



THREE KINGS QUARRY

RESOURCE CONSENT 12977

ANNUAL MONITORING REPORT

May 2011

ANNUAL THREE KING QUARRY MONITORING REPORT

Introduction

The following report is made with regard to Section 9 of the Monitoring and Contingency Plan for Dewatering Three Kings Quarry dated September 2005.

This report contains a compilation of all monitoring data and documents any settlement alarm level events, reviews and remedial action undertaken for the period of 1 April 2010 to 31 March 2011.

Monitoring Summary

The monitoring of groundwater levels has been undertaken monthly for the year ending March 31 2011. Groundwater levels within the quarry have been held above RL34m since the lowering of the groundwater table ceased in October 2002.

No new groundwater monitoring bores were installed in the 12 month period ending 31 March 2011.

The monitoring of precise level survey marks has continued with a survey of all precise level benchmarks undertaken in February/March 2011.

Precise level surveys are currently being undertaken at 12 month intervals as dewatering has not been undertaken for more than 2 years, and there has been a cessation of settlement (as defined in the permit to dewater Three Kings Quarry).

Three replacement marks were installed: AP 21B on the corner of Mt Eden Road and Kingsway, AP 142 on the corner of Carr Road and Hayr Road and AP 132A on the corner of Carr Road and Clinker Street. AP 21B and AP 142 were replacement marks for marks that have been disturbed or destroyed during footpath/street crossing upgrading. AP 132A is a replacement mark for a mark in severely damaged concrete considered no longer reliable.

Groundwater levels and precise level survey results are attached to this report.

Precise Level Survey Results

A precise level survey of all precise level marks was undertaken in February/March 2011.

All precise level survey marks were within 5mm of the previous reading.

Differential settlement alarm values are continued to be recorded between:

- AP92 and AP93, and AP92 and AP80 on Mt Albert Road,
- AP62 and AP88 at the intersection of Mt Albert Road and Hillsborough Road,
- AP110 and AP111 on Hillsborough Road,
- AP67 and AP112 at the intersection of Hillsborough Road and Budock Road, and

- OCP68 and AP114, AP69 and AP114, AP70 and AP117, and AP38 and AP117 on Budock Road.

No new differential settlement alarms were recorded compared with the previous survey undertaken in March 2010.

Marks	Location	Mar-11 Differential Settlement	Distance between Marks	Adjusted Difference in Levels between Marks
AP92 and AP93	Mt Albert Road	1 in 1577	16.7m	10.6mm
AP92 and AP80	Mt Albert Road	1 in 1605	17.7m	11.05mm
AP110 and AP111	Hillsborough Road	1 in 3363	17.7m	5.3mm
OCP68 and AP114	Budock Road	1 in 2310	23.0m	9.95mm
AP67 and AP112	Hillsborough and Budock	1 in 4901	14.6m	3.0mm
AP62 and AP88	Mt Albert and Hillsborough	1 in 4235	28.0m	6.6mm
AP69 and AP114	Budock Road	1 in 2310	26.4m	9.95mm
AP70 and AP117	Budock Road	1 in 3016	21.5m	7.1mm
AP38 and AP117	Budock Road	1 in 3052	22.9m	7.5mm

The actions required for Differential Settlement Alarms Values less than 1 in 5000 but greater than 1 in 2000 are to report these to the Auckland Council and Three Kings Quarry Manager, and to install additional survey marks at 50 metre centres between existing survey marks.

Please note that the spacing between these marks is already less than 50 metres.

The action required for Differential Settlement Alarm Values less than 1 in 2000 but greater than 1 in 1000 are to:

- Install additional survey marks at 25metre centres between existing marks,
- Report these settlements to the Three Kings Quarry Manager, affected property owners, South Epsom Planning, Three Kings United, Epsom Environmental Effects, and Mt Roskill and Eden-Albert Community Boards.
- Assess the potential impact of on-going settlements on building and services, and
- Undertake a review of the groundwater model and settlement predictions.

The Differential Settlement Alarms between AP80, AP92 and AP93 on Mt Albert Road adjacent to the St Andrews Reserve are not a result of dewatering Three Kings Quarry. The reasons are as follows:

- AP80 and AP93 have recorded settlements consistent with other marks in this area (as shown on the attached graph), AP92 has risen since it was first surveyed;
- Differential settlements between all immediately surrounding marks are generally greater than 1 in 10,000, and
- The results of a borehole drilled in the St Andrews Reserve (tuff overlying Waitemata).

While there are no visual signs of deterioration or disturbance to the footpath (all these marks are survey nails in the footpath), none would be expected as the amount of differential settlement being recorded is within the tolerance for damage of the footpath.

A detailed analysis of precise level survey marks in the vicinity of AP80, AP92 and AP93 is presented in the following table. The locations of precise level survey marks are shown on the attached drawings. The adjusted change in levels is undertaken to take into account any settlement prior to precise level survey marks being installed (for precise level survey marks installed after dewatering commenced).

<i>Precise Level Mark</i>	<i>Change in Level since First Survey (mm)</i>	<i>Adjusted Change in Level (mm)</i>	<i>Precise Level Marks</i>	<i>Differential Settlement</i>	
				Spacing (metres)	Differential Settlement
RM 6813	-28.33	-28.33			
AP 97	-8.0	-26.66	RM6813-AP97	25.0	1 in 14928
AP 96	-9.0	-28.05	AP97-AP96	25.5	1 in 18358
AP 8B	-16.0	-27.43	AP96-AP8B	25.0	1 in 40322
AP 79	-10.0	-22.93			
AP 94	-8.67	-26.30	AP79-AP94	21.8	1 in 6472
AP 8B	-16.0	-27.43	AP94-AP8B	23.2	1 in 20449
AP 93	-7.33	-25.93	AP8B-AP93	23.7	1 in 15838
AP 92	+2.67	-15.35	AP93-AP92	16.7	1 in 1577
AP 80	-12.33	-26.40	AP92-AP80	17.7	1 in 1605
AP 91	-8.33	-26.15	AP80-AP91	20.9	1 in 83748
AP90	-9.0	-27.25	AP91-AP90	21.8	1 in 19884
RM 7647	-25.67	-25.67	AP90-RM7647	21.0	1 in 13233

The results show that the change in level of AP92 is anomalous and not consistent with the change in levels in the surrounding precise level survey marks. Its relative rise in level is not considered to be a result of dewatering Three Kings Quarry.

These differential settlement alarm values are being carefully tracked and any further assessments will be undertaken as required by the Monitoring and Contingency Plan for Dewatering Three Kings Quarry.

A review of the Stage Control Levels has been undertaken (Table 1, Section 7.0 of the Monitoring and Contingency Plan). Intermediate triggers have been recorded for total settlement in Settlement Zones I, II, IIB and III.

Section 7.1 of the Monitoring and Contingency Plan requires that if a Stage Control Trigger is recorded, dewatering is to cease. Section 7.2 requires a review of groundwater levels and precise level survey data, and section 7.3 requires that the results of this review be forwarded to the Auckland Council prior to dewatering recommencing.

Graphs showing the adjusted total settlements (any pre-existing settlement has been added to marks installed after dewatering commenced) of precise level marks for each Settlement Zone are attached together with the drawing showing the Settlement Zones.

In summary, the Immediate Trigger for Zone 1 for quarry drawdown at RL30m is 10mm, 20mm for Zone II, 45mm for Zone IIA, 15mm for Zone IIB, 10mm for Zones III and IV, 5mm for Zone V and 25mm for Zone IIIA. There are no precise settlement marks in Zone IIIB.

These triggers have been exceeded as summarised in the following table.

Settlement Zone	Intermediate Trigger (mm)	Current Maximum Total Settlement (mm)
Zone 1	10	16
Zone II	20	27
Zone IIA	45	28
Zone IIB	15	16
Zone III	10	11
Zone IIIA	25	12
Zone IIIB	20	-
Zone IV	10	7
Zone V	5	3

Although further dewatering is not being proposed, a review of groundwater levels and survey data has been undertaken.

Groundwater levels have stabilised since dewatering (lowering of the groundwater table) was ceased in October 2002. Groundwater levels have generally only varied due to season fluctuations since dewatering ceased with some rebound of groundwater levels following the reduced pumped rates being measured in isolated piezometers (bores 23, 26, 28a, 29, 30 and 33).

Precise level marks levels have stabilised since dewatering ceased with cessation of settlement of precise level survey marks (less than 5mm of settlement in 12 months) having been recorded since September 2005.

In summary, the primary consolidation associated with dewatering ceased mid 2004. Precise level survey marks in Areas I, II, IIA and IIIA are recording some secondary consolidation but at a much reduced rate compared with the primary consolidation (3 to 4mm per year primary consolidation compared with 0.6 to 0.9mm per year secondary consolidation).

The Intermediate Stage Control Triggers are shown on the attached graphs with the location of the triggering points shown on the attached plan. In summary the location of the triggering points are scattered but are generally grouped to the northwest and southeast of Three Kings Quarry.

There are no differential settlement triggers associated with these Intermediate Stage Control Triggers.

With regard to section 7.2 of the Monitoring and Contingency Plan, ground settlements are not greater than 10mm per year; there are no differential settlements (as a result of the dewatering) greater than 1 in 2000; and there are no settlements greater than 100mm for points established prior to 30 September 2002, or greater than 75mm for points established after 30 September 2002.

There is no proposal to recommence dewatering. As required by section 7.3 of the Monitoring and Contingency Plan, should dewatering be recommenced, the results of a review undertaken prior to dewatering recommencing will be forwarded to the Auckland Council.

Seasonal Variation Calculations

As required by Section 6.7 of the Monitoring and Contingency Plan, seasonal variation calculations have been defined for bores 37, 38, 39 and 40. The calculated seasonal variation for the deep and shallow piezometers respectively in bores 37, 38, 39 and 40 are as follows:

Table 1: Deep Piezometers

	BH37a	BH38a	BH39a	BH40a
99% Confidence Limits	RL54.17m RL53.60m	RL54.73m RL53.80m	RL55.31m RL54.82m	RL62.07m RL61.23m
99.9% Confidence Limits	RL54.25m RL53.53m	RL54.85m RL53.67m	RL55.37m RL54.76m	RL62.19m RL61.12m

Table 2: Shallow Piezometers

	BH37b	BH38b	BH39b	BH40b
99% Confidence Limits	RL54.03m RL53.56m	RL53.80m RL53.33m	RL57.42m RL56.50m	RL63.86m RL63.31m
99.9% Confidence Limits	RL54.09m RL53.50m	RL53.87m RL53.26m	RL57.55m RL56.38m	RL63.94m RL63.23m

The groundwater levels in BH40a and BH40b have been in excess of seasonal variation (99% confidence limits) since December 2007. BH40 is the southern most of the Three Kings Quarry groundwater monitoring bores located on Hillsborough Road just to the north of the SH20.

Three Kings groundwater monitoring bores located closer to the Three Kings Quarry (boreholes 36 and 39) have not recorded any movement of groundwater levels beyond normal seasonal variations.

The groundwater level in BH40a (deep piezometer) has fallen approximately 1.05metres from an average level of approximately RL61.65m (to March 2007) to an average level of approximately RL60.6m.

The groundwater level in BH40b (shallower piezometer) has fallen 1.05m from an average level of approximately RL63.6m (to March 2007) to an average level of approximately RL62.7m.

The waterlevels in these two piezometers are currently recording normal seasonal variations.

Up until March 2008, Transits groundwater monitoring bores adjacent to the "Hillsborough Road cut" SH20 works recorded a similar or greater amount of change although the monitoring record is not complete as the Three Kings Quarry groundwater monitoring record. Transits BH15 on the crest of the Hillsborough Road cut has recorded a fall in groundwater level of 1.9m since December 2006 (from RL64.44m to RL62.53m).

The Transit monitoring bores do not extend to the same depth as the Three Kings Quarry groundwater monitoring bores but all bores are located in East Coast Bays Formation (Waitemata).

Although the monitoring results are not conclusive (with the deeper groundwater level in BH40a being drawn down more than the shallower groundwater level – BH40b), as the groundwater monitoring bores closer to the Three Kings Quarry (bores 36 and 39) are not being drawn

down, it is considered unlikely that the falling groundwater levels being recorded in BH40a and BH40b are the result of dewatering Three Kings Quarry.

REVIEWS

Groundwater

The results of the groundwater level monitoring are checked and reviewed as the results are received. A review of groundwater levels and precise level survey marks has been undertaken as required by Section 7.2 of the Monitoring and Contingency Plan.

Surface Levels

The results of precise level surfaces are checked and reviewed when the results are received, with the results forwarded to the Auckland Regional Council and Three Kings United Inc.

A review of precise level survey data was undertaken by Tonkin and Taylor in 2005. This report reviewed settlement data to the March 2005 survey and included the findings of the Pattle Delamore annual groundwater report dated January 2005.

The Tonkin and Taylor report concluded that while surface settlement monitoring indicates that surface settlement is typically on-going about the quarry, it was at a much reduced rate.

The on-going settlement close to the quarry was concluded to be the result of secondary consolidation induced by changes in groundwater pressure associated with past quarry dewatering. At increased distances from the quarry, Tonkin and Taylor concluded that it is possible that the ongoing surface settlement includes some delayed consolidation as a result primarily consolidation of soil strata not currently monitored by piezometers. In addition Tonkin and Taylor concluded that any groundwater drawdown effects at distance from the quarry are small and surface settlement data at the fringe of drawdown are within expected settlement tolerances.

A further review of the precise level survey information was undertaken in August 2005 to determine if cessation of settlement had occurred. It was found that cessation of settlement (as defined by the consent to dewater Three Kings Quarry) had occurred and this was reported more fully to the Auckland Regional Council in September 2005. As such, and because more than two years has elapsed since dewatering has been undertaken, precise level surveys are now required to be undertaken at 12 month intervals.

A review of the precise level data has been undertaken as required by Section 7.2 of the Monitoring and Contingency Plan – exceedance of an Intermediate Settlement Trigger. The review concluded that settlements are not in excess of 10mm per year; that the differential settlement between any two monitoring points caused by the exercise of the consent to dewater Three Kings Quarry is greater than 1 in 2000; and total settlement is not greater than 100mm (or 75mm for precise level survey marks installed after 30 September 2002).

There is currently no proposal to further dewater Three Kings Quarry.

REMEDIAL ACTION

No remedial action was required or undertaken for the 12 month period ending 31 March 2011.

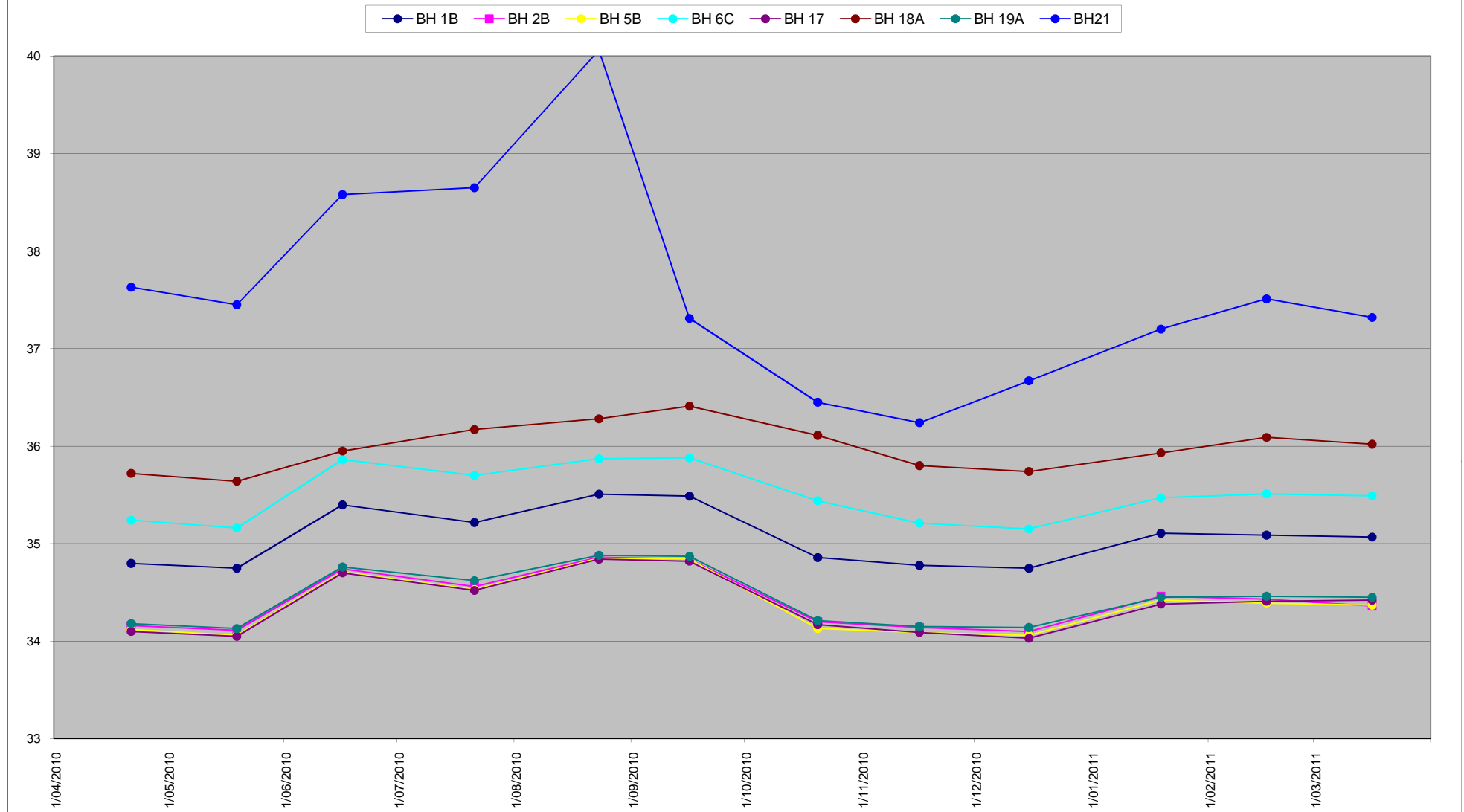
THREE KINGS GROUNDWATER LEVEL RECORD SHEET

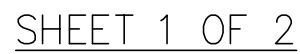
Date	BH 1B	BH 2B	BH 5B	BH 6A	BH 6B	BH 6C	BH 7	BH 10a	BH 10b	BH 11b	BH 12a	BH 12b	BH 13a	BH 13c	BH 16	BH 17	BH 18A	BH 18B	BH 19A	BH 19B
21-Apr-10	34.80	34.16	34.12	44.58	39.71	35.24	39.58	50.92	72.69	72.01	50.21	66.81	55.23	66.00	50.52	34.10	35.72	45.63	34.18	38.57
19-May-10	34.75	34.11	34.06	44.34	39.61	35.16	39.56	50.92	72.69	71.95	50.12	66.82	54.99	66.31	50.41	34.05	35.64	45.25	34.13	38.62
16-Jun-10	35.40	34.74	34.71	44.44	39.99	35.86	40.53	50.91	72.69	72.20	50.59	67.17	54.79	66.34	50.63	34.70	35.95	45.40	34.76	38.60
21-Jul-10	35.22	34.56	34.53	44.94	40.11	35.70	40.36	50.91	72.69	72.45	51.07	67.15	57.83	66.33	51.19	34.52	36.17	46.21	34.62	38.58
23-Aug-10	35.51	34.86	34.85	45.76	40.42	35.87	40.86	51.37	72.69	72.48	51.42	67.16	61.01	66.33	51.63	34.84	36.28	46.55	34.88	38.51
16-Sep-10	35.49	34.84	34.84	46.49	40.57	35.88	40.88	51.59	72.68	72.47	51.61	67.20	61.02	66.33	51.90	34.82	36.41	46.86	34.87	38.76
20-Oct-10	34.86	34.20	34.13	46.69	40.30	35.44	40.15	51.40	72.69	72.43	51.43	67.11	59.46	66.33	51.86	34.17	36.11	46.74	34.21	38.58
16-Nov-10	34.78	34.14	34.09	46.26	40.09	35.21	39.89	51.05	72.68	72.45	51.14	66.94	56.84	66.33	51.56	34.09	35.80	46.55	34.15	38.59
15-Dec-10	34.75	34.10	34.06	45.78	39.97	35.15	39.80	50.93	72.68	72.47	50.91	66.88	56.36	66.32	51.29	34.03	35.74	46.37	34.14	39.03
19-Jan-11	35.11	34.46	34.42	45.38	40.08	35.47	39.83	51.00	72.69	72.44	50.81	66.89	56.08	66.33	51.16	34.38	35.93	46.20	34.45	38.68
16-Feb-11	35.09	34.43	34.39	45.44	40.15	35.51	40.38	51.06	72.69	72.44	51.16	67.12	55.92	66.33	51.53	34.41	36.09	46.21	34.46	38.59
16-Mar-11	35.07	34.36	34.37	45.34	40.09	35.49	40.19	50.94	72.69	72.46	51.02	67.11	55.54	66.34	51.45	34.42	36.02	46.20	34.45	38.57

Date	BH 20	BH 20A	BH21	BH22	BH22a	BH23	BH23a	BH24	BH24a	BH25	BH25a	BH25b1	BH25b2	BH26	BH26a	BH27	BH28a	BH28b	BH29	BH30
21-Apr-10	54.19	49.73	37.63	41.24	64.58	51.37	51.09	55.65	60.93	36.96	47.40	46.57	50.91	59.35	54.06	49.56	51.11	52.20	57.97	54.96
19-May-10	54.27	49.57	37.45	41.24	64.52	51.36	51.05	55.55	60.88	36.96	47.70	47.15	50.98	59.36	54.08	49.57	51.15	52.43	57.95	55.04
16-Jun-10	54.66	50.56	38.58	41.24	65.07	51.47	50.82	55.72	61.85	37.19	48.17	47.84	50.92	59.38	54.30	49.40	51.23	52.64	58.09	54.58
21-Jul-10	54.93	51.49	38.65	41.23	65.09	51.52	51.00	55.96	61.81	37.31	49.00	48.01	51.30	59.39	54.31	49.44	51.25	52.78	58.23	55.01
23-Aug-10	55.29	52.26	40.06	41.22	65.36	51.60	51.26	57.15	61.79	37.45	49.49	48.07	51.38	59.40	54.42	49.59	51.28	52.83	58.44	54.94
16-Sep-10	55.47	52.52	37.31	41.22	65.46	51.70	51.43	56.44	60.78	37.52	49.65	48.12	51.40	59.42	54.46	49.58	51.30	52.84	58.55	54.99
20-Oct-10	55.44	52.09	36.45	41.22	65.20	51.74	51.47	56.48	60.78	37.34	49.23	48.84	51.36	59.43	54.33	49.59	51.27	52.66	58.48	54.82
16-Nov-10	55.21	51.57	36.24	41.20	64.81	51.72	51.34	56.38	60.78	37.09	48.04	48.78	51.31	59.43	54.23	49.59	51.25	52.64	58.38	54.75
15-Dec-10	54.94	51.06	36.67	41.22	64.56	51.70	51.24	56.26	60.76	37.03	47.27	48.90	51.64	59.43	54.18	49.59	51.06	52.68	58.31	54.96
19-Jan-11	54.79	50.80	37.20	41.21	64.37	51.71	51.14	56.20	60.75	37.12	47.04	48.86	51.52	59.43	54.21	49.58	51.17	52.66	58.29	54.85
16-Feb-11	54.83	51.49	37.51	41.21	64.79	51.67	51.19	56.19	60.74	37.23	45.68	46.62	50.66	59.43	54.24	49.59	51.39	53.05	58.35	54.83
16-Mar-11	54.79	51.32	37.32	41.21	64.60	51.67	51.17	56.23	60.74	37.18	47.64	48.31	51.70	59.44	54.23	49.59	51.46	52.73	58.38	55.33

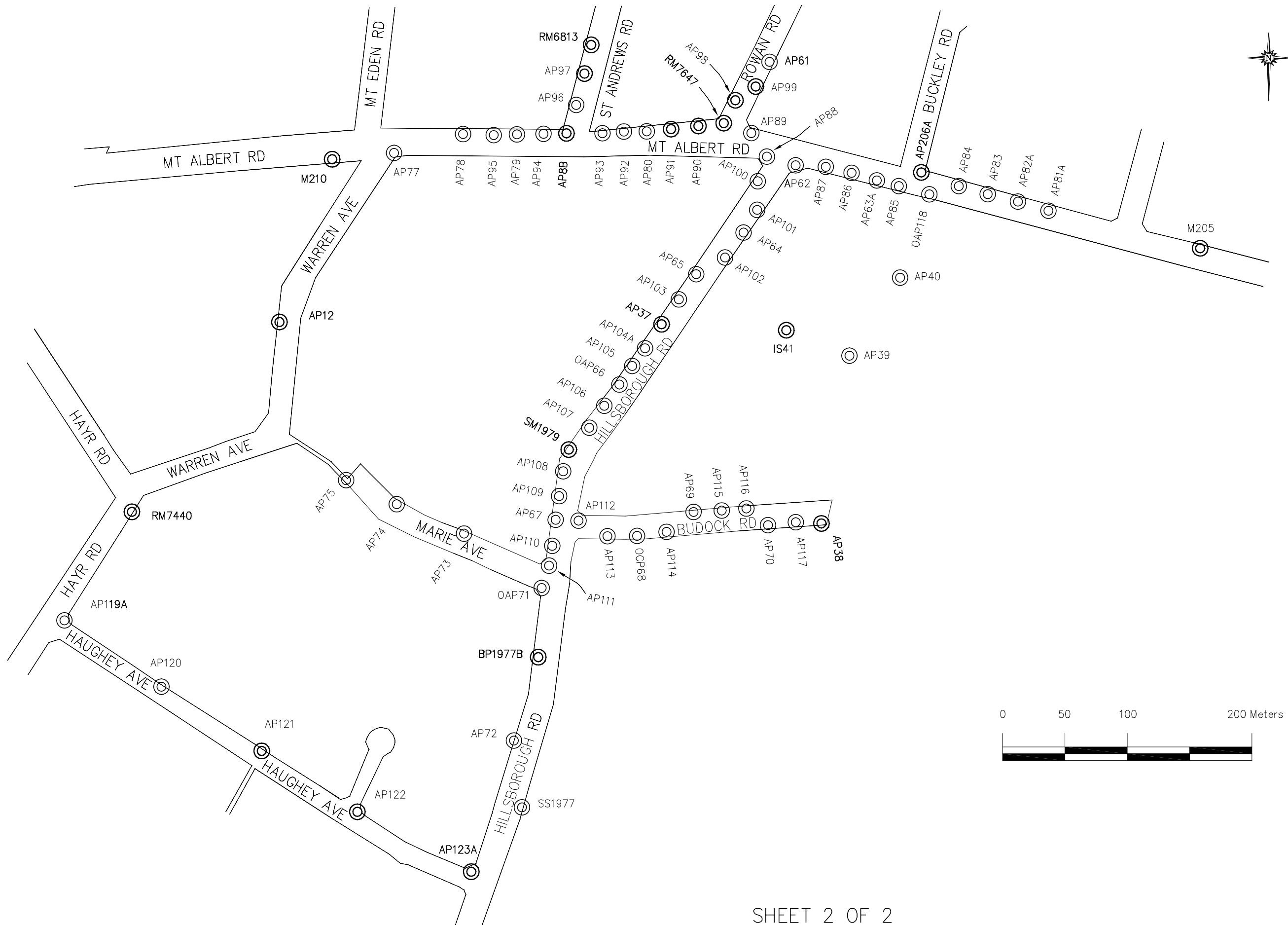
Date	BH31a	BH31b	BH32	BH33	BH34	BH35a	BH35b	BH36a	BH36b	BH37a	BH37b	BH38a	BH38b	BH39a	BH39b	BH40a	BH40b
21-Apr-10	48.82	50.11	53.80	59.18	48.10	48.61	54.86	58.62	58.65	53.78	53.71	54.19	53.43	54.74	56.94	60.30	62.51
19-May-10	48.78	50.16	53.67	59.12	48.18	48.49	54.82	58.63	58.66	53.77	53.65	54.19	53.45	54.71	56.95	60.25	62.46
16-Jun-10	48.55	49.78	54.49	59.25	49.00	48.54	54.91	58.85	58.89	53.94	53.77	54.30	53.68	54.80	57.10	60.38	62.62
21-Jul-10	48.76	49.92	54.91	59.31	49.58	48.54	55.18	59.02	59.07	53.94	53.80	54.25	53.67	54.76	57.13	60.42	62.61
23-Aug-10	48.67	49.89	55.58	59.62	50.02	48.65	55.46	59.23	59.26	53.97	53.89	54.28	53.69	54.75	57.25	60.55	62.65
16-Sep-10	48.71	49.90	55.83	59.80	50.04	48.73	55.59	59.30	59.34	53.98	53.91	54.29	53.74	54.77	57.24	60.59	62.75
20-Oct-10	48.57	49.82	55.36	60.12	49.73	48.71	55.56	59.18	59.21	54.04	53.73	54.32	53.69	54.88	57.46	60.68	62.81
16-Nov-10	48.54	49.77	54.83	59.89	49.00	48.61	55.46	59.06	59.09	54.01	53.83	54.21	53.57	54.85	57.20	60.63	62.79
15-Dec-10	48.65	49.91	54.47	59.71	48.36	49.19	55.38	58.94	58.98	53.95	53.76	54.18	53.54	54.79	57.16	60.58	62.68
19-Jan-11	48.63	49.88	54.38	59.55	48.46	49.02	55.33	58.94	58.98	53.89	53.73	54.14	53.54	54.73	57.14	60.95	62.60
16-Feb-11	48.62	49.96	54.79	59.40	48.34	49.27	55.34	59.08	59.10	53.97	53.81	54.24	53.63	54.80	57.16	60.58	62.69
16-Mar-11	49.04	50.33	54.72	59.23	48.88	49.18	55.34	59.00	59.05	53.92	53.80	54.25	53.60	54.88	57.16	60.56	62.66

Groundwater Levels





C	AP21B, AP142, AP132A ADDED AP21A, OCP41B, AP132 DELETED AP3895A POSITION CORRECTED	MD	02/11	DESIGNED:	DATE:	SIGNATURE:	PLOT DATE: 15/02/2011	 ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND  HARRISON GRIERSON CONSULTING ENGINEERS SURVEYORS PLANNERS Level 5 Cogita House, 20 Amersham Way Manukau City PH 09 966 3380 Fax 09 966 3390	PROJECT:	TITLE:	PLOT STATUS:
				DRAWN:	DATE:	SIGNATURE:	CAD REF: 6451-102 Control Pts Plan				
				CHECKED:	DATE:	SIGNATURE:	CAD XREF:				
							SURVEY BY:		THIS DRAWING AND DESIGN REMAINS THE PROPERTY OF, AND MAY NOT BE REPRODUCED OR ALTERED, WITHOUT THE WRITTEN PERMISSION OF HARRISON GRIERSON CONSULTANTS LIMITED. NO LIABILITY SHALL BE ACCEPTED FOR UNAUTHORISED USE OF THIS DRAWING.		
M	ORIGIN OF LEVELS CHANGED	MD	5/02	APPROVED:	DATE:	SIGNATURE:	SURVEY DATE:				
R	AMENDMENT	BY	DATE				SDR REF:				
									WINSTONE AGGREGATES THREE KINGS QUARRY	SURVEY MONITORING LEVEL CONTROL POINTS	PROJECT No: 1130/006451 SCALES: A1 1:5000 A3 1:10000 DRAWING No: 6451_102 REV C



SHEET 2 OF 2

C SEE SHEET 1		MD	02/11	DESIGNED:	DATE:	SIGNATURE:	PLOT DATE:	15/02/2011		ASSOCIATION OF CONSULTING ENGINEERS NEW ZEALAND	ISO 9001 QUALITY ASSURED		HARRISON GRIERSON	CONSULTING ENGINEERS SURVEYORS PLANNERS	Level 5 Cogita House, 20 Amersham Way Manukau City Ph 09 966 3380 Fax 09 966 3390	PROJECT:	WINSTONE AGGREGATES THREE KINGS QUARRY	TITLE:	SURVEY MONITORING LEVEL CONTROL POINTS	PLOT STATUS:			
				DRAWN:	DATE:	SIGNATURE:	CAD REF:	6451-102 Control Pts Plan												PROJECT No:	SCALES:	A1 1:1500 A3 1:3000	A1 A3 REV
				CHECKED:	DATE:	SIGNATURE:	SURVEY BY:													DRAWING No:			
M REF	ORIGIN OF LEVELS CHANGED AMENDMENT	MD BY	5/02 DATE	APPROVED:	DATE:	SIGNATURE:	SURVEY DATE:													6451_102			C
										THIS DRAWING AND DESIGN REMAINS THE PROPERTY OF, AND MAY NOT BE REPRODUCED OR ALTERED, WITHOUT THE WRITTEN PERMISSION OF HARRISON GRIERSON CONSULTANTS LIMITED. NO LIABILITY SHALL BE ACCEPTED FOR UNAUTHORISED USE OF THIS DRAWING.													

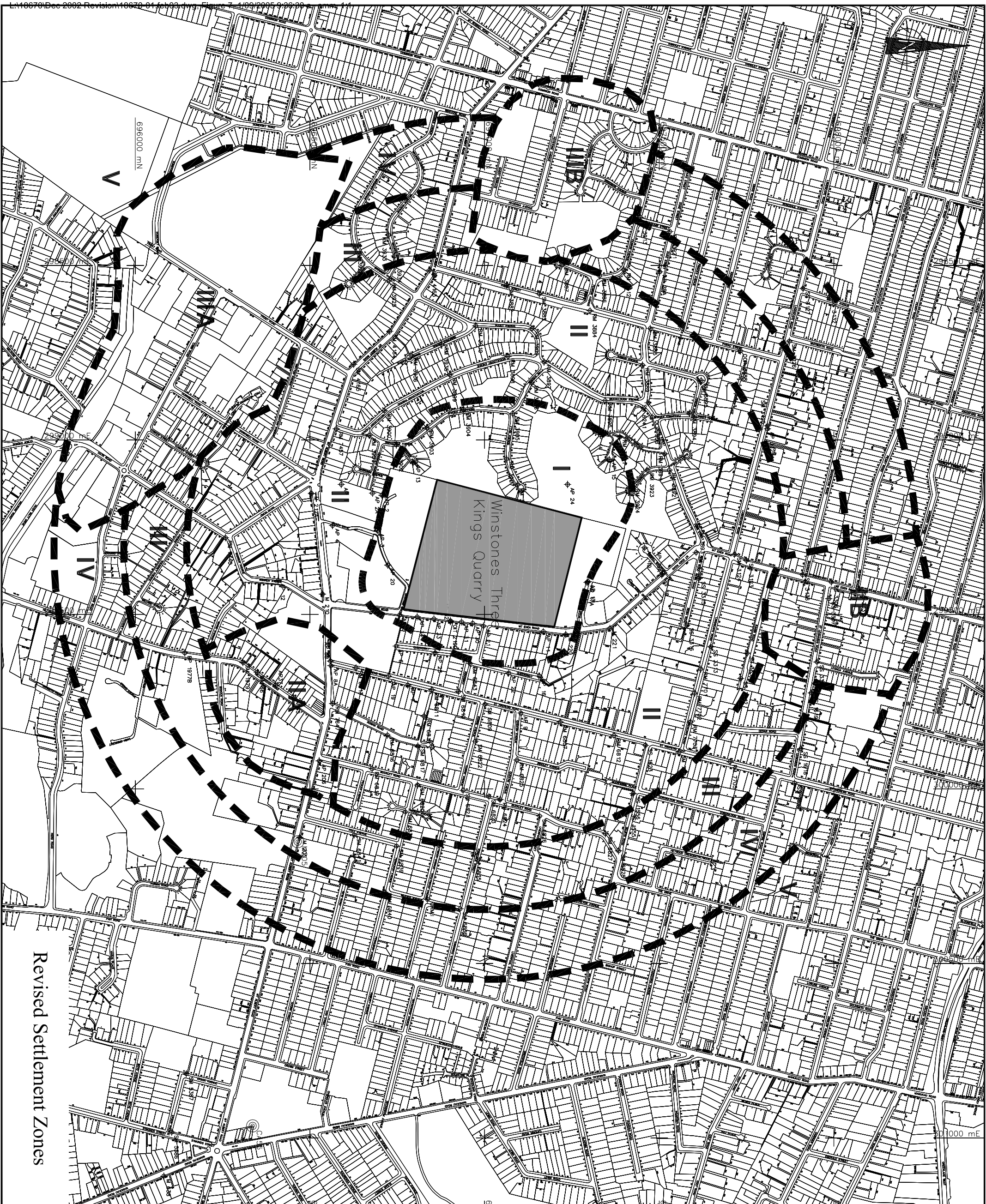
THREE KINGS SURVEY RECORD

Station ID	Location	Coordinates		Averaged Level	Surveyed Levels (metres)		Change from Averaged Level (mm)		Mar 11 cf Mar 10 (mm)
		mN	mE		Mar-10	Mar-11	Mar-10	Mar-11	
SS 3136	Mt Eden Rd	697910.68	299385.73	63.047	63.031	63.031	-16	-16	0
SS 3137	Mt Eden Rd	698072.60	299427.08	63.343	63.341	63.341	-2	-2	0
M 212A	Mt Albert Rd	696504.39	299153.17	86.127	86.110	86.109	-17	-18	-1
SM 4163	Mt Albert Rd	696843.03	298513.03	74.142	74.141	74.141	-1	-1	0
SM 4164	Mt Albert Rd	696728.57	298688.37	75.851	75.844	75.844	-7	-7	0
SM 4165	Mt Albert Rd	696625.11	298783.31	83.632	83.623	83.621	-9	-11	-2
SM 3882	Parau St	697063.26	298555.52	63.302	63.299	63.300	-3	-2	1
RM 3898	McCullough Ave	697067.11	298760.28	76.078	76.062	76.064	-16	-14	2
RM 3899	McCullough Ave	696900.99	298813.23	77.811	77.799	77.800	-12	-11	1
RM 3900	McCullough Ave	696713.60	298916.53	76.657	76.641	76.640	-16	-17	-1
RM 3901	Smallfield Ave	696669.58	298986.57	78.931	78.909	78.905	-22	-26	-4
RM 3902	Smallfield Ave	696747.40	299014.21	80.177	80.162	80.161	-15	-16	-1
RM 3903	Smallfield Ave	696834.73	298965.09	82.524	82.513	82.512	-11	-12	-1
RM 3904	Smallfield Ave	696939.98	298912.45	82.708	82.697	82.696	-11	-12	-1
RM 3907	Fyvie Ave	697063.27	299054.59	80.321	80.312	80.314	-9	-7	2
RM 3910	Scout Ave	696974.91	298672.88	83.414	83.403	83.402	-11	-12	-1
RM 3925	Bremner Ave	696727.72	298541.52	65.423	65.424	65.426	1	3	2
RM 3926	Bremner Ave	696630.47	298448.99	59.088	59.091	59.092	3	4	1
RM 3933	Milliken Rd	696725.14	298412.65	71.049	71.054	71.056	5	7	2
RM 3934	Milliken Rd	696742.66	298472.30	66.303	66.307	66.308	4	5	1
RM 3935	Simmonds Ave	696876.97	298725.70	91.755	91.743	91.741	-12	-14	-2
RM 3936	Simmonds Ave	696788.84	298756.78	90.869	90.854	90.850	-15	-19	-4
RM 7440	Hayr Rd	696258.10	299279.70	84.033	84.024	84.022	-9	-11	-2
RM 7457	Mt Albert Rd	696575.40	298967.90	85.707	85.690	85.689	-17	-18	-1
AP 1	Plaza, Mt Albert Rd	696589.80	299127.20	81.269	81.249	81.248	-20	-21	-1
AP 2	Plaza, Mt Albert Rd	696706.40	299158.20	76.290	76.275	76.274	-15	-16	-1
AP 2A	Plaza, Mt Albert Rd	696679.30	299152.50	77.582	77.567	77.567	-15	-15	0
AP 3	Plaza, Mt Albert Rd	696693.00	299259.10	77.367	77.354	77.353	-13	-14	-1
AP 4	Plaza, Mt Albert Rd	696564.80	299244.90	83.366	83.345	83.344	-21	-22	-1
AP 13	Barrister Ave	696796.00	299064.30	79.867	79.859	79.859	-8	-8	0
AP 20	Grahame Breed Dr	696723.10	299358.50	76.792	76.784	76.784	-8	-8	0
SM 3123	Mt Eden Rd	697750.13	299344.75	75.676	75.656	75.656	-20	-20	0
SM 3124	Landscape Rd	697715.79	299327.99	77.724	77.704	77.703	-20	-21	-1
SM 3125	Landscape Rd	697810.23	298959.44	69.440	69.429	69.429	-11	-11	0
SM 3126	Landscape Rd	697873.04	298716.42	63.015	63.010	63.009	-5	-6	-1
SS 3127	Landscape Rd	697911.99	298565.74	59.724	59.723	59.722	-1	-2	-1
SS 3132	Waitomo St	697987.80	298590.90	61.689	61.688	61.688	-1	-1	0
SM 3883	Parau St	697156.95	298581.04	64.371	64.365	64.367	-6	-4	2
RM 3884	Parau St	697301.96	298629.21	62.539	62.533	62.536	-6	-3	3
SM 3885	Duke St	697474.42	298680.34	61.857	61.847	61.848	-10	-9	1
RM 3886	Fearon Ave	697329.55	298529.49	55.236	55.234	55.236	-2	0	2
RM 3887	Fearon Ave	697221.32	298498.22	51.548	51.536	51.540	-12	-8	4
OCP 3888	Parau St	697732.59	298744.43	62.513	62.504	62.504	-9	-9	0
RM 3889	Duke St	697452.34	298785.50	69.233	69.209	69.211	-24	-22	2
RM 3891	Duke St	697515.89	299039.80	77.575	77.558	77.559	-17	-16	1
RM 3892	Duke St	697529.22	299086.26	78.012	77.995	77.997	-17	-15	2
RM 3893A	Duke St	697610.68	299248.02	79.110	79.109	79.110		1	1
RM 3894	Fulljames Ave	697586.82	298923.43	72.082	72.059	72.061	-23	-21	2
RM 3895	Hamon Ave	697620.41	298829.46	65.188	65.155	65.158	-33	-30	3
AP 3895A	Hamon Ave	697631.96	298839.08	65.612	65.611	65.613		1	2
RM 3896	McCullough Ave	697345.49	298887.04	69.820	69.796	69.799	-24	-21	3
RM 3897	McCullough Ave	697170.56	298776.56	75.084	75.066	75.068	-18	-16	2
RM 3905	Fyvie Ave	697080.60	298923.97	75.813	75.803	75.804	-10	-9	1
RM 3906	Fyvie Ave	697134.57	298836.07	77.447	77.432	77.434	-15	-13	2
RM 3908	Fyvie Ave	697093.64	299129.18	82.069	82.063	82.064	-6	-5	1
RM 3909	Scout Ave	697136.38	298680.63	80.056	80.044	80.044	-12	-12	0
RM 3911	Dally Tce	697387.46	298991.05	88.894	88.878	88.880	-16	-14	2
RM 3912	Fearon Ave	697399.31	298512.83	51.652	51.652	51.655	0	3	3
RM 3913	Fearon Ave	697445.84	298362.01	49.238	49.243	49.245	5	7	2
RM 3921	Duncumb St	697530.84	298402.67	50.034	50.037	50.039	3	5	2
RM 3923	Connelly Ave	697465.89	299086.33	74.293	74.276	74.278	-17	-15	2
RM 3924	Connelly Ave	697424.55	299131.88	73.034	73.018	73.019	-16	-15	1
SM 4354	Mt Eden Rd	697606.00	299322.20	80.155	80.130	80.129	-25	-26	-1
SM 6241	Duke St	697468.58	298893.36	70.012	69.984	69.985	-28	-27	1
OCP 90B	Duke St	697480.39	298934.30	71.805	71.784	71.786	-21	-19	2
AP 10	Roskill Way	697458.10	299308.70	82.673	82.661	82.659	-12	-14	-2
AP 14	Churches Ave	697318.10	298969.20	91.334	91.317	91.321	-17	-13	4
AP 15	Dally Terrace	697357.20	299055.90	90.821	90.806	90.809	-15	-12	3
AP 17C	Hunters Park Dr	697293.89	299402.87	74.602	74.596	74.594	-6	-8	-2
AP 29A	Duke St	697501.58	298517.84	49.542	49.537	49.541	-5	-1	4
M 220	Mt Eden Rd	697232.61	299557.19	81.700	81.665	81.664	-35	-36	-1
M 221	Mt Eden Rd	697359.09	299539.94	83.449	83.434	83.433	-15	-16	-1

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		mN	mE		Mar-10	Mar-11	Mar-10	Mar-11	
SS 1555	Selwyn Rd	697413.60	300062.90	99.584	99.582	99.581	-2	-3	-1
SS 1556	Selwyn Rd	697425.87	300012.81	102.373	102.370	102.369	-3	-4	-1
SS 1617	St Andrews Rd	697887.68	299983.32	81.442	81.442	81.441	0	-1	-1
SS 1618	St Leonards Rd	697906.03	299884.48	78.478	78.475	78.477	-3	-1	2
AP 1619A	St Leonards Rd	697935.70	299724.63	66.609	66.608	66.610		1	2
SS 1623	St Andrews Rd	697461.10	299874.96	107.522	107.515	107.513	-7	-9	-2
SS 3306	Mt Eden Rd	697993.20	299406.80	60.565	60.557	60.556	-8	-9	-1
SS 3307	St Leonards Rd	697985.83	299454.69	59.661	59.655	59.654	-6	-7	-1
SS 3308	St Leonards Rd	697952.15	299635.99	63.275	63.272	63.272	-3	-3	0
SS 3311	Rahiri Rd	697752.00	299610.94	95.306	95.293	95.291	-13	-15	-2
SS 3312	Rahiri Rd	697733.64	299682.97	95.929	95.917	95.916	-12	-13	-1
SS 3313	Landscape Rd	697648.30	299592.51	112.633	112.615	112.614	-18	-19	-1
SS 3315	Rewa Rd	697613.41	299396.64	80.938	80.915	80.914	-23	-24	-1
SS 3316	Rewa Rd	697579.48	299529.80	98.902	98.884	98.882	-18	-20	-2
RM 6807	St Andrews Rd	697216.70	299808.10	102.487	102.472	102.472	-15	-15	0
RM 6812	St Andrews Rd	697370.60	299846.60	108.907	108.894	108.892	-13	-15	-2
SM 6826	Buckley Rd	697157.90	300077.50	74.710	74.708	74.708	-2	-2	0
RM 6827	Buckley Rd	697345.96	300128.04	83.332	83.334	83.334	2	2	0
SM 6828	Buckley Rd	697383.80	300177.40	87.952	87.953	87.954	1	2	1
SS 7701B	Landscape Rd	697619.71	299657.05	115.509	115.506	115.504	-3	-5	-2
SS 7702B	Landscape Rd	697602.26	299725.78	110.538	110.534	110.533	-4	-5	-1
RM 7703	Landscape Rd	697589.21	299808.37	100.149	100.133	100.130	-16	-19	-3
SM 7704	St Andrews Rd	697556.90	299894.50	97.816	97.809	97.807	-7	-9	-2
AP 7705A	St Andrews Rd	697700.05	299930.56	88.195	88.195	88.195		0	0
AP 9	St Andrews Rd	697103.90	299782.20	92.802	92.782	92.781	-20	-21	-1
AP 11	Mt Eden Rd	697168.40	299548.70	80.191	80.182	80.181	-9	-10	-1
AP 16	Queens Way	697156.20	299676.20	83.646	83.632	83.634	-14	-12	2
AP 18B	Mt Eden Rd	697509.31	299384.27	81.641	81.640	81.639	-1	-2	-1
M 205	Mt Albert Rd	696471.16	300138.54	59.305	59.304	59.304	-1	-1	0
AP 206A	Mt Albert Rd	696527.29	299919.36	59.997	59.995	59.996	-2	-1	1
M 210	Mt Albert Rd	696536.06	299441.55	83.050	83.030	83.028	-20	-22	-2
SM 1979	Hillsborough Rd	696308.02	299637.25	61.241	61.213	61.213	-28	-28	0
BP 1977B	Hillsborough Rd	696141.75	299609.93	71.993	71.983	71.985	-10	-8	2
SM 6809	St Andrews Rd	697001.27	299757.44	81.800	81.779	81.777	-21	-23	-2
SM 6810	St Andrews Rd	696925.56	299720.86	76.956	76.936	76.935	-20	-21	-1
RM 6811	St Andrews Rd	696849.02	299715.44	76.526	76.504	76.502	-22	-24	-2
RM 6813	St Andrews Rd	696631.95	299652.97	80.905	80.879	80.877	-26	-28	-2
RM 6816	Rowan Rd	696721.88	299845.69	78.908	78.887	78.884	-21	-24	-3
SM 6817	Rowan Rd	696808.83	299876.79	80.995	80.978	80.976	-17	-19	-2
RM 6818	Rowan Rd	696826.70	299791.25	81.966	81.946	81.944	-20	-22	-2
RM 6819	Buckley Rd	696678.00	299942.25	65.620	65.607	65.606	-13	-14	-1
SM 6820	Buckley Rd	696808.11	299988.79	71.955	71.947	71.946	-8	-9	-1
SM 6821	Buckley Rd	696938.51	300004.30	71.114	71.109	71.108	-5	-6	-1
SM 6822	Gorrie Ave	696973.90	299863.23	81.874	81.856	81.855	-18	-19	-1
SM 6823	Buckley Rd	697012.43	300021.72	70.593	70.587	70.586	-6	-7	-1
RM 6824	Buckley Rd	697044.38	300030.36	71.084	71.081	71.080	-3	-4	-1
RM 6825	Quentin Ave	697092.90	299916.80	81.386	81.375	81.374	-11	-12	-1
SM 6835	Torrance St	696969.98	300185.70	70.784	70.785	70.785	1	1	0
SM 6836	Torrance St	696930.33	300343.26	65.955	65.958	65.957	3	2	-1
RM 6838	Fernleigh Ave	696773.28	300065.80	70.304	70.298	70.297	-6	-7	-1
SM 6839	Fernleigh Ave	696748.10	300163.47	67.487	67.487	67.485	0	-2	-2
SM 6840	Fernleigh Ave	696714.69	300296.02	63.278	63.281	63.279	3	1	-2
SM 6841	Peet Ave	696626.68	300131.57	65.698	65.696	65.695	-2	-3	-1
AP 6843A	Kings Way	696958.45	299642.05	75.221	75.220	75.218	-1	-3	-2
RM 7647	Mt Albert Rd	696565.00	299755.10	67.601	67.575	67.575	-26	-26	0
ORM.I	Weaver Street	696836.50	300316.20	63.578	63.582	63.580	4	2	-2
AP 5	Mt Eden Rd	696757.00	299500.90	75.746	75.735	75.734	-11	-12	-1
AP 6	Queens Way	696746.90	299590.60	75.306	75.286	75.284	-20	-22	-2
AP 7A	St Andrews Rd	696778.94	299702.10	76.820	76.817	76.816	-3	-4	-1
AP 8B	Mt Albert Rd	696559.06	299633.48	75.740	75.725	75.724	-15	-16	-1
AP 12	Warren Ave	696409.10	299402.20	94.357	94.339	94.337	-18	-20	-2
OAP 19	St Andrews Rd	696725.00	299676.40	77.508	77.483	77.482	-25	-26	-1
AP 21A	Mt Eden Rd	696997.90	299534.34	77.288	77.285		-3	Refer AP 21B	
AP 21B	Mt Eden Rd	696995.04	299530.41	77.649		77.649		No previous	
AP 22	Queens Way	697069.30	299667.60	78.352	78.341	78.343	-11	-9	2
AP 23	Queens Way	696858.57	299609.62	74.402	74.390	74.389	-12	-13	-1
AP 30	Mt Eden Rd	696966.19	299525.13	77.329	77.319	77.318	-10	-11	-1
AP 31	Mt Eden Rd	696934.22	299521.42	76.857	76.852	76.851	-5	-6	-1
AP 32	Mt Eden Rd	696902.63	299517.81	76.203	76.193	76.193	-10	-10	0
AP 33	Mt Eden Rd	696855.06	299512.27	75.121	75.111	75.110	-10	-11	-1
AP 34	Mt Eden Rd	696807.28	299506.75	74.937	74.924	74.923	-13	-14	-1
SM 5387	Erson Ave	696146.21	300815.94	56.747	56.748	56.748	1	1	0
SM 5386	Symonds St	696104.12	300983.29	55.184	55.185	55.186	1	2	1
M 638	Manukau Rd	696081.51	301109.25	54.690	54.691	54.691	1	1	0

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		mN	mE		Mar-10	Mar-11	Mar-10	Mar-11	
CA 55	Manukau Rd	696605.90	300894.30	65.141	65.141	65.141	0	0	0
CA 53	Akarana Ave	696935.90	298292.10	70.594	70.594	70.594	0	0	0
M 216	Mt Albert Rd	696903.54	298347.91	72.658	72.658	72.658	0	0	0
SS 1977	Hillsborough Rd	696020.20	299595.82	74.453	74.447	74.448	-6	-5	1
RM 3927	Bremner Ave	696633.32	298338.77	62.651	62.651	62.652	0	1	1
RM 3928	Bremner Ave	696727.76	298195.81	56.144	56.146	56.146	2	2	0
AP 139	Bremner Ave	696788.02	298157.42	56.225	56.224	56.224	-1	-1	0
RM 3931	Milliken Ave	696817.47	298257.51	62.500	62.502	62.500	2	0	-2
RM 3932	Milliken Ave	696733.95	298363.24	71.719	71.719	71.720	0	1	1
SS 3004	Dominion Rd	698058.80	298223.46	51.812	51.812	51.811	0	-1	-1
SS 3131	Shackleton Rd	698110.53	298631.80	59.419	59.418	59.418	-1	-1	0
SS 3133	Shackleton Rd	698071.30	298770.71	59.554	59.551	59.551	-3	-3	0
SS 3134	Shackleton Rd	698021.66	298946.50	61.479	61.473	61.473	-6	-6	0
SS 3135	Shackleton Rd	697966.25	299165.81	61.684	61.681	61.681	-3	-3	0
SS 3151	Mt Eden Rd	698285.87	299497.70	67.987	67.989	67.989	2	2	0
SS 1905	St Andrews Rd	698147.73	300049.39	88.810	88.807	88.807	-3	-3	0
AP 7707A	St Andrews Rd	697977.74	300004.98	81.535	81.535	81.535		0	0
SS 1558	Empire Rd	697813.79	300111.39	92.169	92.164	92.163	-5	-6	-1
SS 1559	Empire Rd	697800.00	300165.50	96.024	96.019	96.019	-5	-5	0
SS 1549	The Drive	697753.34	300348.67	85.871	85.870	85.868	-1	-3	-2
SS 1550	The Drive	697589.88	300306.71	84.432	84.434	84.433	2	1	-1
RM 6830	The Drive	697538.21	300294.84	81.638	81.638	81.637	0	-1	-1
SS 1551	The Drive	697492.54	300281.71	77.481	77.480	77.479	-1	-2	-1
RM 6829	Selwyn Rd	697363.05	300258.05	79.864	79.859	79.857	-5	-7	-2
RM 6832	Selwyn Rd	697337.40	300403.57	80.190	80.190	80.190	0	0	0
SM 5912	Pah Rd	697278.09	300666.24	74.285	74.285	74.285	0	0	0
AP 35	Mt Albert Rd	696402.12	300407.23	54.190	54.194	54.194	4	4	0
AP 37	Hillsborough Rd	696407.39	299705.88	59.335	59.322	59.322	-13	-13	0
AP 38	Budock Rd	696246.76	299834.65	69.274	69.268	69.267	-5	-7	-1
AP 39	Hillsborough Bowling	696383.07	299856.28	56.297	56.291	56.292	-6	-5	1
AP 40	Hillsborough Bowling	696445.91	299895.62	55.757	55.753	55.752	-4	-5	-1
IS 41	Hillsborough Bowling	696403.82	299804.75	56.336	56.330	56.330	-6	-6	0
AP 42	Dornwell Rd	696378.41	299015.87	76.373	76.362	76.361	-11	-12	-1
AP 43	Dornwell Rd	696260.57	298956.76	66.002	65.993	65.993	-9	-9	0
AP 44	Dornwell Rd	696110.00	298858.85	58.493	58.485	58.483	-8	-10	-2
AP 45	Frost Rd	696471.85	298726.92	64.920	64.911	64.911	-9	-9	0
AP 54	Frost Rd	696264.66	298577.84	57.855	57.844	57.843	-11	-12	-1
AP 46	Dominion Rd	697995.61	298226.64	50.443	50.442	50.441	-1	-2	-1
AP 47A	Landscape Rd	697951.78	298343.10	52.565	52.566	52.566	1	1	0
AP 48A	Landscape Rd	697937.88	298463.58	57.065	57.066	57.065	1	0	-1
AP 49B	Landscape Rd	697788.49	299044.88	70.340	70.340	70.339	0	-1	-1
AP 50B	Landscape Rd	697766.32	299132.16	71.659	71.659	71.659	0	0	0
AP 51B	Landscape Rd	697745.03	299214.61	74.120	74.120	74.119	0	-1	-1
AP 55	Mt Eden Rd	698209.04	299461.78	68.263	68.264	68.264	1	1	0
AP 56	Mt Albert Rd	696314.42	300774.76	58.409	58.411	58.411	2	2	0
AP 60	Rowan Rd	696681.05	299826.31	76.276	76.267	76.265	-9	-11	-2
AP 61	Rowan Rd	696616.53	299797.11	71.310	71.298	71.296	-12	-14	-2
AP 62	Mt Albert Rd	696530.18	299814.00	63.068	63.059	63.059	-9	-9	0
AP 63A	Mt Albert Rd	696520.06	299875.15	61.370	61.368	61.368	-2	-2	0
AP 64	Hillsborough Rd	696478.45	299774.30	60.579	60.571	60.571	-8	-8	0
AP 65	Hillsborough Rd	696446.58	299735.84	59.546	59.535	59.535	-11	-11	0
OAP 66	Hillsborough Rd	696359.44	299672.76	59.987	59.979	59.979	-8	-8	0
AP 67	Hillsborough Rd	696248.43	299622.21	63.871	63.863	63.863	-8	-8	0
OCP 68	Budock Rd	696235.97	299684.44	66.304	66.299	66.299	-5	-5	0
AP 69	Budock Rd	696249.57	299731.19	65.977	65.972	65.972	-5	-5	0
AP 70	Budock Rd	696244.13	299790.39	71.208	71.204	71.204	-4	-4	0
OAP 71	Hillsborough Rd	696195.17	299615.83	67.651	67.646	67.646	-5	-5	0
AP 72	Hillsborough Rd	696072.41	299594.01	74.077	74.072	74.072	-5	-5	0
AP 73	Marie Ave	696238.34	299544.47	70.874	70.866	70.864	-8	-10	-2
AP 74	Marie Ave	696260.93	299489.18	80.330	80.322	80.319	-8	-11	-3
AP 75	Marie Ave	696280.07	299452.86	86.876	86.871	86.869	-5	-7	-2
AP 77	Mt Albert Rd	696539.58	299487.18	82.751	82.741	82.739	-10	-12	-2
AP 78	Mt Albert Rd	696559.36	299551.48	81.022	81.013	81.011	-9	-11	-2
AP 79	Mt Albert Rd	696558.48	299588.52	78.663	78.655	78.653	-8	-10	-2
AP 80	Mt Albert Rd	696561.89	299691.52	71.414	71.403	71.402	-11	-12	-1
AP 81A	Mt Albert Rd	696501.72	300015.21	58.551	58.549	58.549	-2	-2	0
AP 82A	Mt Albert Rd	696507.72	299991.38	58.575	58.574	58.574	-1	-1	0
AP 83	Mt Albert Rd	696514.36	299966.95	58.863	58.860	58.860	-3	-3	0
AP 84	Mt Albert Rd	696520.40	299943.25	59.350	59.346	59.347	-4	-3	1
AP 85	Mt Albert Rd	696516.23	299894.40	60.619	60.613	60.614	-6	-5	1
AP 86	Mt Albert Rd	696524.80	299855.75	62.051	62.046	62.046	-5	-5	0
AP 87	Mt Albert Rd	696530.55	299833.50	62.733	62.728	62.728	-5	-5	0
AP 88	Mt Albert Rd	696541.65	299788.51	64.828	64.818	64.817	-10	-11	-1
AP 89	Mt Albert Rd	696560.86	299777.80	65.939	65.931	65.931	-8	-8	0

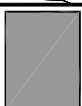
Station ID	Location	Coordinates		Averaged Level	Surveyed Levels (metres)		Change from Averaged Level (mm)		Mar 11 cf Mar 10 (mm)
		mN	mE		Mar-10	Mar-11	Mar-10	Mar-11	
AP 90	Mt Albert Rd	696562.93	299734.25	68.687	68.679	68.678	-8	-9	-1
AP 91	Mt Albert Rd	696562.43	299712.45	70.075	70.068	70.067	-7	-8	-1
AP 92	Mt Albert Rd	696560.50	299673.84	72.613	72.614	72.616	1	3	2
AP 93	Mt Albert Rd	696559.89	299657.17	73.864	73.858	73.857	-6	-7	-1
AP 94	Mt Albert Rd	696558.57	299610.31	77.101	77.095	77.092	-6	-9	-3
AP 95	Mt Albert Rd	696559.21	299569.96	79.957	79.949	79.947	-8	-10	-2
AP 96	St Andrews Rd	696582.87	299641.10	77.897	77.890	77.888	-7	-9	-2
AP 97	St Andrews Rd	696607.72	299646.90	80.321	80.314	80.313	-7	-8	-1
AP 98	Rowan Rd	696588.07	299763.68	68.501	68.494	68.493	-7	-8	-1
AP 99	Rowan Rd	696594.23	299786.13	69.478	69.471	69.470	-7	-8	-1
AP 100	Hillsborough Rd	696521.99	299784.89	62.966	62.958	62.957	-8	-9	-1
AP 101	Hillsborough Rd	696494.72	299786.95	61.359	61.350	61.351	-9	-8	1
AP 102	Hillsborough Rd	696457.24	299761.13	60.006	59.999	59.999	-7	-7	0
AP 103	Hillsborough Rd	696427.81	299719.78	59.404	59.395	59.394	-9	-10	-1
AP 104A	Hillsborough Rd	696385.14	299690.23	59.554	59.548	59.547	-6	-7	-1
AP 105	Hillsborough Rd	696373.80	299682.70	59.711	59.704	59.704	-7	-7	0
AP 106	Hillsborough Rd	696341.88	299660.52	60.458	60.453	60.453	-5	-5	0
AP 107	Hillsborough Rd	696324.59	299648.55	60.881	60.876	60.875	-5	-6	-1
AP 108	Hillsborough Rd	696290.76	299628.82	62.060	62.056	62.055	-4	-5	-1
AP 109	Hillsborough Rd	696270.02	299627.79	62.806	62.801	62.801	-5	-5	0
AP 110	Hillsborough Rd	696230.60	299619.62	64.997	64.990	64.990	-7	-7	0
AP 111	Hillsborough Rd	696213.05	299617.07	66.322	66.318	66.318	-4	-4	0
AP 112	Budock Rd	696247.78	299636.80	63.699	63.696	63.695	-3	-4	-1
AP 113	Budock Rd	696235.55	299662.37	65.546	65.544	65.544	-2	-2	0
AP 114	Budock Rd	696238.48	299707.28	65.879	65.884	65.885	5	6	1
AP 115	Budock Rd	696251.17	299753.13	67.579	67.576	67.575	-3	-4	-1
AP 116	Budock Rd	696251.91	299773.34	69.485	69.483	69.483	-2	-2	0
AP 117	Budock Rd	696245.16	299811.84	70.833	70.837	70.838	4	5	1
OAP 118	Mt Albert Rd	696509.17	299918.39	59.895	59.889	59.889	-6	-6	0
AP 119A	Haughey Ave	696164.45	299223.61	72.895	72.891	72.889	-4	-6	-2
AP 120	Haughey Ave	696109.88	299304.27	67.450	67.447	67.445	-3	-5	-2
AP 121	Haughey Ave	696056.80	299385.05	66.666	66.662	66.660	-4	-6	-2
AP 122	Haughey Ave	696006.86	299462.68	66.032	66.028	66.027	-4	-5	-1
AP 123A	Haughey Ave	695959.41	299557.72	73.518	73.517	73.518	-1	0	1
AP 125A	Hillsborough Rd	695847.28	299535.57	69.947	69.946	69.947		1	1
SS 1976	Hillsborough Rd	695759.40	299503.94	71.137	71.127	71.129	-10	-8	2
AP 126A	Carr Rd	695885.14	299465.23	65.244	65.243	65.245	-1	1	2
AP 127A	Carr Rd	695905.29	299374.82	61.514	61.512	61.514	-2	0	2
RM 7441	Carr Rd	695901.87	299261.38	58.499	58.493	58.495	-6	-4	2
AP 129A	Carr Rd	695938.31	299190.92	58.156	58.155	58.155	-1	-1	0
OAP 130	Dornwell Rd	696185.75	298907.65	60.670	60.668	60.667	-2	-3	-1
OAP 131	Hayr Rd	696067.40	299157.71	63.120	63.118	63.118	-2	-2	0
OCP 41B	DESTROYED	695981.19	299080.36	58.362	58.356		-6	Refer AP 142	
AP 142	Carr/Hayr Rds	695981.15	299082.87	58.439		58.439		No previous	
AP 132	DESTROYED	696043.81	298963.55	58.403	58.399		-4	Refer AP 132A	
AP 132A	Carr Rd	696037.11	298976.78	58.345		58.345		No previous	
AP 133	Carr Rd	696128.84	298776.82	58.156	58.155	58.155	-1	-1	0
AP 134	Carr Rd	696177.86	298685.47	58.033	58.033	58.032	0	-1	-1
AP 135	Frost Rd	696157.94	298506.10	57.399	57.400	57.400	1	1	0
AP 136	Frost Rd	696363.44	298640.34	59.265	59.263	59.262	-2	-3	-1



NOTES

1. All dimensions are in metres unless noted otherwise.

LEGEND



Quarry

0	First Issue			
REVISION DESCRIPTION		BY	DATE	
DESIGNED :				
DRAWN :		AMM	OCT 02	
DESIGN CHECKED :				
DRAFTING CHECKED :				
REFERENCE :				

CADFILE : L:\18670\18670-01

APPROVED : _____

NO FOR CONSTRUCTION
This drawing is not to be used for construction
without written approval

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Tonkin & Taylor

Environmental & Engineering Consultants
 ■ Auckland 19 Morgan St. Newmarket
 Tel. (09) 355 6000 Fax. (09) 307 0265
 Email : quick@tonkin.co.nz

<input type="checkbox"/> Wellington	<input type="checkbox"/> Christchurch
<input type="checkbox"/> Hamilton	<input type="checkbox"/> Whangarei
<input type="checkbox"/> Nelson	

WINSTONE
AGGREGATES LTD

THREE KINGS QUARRY DEWATERING

REVIEW OF SETTLEMENT PREDICTIONS

Figure 7

SCALES (AT A3 SIZE)
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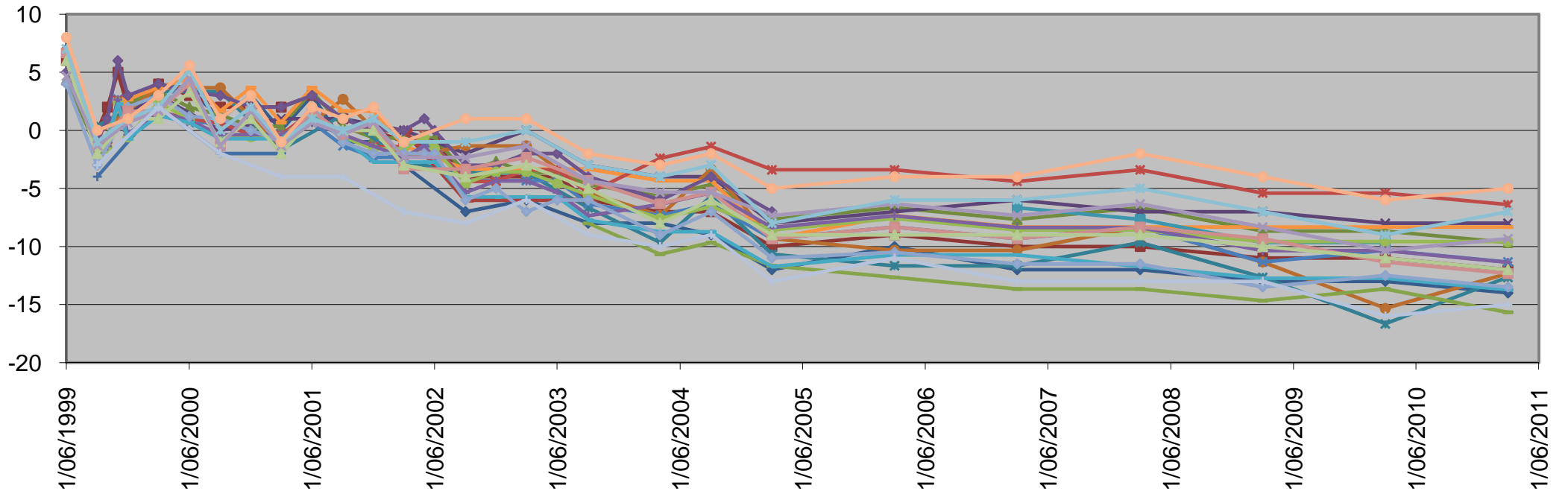
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DWG. No.
18670-04

REV.

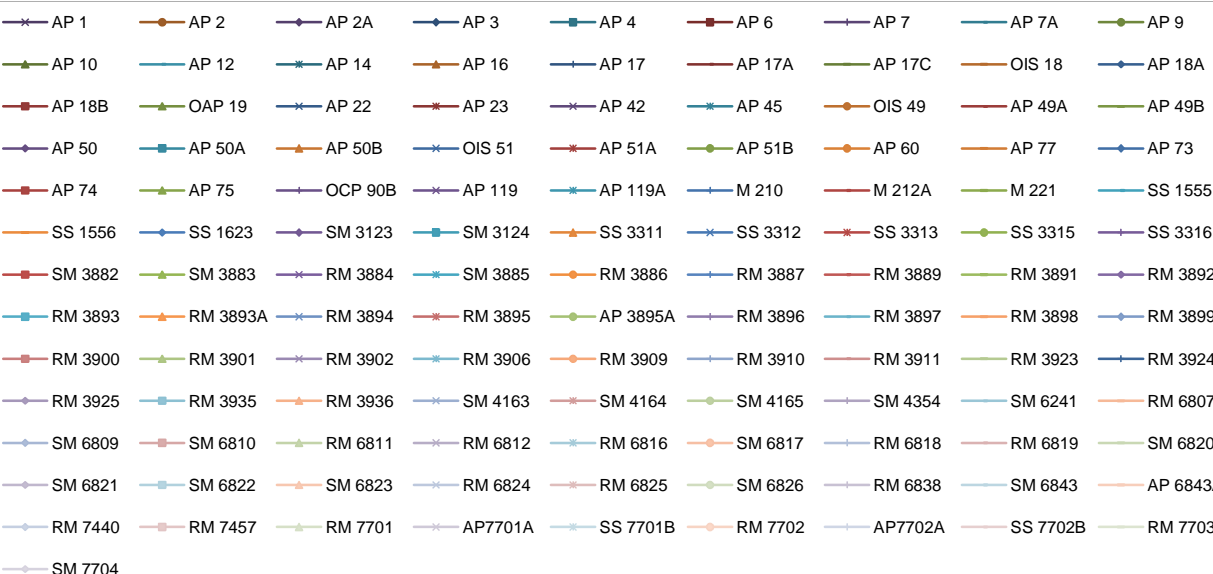
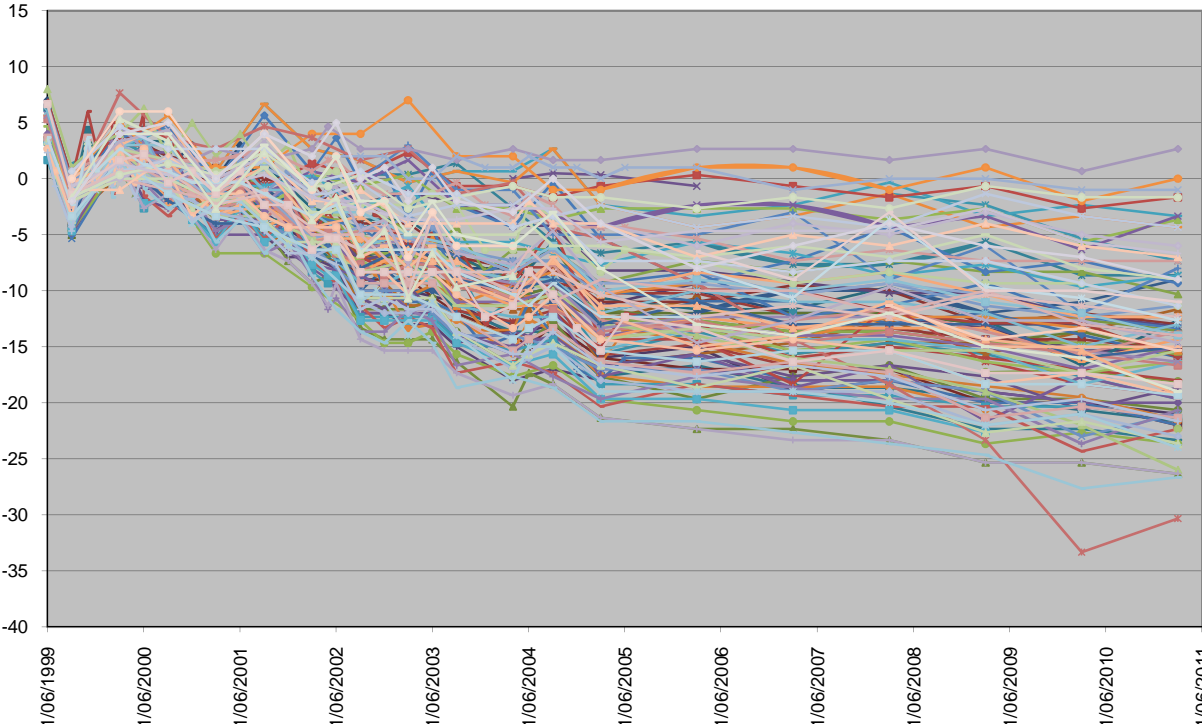
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Area I - All Marks

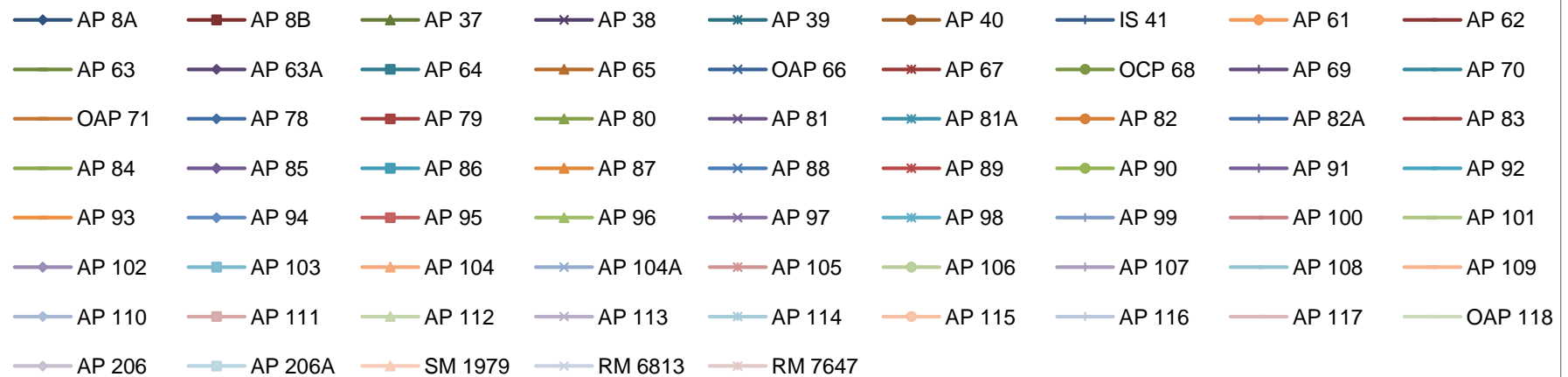
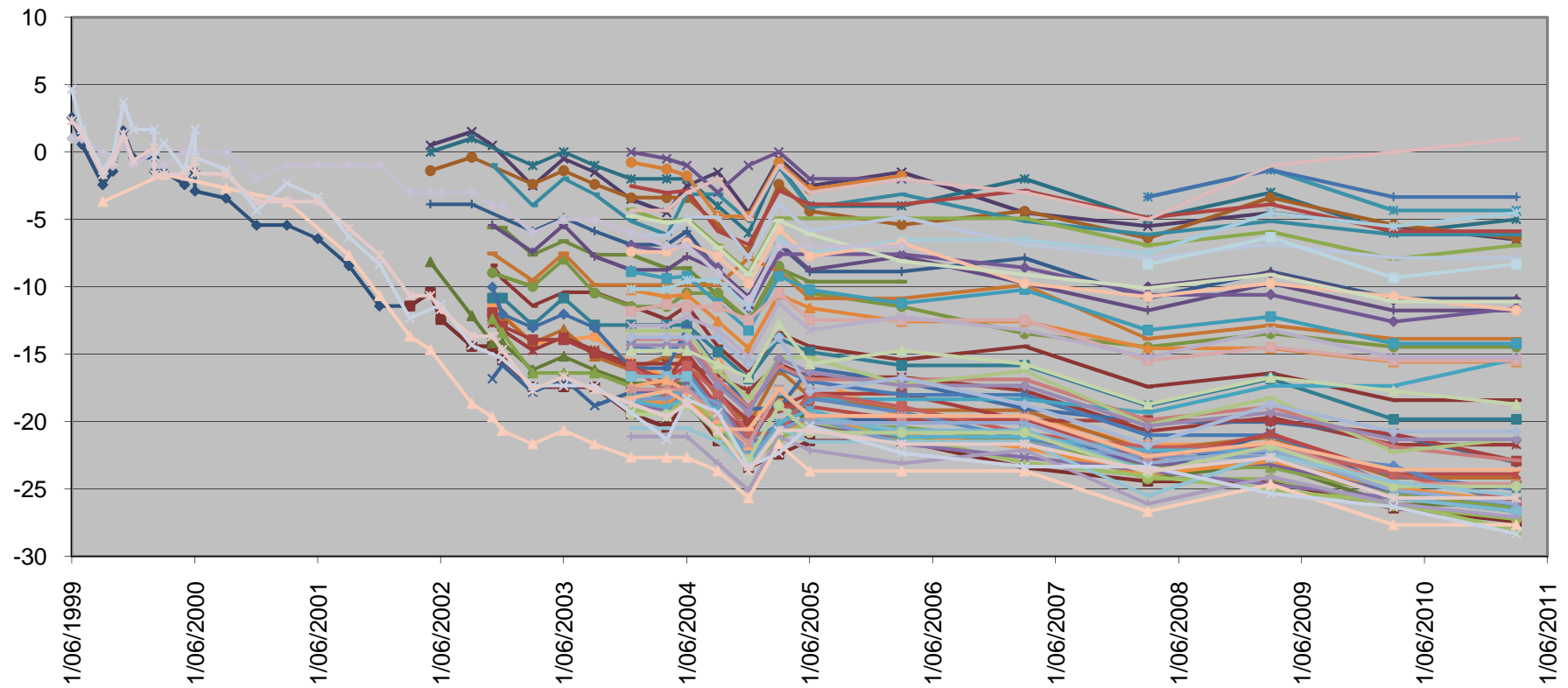


- | | | | | | | | | |
|-------|---------|---------|---------|---------|---------|---------|--------|--------|
| AP 3 | AP 5 | AP 11 | AP 13 | AP 14 | AP 15 | AP 17 | AP 17A | AP 17C |
| AP 20 | AP 21 | AP 21A | AP 21B | AP 30 | AP 31 | AP 32 | AP 33 | AP 34 |
| M 220 | RM 3903 | RM 3904 | RM 3905 | RM 3907 | RM 3908 | RM 3924 | | |

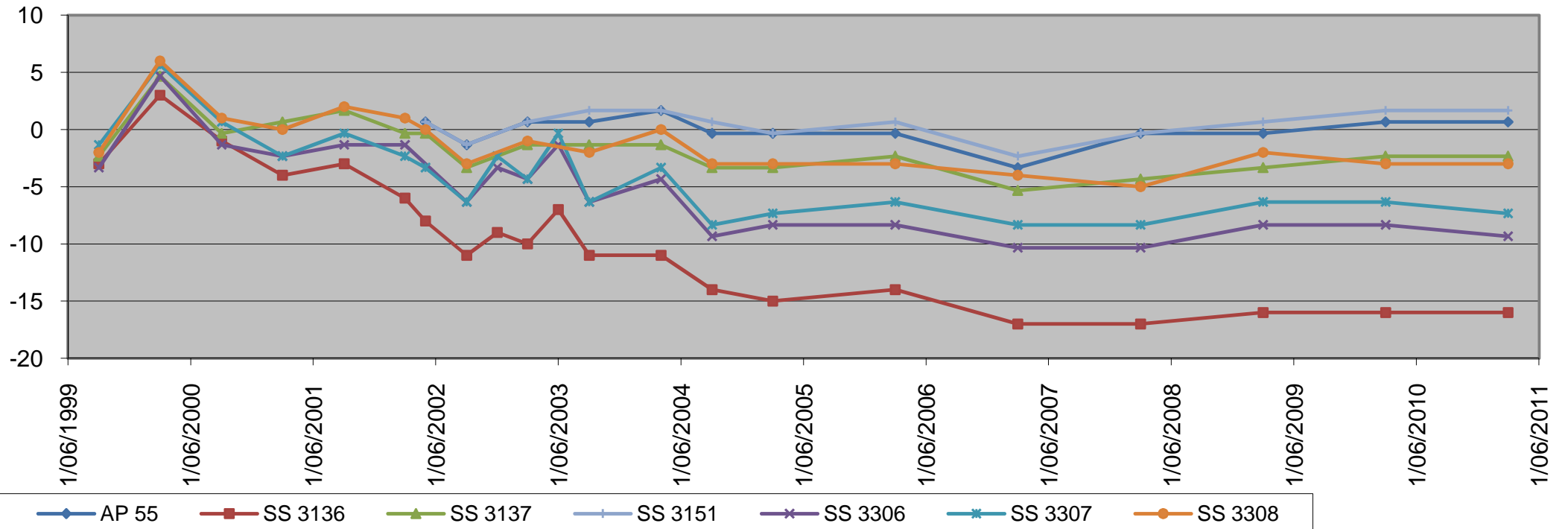
Area II - All Marks



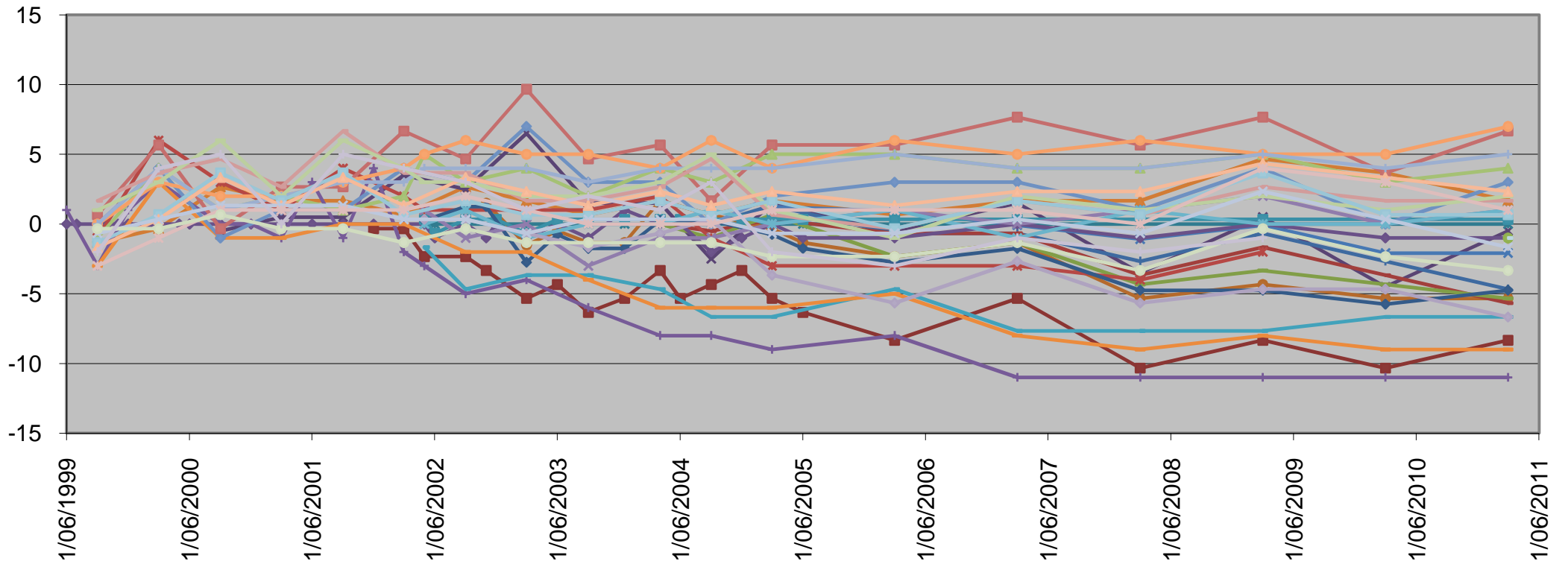
Area IIA - All Marks



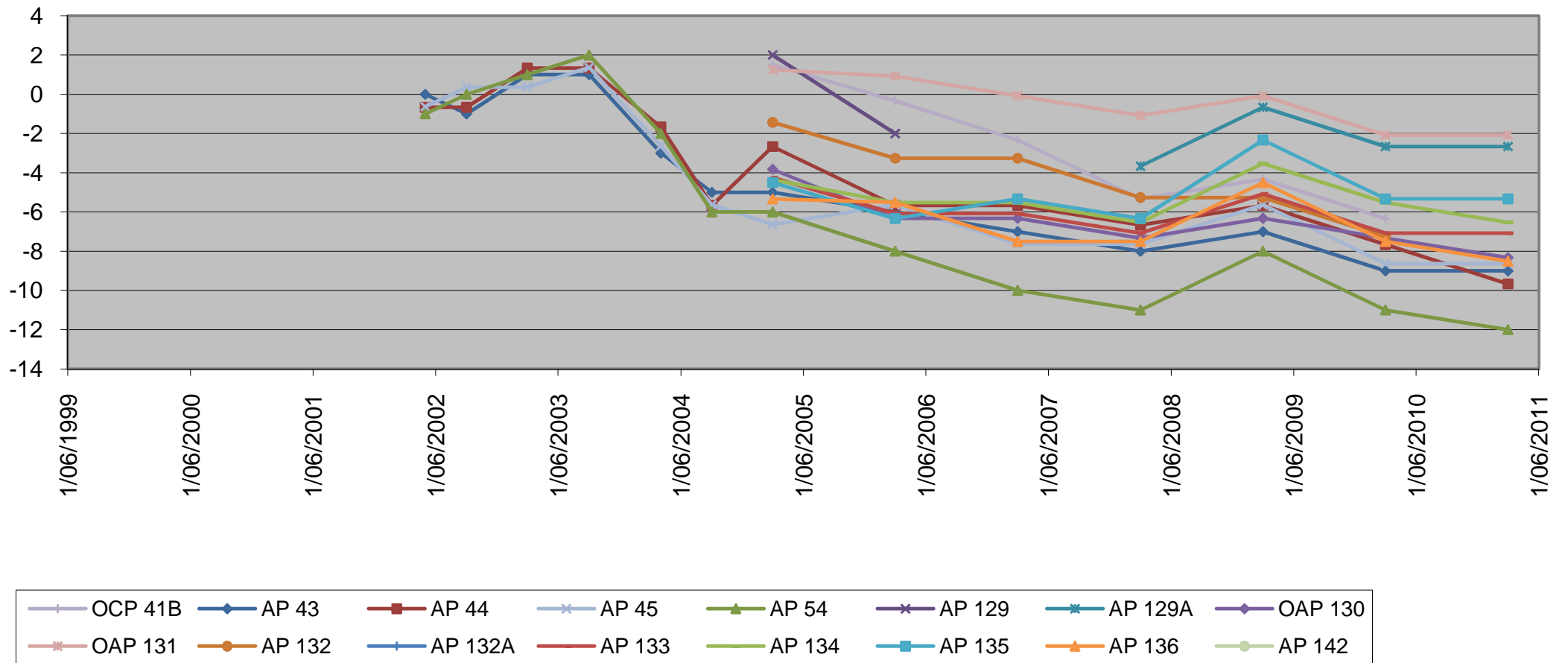
Area IIB - All Marks



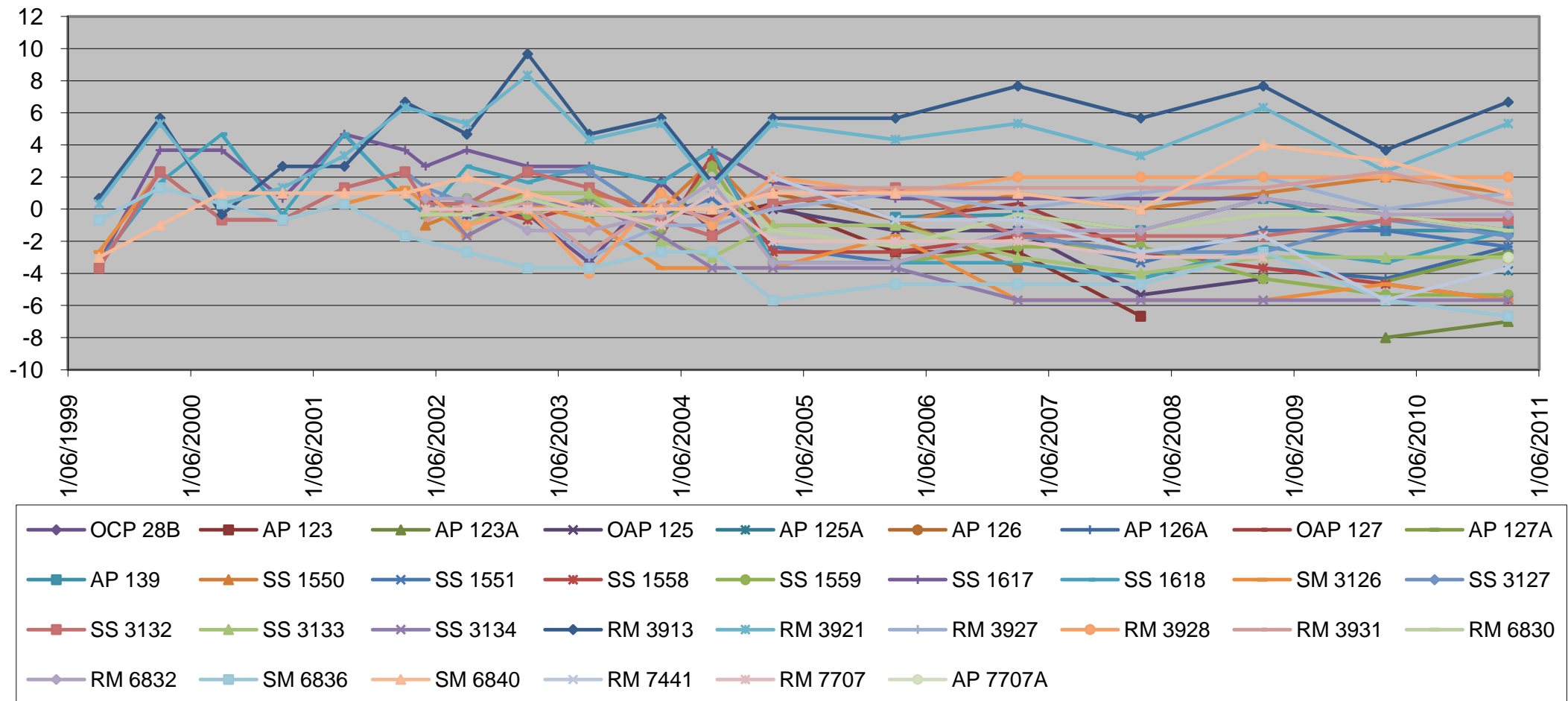
Area III - All Marks



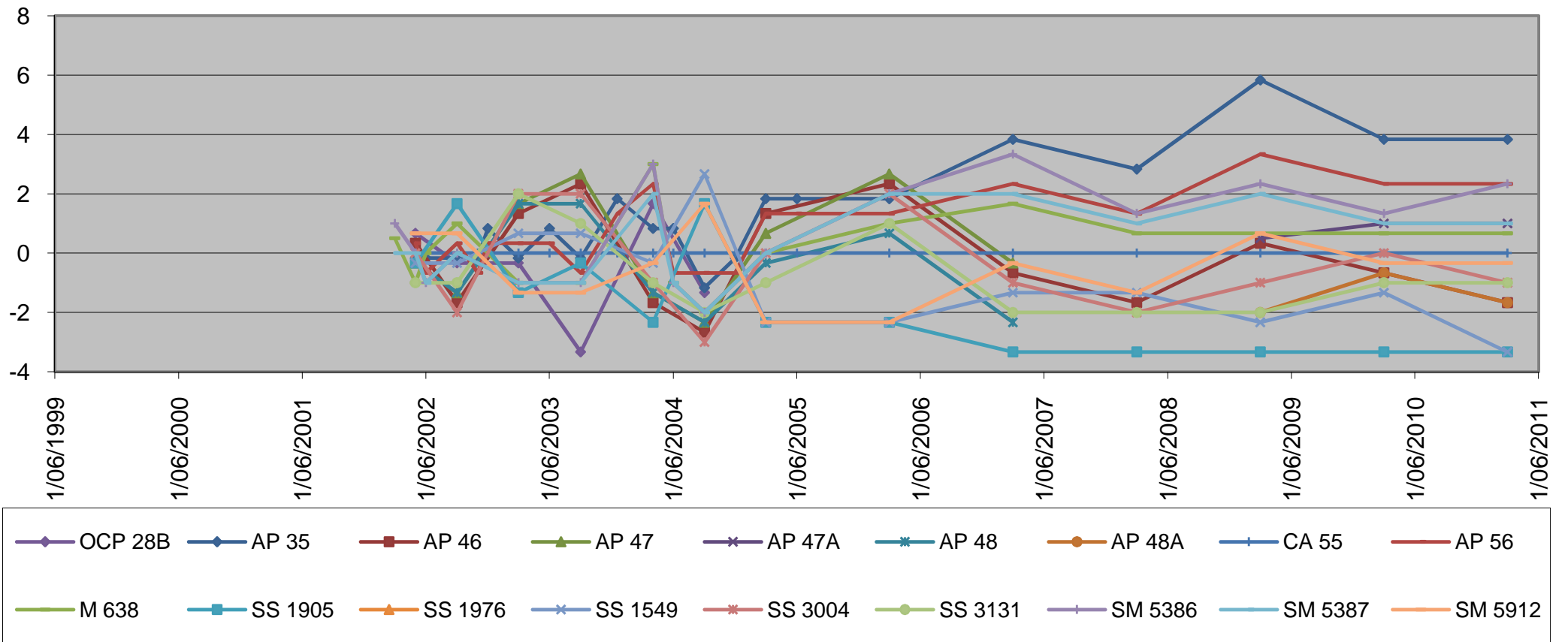
Area IIIA - All Marks



Area IV - All Marks



Area V - All Marks





Note:
 Origin of Levels
 CA55 S049930
 RL65.1412m
 in same terms as
 M205 S054417
 RL59.305m
 (as at 5/02)
 • SS3316 = Level
 Control (H)
 Existing

- Stage I Control Trigger
- Stage II Control Trigger
- Stage IIB Control Trigger
- Stage III Control Trigger

SHEET 1 OF 2

C	AP218, AP142, AP132A	MD	02/11	DESIGNED	DATE	SIGNATURE	PLOT DATE	15/02/2011
	ADDED							
	AP218, OCH18, AP132			DRAWN	DATE	SIGNATURE	CAD REF	645102 Control Pt Plan
	DELETED							
	AP218A			CHECKED	DATE	SIGNATURE	SURVEY BY	
	POSITION CORRECTED							
H	ORIGIN OF LEVELS CHANGED	MD	5/02	APPROVED	DATE	SIGNATURE	SURVEY DATE	
REF	AMENDMENT	BY	DATE				SEA REF	

ASSOCIATION OF CONSULTING ENGINEERS
 NEW ZEALAND
 ISO 9001
 QUALITY ASSURED

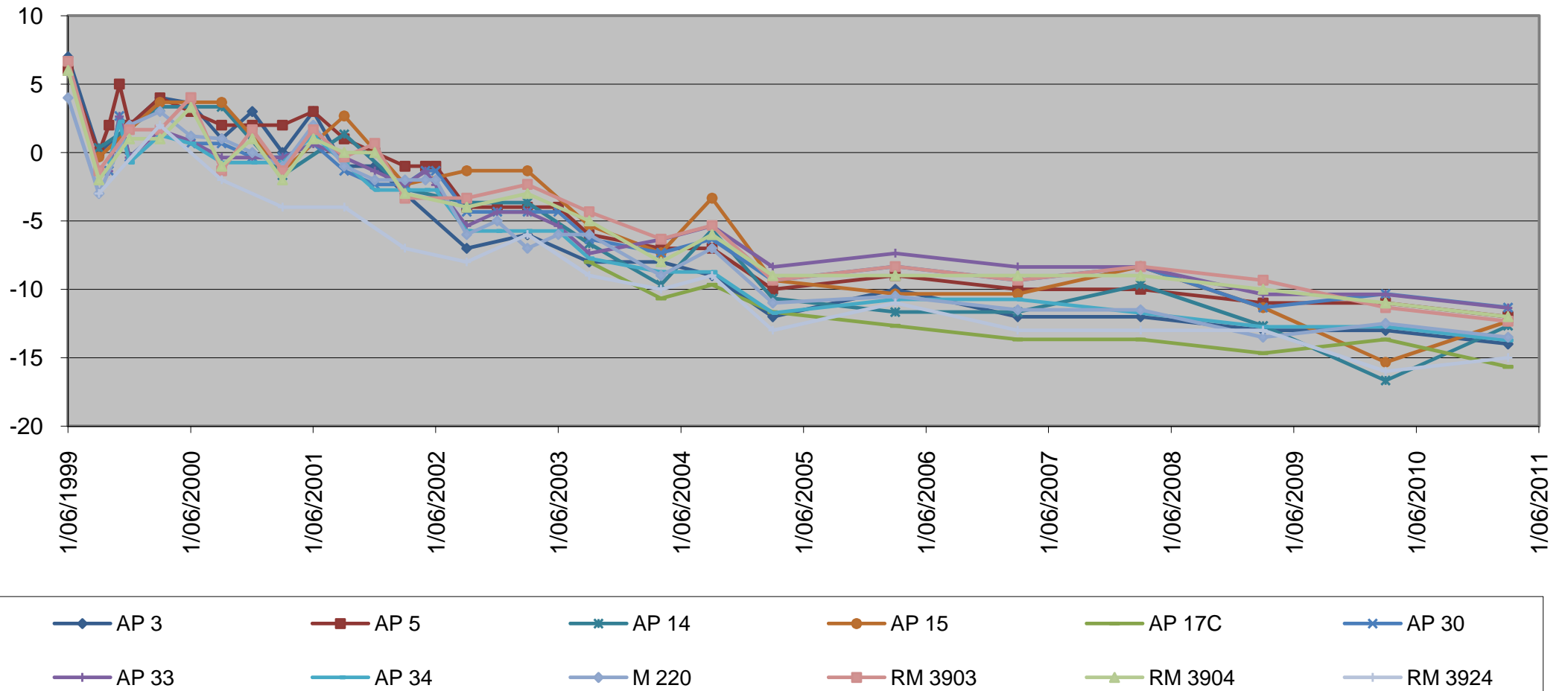
HARRISON GRIERSON
 CONSULTING ENGINEERS SURVEYORS PLANNERS
 Level 5, Capital House, 20 American Way, Manukau City PB 09 966 3380 Fax 09 966 3390

PROJECT: WINSTONE AGGREGATES
 THREE KINGS QUARRY

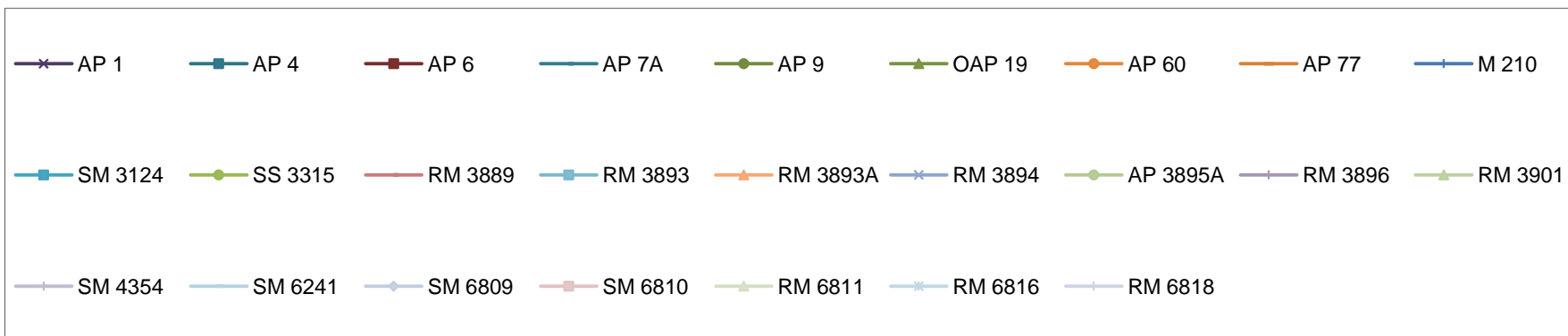
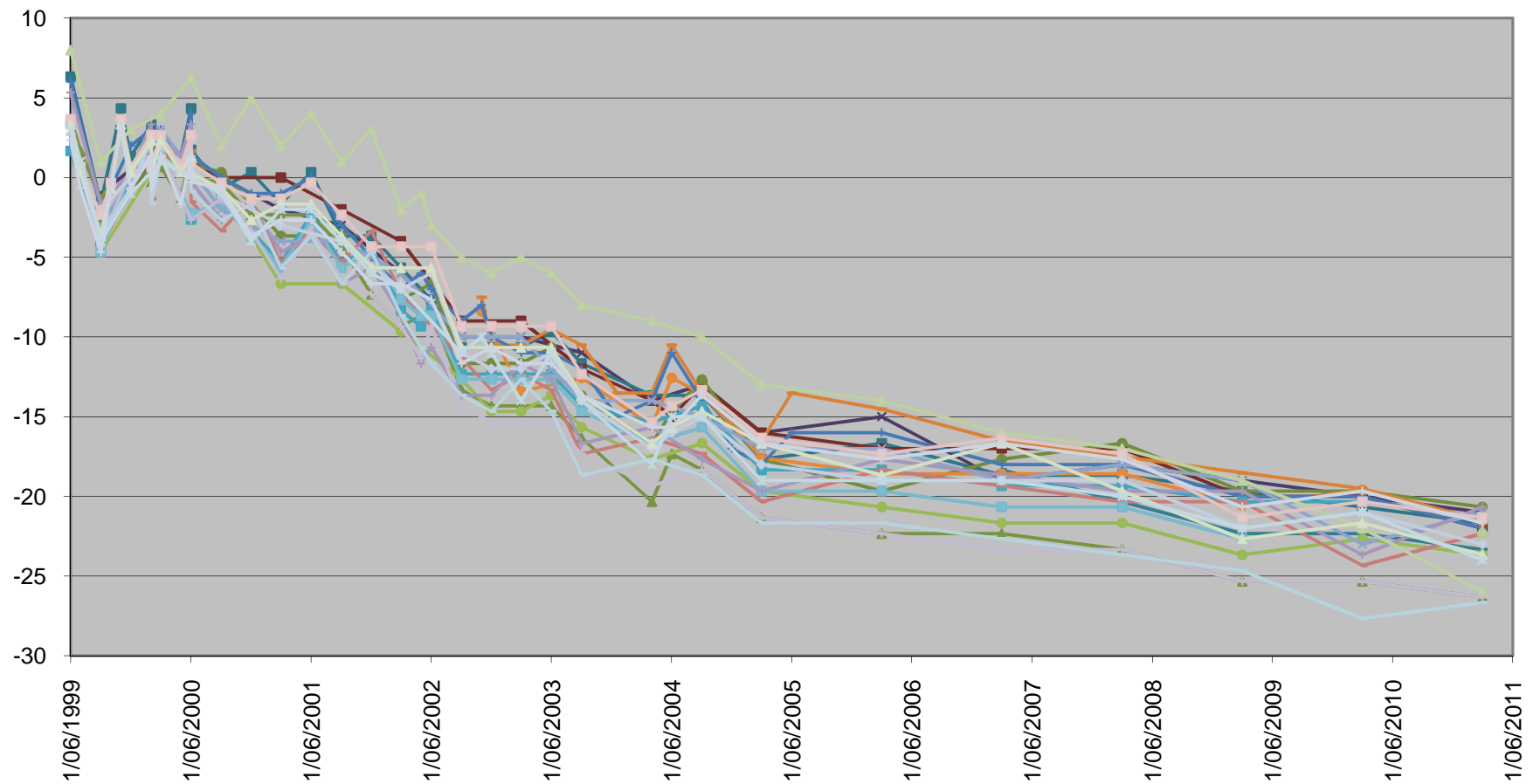
TITLE: SURVEY MONITORING
 LEVEL CONTROL POINTS

PLOT STATUS:	PROJECT NO:	SCALE:	A1
	1130/006451	A1 1:5000	A3
	DRAWING NO:	A3 1:10000	REV
	6451_102		C

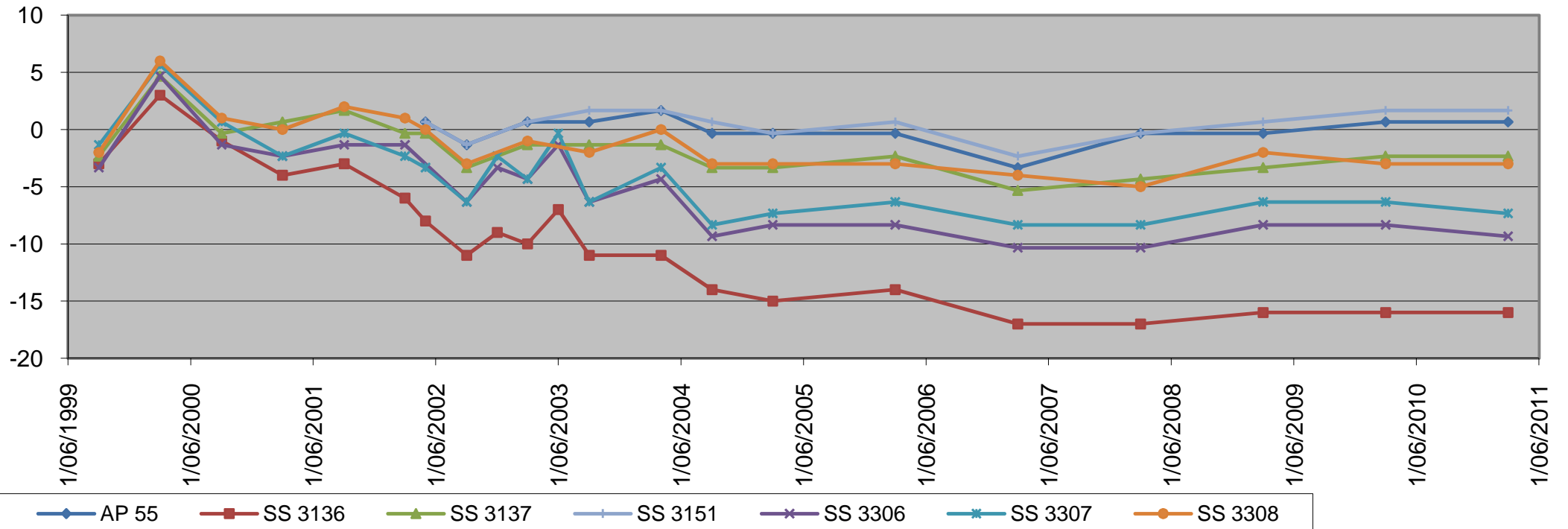
Area I - Marks with Adjusted Total Settlement Greater than 10mm



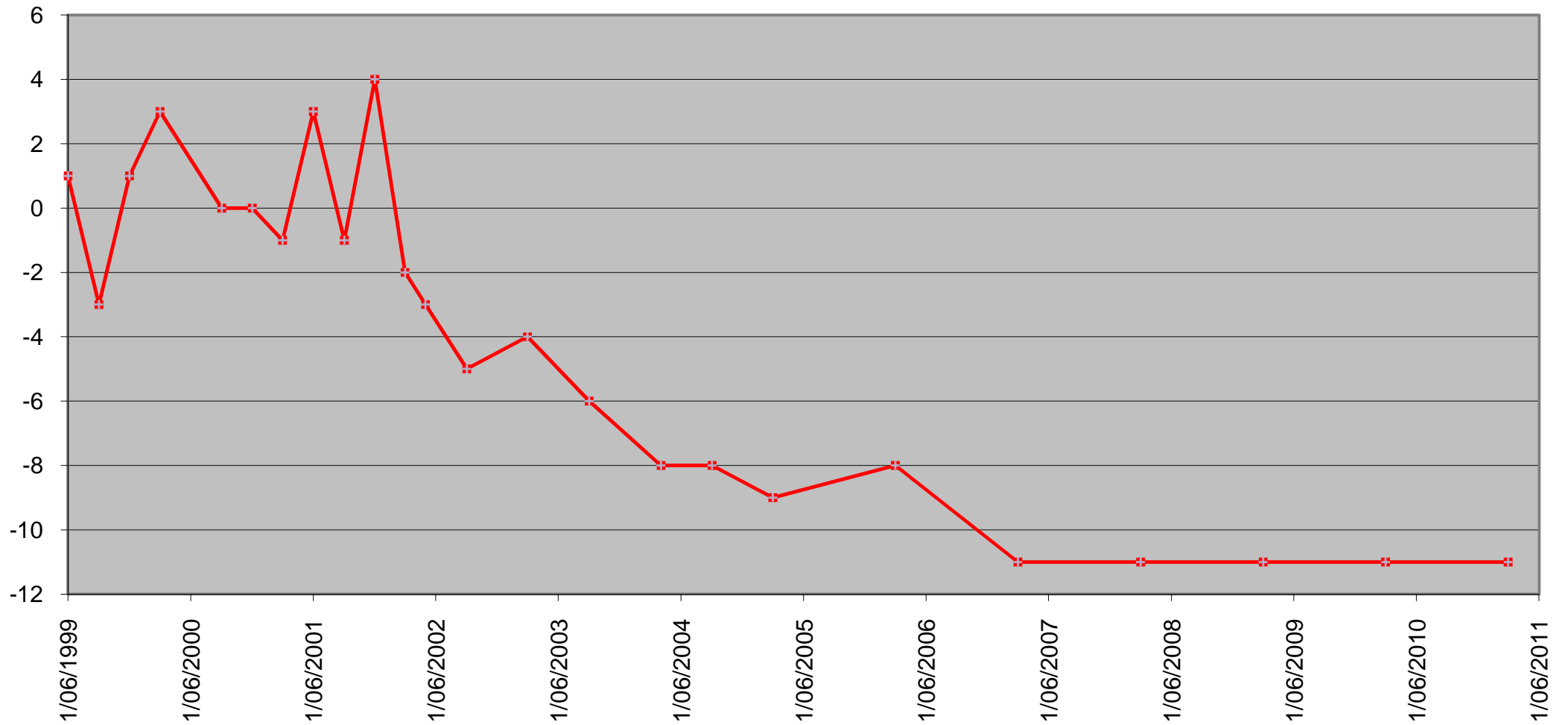
Area II - Marks with Adjusted Total Settlements Greater than 20mm



Area IIB - All Marks



Area III - Marks with Adjusted Total Settlement Greater than 10mm



SM 3125