

Appendix B

Plates

Table A2
Cumulative Changes to Settlement Plates



Locality	Monitoring Point	EASTING	NORTHING	Initial Height September 2005	Re-survey Height September 2006	Re-survey Height May 2007	Re-survey Height May 2008	Difference 2005 - 2006	Difference 2006 - 2007	Difference 2007 - 2008	Total Change to Date	Base Case Settlement Prediction
		(MGA)	(MGA)	(mAHD)(± 0.5mm)	(mAHD)(± 0.5mm)	(mAHD)(± 0.5mm)	(mAHD)(± 0.5mm)	(m)	(m)	(m)	(m)	(m)
Benchmarks	B1	334589.00	6240682.92	3.7420	3.7420	3.7420	-	0.0000	0.0000	-	0.0000	NA
	B2	335133.04	6241040.54	3.7330	3.7330	3.7330	-	0.0000	0.0000	-	0.0000	NA
	B3	335067.26	6241841.95	6.2640	6.2640	6.2640	6.2500	0.0000	0.0000	-0.0140	-0.0140	NA
	B4	335391.20	6241463.59	6.8960	6.8960	6.8960	6.8960	0.0000	0.0000	0.0000	0.0000	NA
	B5	334503.99	6241782.18	12.6960	12.6960	12.6960	12.6960	0.0000	0.0000	0.0000	0.0000	NA
	B6	334135.59	6241084.71	2.4600	2.4600	2.4600	-	0.0000	0.0000	-	0.0000	NA
	B7	335687.62	6242478.46	19.9520	19.9520	19.9520	19.9520	0.0000	0.0000	0.0000	0.0000	NA
BIP	Z4	334548.79	6242072.94	11.0730	11.0725	11.0725	11.0725	-0.0005	0.0000	0.0000	-0.0005	-0.0170
	Z5	334942.35	6241999.74	6.0795	6.0845	6.0850	6.0770	0.0050	0.0005	-0.0080	-0.0025	-0.0170
	Z6	334827.97	6241998.97	5.9785	5.9775	5.9755	5.9755	-0.0010	-0.0020	0.0000	-0.0030	-0.0170
	Z7	335098.74	6241800.76	6.4310	6.4340	6.4370	6.4290	0.0030	0.0030	-0.0080	-0.0020	-0.0170
	Z8	335236.08	6241633.32	6.5030	6.5055	6.5085	6.5005	0.0025	0.0030	-0.0080	-0.0025	-0.0170
	Z9	335290.80	6241667.49	6.8965	6.9000	6.9025	6.8960	0.0035	0.0025	-0.0065	-0.0005	-0.0170
	Z10	335495.41	6241459.67	8.1600	8.1590	8.1575	8.1565	-0.0010	-0.0015	-0.0010	-0.0035	-0.0170
	Z11	335375.11	6241431.20	6.6770	6.6770	6.6760	6.6760	0.0000	-0.0010	0.0000	-0.0010	-0.0170
	Z16	335810.20	6242161.38	17.6315	17.6330	17.6320	17.6335	0.0015	-0.0010	0.0015	0.0020	-0.0170
	Z17	336082.99	6242433.93	22.3205	22.3215	22.3215	22.3235	0.0010	0.0000	0.0020	0.0030	-0.0170
Z21	335834.15	6241601.54	14.2925	14.2910	14.2905	14.2925	-0.0015	-0.0005	0.0020	0.0000	-0.0170	
Southlands (PCA)	Z3	334409.46	6241507.34	16.1720	16.1720	16.1730	16.1710	0.0000	0.0010	-0.0020	0.0010	-0.0060
	Z12	334809.77	6241099.73	2.9650	2.9670	2.9650	-	0.0020	-0.0020	-	0.0000	-0.0060
	Z13	335012.59	6241064.96	3.7910	3.7895	3.7880	-	-0.0015	-0.0015	-	-0.0030	-0.0060
	Z14	335201.27	6241036.60	2.9945	2.9940	2.9910	-	-0.0005	-0.0030	-	-0.0035	-0.0060
	Z15	335361.18	6241001.22	4.0375	4.0380	4.0380	-	0.0005	0.0000	-	0.0005	-0.0060
Foreshore Road (SCA)	Z1	334297.02	6241003.77	1.6915	1.7185	1.7195	-	0.0270	0.0010	-	0.0280	-0.0020
	Z2	334120.72	6241097.37	1.5900	1.5920	1.5925	-	0.0020	0.0005	-	0.0025	-0.0020
	Z18	334810.18	6240651.33	3.5775	3.5775	3.5780	-	0.0000	0.0005	-	0.0005	-0.0020
	Z19	334610.38	6240678.29	3.5160	3.5160	3.5155	-	0.0000	-0.0005	-	-0.0005	-0.0020
	Z20	334266.13	6240793.87	3.4565	3.4570	3.4565	-	0.0005	-0.0005	-	0.0000	-0.002

Notes:
 Results provided by AAM Hatch.
 MGA = Map Grid Australia
 mAHD - Metres above Australian Height Datum
 NA - Not Applicable.
 (-) Not Surveyed

Appendix C

AAM Hatch May 2008 Survey Report



AAMHatch Ref: 14521_01_rev0

Date: May 2008

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Attention: Holly Marshall

Dear Holly,

Re: SETTLEMENT MONITORING SURVEY- BOTANY

An initial survey of the Botany settlement monitoring plates was undertaken in September 2005 by AAMHatch to establish base level data for seven (7) benchmarks, B1 to B7, and twenty one (21) monitoring plates, Z1 to Z21, in Botany Industrial Park and surrounding area (See attached image). The second survey of the twenty one (21) monitoring plates was undertaken in September 2006 to establish if any change had taken place in the reduced levels of the monitoring plates. A third survey was undertaken in May 2007 to once again establish if any change had taken place of the monitoring plates. A fourth survey was undertaken in May 2008

September 2005 Survey

The initial survey was undertaken using a Sokkia digital level with a quoted accuracy of $\pm 0.3\text{mm/km}$ for a double level run under ideal conditions. Coordinates of each benchmark were derived from the quoted Lands Department value of the nearest survey mark. Three closed loop double level runs were surveyed to each point to determine the level of each monitoring plate and the precision of the result. This resulted in a precision of the level on most monitoring plates being $\pm 0.5\text{mm}$ due to weather and traffic conditions. The longer level runs to Z6 along Swinbourne Street and to Z21 along Denison Street have a lower precision of $\pm 1.0\text{mm}$ due to the extra length of the level run and ground shake due to truck movements.

September 2006 Survey

The second epoch measurements were undertaken using the same equipment, and two closed loop double level runs. Comparison of multiple observations, and analysis of loop closure values, indicate similar precision results to the first epoch measurements. The results are shown in the attached table (Table 1).

Overall there seems to be minor variations to the monitoring plate reduced levels between epochs, except for Z1 that has risen by 27mm.

Given that this measurement epoch is the first since establishment, and the large time period between measurement epochs, the small general movements may in part be due to the monitoring points establishing a settled position after placement.

The results for point Z1 indicate to us that the point has moved in some way since our first epoch measurements. All observation – both current and previous – have been reviewed, and no anomalies can be found. Indeed, in order to ensure a high quality of analysis, we implemented a works process during measurement epoch 1 that ensured each levelling change point was identifiable between epochs. This allowed us to virtually reproduce the exact same level route for each epoch. In analysing the results (unreported) of the levelling change points associated with Z1 observations (total of 3), we find no significant variations between epochs. This includes a change point within approximately 25 m of point Z1.

May 2007 Survey

The third epoch measurements were undertaken using the same equipment, and a closed loop double level run. Comparison of multiple observations, and analysis of loop closure values, indicate similar precision results to the first and second epoch measurements. The results are shown in the attached table (Table 1).

Overall there seems to be minor variations to the monitoring plate reduced levels between epochs. Monitoring plate Z1 has shown little variation to when the second epoch was taken.

May 2008 Survey

The fourth epoch measurements of part of the network were undertaken with a closed loop and a single level run. Comparison of multiple observations, and analysis of loop closure values, indicate similar precision results to the first three epoch measurements. The results are shown in the attached table (Table 1).

An analysis of results from bench mark B3 for points Z5 and Z7 to Z9 indicated a likely problem with the stability of bench mark B3 so check level runs were made from bench mark B4. It was found that B3 has settled 14mm with respect to B4 and other control marks. The quoted values of B3, Z5 and Z7 to Z9 (in red) are based on the value of B4 which appears to be stable.

Recommendations

It is recommend that points B3, Z5 and Z7 to Z9 be monitored from B4 in future to determine if the B3 has achieved a stable location.

Yours faithfully
AAMHatch Pty Ltd



David McLaughlin
Surveyor

Table 1: Results of Level Survey for September 2005, September 2006 and May 2007

MONITORING POINT	EASTING (MGA)	NORTHING (MGA)	HEIGHT (AHD) Sep-05	HEIGHT (AHD) Sep-06	HEIGHT (AHD) May-07	HEIGHT (AHD) May-08
B6	334135.59	6241084.71	2.4600	2.4600	2.4600	
Z1	334297.02	6241003.77	1.6915	1.7185	1.7195	
Z2	334120.72	6241097.37	1.5900	1.5920	1.5925	
B5	334503.99	6241782.18	12.6960	12.6960	12.6960	12.6960
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Z10	335495.41	6241459.67	8.1600	8.1590	8.1575	8.1565
Z11	335375.11	6241431.20	6.6770	6.6770	6.6760	6.6760
B2	335133.04	6241040.54	3.7330	3.7330	3.7330	
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B7	335687.62	6242478.46	19.9520	19.9520	19.9520	19.9520
Z16	335810.20	6242161.38	17.6315	17.6330	17.6320	17.6335
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Z19	334610.38	6240678.29	3.5160	3.5160	3.5155	
Z20	334266.13	6240793.87	3.4565	3.4570	3.4565	