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Supplement of

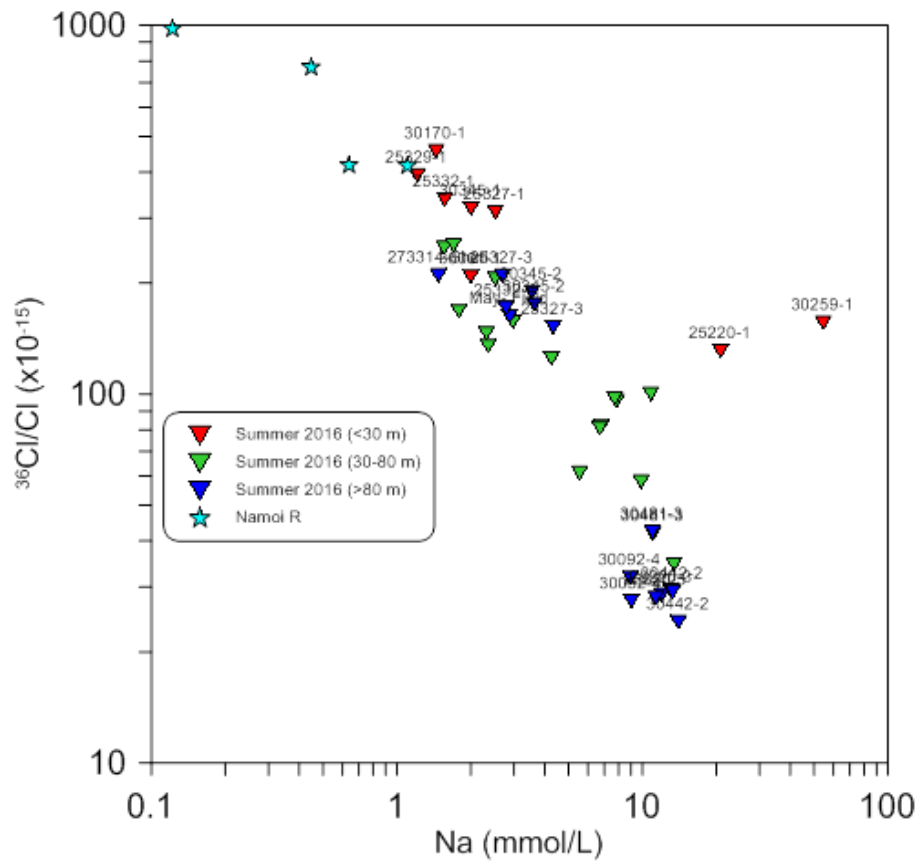
A multi-tracer approach to constraining artesian groundwater discharge into an alluvial aquifer

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Supplementary Figure 1. Plot of ^{36}Cl vs Na, providing additional evidence for groundwater mixing in the LNA.



Supplementary Table 1. Geochemical data for regional GAB boreholes used as representative of GAB groundwater (Radke et al. 2000; McLean 2003).

Bore	Depth (m bgs)	Na ⁺ (mmol/L)	Cl ⁻ (mmol/L)	HCO ₃ ⁻ (mmol/L)	F ⁻ (mmol/L)	Br ⁻ (mmol/L)	¹⁴ C (‰)	³⁶ Cl/Cl (x10 ⁻¹⁵)
Billandrie	55.4	22.798	19.725	8.074	0.009	0.027	6.3	147.3
Bundy	478.5	4.509	0.776	6.681	0.033	0.001	nd	147.5
Banyah	952	13.215	1.434	8.840	0.040	nd	0.78	nd
Combadello	837.9	10.682	1.471	9.590	0.038	0.003	2.9	33.1
Drilldool-1	659	12.803	1.753	9.003	0.043	nd	0.74	nd
Combogol-3	714.5	14.097	2.409	12.131	0.068	0.003	nd	17.7
Coonamble-3	664.2	2.7104	0.480	6.314	0.024	0.001	2.4	156.1
Keelindi-1	672.4	11.724	1.550	10.378	0.033	0.003	nd	29.6
Kensington	813	14.349	2.033	9.554	0.036	nd	0.57	nd
Kensington	812.6	14.243	1.864	12.786	0.045	0.003	nd	20
Mercadool-2	839.4	10.679	1.736	9.210	0.033	0.003	nd	32.7
Mungyer	828	12.224	1.471	8.624	0.042	nd	1	nd
Mungyer	827.8	12.191	1.550	11.167	0.051	0.003	nd	33.3
Narba	838.5	12.956	1.793	11.486	0.058	0.003	nd	25.1
Pagan Creek	908	14.725	2.595	9.398	0.047	nd	0.9	nd
Pilliga	564	12.129	1.615	7.618	0.027	nd	0.74	nd
Rowena	813.5	12.575	1.751	11.443	0.047	0.003	3.6	34.9
Telleraga-2	919	11.795	1.397	8.293	0.034	nd	1.42	nd
Ulumbie	811	13.588	1.892	8.429	0.023	nd	0.83	nd
Ulumbie	810.8	14.09	1.889	11.977	0.074	0.004	nd	14.8
Warrana-3	506	3.1064	1.118	4.966	0.038	0.002	nd	179.4
Keelendi-2	740	10.885	1.685	7.544	0.024	nd	0.93	nd
Keelindi-3	706.8	11.636	1.745	10.229	0.035	0.003	nd	32.2
Kiel	609.6	19.489	5.084	14.693	0.105	0.009	nd	6.3

Bore	Depth (m bgs)	Na ⁺ (mmol/L)	Cl ⁻ (mmol/L)	HCO ₃ ⁻ (mmol/L)	d ¹⁸ O (‰)	d ² H (‰)
4057	733	12.54	1.79	12.03	-6.45	-41.1
4061	715	13.15	1.82	12.11	-6.55	-40.9
4063	678	13.33	1.74	11.94	-6.58	-41.2
4064	671	12.53	2.17	11.89	-6.57	-41.1
4073	689	12.97	2.08	11.62	-6.48	-41.9
4091	745	13.43	1.92	11.92	-6.56	-41
4171	674	12.61	1.99	11.03	-6.55	-43.1
4265	826	12.47	1.60	11.27	-6.24	-42
4356	819	13.40	1.68	11.46	-6.39	-41.5
4405	839	14.48	1.93	11.81	-6.48	-41.4
4442	564	12.51	1.97	10.92	-6.55	-40.8
4461	813	12.68	1.96	11.69	-6.5	-38.8
4692	706	11.85	1.95	10.43	-6.42	-41.3

Supplementary Table 2. Major ion data for both sampling campaigns.

Sample	Northing(mMGA)	Easting(mMGA)	DepthInterval(mBgs)	StandingWaterLevel(mBgs)	Campaign	Na ⁺ (mmol/L)	Cl ⁻ (mmol/L)	Br ⁻ (mmol/L)	F ⁻ (mmol/L)	HCO ₃ ⁻ (mmol/L)
36020-2	6652630	741154	51.2-69.4	31.5	Jan-Feb	7.851	1.098	0.0023	0.0237	6.714
25327-1	6660002	745508	18.9-21.9	18.84	Jan-Feb	2.522	1.772	0.0059	0.0089	3.155
25327-2	6660002	745508	57.9-60.9	30.73	Jan-Feb	1.703	0.962	0.0026	0.0063	2.344
25327-3	6660002	745508	80.8-83.8	42.64	Jan-Feb	4.330	1.078	0.0026	0.0089	6.119
36001-2	6652630	741154	47.5-50.5	24.39	Jan-Feb	2.354	0.313	0.0008	0.0095	3.120
36001-1	6652630	741154	22.8-25.9	21.21	Jan-Feb	2.002	1.910	0.0050	0.0058	2.522
30357-1	6645066	754061	33.5-35.3	28.76	Jan-Feb	13.458	1.550	0.0028	0.0537	12.027
30442-2	6645066	754061	106-109	29.27	Jan-Feb	14.026	1.471	0.0026	0.0521	12.789
25331-4	6656029	744869	67.1-74.7	25.64	Jan-Feb	4.267	0.415	0.0009	0.0242	4.621
30170-1	6656029	744869	19.2-20.7	14.29	Jan-Feb	1.446	0.883	0.0021	0.0089	2.954
NamoitRiver	6656029	744869	NA	NA	Jan-Feb	1.103	0.567	0.0014	0.0089	2.353
25329-1	6657487	745009	16.8-19.2	15.65	Jan-Feb	1.212	0.494	0.0013	0.0068	2.392
25329-4	6657487	745009	78.9-80.1	33.66	Jan-Feb	5.553	0.756	0.0016	0.0111	6.757
25325-2	6663243	746074	36.9-38.4	26.94	Jan-Feb	1.790	0.581	0.0014	0.0063	2.759
25325-6	6663243	746074	67.1-70.1	43.4	Jan-Feb	2.523	1.408	0.0039	0.0100	2.809
30481-3	6645650	748754	82.2-85.3	29.19	Jan-Feb	11.049	1.530	0.0030	0.0463	10.074
30481-2	6645650	748754	54.8-56.3	27.73	Jan-Feb	6.811	0.844	0.0019	0.0237	6.548
273314	6639582	764809	182-195	6.38	Jan-Feb	1.478	1.015	0.0023	0.0032	1.741
30345-2	6632394	778260	97.5-99.5	6	Jan-Feb	3.547	0.562	0.0014	0.0116	4.591
30345-1	6632394	778260	7-9.8	7.65	Jan-Feb	2.010	0.945	0.0026	0.0068	4.212
25342-3	6644130	738160	43.49-45.7	30.98	Jan-Feb	10.833	1.539	0.0029	0.0537	9.233
30092-4	6661225	750822	108.2-110	64.67	Jan-Feb	9.017	1.457	0.0030	0.0189	8.511
25220-3	6647062	756996	97.5-109.7	28.09	Jan-Feb	11.988	1.358	0.0025	0.0405	10.317
25220-1	6647062	756996	24.4-30.5	23.8	Jan-Feb	20.854	4.040	0.0065	0.2148	16.156
25332-1	6655392	744426	17.7-21	18.14	Jan-Feb	1.567	0.748	0.0018	0.0053	3.512
25332-4	6655392	744426	66.8-69.8	23.92	Jan-Feb	2.779	0.446	0.0013	0.0121	4.056
30259-1	6643274	760784	27.1-32	8.56	Jan-Feb	54.583	26.731	0.0550	0.0358	24.020
30259-2	6643274	760784	57.9-61.4	4.57	Jan-Feb	13.071	1.547	0.0025	0.0500	11.877
25339-4	6649072	739016	59.4-62.4	26.96	Jan-Feb	9.880	1.877	0.0040	0.0316	9.127
30357-1	6645066	754061	33.5-35.3	28.88	July	13.379	1.499	0.0028	0.0579	11.746
30442-2	6645066	754061	106-109	21.41	July	13.288	1.440	0.0028	0.0526	12.520
36020-2	6652630	741154	51.2-69.4	31.58	July	7.720	1.084	0.0023	0.0195	6.941
30481-2	6645650	748754	54.8-56.3	27.78	July	6.723	0.813	0.0018	0.0242	6.745
30481-3	6645650	748754	82.2-85.3	27.75	July	11.004	1.485	0.0029	0.0490	10.266
25327-1	6660002	745508	18.9-21.9	19.295	July	2.665	1.862	0.0061	0.0095	3.070
25327-2	6660002	745508	57.9-60.9	23.66	July	1.560	0.897	0.0024	0.0063	2.385
25327-3	6660002	745508	80.8-83.8	25.58	July	2.692	1.233	0.0033	0.0074	4.258
30092-2	6661225	750822	48.2-49.4	22.07	July	2.979	0.751	0.0019	0.0095	3.531
30092-4	6661225	750822	108.2-110	28.815	July	8.930	1.400	0.0024	0.0211	8.503
36001-1	6652630	741154	22.8-25.9	21.535	July	2.020	1.910	0.0051	0.0063	2.466
36001-2	6652630	741154	47.5-50.5	21.865	July	2.319	0.310	0.0008	0.0105	3.149
25220-1	6647062	756996	24.4-30.5	12.475	July	20.276	4.463	0.0085	0.2053	16.147
25220-3	6647062	756996	97.5-109.7	13.145	July	11.340	1.194	0.0015	0.0426	10.351
30345-1	6632394	778260	7-9.8	8.75	July	2.067	1.072	0.0031	0.0084	4.237
30345-2	6632394	778260	97.5-99.5	7.65	July	3.638	0.545	0.0014	0.0126	4.641
Dawson'sSpring	6646647	227301	NA	NA	July	0.122	0.063	NA	0.0021	0.287
EulahCreek	6639638	784466	NA	NA	July	0.448	0.270	0.0001	0.0079	0.910
NamoitRiver	6656707	740392	NA	NA	July	0.639	0.296	0.0003	0.0100	1.391
DCE-16-50	6655189	773812	99-144.5	NA	July	2.880	0.686	0.0013	0.0168	7.572

Supplementary Table 3. Stable water isotopes, ^3H and ^{14}C (pmc and pMC) data for both sampling campaigns.

Sample	Depth interval	Campaign	$\delta^{18}\text{O}$ (‰)	$\delta^2\text{H}$ (‰)	^3H (TU)	^{14}C (pmc)	^{14}C (pMC)
36020-2	51.2-69.4	Jan-Feb	-6.49	-41.88	0.05	52.4	53.7
25327-1	18.9-21.9	Jan-Feb	-2.61	-17.33	1.10	103.4	106.2
25327-2	57.9-60.9	Jan-Feb	-5.21	-33.57	0.29	92.0	94.9
25327-3	80.8-83.8	Jan-Feb	-5.76	-36.72	0.22	25.8	26.3
36001-2	47.5-50.5	Jan-Feb	-6.14	-40.26	<0.04	72.8	75.1
36001-1	22.8-25.9	Jan-Feb	-5.23	-33.24	0.30	97.3	100.2
30357-1	33.5-35.3	Jan-Feb	-6.49	-40.56	0.12	1.1	1.1
30442-2	106-109	Jan-Feb	-6.52	-40.54	<0.04	0.2	0.2
25331-4	67.1-74.7	Jan-Feb	-6.14	-39.18	<0.04	51.8	53.2
30170-1	19.2-20.7	Jan-Feb	-1.36	-11.52	2.21	100.1	102.6
Namoi River	NA	Jan-Feb	-0.76	-7.51	2.36	101.2	103.0
25329-1	16.8-19.2	Jan-Feb	-5.25	-30.94	1.16	104.0	107.6
25329-4	78.9-80.1	Jan-Feb	-6.02	-38.48	0.04	19.6	19.9
25325-2	36.9-38.4	Jan-Feb	-6.17	-40.05	0.06	86.3	88.7
25325-6	67.1-70.1	Jan-Feb	-5.69	-36.81	0.18	90.4	92.8
30481-3	82.2-85.3	Jan-Feb	-6.44	-40.07	<0.04	4.9	4.9
30481-2	54.8-56.3	Jan-Feb	-6.54	-41.54	0.05	29.5	30.1
273314	182-195	Jan-Feb	-6.17	-37.78	0.08	0.6	0.6
30345-2	97.5-99.5	Jan-Feb	-6.32	-38.69	<0.04	33.4	34.3
30345-1	7-9.8	Jan-Feb	-6.15	-39.97	0.13	91.8	94.5
25342-3	43.49-45.7	Jan-Feb	-6.50	-41.52	0.14	50.1	51.2
30092-4	108.2-110	Jan-Feb	-6.35	-39.55	<0.04	0.3	0.3
25220-3	97.5-109.7	Jan-Feb	-6.50	-40.61	0.07	0.2	0.2
25220-1	24.4-30.5	Jan-Feb	-2.10	-14.63	0.76	69.7	70.8
25332-1	17.7-21	Jan-Feb	-3.40	-20.53	1.47	102.5	105.8
25332-4	66.8-69.8	Jan-Feb	-6.53	-41.87	0.15	73.6	75.7
30259-1	27.1-32	Jan-Feb	-6.21	-39.36	0.15	57.0	58.1
30259-2	57.9-61.4	Jan-Feb	-6.56	-41.19	<0.04	0.3	0.3
25339-4	59.4-62.4	Jan-Feb	-6.24	-40.13	0.08	0.8	0.8
30357-1	33.5-35.3	July	-6.35	-39.74	0.04	0.2	0.2
30442-2	106-109	July	-6.44	-39.94	0.06	3.1	3.2
36020-2	51.2-69.4	July	-6.42	-41.00	0.07	52.3	53.6
30481-2	54.8-56.3	July	-6.32	-40.24	0.04	29.3	29.9
30481-3	82.2-85.3	July	-6.38	-39.63	0.08	4.3	4.4
25327-1	18.9-21.9	July	-2.54	-16.55	1.03	102.7	105.5
25327-2	57.9-60.9	July	-5.57	-35.43	0.19	90.6	93.4
25327-3	80.8-83.8	July	-5.54	-35.21	0.19	56.1	57.4
30092-2	48.2-49.4	July	-5.90	-37.77	0.06	66.9	68.5
30092-4	108.2-110	July	-6.29	-39.26	<0.04	0.2	0.2
36001-1	22.8-25.9	July	-5.16	-32.92	0.31	97.8	100.8
36001-2	47.5-50.5	July	-6.53	-41.67	<0.04	73.2	75.5
25220-1	24.4-30.5	July	-2.25	-15.39	0.65	69.9	71.2
25220-3	97.5-109.7	July	-6.52	-40.49	<0.04	0.2	0.2
30345-1	7-9.8	July	-6.17	-40.05	0.19	94.5	97.4
30345-2	97.5-99.5	July	-6.33	-38.84	<0.04	33.6	34.5
Dawson's Spring	NA	July	-7.66	-43.69	1.84	107.6	107.6
Eulah Creek	NA	July	-7.25	-43.71	2.21	101.0	103.6
Namoi River	NA	July	-8.42	-54.92	2.34	99.5	101.8
DCE-16-50	99-144.5	July	-5.73	-35.65	0.08	48.3	49.6

Supplementary Table 4. ^{36}Cl data used in residence time analyses for the Jan-Feb campaign only.

Sample	Depth interval	Campaign	$^{36}\text{Cl}/\text{Cl}$ ($\times 10^{-15}$)	Error
36020-2	51.2-69.4	Jan-Feb	95.61	3.10
25327-1	18.9-21.9	Jan-Feb	310.99	4.65
25327-2	57.9-60.9	Jan-Feb	253.05	3.80
25327-3	80.8-83.8	Jan-Feb	151.68	3.55
36001-2	47.5-50.5	Jan-Feb	135.00	3.60
36001-1	22.8-25.9	Jan-Feb	208.00	3.20
30357-1	33.5-35.3	Jan-Feb	34.50	4.05
30442-2	106-109	Jan-Feb	24.06	6.00
25331-4	67.1-74.7	Jan-Feb	124.75	3.90
30170-1	19.2-20.7	Jan-Feb	455.35	3.00
Namoi River	NA	Jan-Feb	416.05	3.25
25329-1	16.8-19.2	Jan-Feb	391.32	3.05
25329-4	78.9-80.1	Jan-Feb	61.09	4.10
25325-2	36.9-38.4	Jan-Feb	167.68	4.55
25325-6	67.1-70.1	Jan-Feb	205.45	3.20
30481-3	82.2-85.3	Jan-Feb	41.76	4.95
30481-2	54.8-56.3	Jan-Feb	81.73	4.30
273314	182-195	Jan-Feb	209.51	3.55
30345-2	97.5-99.5	Jan-Feb	189.00	3.30
30345-1	7-9.8	Jan-Feb	318.15	3.20
25342-3	43.49-45.7	Jan-Feb	100.05	3.15
30092-4	108.2-110	Jan-Feb	27.42	4.70
25220-3	97.5-109.7	Jan-Feb	28.54	4.50
25220-1	24.4-30.5	Jan-Feb	130.75	2.80
25332-1	17.7-21	Jan-Feb	336.50	2.85
25332-4	66.8-69.8	Jan-Feb	171.15	3.30
30259-1	27.1-32	Jan-Feb	156.05	3.20
30259-2	57.9-61.4	Jan-Feb	29.35	4.35
25339-4	59.4-62.4	Jan-Feb	57.85	3.65