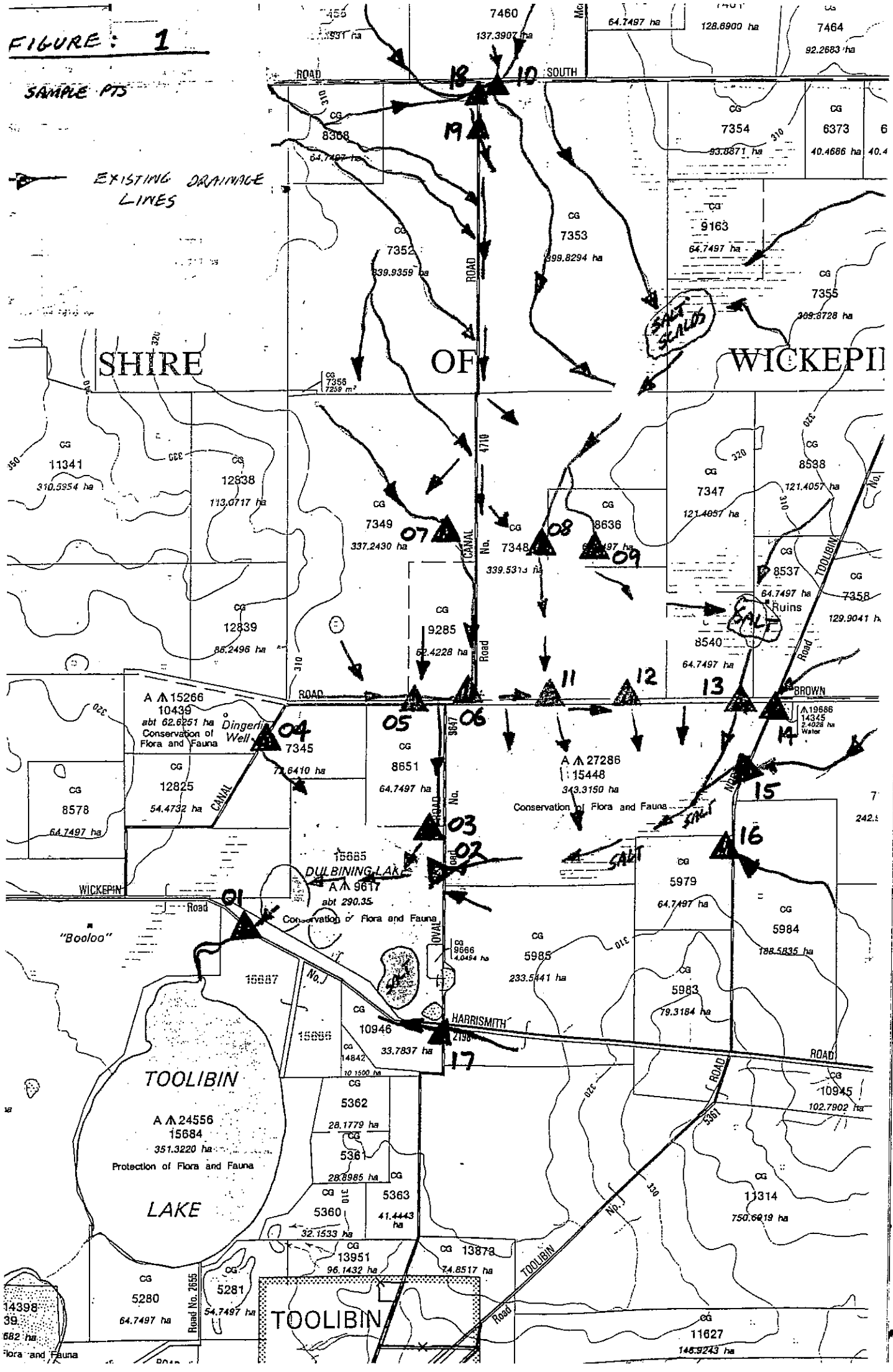
LAKE TOOLIBIN CATCHMENT

Sample Point	No. Samples	Flow Range M^3/S	TSS Mg/l Mean	Max	Min	Comments
LT01	7	.003 to 9.0	1751	2641	811	
LT02	7	.008 to 2.5	1828	4148	892	
LT03	5	0 to 0.8	441	1126	197	
LT04	3	.001 to .05	11869	12105	11575	
LT05	3	.001 to .15	3061	6916	984	
LT06	4	.002 to 0.8	469	887	168	
LT07	4	0 to .04	584	1381	228	
LT08	3	0 to .06	1254	2382	197	
LT09	3	.05 to .4	2606	4802	899	
LT10	5	.001 to .3	150	221	83	
LT11	6	.04 to 3.5	1031	1752	213	
LT12	4	0 to .25	615	1278	111	
LT13	5	.001 to .34	1740	3118	791	
LT14	5	0 to 1.0	1982	4243	404	
LT15	7	0 to 1.5	1546	5273	147	
LT16	4	0 to 0.6	1215	2570	573	
LT17	2	0 to .07	5600	6160	5026	
LT18	1	.03	116	-	-	
LT19	1	.01	111	-	-	

FIGURE: 1

SAMPLE PTS

EXISTING DRAINAGE LINES



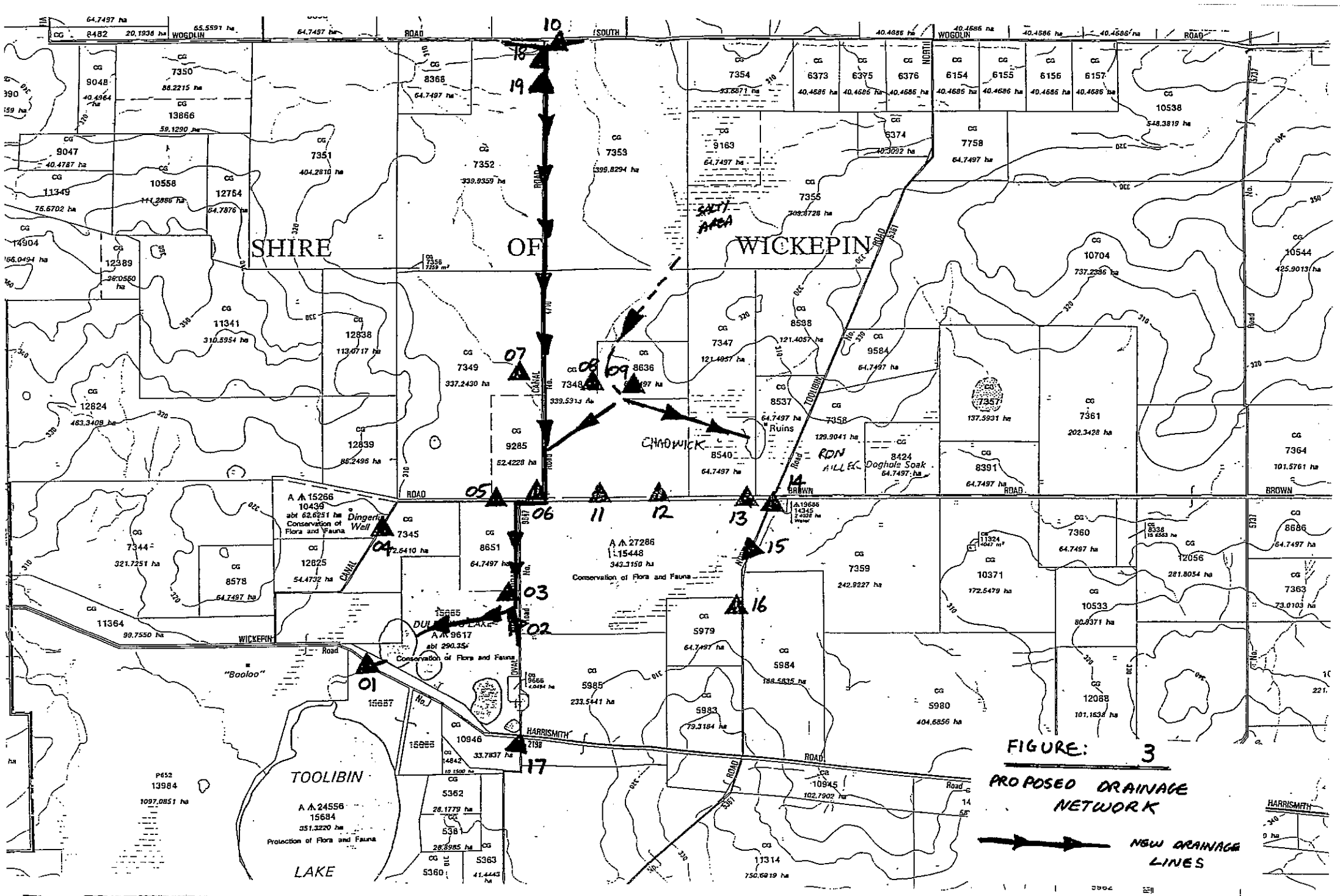


FIGURE: 3

PROPOSED DRAINAGE NETWORK

NEW DRAINAGE LINES

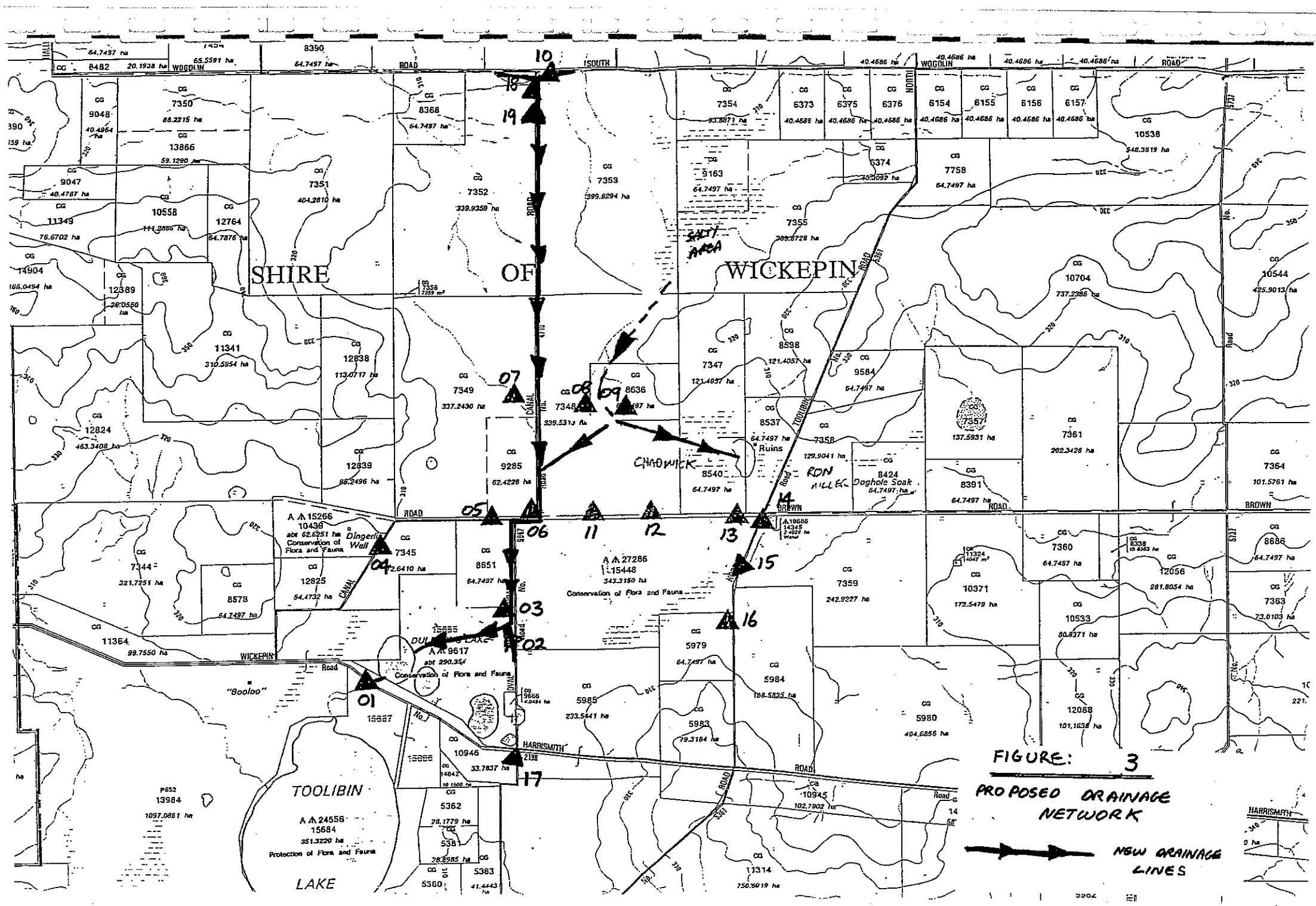


FIGURE: 3

PROPOSED DRAINAGE NETWORK

NEW DRAINAGE LINES

APPENDIX 1

1990

STREAM SAMPLE RESULTS

ROUTINE SAMPLE RECORDS

SAMPLING POINT=LT01

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:16:55	0.003	436.00	2364.60
16JUL90:14:25	0.030	483.00	2641.39
17JUL90:12:00	.	419.00	2264.49
17JUL90:15:47	9.000	318.00	1669.70
23JUL90:08:50	.	232.00	1187.04
14AUG90:16:17	0.004	259.00	1324.01
28AUG90:18:05	0.500	158.00	811.63

SAMPLING POINT=LT02

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:18:05	.	280.00	1445.92
16JUL90:14:40	0.070	432.00	2341.05
17JUL90:12:00	.	739.00	4148.97
17JUL90:17:30	0.800	260.00	1328.14
23JUL90:11:40	2.500	184.00	943.53
14AUG90:16:07	0.008	323.00	1699.15
28AUG90:17:45	0.250	174.00	892.80

SAMPLING POINT=LT03

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:17:58	.	42.00	223.17
16JUL90:14:50	0.020	220.00	1126.16
17JUL90:17:30	0.800	37.00	197.80
23JUL90:11:35	0.300	62.00	324.63
28AUG90:17:55	0.012	64.40	336.80

SAMPLING POINT=LT04

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:16:47	0.001	2000.00	11575.0
16JUL90:14:15	0.050	2090.00	12105.0
21JUL90:15:35	0.001	2060.00	11928.3

SAMPLING POINT=LT05

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:17:50	0.002	192.00	984.12
16JUL90:15:50	0.150	251.00	1283.42
28AUG90:15:40	0.001	1209.00	6916.80

NOTE: 1) FLW_GESS = ESTIMATED FLOW RATE m^3/s

2) COND_25 = ELECTRICAL CONDUCTIVITY @ 25°C mS/M

3) TSS = TOTAL SOLUABLE SALTS mg/l

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ROUTINE SAMPLE RECORDS

SAMPLING POINT=LT06

SAMPDATE	FLW_GESS	COND_25	TSS
14JUL90:09:40	0.002	93.00	481.889
16JUL90:14:55	0.110	173.00	887.729
17JUL90:17:00	0.800	31.30	168.985
28AUG90:15:50	0.015	65.20	340.860

SAMPLING POINT=LT07

SAMPDATE	FLW_GESS	COND_25	TSS
14JUL90:09:50	.	75.00	390.57
16JUL90:15:50	0.03	269.00	1381.14
23JUL90:11:00	.	43.00	228.24
28AUG90:16:10	0.04	64.50	337.31

SAMPLING POINT=LT08

SAMPDATE	FLW_GESS	COND_25	TSS
14JUL90:10:00	.	37.00	197.80
16JUL90:15:15	0.060	439.00	2382.27
28AUG90:16:30	0.001	226.00	1156.60

SAMPLING POINT=LT09

SAMPDATE	FLW_GESS	COND_25	TSS
14JUL90:10:05	0.05	394.00	2117.27
16JUL90:15:20	0.40	850.00	4802.65
28AUG90:16:20	0.10	175.40	899.90

SAMPLING POINT=LT10

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:17:40	0.001	40.00	213.020
16JUL90:16:00	0.300	14.40	83.151
17JUL90:12:00	.	20.00	111.560
23JUL90:10:46	0.200	22.00	121.706
28AUG90:16:45	0.030	41.60	221.137

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ROUTINE SAMPLE RECORDS

SAMPLING POINT=LT16

SAMPDATE	FLW_GESS	COND_25	TSS
07JUN90:17:05	.	149.00	765.98
16JUL90:16:50	0.004	186.00	953.68
17JUL90:16:00	0.600	111.00	573.20
14AUG90:14:55	.	471.00	2570.72

SAMPLING POINT=LT17

SAMPDATE	FLW_GESS	COND_25	TSS
16JUL90:12:00	.	1080.00	6157.12
17JUL90:17:40	0.07	888.00	5026.43

SAMPLING POINT=LT18

SAMPDATE	FLW_GESS	COND_25	TSS
23JUL90:10:45	0.03	21.00	116.633

SAMPLING POINT=LT19

SAMPDATE	FLW_GESS	COND_25	TSS
23JUL90:10:50	0.02	20.00	111.56

DEPTH TO GROUNDWATER BELOW SURFACE (IN CENTIMETRES)

	27-5-87		18-5-89		9-5-90		15-11-90			
	D	MS	D	MS	D	MS	D	MS	D	MS
:M 1					244	1550	244	841		
?M 1	100		110	441	115	1949	102	1950		
?M 2	168		164	460	174	784	130	922		
?M 3	107		129	652	133	1104	104	1930		
?M 4	233	DRY	234	DRY	194	263	192	163		
SC 1	209		198	2110	136	228	120	137		
SC 2	168	DRY	164	DRY	164	DRY	NF			
SC 3	230	DRY	230	DRY	232	DRY	NF			
SC 4			150		114	3620	109	4920		
SC 5	245	DRY	245	DRY	244	DRY	242	117		
SC 6	224	DRY	225	DRY	224	DRY	224	DRY		
SC 7	216	DRY	215	DRY	217	DRY	216	DRY		
SC 8	142		132		127	56	121	60		
?M 1	232	DRY	230	DRY	230	DRY	227	1290		
?M 3	96		40	1900	106	3100	120	3530		
BJ 2	176		87	756	129	620	099	1347		
BJ 3	112		NF		171	2310	108	2370		
NS 1	293	DRY	273	DRY	267	DRY	256	PUTRID 818		
NS 3	281	DRY	NF		263	581	262	4780		
NS 4	253	DRY	NF		244	DRY	244	DRY		
RM 1	111		109		110	1619	098	2540		
RM 2	132		126		113	4070	099	3430		
RM 3	213		205		198	2980	162	5410		
RM 4	135		133		124	2850	097	250		
RM 5	84		135		113	2620	104	2870		
GE 1	189	DRY	182	DRY	187	DRY	187	DRY		
GE 2	216		226	DRY	226	DRY	226	DRY		

LAKE TOOLIBIN CATCHMENT.

DEPTH TO GROUNDWATER BELOW SURFACE (IN CENTIMETRES).

	27-5-87		18-5-89		9-5-90		15-11-90							
	D	MS	D	MS	D	MS	D	MS	D	MS				
GD1	190		202	DRY	202	DRY	203	DRY						
GD2	212	DRY	190	DRY	190	DRY	190	DRY						
GD4.					035	3050								
IE2	218	DRY	218	DRY	218	DRY	220	DRY						
IE3	230	DRY	230	DRY	223	MUD	232	TINY ANTS DRY.						
IE4	236	DRY	162	538	232	DRY	232	MOIST						
NB1	227	DRY	231	DRY	230	DRY	230	DRY						
NB2	840	DRY	833	DRY	838	DRY	795	MOIST						
NB3	158		180	161	152	1320	127	164						
NB4.	223		198	222	177	1580	163	1625						
10 5							631	949						
10 6					575	555	579	1450						
10 7							410	3720						
10 8					135	3930	107	4260						
10 9							738	627						
10 10.					711	297	803	DRY						
10 14							794	MUD.						
10 15							480	397						
10 14							735	MUD.						
10 18							765	158						
10 19							853	634						
10 20							668	142						
10 23.							N F							