

Appendix 2.1

Figure 1 is a map of the Perry Lakes sector of the Gnangara Mound showing all monitoring wells, research bores and piezometers and natural water bodies used to compile summer and winter water table minimum and maximum levels in 1997. The accompanying Table 1 includes each well location in Australian Map Grid (AMG) coordinates and standing water levels (SWL) in metres above AHD. Wells drilled for this project within Perry Lakes reserve are included in the table but not labelled separately on the map. Refer to Figure 3.3 for well locations within Perry Lakes Reserve.

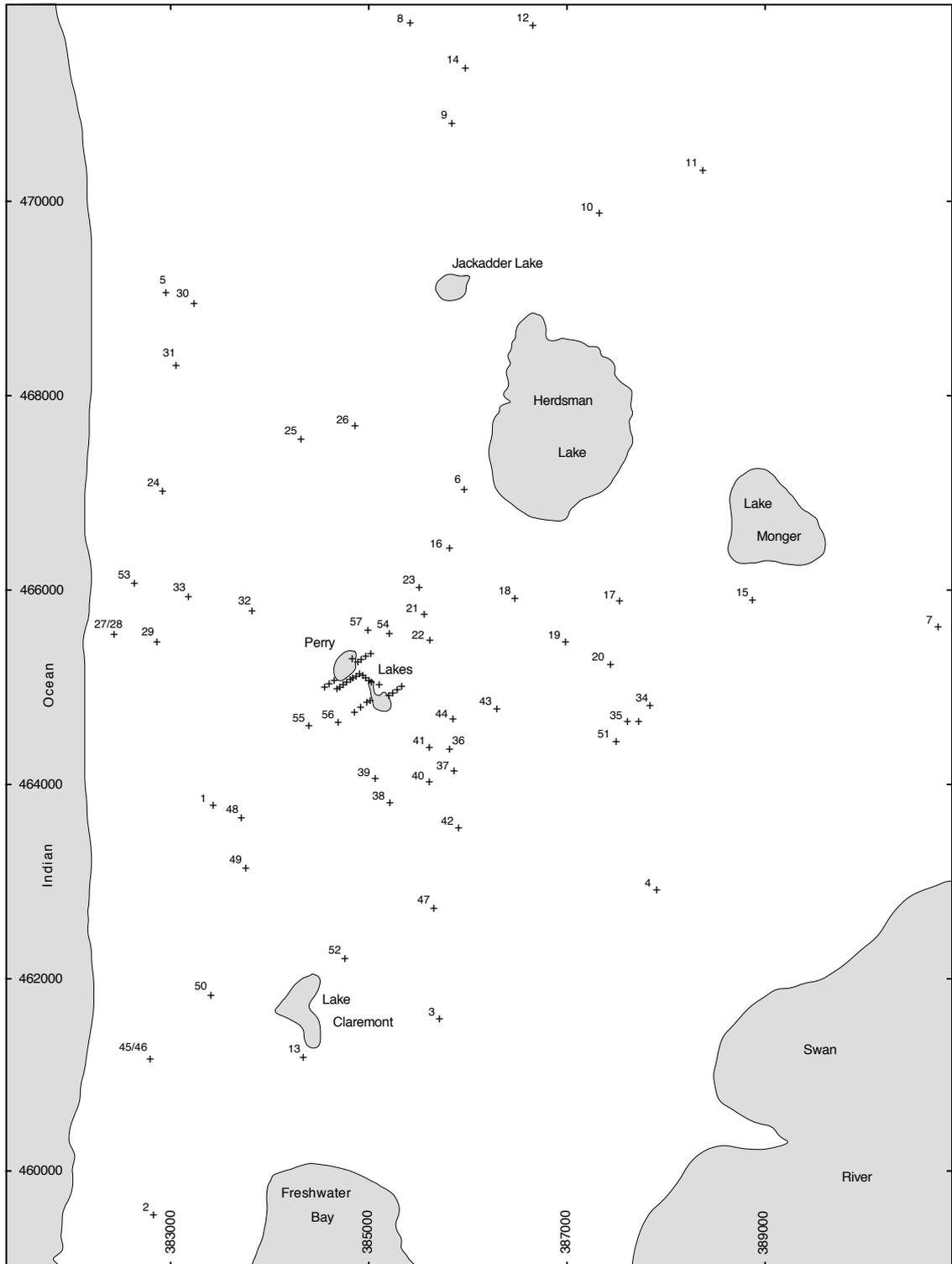
Perth is literally peppered with public and private irrigation bores. Within the survey area however there were only 14 dedicated monitoring wells (ID 1-14 in the table). Their distribution and density was insufficient to provide the detail required. In particular we thought a very detailed survey might reveal local perturbations in the water table around areas of very high extraction areas such as Perry Lakes. Such features do occur at a detailed scale during and immediately following pumping (Chapter 7) but were not observed regionally. The requirement that the end of summer readings be taken 2-3 weeks after irrigation bores were shut off for the winter probably meant that any such features had long disappeared. End of winter measurements were taken in September at around the time of peak water levels in Perry Lakes Reserve and well before the commencement of lawn irrigation. Depending on the depth to the water table the date of maximum winter recharge SWL will vary slightly from place to place occurring earlier close to wetlands and later under high ground where winter recharge takes much longer to infiltrate.

The survey proved to be technically and logistically difficult. Public irrigation bores are fitted with either turbine or submersible pumps. Only submersible equipped wells could be monitored. Turbine pumps have no access to the well casing. Submersible equipped wells are of variable construction. Many have a small 3/4 inch (18mm) threaded bung in the top plate. This allows a standard water level probe to be lowered down the well. Entanglement with the electrical cables feeding the submersible were a constant problem.

One probe entangled in the Wollaston College bore had to be cut off and abandoned. Many other wells had no bung but access was possible by removing the access plate for the electrical junction box. The cable access to the well casing was seldom large enough to allow access for the standard water level probe and were often off set from the top of the casing. A custom made water level sensor was constructed of thin (2.5mm) brass and thin 'figure 8' electrical cable. This was flexible enough to be fed through tight spaces and cheap enough that if it got jammed it could be abandoned at no great cost.

The second (and greatest) logistical problem was the requirement that every well be tied to a surveyed bench mark. All SWL were read to an accuracy of +/- 1mm. Similar surveyed height accuracy was required for the height datum at each well. In Perth there is generally a primary or secondary bench mark within about 500m of any point. The reality is that many secondary points end up hidden by gardens, under brick paving and so on. The Department of Land Administration (DOLA) provide very detailed maps of the location of each mark but despite this many could not be located. Optical levelling over distances of up to 2km was sometimes required to tie bores to the closest bench mark.

The bores surveyed were situated within five different municipal areas (City of Stirling, City of Subiaco, City of Nedlands, Town of Cambridge and Town of Claremont). Thanks to all of them for their cooperation and assistance with the survey.



Appendix 2.1 Figure 1

Scale 1:65 000

³⁺ Bore or piezometer location and identifier (ID number in Table 1)

Monitoring wells, irrigation bores, research wells and water bodies used to compile summer and winter water table levels 1997. Refer to Figure 3.3 for designation of research wells around Perry Lakes.

Surface water levels in lakes read from Water and Rivers Commission staff gauges except Jackadder Lake which has no gauge and was levelled from a bench mark specifically for this survey.

Bore or Water Body		AMG mE	AMG mN	SWL May	SWL Sept	Seasonal Change
Water and Rivers Commission Monitoring Bores						
ID	Name					
1	GE-1	383405	6463761	1.165	1.376	0.211
2	GE-2	382867	6459546	0.046	0.087	0.041
3	GE-3	385682	6461550	1.292	1.758	0.466
4	GE-4	387874	6462874	3.074	3.541	0.467
5	GD-4	382893	6467000	1.492	1.760	0.268
6	GD-5	385942	6467014	6.732	6.970	0.238
7	GD-6	390720	6465580	NR	12.947	
8	GM-17	385396	6471802	5.202	5.721	0.519
9	GM-22	385821	6470754	6.225	6.833	0.608
10	GM-26	387308	6469851	9.613	10.414	0.801
11	GM-27	388358	6470269	12.259	12.610	0.351
12	GM-30	386628	6471760	8.170	9.268	1.098
13	142	384321	6461154	NR	1.067	
14	8525	385970	6471330	6.150	6.325	0.175
Irrigation Bores in Parks and Reserves (including CSIRO Research Wells)						
15	Tara Vista Park	388840	6465850	9.466	9.818	0.352
16	Park, Lothian & Brookdale St.	385790	6466400	3.711	4.403	0.692
17	Rutter Park	387510	6465860	7.096	7.626	0.530
18	Park, Seymour & The Boulevard	386450	6465880	3.903	4.530	0.627
19	Rose Garden	386960	6465420	4.797	5.396	0.599
20	Henderson Park	387420	6465200	6.292	6.922	0.630
21	Floreat Oval, Chandler Ave.	385540	6465720	3.387	4.067	0.680
22	Floreat Oval Tennis Courts	385590	6465450	3.419	4.059	0.640
23	McLean Park	385480	6466000	3.387	4.084	0.697
24	The Boulevard & Landra Gdns.	383500	6466860	2.034	2.502	0.468
25	Empire Ave Reserve	384290	6467540	2.557	3.080	0.523
26	Luketina Reserve	384830	6467670	2.952	3.555	0.603
27	Jubilee Park abandoned bore casing	382420	6465520	1.098	NR	
28	Jubilee Park submersible	382430	6465520	NR	1.128	0.030
29	Oceanic Drive & West Coast Hwy	382830	6465450	1.330	1.567	0.237
30	Drabble Reserve	383190	6468930	1.660	2.032	0.372
31	Hale-Brompton Park	383020	6468300	NR	NR	
32	City Beach High School	383800	6465760	1.977	2.402	0.425
33	City Beach Primary School	383150	6465920	1.530	1.865	0.335
34	CSIRO BOC 1	387810	6464765	6.198	6.740	0.542
35	CSIRO BOC 6	387580	6464615	5.614	6.108	0.494
36	UWA Field Station, Wx station abd. bore	385790	6464330	3.065	3.533	0.468
37	UWA Field Station, Sheep paddock well	385840	6464100	3.070	3.486	0.416
38	UWA McGillivray #84	385180	6463780	2.010	2.507	0.497
39	UWA McGillivray #85	385040	6464020	2.076	2.561	0.485
40	UWA McGillivray #86	385590	6464000	2.632	3.146	0.514
41	CSIRO 'PF' well	385580	6464360	2.874	3.349	0.475
42	Lemnos St.	385890	6463530	2.624	3.114	0.490
43	Lawler Park	386270	6464740	3.590	4.053	0.463
44	Rogerson Gardens	385820	6464640	3.300	3.765	0.465
45	Allen Park (submersible)	382770	6461140	0.380	0.436	0.056
46	Allen Park (adjacent well)	382780	6461140	0.387	0.442	0.055
47	Graylands Hospital, depot bore	385620	6462700	1.645	2.133	0.488
48	Wollaston College	383680	6463640	1.326	1.501	0.175
49	Christchurch Grammar McClements Rd.	383730	6463110	1.104	1.366	0.262
50	Swanbourne High School	383380	6461800	0.495	0.608	0.113
51	CSIRO J6 Jolimont Primary School	387470	6464400	5.030	5.548	0.518
52	Town of Claremont, Alfred & Davies Rd.	384730	6462180	1.282	1.753	0.471
53	West Coast Highway	382600	6466065	NR	1.588	

Bore or Water Body	AMG mE	AMG mN	SWL May	SWL Sept	Seasonal Change
Perry Lakes Research Wells					
54 PL1	385170	6465525	3.029	3.722	0.693
WL1	384990	6465325	2.960	3.645	0.685
WL2	384930	6465275	2.922	3.602	0.680
WL3	384890	6465250	2.883	3.546	0.663
N1a	384870	6465240	2.862	3.506	0.644
N2a	384610	6465045	2.461	3.119	0.658
WL4	384595	6465035	2.401	3.013	0.612
WL5	384545	6465000	2.285	2.817	0.532
WL6	384845	6465090	2.773	3.447	0.674
WL7	384828	6465080	2.753	3.442	0.689
WL8	384810	6465065	2.733	3.436	0.703
WL9	384730	6465010	2.673	3.395	0.722
WL10	384710	6464998	2.631	3.334	0.703
WL11	384700	6464985	2.601	3.295	0.694
WL12	384680	6464972	2.546	3.230	0.684
PL2	384860	6465102	2.795	3.477	0.682
WL13	384885	6465091	2.820	3.510	0.690
WL14	384910	6465080	2.841	3.530	0.689
WL15	384935	6465068	2.853	3.545	0.692
WL16	384960	6465055	2.875	3.562	0.687
WL17	384982	6465045	2.899	3.577	0.678
WL18	385290	6464968	3.107	3.797	0.690
WL19	385250	6464935	3.043	3.721	0.678
WL20	385228	6464922	3.004	3.661	0.657
N3a	385205	6464905	2.964	3.620	0.656
N4a	384975	6464822	2.798	3.463	0.665
WL21	384962	6464815	2.768	3.431	0.663
WL22	384950	6464802	2.728	3.390	0.662
WL23	384890	6464762	2.603	3.263	0.660
WL24	384820	6464715	2.512	3.187	0.675
55 WL25	384360	6464568	1.956	2.346	0.390
56 N5a	384655	6464600	2.114	2.584	0.470
W26A	385077	6464988	NR	3.598	
57 Abd#8	384965	6465560	2.956	3.622	0.666
Surface Water					
Indian Ocean			0.000	0.000	0.000
Swan River/Freshwater Bay			0.000	0.000	0.000
Lake Monger			12.665	12.902	0.237
Jackadder Lake			8.000	8.352	0.352
Herdsman Lake			6.530	7.052	0.522
Perry Lake East			3.006	3.526	0.520
Perry Lake West			2.687	3.455	0.768
Lake Claremont			1.090	1.605	0.515

Notes

All values in metres, SWL are m AHD

NR = not read

#27 Jubilee Park, May reading in abandoned bore, September reading in adjacent submersible well #28