2002 SUMMER HILL GRAVITY SURVEY

FINAL REPORT

PART A : ACQUISITION (Phase 2)

PEL 57, OTWAY BASIN, SOUTH AUSTRALIA

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December 2003

TABLE OF CONTENTS

1 INTRODUCTION 3
2 SURVEY OBJECTIVES 3
3 SURVEY LOCATION 3
4 FIELD OPERATIONS 5
4.1 Environment 5
4.2 Permitting 5
4.3 Data Acquisition 5
5 CONCLUSIONS 6
6 REFERENCES 6
APPENDIX 1 – Acquisition Contractor's Report 8
APPENDIX 2 – Permitting Contractor's Report 9

FIGURES

1 2002 Summer Hill Gravity Survey Location Map 4

TABLES

1 Goal Attainment Scaling Inventory 7

1 INTRODUCTION

This report covers the acquisition of Phase 2 of the Summer Hill Gravity Survey conducted between October 26 and November 1, 2002. Phase 2, located within PEL 57 (South Australia) and PEP 151 (Victoria) consisted of some 237 gravity stations including 196 new locations as well as both repeat and base station observations (**Figure 1**).

Due to delays with the granting of Exploration Licence PEP 151 to Essential Petroleum Resources (Operator), Phase 2 of the Summer Hill Gravity Survey was recorded much later than Phase 1 which was conducted in May 2002 within PEL 57. Acquisition for the South Australian portion of the survey is described in the separate Origin Energy report "2002 Summer Hill Gravity Survey Final Report, Part A : Acquisition".

Haines Surveys of Aldgate, SA, conducted the Phase 2 survey using a Scintrex CG3 Autograv instrument. Permitting was handled by Chris Annear of Petroleum Support Services based in Mt Gambier.

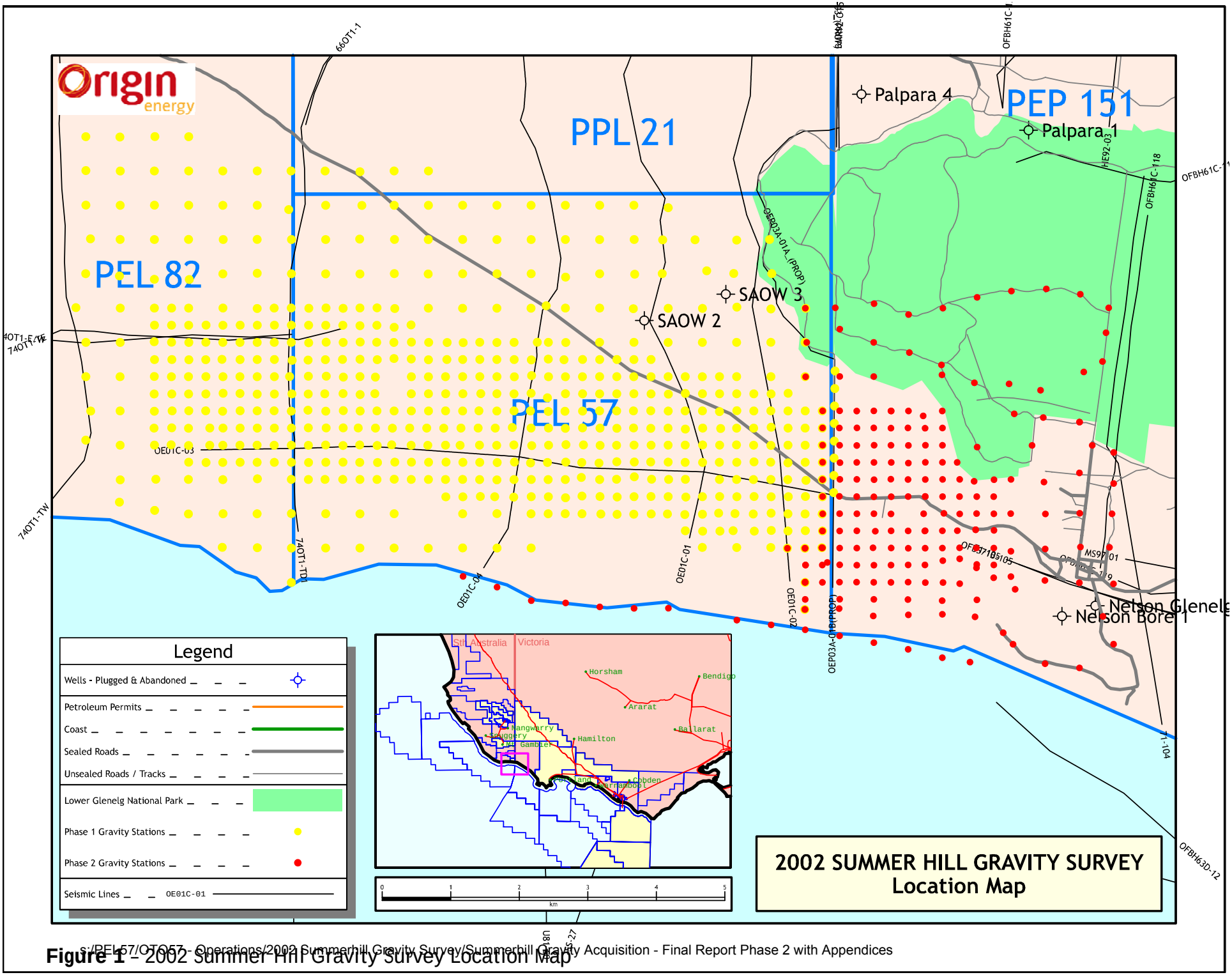
2 SURVEY OBJECTIVES

The Summer Hill Gravity Survey was designed to provide high resolution gravity information over a Waarre Sandstone play located in the southern part of PEL 57 (South Australia) with possible extension into the western portion of PEP 151 (Victoria).

Previously recorded seismic data identified a potentially significant structure at the Waarre Sandstone level. Regional gravity data highlights the Summer Hill Lead as a significant gravity anomaly, and this survey was aimed to provide confirmation of structural closure and to identify the approximate location of the crest of the structure.

3 SURVEY LOCATION

The survey grid straddles the South Australian-Victorian border and is located approximately 27 km southeast of Mt Gambier (**Figure 1**). The coastline provided the southern limit to the survey. A small portion of the grid extended into the Lower Glenelg National Park.



s:/PEL57/OTO57 - Operations/2002 Summerhill Gravity Survey/Summerhill Gravity Acquisition - Final Report Phase 2 with Appendices

Figure 1 – 2002 Summer Hill Gravity Survey Location Map

4 FIELD OPERATIONS

4.1 Environment

The PIRSA Statement of Environmental Objectives and Assessment Criteria for Pipeline Preliminary Survey Activities was adopted for the Summer Hill Gravity Survey (PIRSA, 2001). The objectives were relevant to and adequately covered the survey activities. The same conditions were applied to the Victorian survey extension.

The survey had an extremely low impact and required no line clearing or fence alteration. A 4WD utility and quad bike were used for most of the survey. The option of a backpack for difficult areas was always available. There were no known animal diseases or quarantined properties in the area of the survey grid.

Permission to enter the Lower Glenelg National Park for the Phase 2 programme was granted by the Victorian Department of Natural Resources and Environment on the condition that readings were taken on nominated tracks.

A Goal Attainment Scaling Inventory is included in Table 1 rating environmental impacts relevant to the Summer Hill Gravity Survey.

4.2 Permitting

The permitting process was completed in excess of 21 days prior to the start of fieldwork. All landowners were supplied with documentation describing the field procedures. Special requirements for each property were noted and at the end of the survey the landowners were contacted again to make sure that everything was in order. Nineteen landowners were involved and there were no restoration claims.

A full account of permitting conducted for the project is provided in **Appendix 2**.

4.3 Data Acquisition

In the past gravity surveys had been conducted along seismic lines at the same time as seismic surveying. This was the first pure gravity survey in the area and acquisition techniques were based on mining experience as well as the Phase 1 Summer Hill gravity acquisition completed in May 2002 in South Australia. A Landcruiser manned with two people was used for most of the survey, with the quad bike or backpack being used in the difficult or soft areas.

Survey control was provided using the Real Time Kinematic GPS technique with a base station centrally located at Summer Hill. A Scintrex CG3 Autograv was used for gravity observations. The main area of the grid had a station spacing of 250 metres with stations on the perimeter extending to 500 metres.

Appendix 1 provides a full account of acquisition activities for the Summer Hill Gravity Survey.

5 CONCLUSIONS

The operation proved successful with good quality gravity data being acquired. The permit man and gravity operators worked well together, both being recommended for future surveys.

The permit man played a key role in the success of the survey utilising his local knowledge and communication with landowners to allow the Haines personnel to concentrate on data acquisition. He also ensured that all environmental and safety regulations were adhered to.

There were no environmental or safety incidents.

6 REFERENCES

Origin Energy Resources Ltd, 2002. *2002 Summer Hill Gravity Survey Final Report, Part A : Acquisition*: Origin Energy Report.

PIRSA, 2001. *2001 Statement of Environmental Objectives for Pipeline Preliminary Survey Activities in South Australia*: PIRSA Report prepared by ECOS.

MEASURE	SCORE				
	+2	+1	0	-1	-2
Impact on infrastructure	No impact on infrastructure				
Impact on agricultural activities	No disturbance to rural or urban pursuits				
Visual impact, pasture area	No visual impact to pasture area				
Visual impact, native vegetation	No impact on native vegetation				
Pollution or litter	No pollution or litter				
Impact on native vegetation	No impact on native vegetation				
Disturbance to land surface	No disturbance to land surface				

Table 1 – Goal Attainment Scaling Inventory

APPENDIX 1

ACQUISITION CONTRACTOR'S REPORT

Haines Surveys Pty Ltd

Contents

Introduction 2

Location Diagram 2

GPS Observations and Processing 3

Gravity Observations 3

Survey Control 4

Point Numbering and Marking 4

Gravity Processing 5

Results Formats 7

Production Log 8

Repeat Observation Results 9

Plots

- **Station Locations** 12
- **Stations and Bouguer Anomaly Contours** 13
- **Bouguer Anomaly Contours and Zoned Colour Image** 14
- **Elevation-Bouguer Anomaly Profiles** 15

Processed Results 24

Introduction

A detail GPS gravity survey designated as Summer Hill Victoria Gravity Survey was carried out in an area approximately 1 kilometre west of Nelson in Victoria. The survey was conducted over 7 days from 26 October to 1 November 2002 on behalf of Origin Energy Resources Ltd.

The proposed gravity survey consisted of 116 stations in a grid of 12 N-S lines with intermittent line spacings of 250m and 500m, and intermittent station spacings of 200m and 500m. Lines were orientated north-south. The proposed gravity survey was coincident with AMG and bounded by the following Zone 54 coordinates: in the south-west 496000E 5787000N, north-west 496000E 5793000N, north-east 501000E 5793000N and south-east 501000E 5787000N.

The completed gravity survey comprised a total of 196 gravity stations in a grid of 17 N-S lines coincident with AMG Zone 54 coordinates. There were 12 observations repeated for quality control purposes including a number used to verify gravity features. Four repeats were compared with observations from a previous survey (Summer Hills Gravity Survey completed May 2002) and 8 repeats compared with observations from the Summer Hills gravity survey, giving a repeat percentage of 6.15%.

The Bouguer anomaly processing has been performed using a country rock density of 2.67 g/cc.

Figure 1 below shows the location of the survey area.

Figure 1. Location Diagram

GPS Observations and Processing

Carrier phase GPS data has been collected using *Trimble 4000* series Geodetic receivers.

Measurements to existing control have been made using Static techniques with baselines processed to double difference fixed solutions resulting in horizontal and vertical precision of approximately 2 cm.

Measurements for detail gravity observations have been made using Real Time Kinematic (RTK) techniques giving horizontal and vertical precisions of at least 5 cm.

Static processing has been done using Trimble GPSurvey Version 2.35 software and RTK processing using Trimble TDC1 firmware and TRIMMAP Version 6.0 software.

The GPS horizontal coordinates (WGS84 datum) have been transformed to and from AGD coordinates using the ICSM published 7 parameters for WGS84 to AGD84. The AGD Latitude and Longitude is then converted into AMG Zone 54 grid coordinates.

The GPS ellipsoidal heights (WGS84 datum) have been corrected to orthometric heights (AHD) using the AusGeoid98 geoid model for the control and the gravity stations.

Details of Horizontal and Vertical control are given in the sections below.

Gravity Observations

Gravity measurements have been made using *Scintrex CG3 Autograv* instruments. The instrument number 408276 was used in this project.

Readings of 120 seconds were taken at base station. Readings of 40 seconds were taken at all other gravity survey points.

Base station readings were taken at the beginning of the day and at the end of the day's fieldwork.

The CG3 instrument applies an instrument drift correction to its final gravity reading. Any residual drifts between base station readings are corrected by the gravity post processing software. The instrument also applies Earth Tide Correction to its final gravity reading at each station. The instrument calibration constants are contained in the daily gravity data files.

Survey Control

A local gravity/GPS base was previously established in the Summer Hill survey area (Summer Hill Gravity Survey completed May 2002) and designated 00000001. The base is marked with a cut metal star picket at the natural surface with an adjacent witness post (steel star picket) with a metal tag attached and stamped Haines Surveys GPS & Grav Base 00000001.

Horizontal and vertical control for Base 70211331, was supplied by the Lands Department of South Australia

Gravity control was established to 70211331 by repeated loop observations opening and closing on 00000001. The base value for 00000001 was previously established in the Summer Hills survey area (Summer Hills Gravity Survey completed May 2002).

Control information (**WGS84 heights have been derived using AusGeoid98**):

SUMMER HILLS SURVEY/GRAVITY CONTROL

	WGS84			AMG84 Zone 53		AHD	Isogal84
Station	Latitude	Longitude	Height	Easting	Northing	Height	Gravity mgal
70211331	-38° 02' 49.31353"	140° 57' 54.48040"	32.763	496818.949	5788789.59	36.508	979999.869
00000001							979994.227

Point Numbering and Marking

An 8 digit point number is used to identify each gravity station. The first 4 digits indicate the line number. The second 4 digits indicate the station number

The grid lines are in a N-S orientation and the 8 digits are constructed, from the coordinates, for each gravity station using

Line No =(AMG N - 5700000) / 10 Stn No = (AMG E – 400000)/ 10

eg. Planned local gravity station coordinates

5789000N 496750E

Line No = 8900 Station No = 9675

i.e. Pt No = 89009675

Station numbers have not been expanded in the processed data.

The gravity stations have not been marked in the field.

Gravity Processing

The gravity values for this survey are related to the *Australian Gravity Base Station Network* using the *Isogal84 (IGSN 71)* values at known Gravity Stations as provided by *DMR*.

Note that all gravity values shown in these surveys are expressed in units of milligals.

The field gravity observations have been processed using standard formulae and constants to produce a Bouguer Anomaly for each gravity station.

The meter reading as recorded in the raw Scintrex data file is corrected for instrument tilts, meter drift and Earth Tide. Post processing corrections are detailed below.

Drift

The residual drift between base station readings is calculated for each station reading proportionately by time. This is the drift value shown in the processing output.

$$\text{Drift} = [\,(t_1 - t_n)\,((b_2 - b_1)/(t_2 - t_1))\,]$$

t_n = time of meter reading at each station
b_1 = base meter reading prior to station reading
t_1 = time of base reading b_1
b_2 = base meter reading after station reading
t_2 = time of base reading b_2

Obs mgal

This is the observed gravity value in milligals.

$$\text{Obs} = b_g + (r_n - \text{drift}) - b_1$$

b_g = base stn gravity value (Isogal84)
r_n = meter reading at each station as shown in the CG3 .dat file
drift = residual drift correction as shown above
b_1 = base meter reading prior to station reading

Anom

This is the difference between the observed gravity and the theoretical gravity value at each station. The theoretical value is calculated using the *1967 International Gravity Formula*.

$$\text{Anom} = \text{Obs} - g_{th}$$

Obs = observed gravity as explained above

g_{th} = 978031.8 (1 + 0.0053024 $\sin^2\phi$ - 0.0000059 $\sin^2 2\phi$)

ϕ = WGS84 Latitude

Freeair corrn

The freeair correction is calculated using

Freeair corrn = 0.3086 H

H = height above sea level (AHD height)

Bouguer corrn

Bouguer corrn = 0.04191 ρ H

ρ = density (2.67 g/cc used for this survey)

H = height above sea level (AHD height)

Bouguer Anom

Bouguer Anom = Anom + Freeair corrn + Bouguer corrn

Results Formats

Printed results of the gravity processing (with Bouguer corrections at density 2.67 g/cc) are included in the Appendix of this report. The results are also supplied in digital form on floppy disk with the following of files being supplied.

ALLCOR.XYZ ALLGEO.XYZ ALLCSV.CSV

Field gravity observation files with the extension .DAT and .DC and summarised GPS baseline solution files with extension .GPS are also supplied in a separate subdirectory named OBS.

ALLCOR.XYZ format

This is a *GEOSOFT* compatible XYZ (space delimited columns) file. The data is sorted by Day then Line and Stn number. The column order is as follows:

AMG E	AMG N	Line	Stn	drift	corr'd meter	obs mgal	anom	freeair corrn	bouguer corrn (2.67)	bouguer anom	height (AHD)

ALLGEO.XYZ format

This is a *GEOSOFT* format XYZ (space delimited columns) file. The data is sorted into Line and Stn number suitable for profiling. The column order is as follows:

Line	Stn	AMG E	AMG N	drift	corr'd meter	obs mgal	anom	freeair corrn	bouguer corrn (2.67)	bouguer anom	height (AHD)

ALLCSV.CSV Format

This is a Comma Separated Variable format file. This format facilitates data import into spreadsheet and database software. Each record (line) contains the following data fields:

Pt Number, Line No, Station No, Date, Day Number, Local Time, WGS Latitude, WGS Longitude, WGS Height, AMG East, AMG North, AHD Height, Meter reading, Meter reading standard deviation, Earth Tide Correction, drift correction, corrected meter reading, gravity difference (mgal) from base, observed gravity (mgals), gravity anomaly, freeair correction, Bouguer correction (2.67), Bouguer anomaly

*.DAT

These are the raw data files from the *Scintrex CG3* gravimeter. There is a separate file for each day's data and for each field party. The files are identified by the Julian day number (001 = Jan 1st) with the prefix G. eg. G142 = day 142 (21st May).

*.DC

These are the GPS Real Time Kinematic Data Collector files. They are ASCII format files containing the GPS vectors from the base station. The data is structured in a Trimble format (DC file Version 4).

*.GPS

These are the GPS solution summaries for all post processed Fast Static baselines with a separate file for each day's solutions. Each record (line) contains the following data fields:

Station, Solution Type, GPS Time, WGS84 Latitude, WGS84 Longitude, WGS84 Height, WGS84 dX, WGS84 dY, WGS84 dZ, Wgs84 dH, Baseline Distance, Solution Reference Variance, Solution RMSE, Rover Antenna Height, Baseline Standard Deviation , Solution Variance Ratio, Observation Count/Rejects, Observation Start time, Observation Finish time

PRODUCTION LOG

Summer Hills Gravity Survey Production Log

Date	GPS Day	Observed	Repeats	Comments
26-Oct	299	22	1	Mobilisation, establish control,start gravity survey
27-Oct	300	52	1	Continue gravity survey
28-Oct	301	36	1	Continue gravity survey
29-Oct	302	47	1	Continue gravity survey
30-Oct	303	19	7	Continue gravity survey
31-Oct	304	20	1	Complete gravity survey
1-Nov	305	0	0	Depart Summer Hills
	Total	196	12	

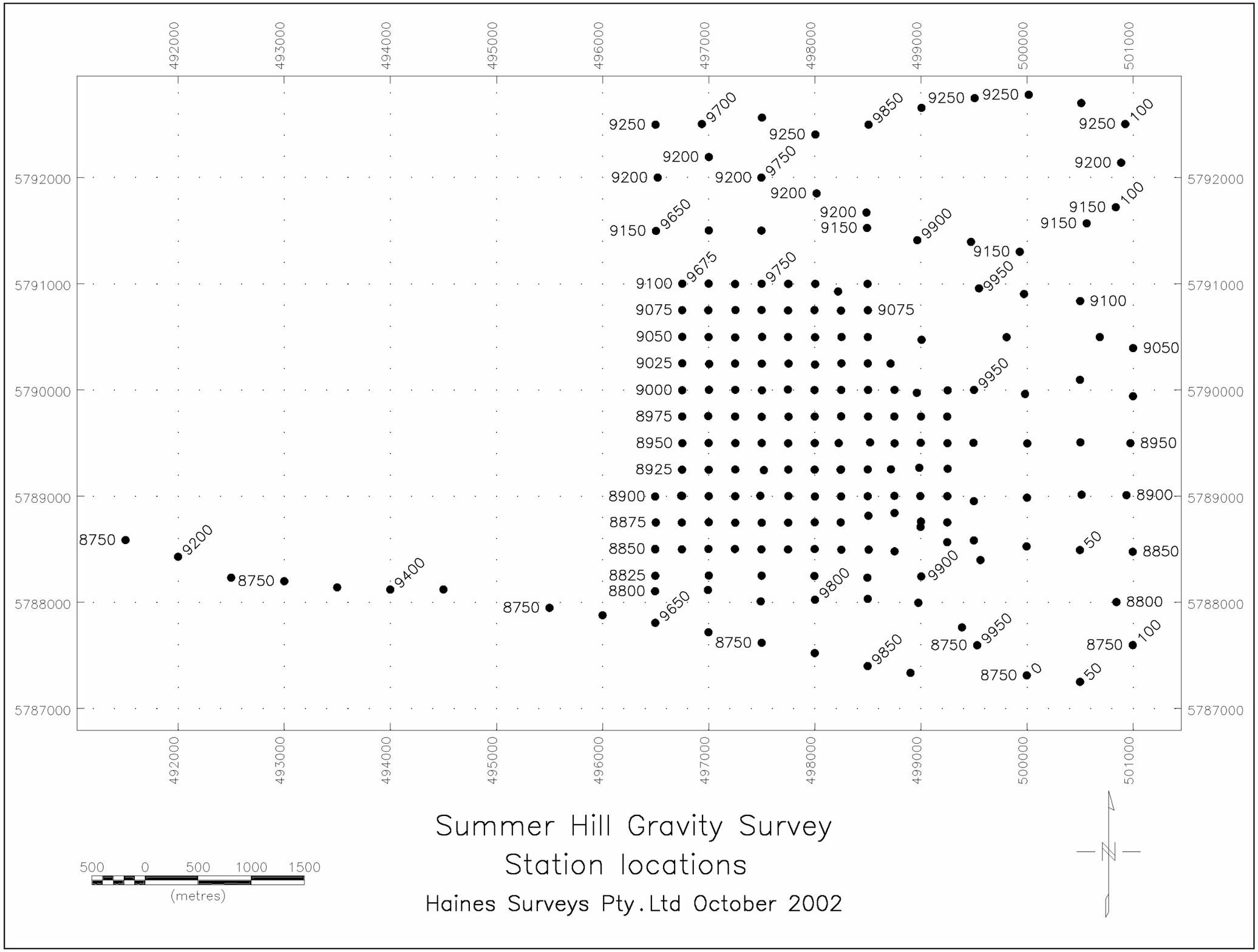
Repeat Observation Results

Pt	Day1	Day2	Diff E	Diff N	Diff Hgt	Diff g	Diff BAr	Vector	Abs Diff g	Abs Diff BAn
88009650	132	303	-3.084	-0.244	-0.064	0.096	0.083	3.094	0.096	0.083
89009650	132	303	-2.021	-0.494	0.088	0.074	0.091	2.082	0.074	0.091
89009675	132	299	-9.096	2.171	-0.547	0.158	0.053	9.367	0.158	0.053
89009675	132	303	-0.914	0.909	-0.062	-0.027	-0.038	1.291	0.027	0.038
89259675	299	300	-0.094	0.087	-0.003	-0.016	-0.017	0.128	0.016	0.017
88509650	300	303	-1.163	5.631	0.100	0.008	0.032	5.751	0.008	0.032
88759650	300	301	-0.098	-0.572	-0.035	0.056	0.048	0.581	0.056	0.048
91009775	300	303	3.800	-0.511	-0.081	0.068	0.051	3.835	0.068	0.051
89259825	301	302	4.788	3.323	-0.138	0.017	-0.007	5.830	0.017	0.007
89259900	302	303	-0.089	-0.189	-0.007	-0.010	-0.011	0.209	0.010	0.011
89759825	302	303	0.026	0.500	0.020	-0.021	-0.017	0.501	0.021	0.017
91000050	303	304	-0.252	-0.073	-0.008	-0.051	-0.052	0.262	0.051	0.052

	g	BAn	Vector	Abs(g)	Abs(BAn)
Mean	0.029	0.018	2.744	0.050	0.042
Min	-0.051	-0.052	0.128	0.008	0.007
Max	0.158	0.091	9.367	0.158	0.091
Count	12	12	12	12	12
SD	0.061	0.048	2.945	0.044	0.027

Plots

Station Locations 12
Stations and Bouguer Anomaly Contours 13
Bouguer Anomaly Contours and Zoned Colour Image 14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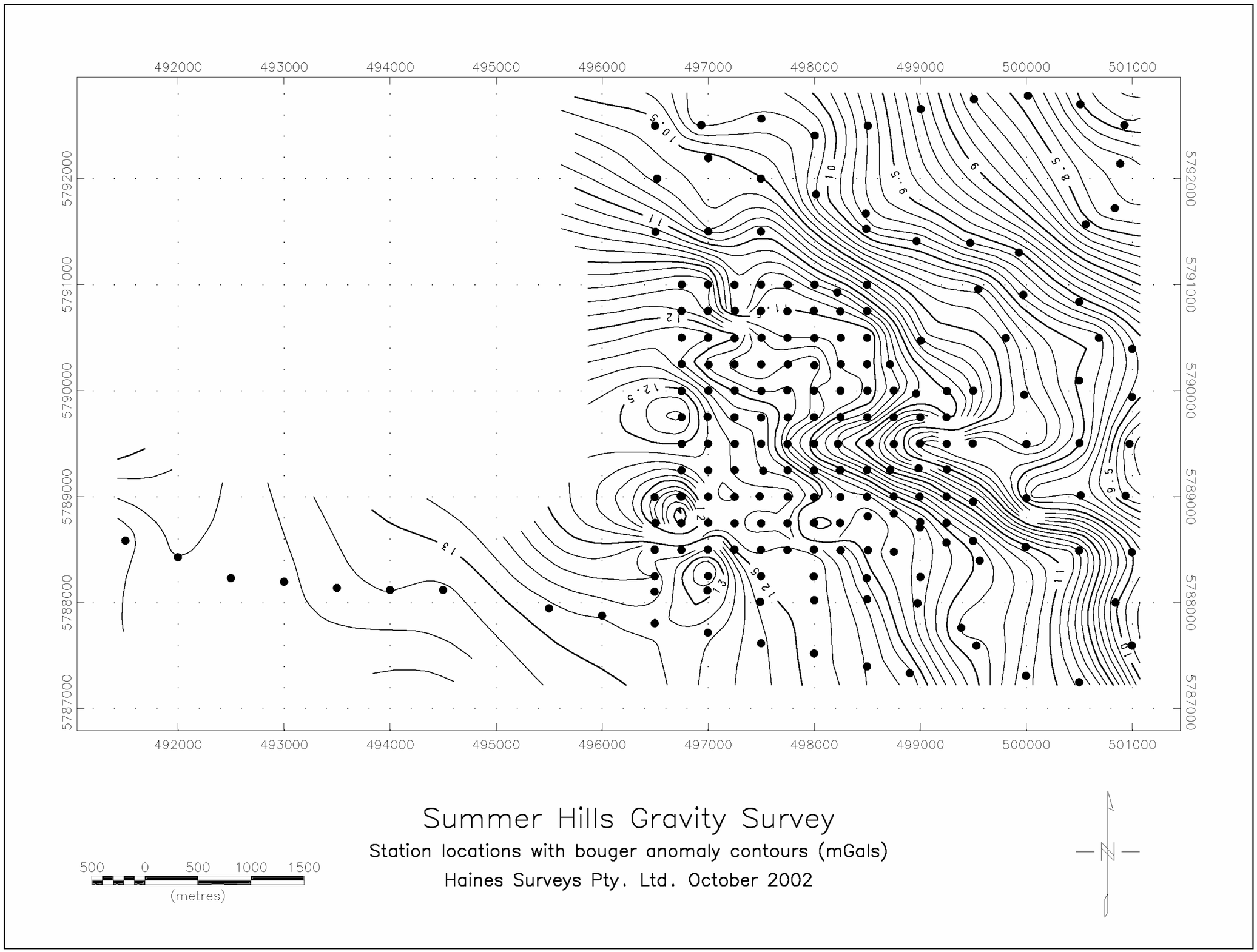
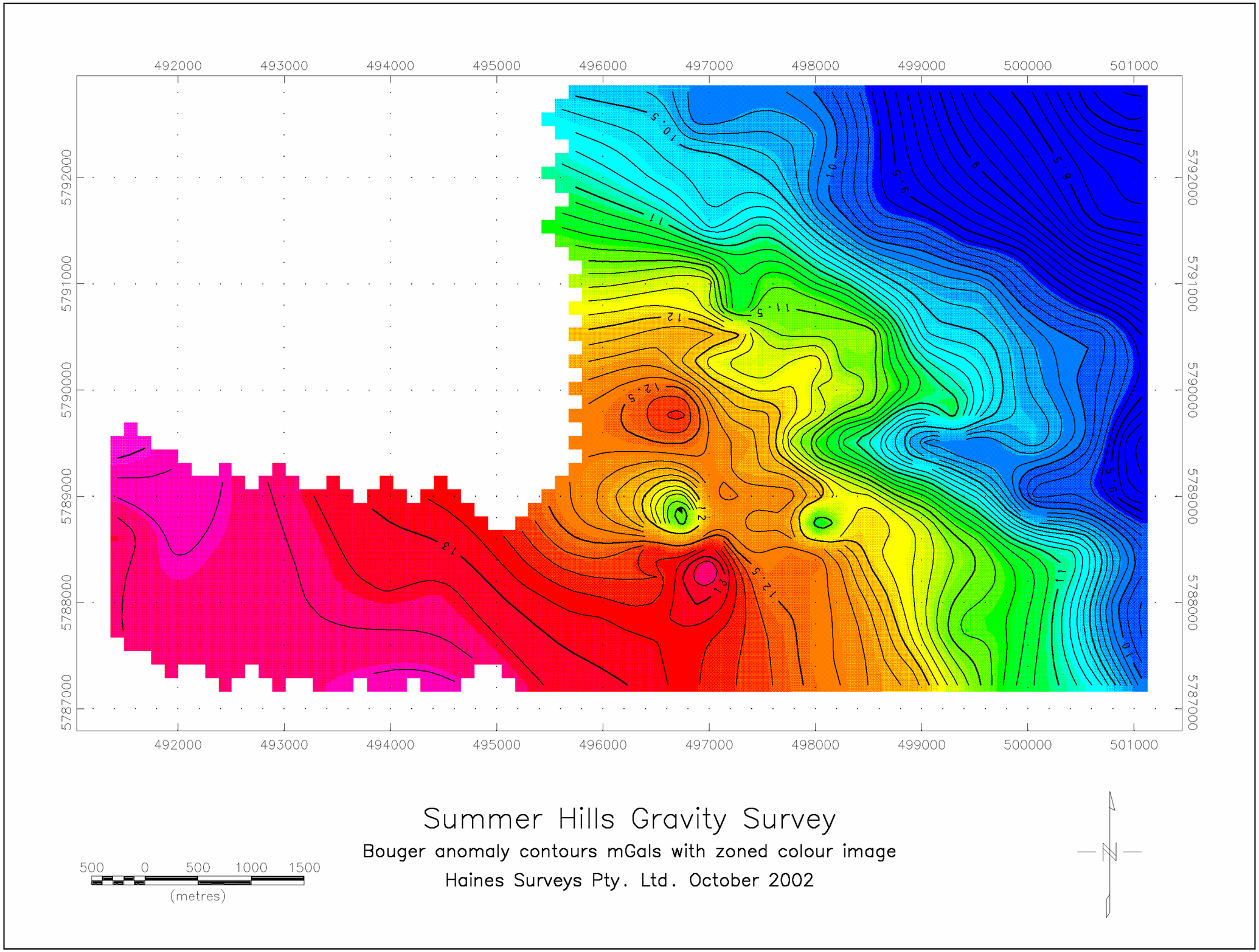
Summer Hill Gravity Survey
Station locations
Haines Surveys Pty.Ltd October 2002



Summer Hills Gravity Survey

Station locations with bouger anomaly contours (mGals)

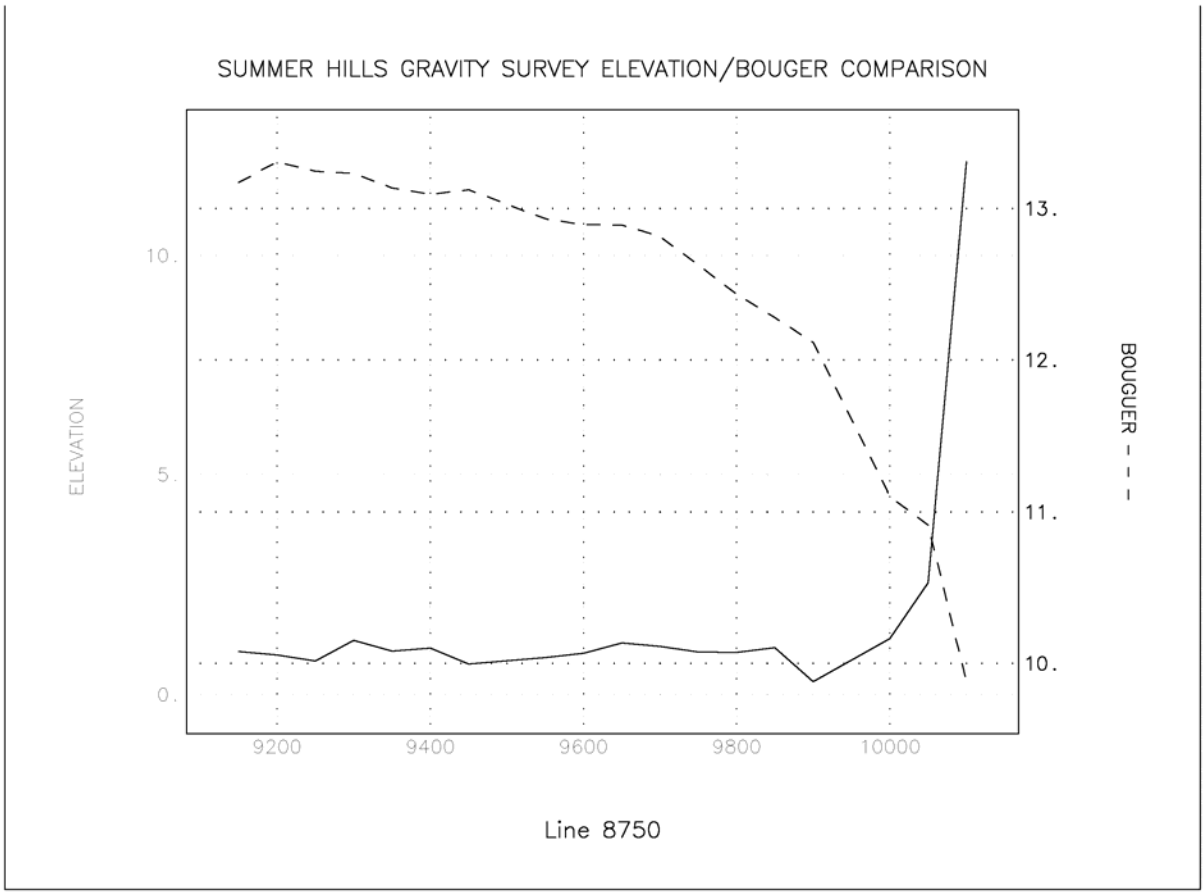
Haines Surveys Pty. Ltd. October 2002



Summer Hills Gravity Survey

Bouger anomaly contours mGals with zoned colour image

Haines Surveys Pty. Ltd. October 2002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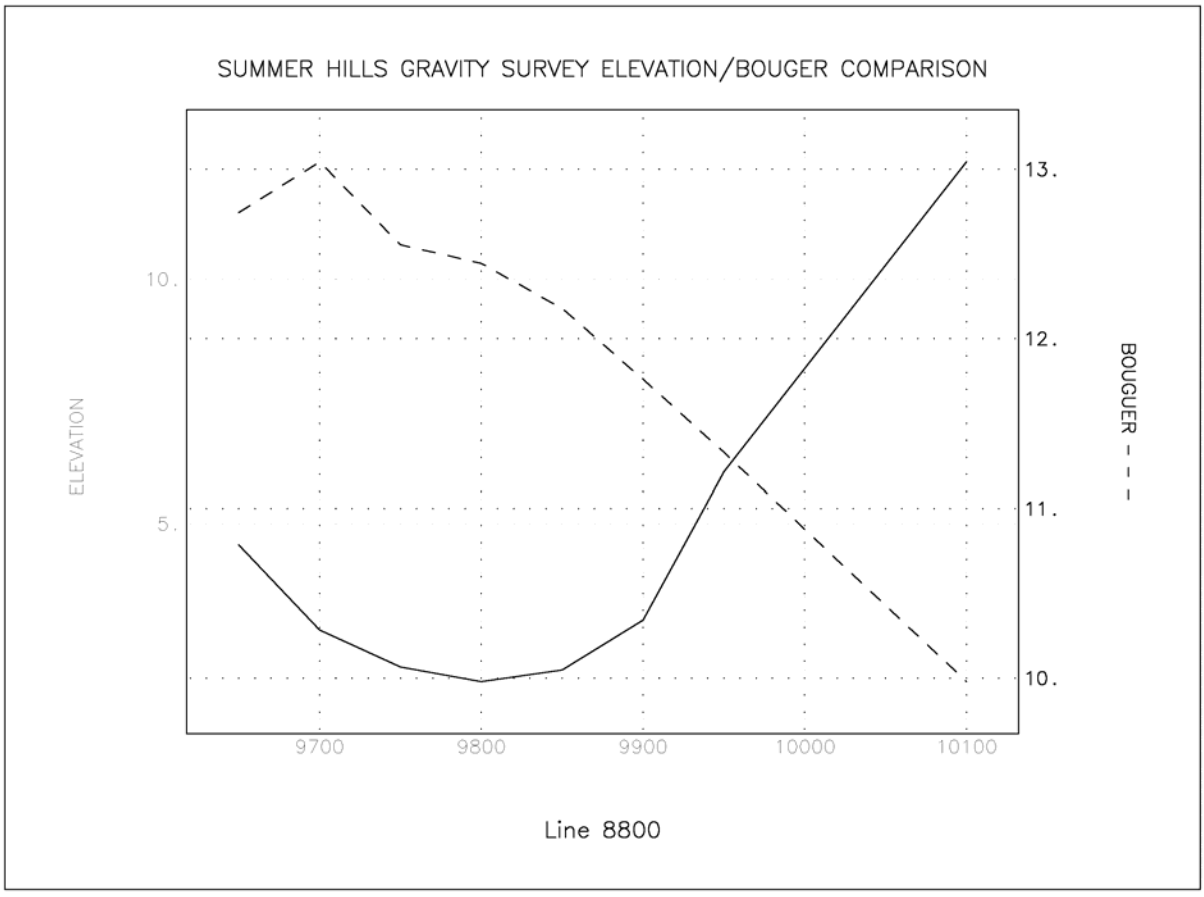
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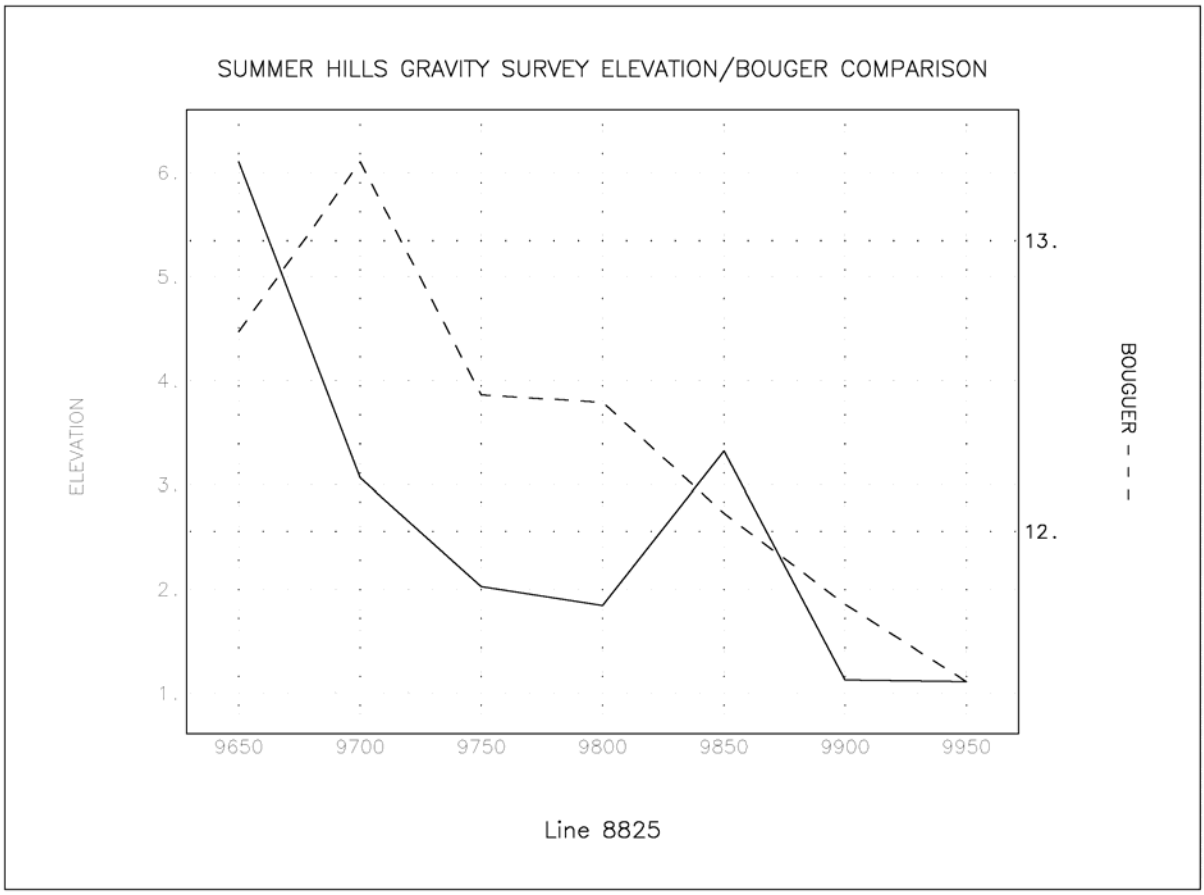
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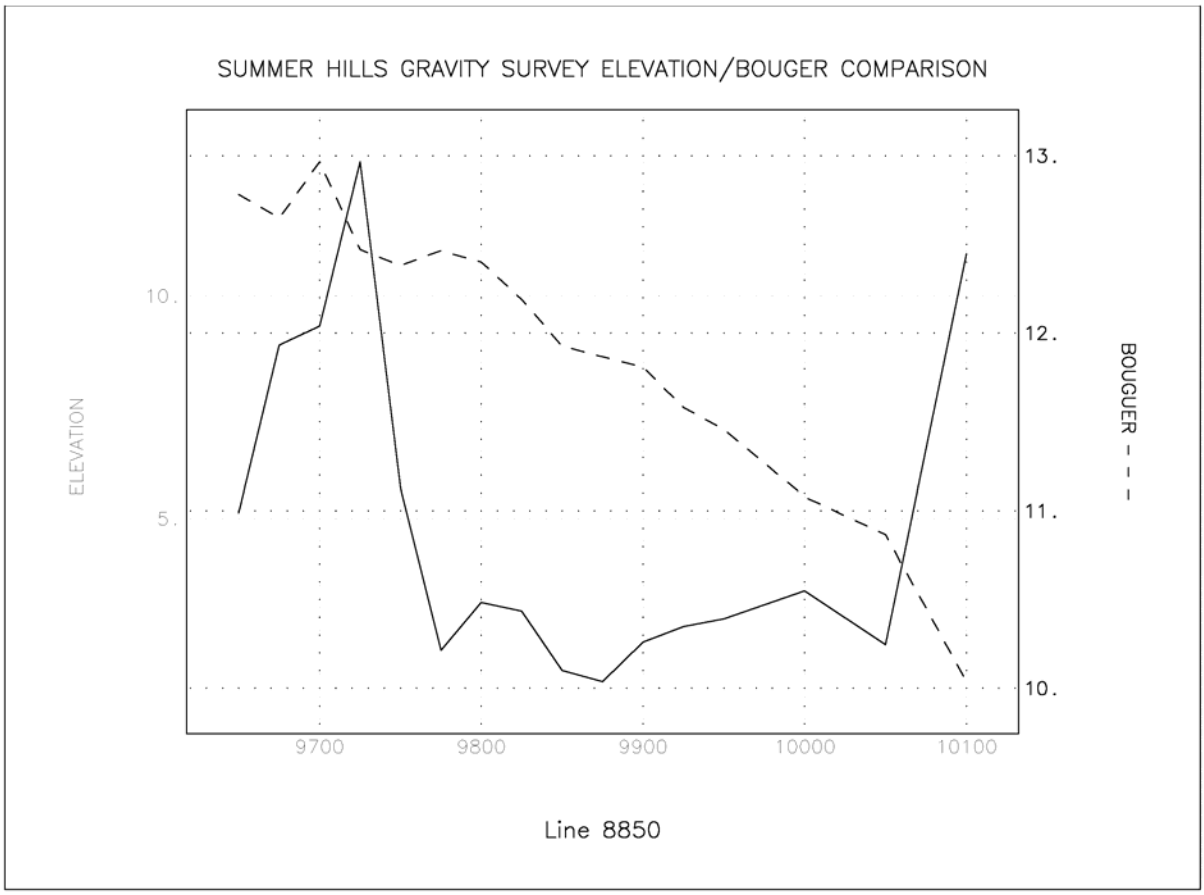
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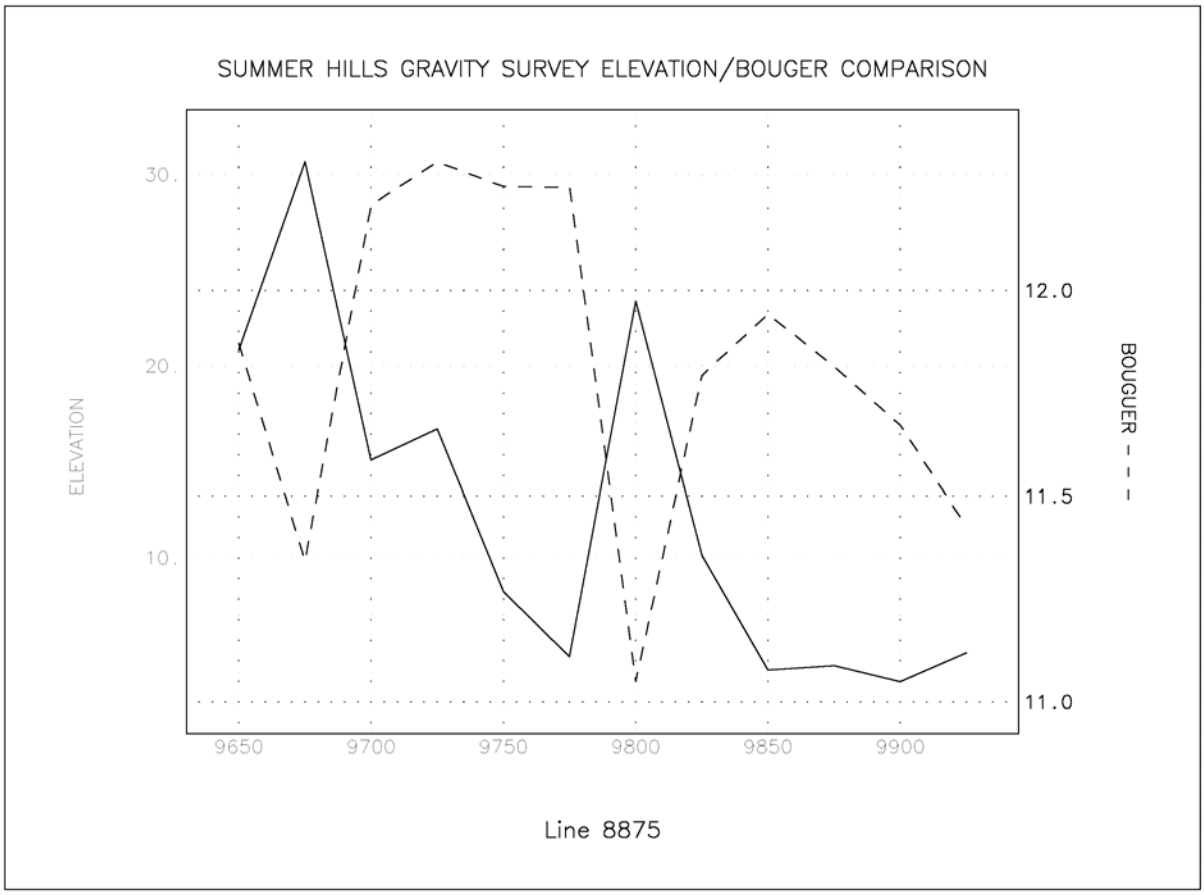
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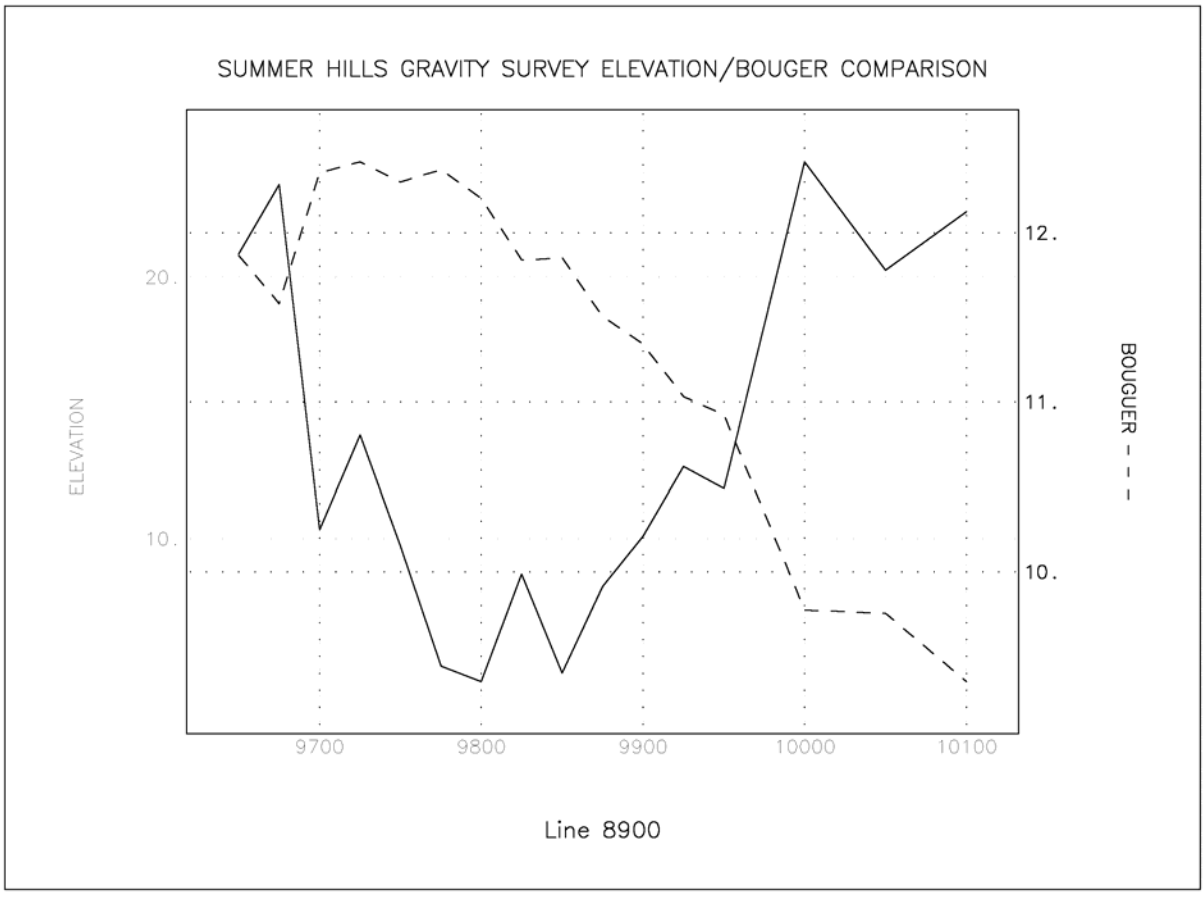
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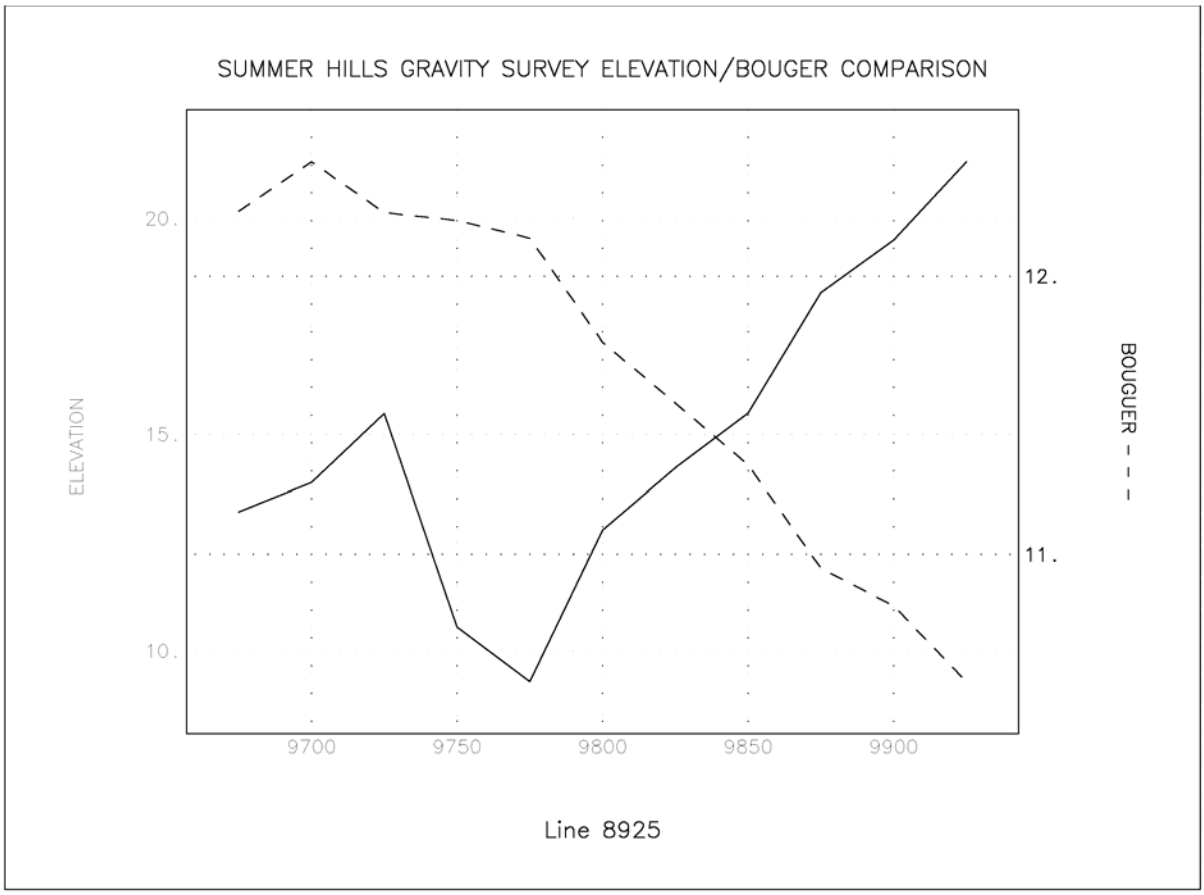
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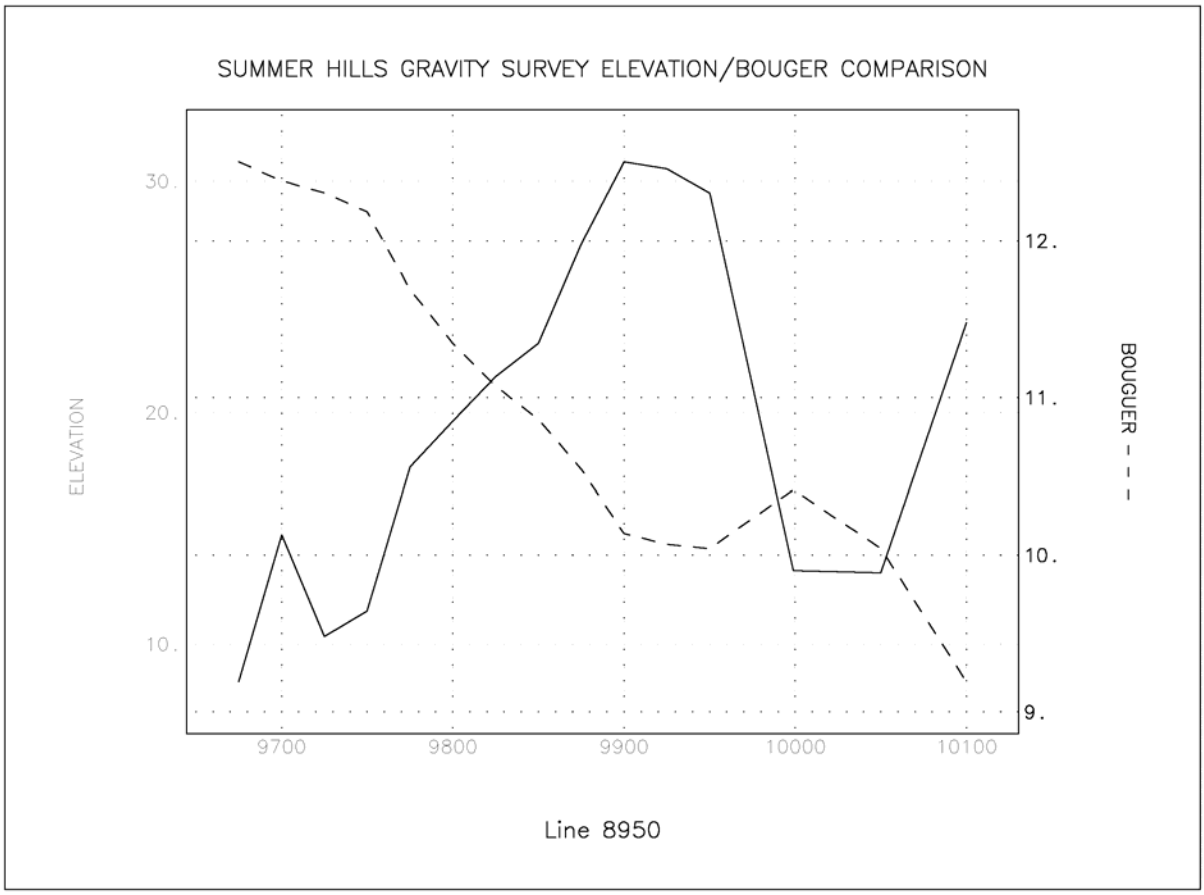
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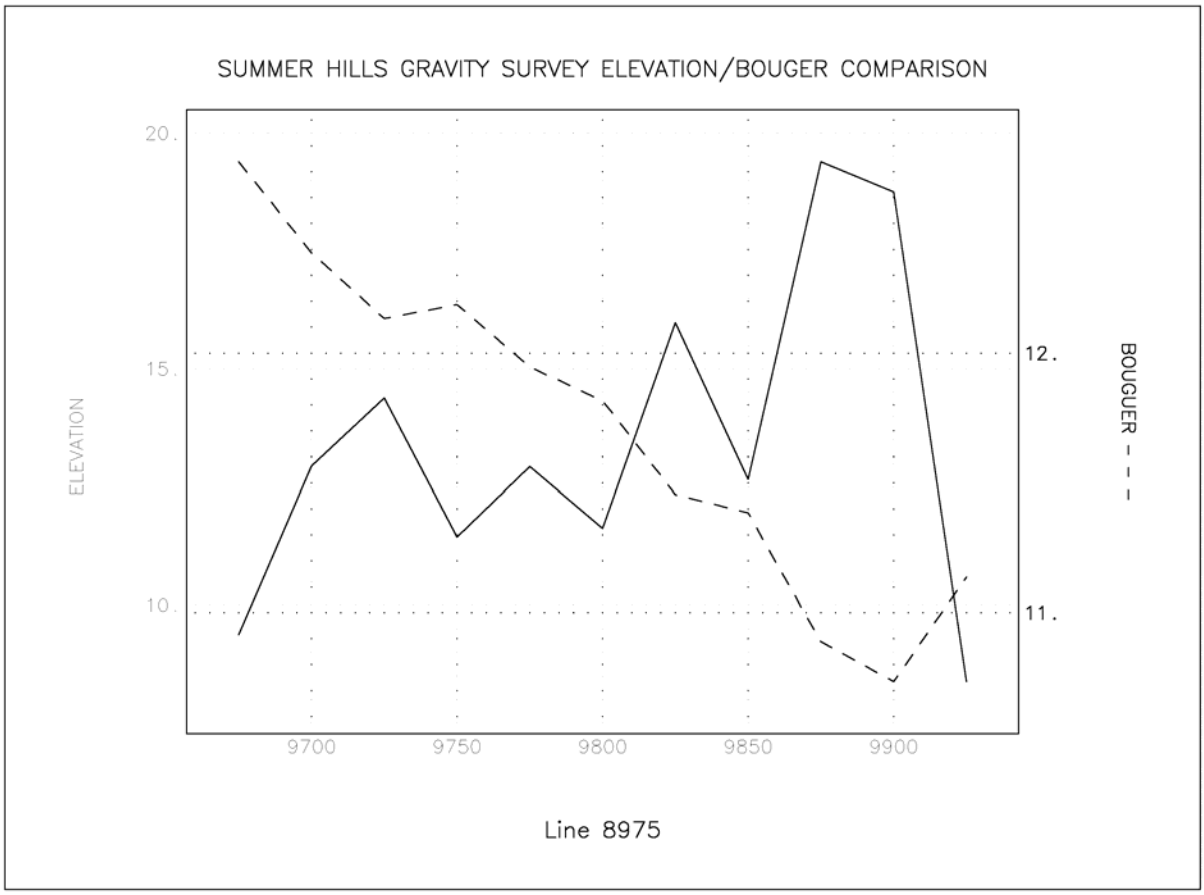
SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
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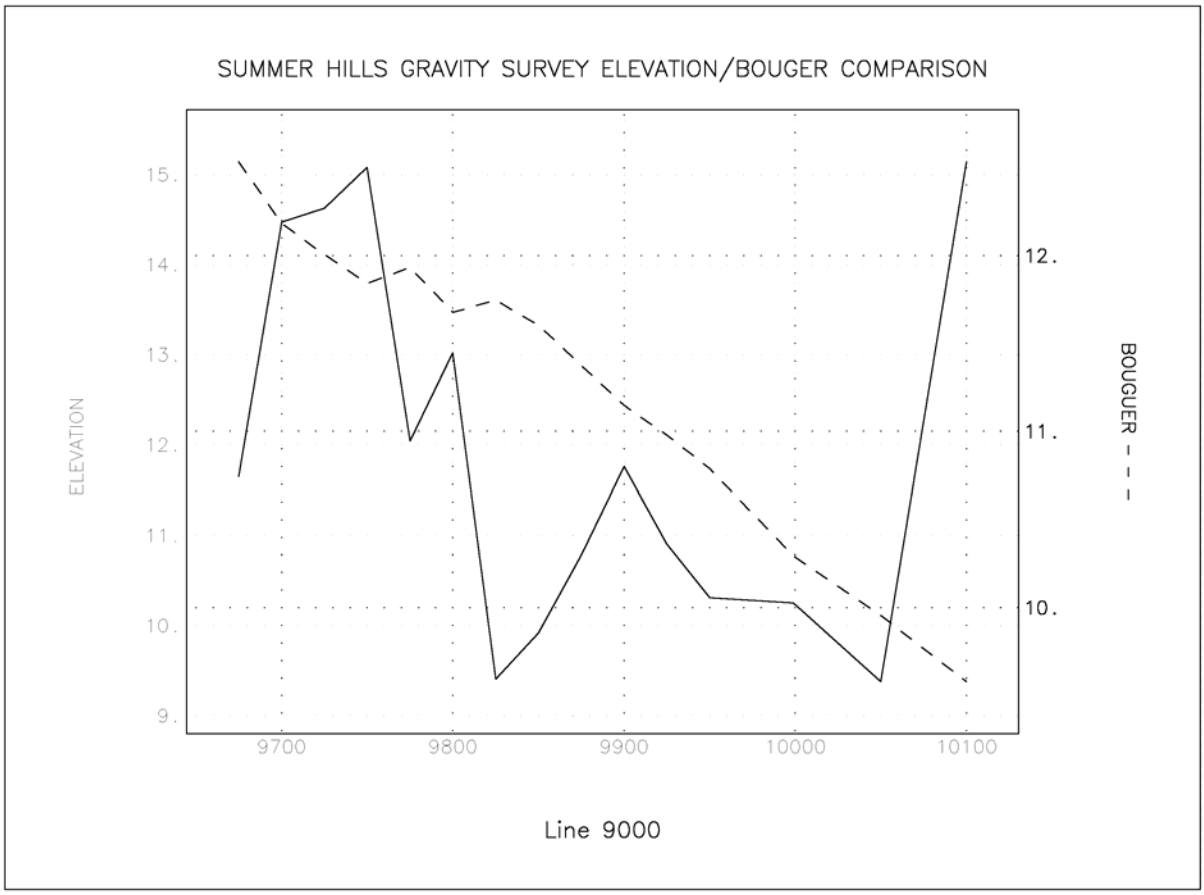
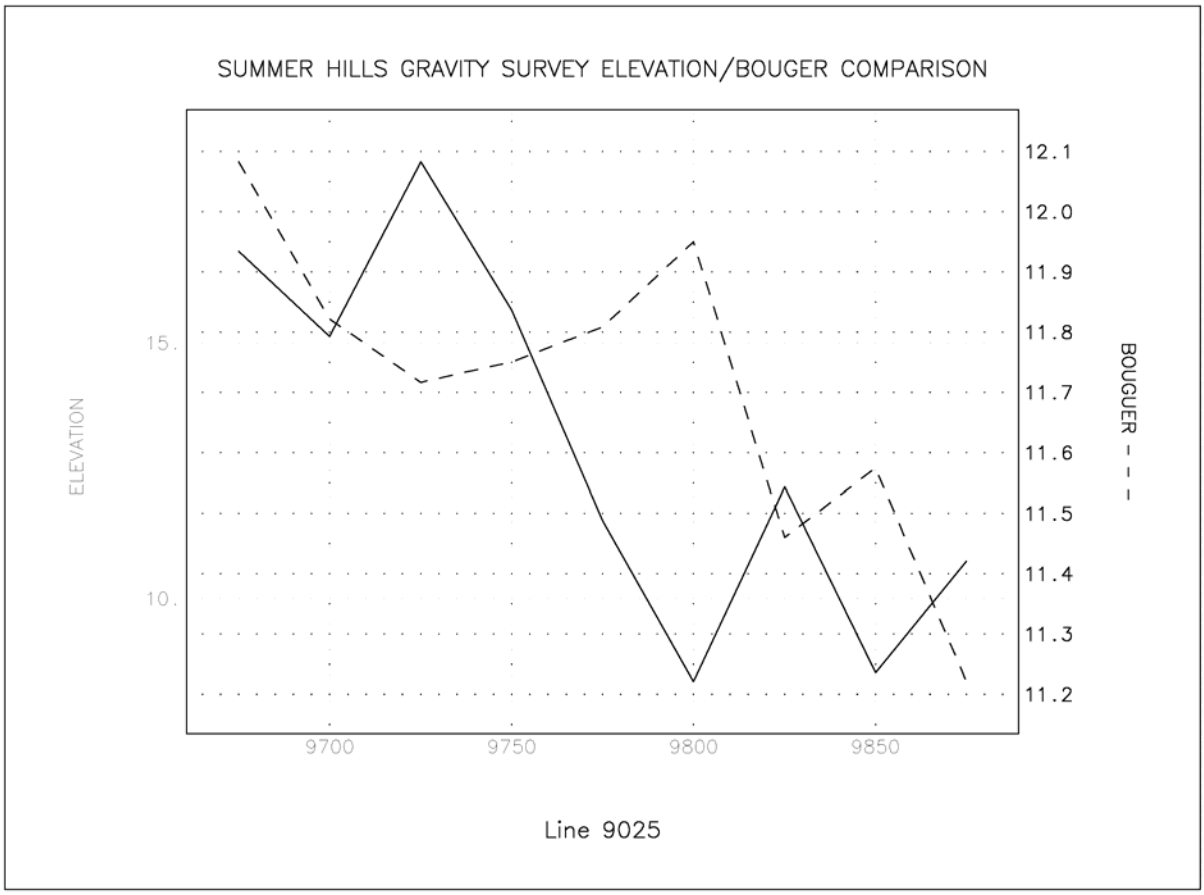
Line 8975


SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
15.
14.
13.
12.
11.
10.
9.
ELEVATION
12.
11.
10.
BOUGUER - - -
9700
9800
9900
10000
10100
Line 9000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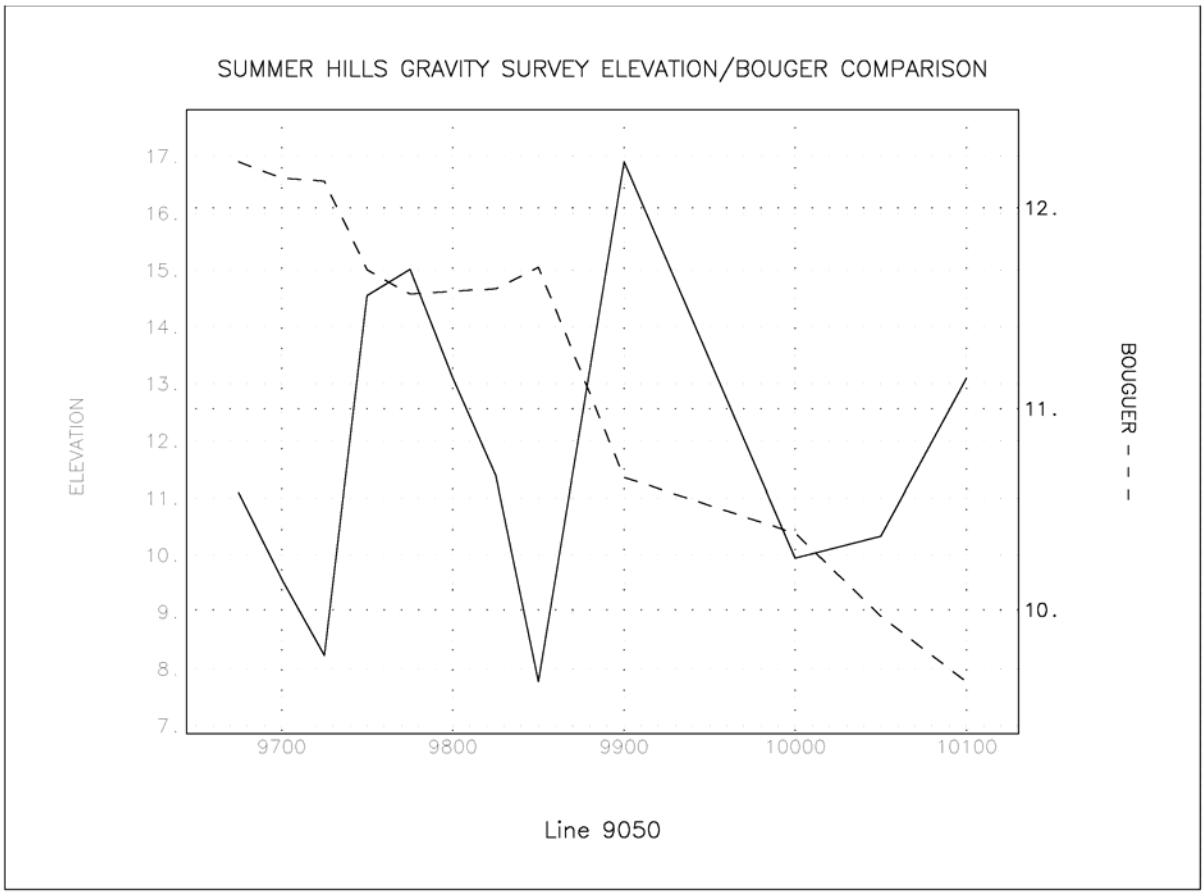
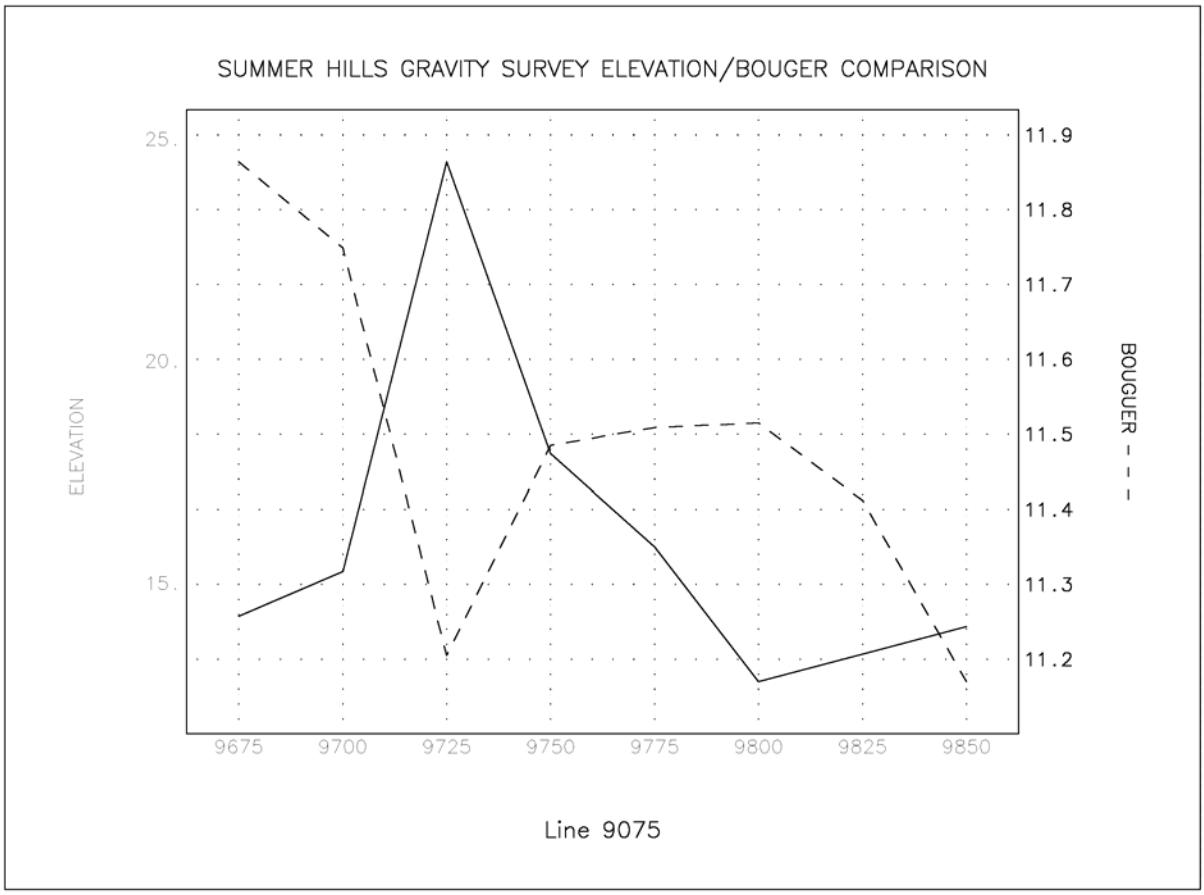
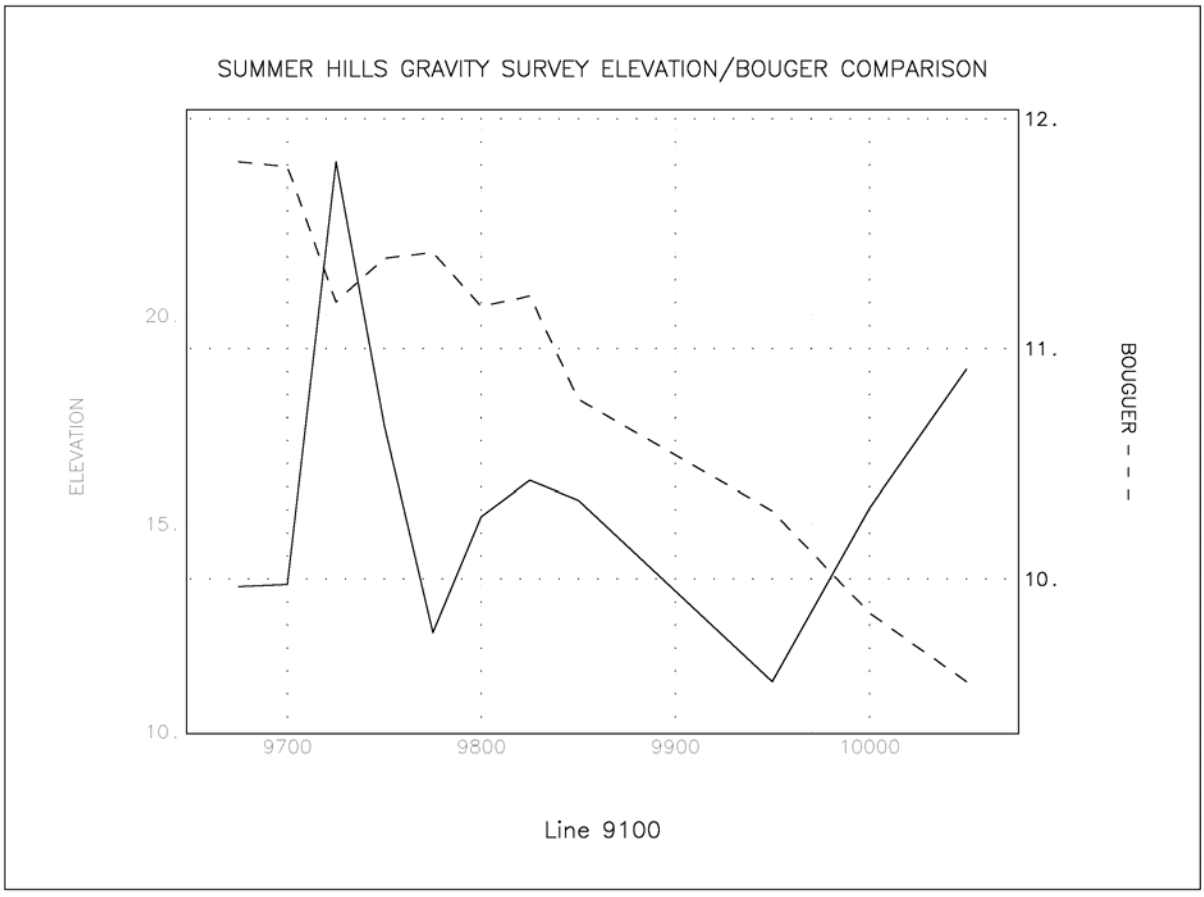
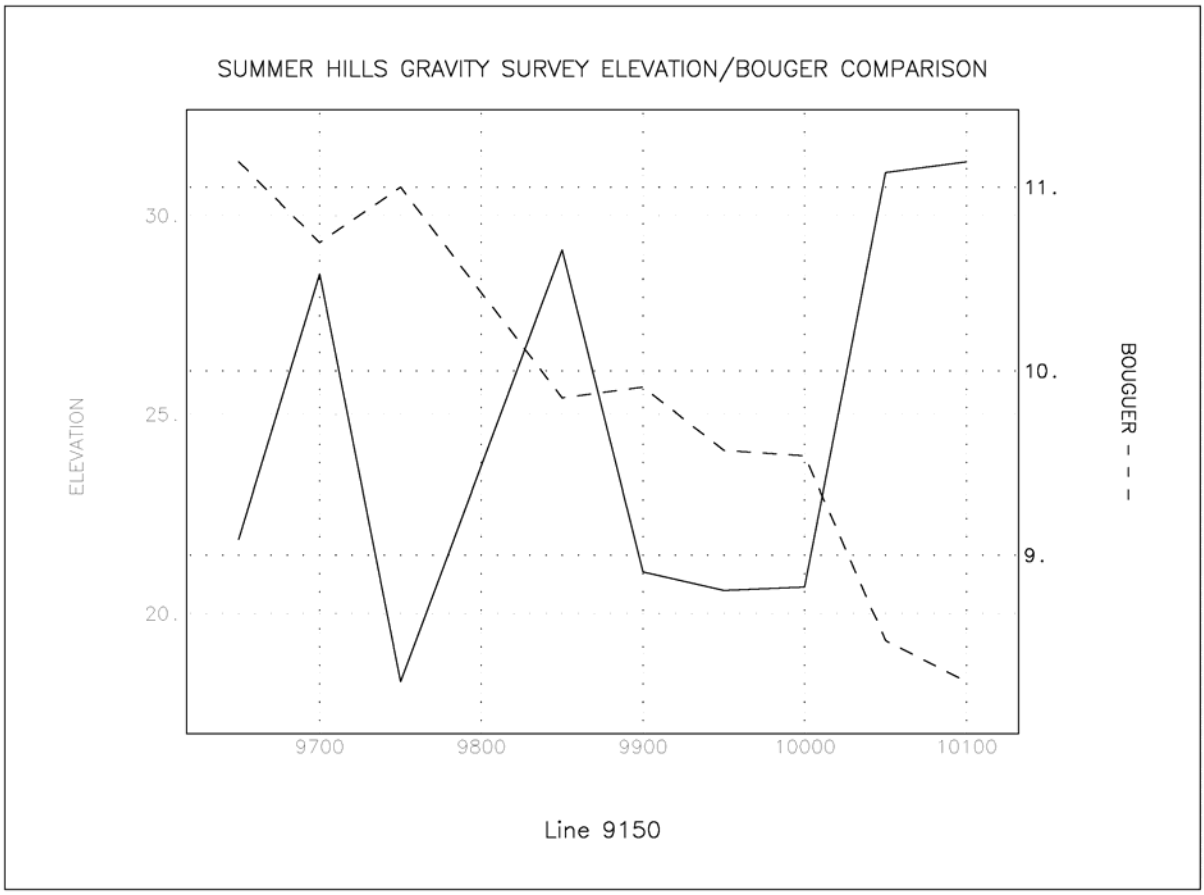
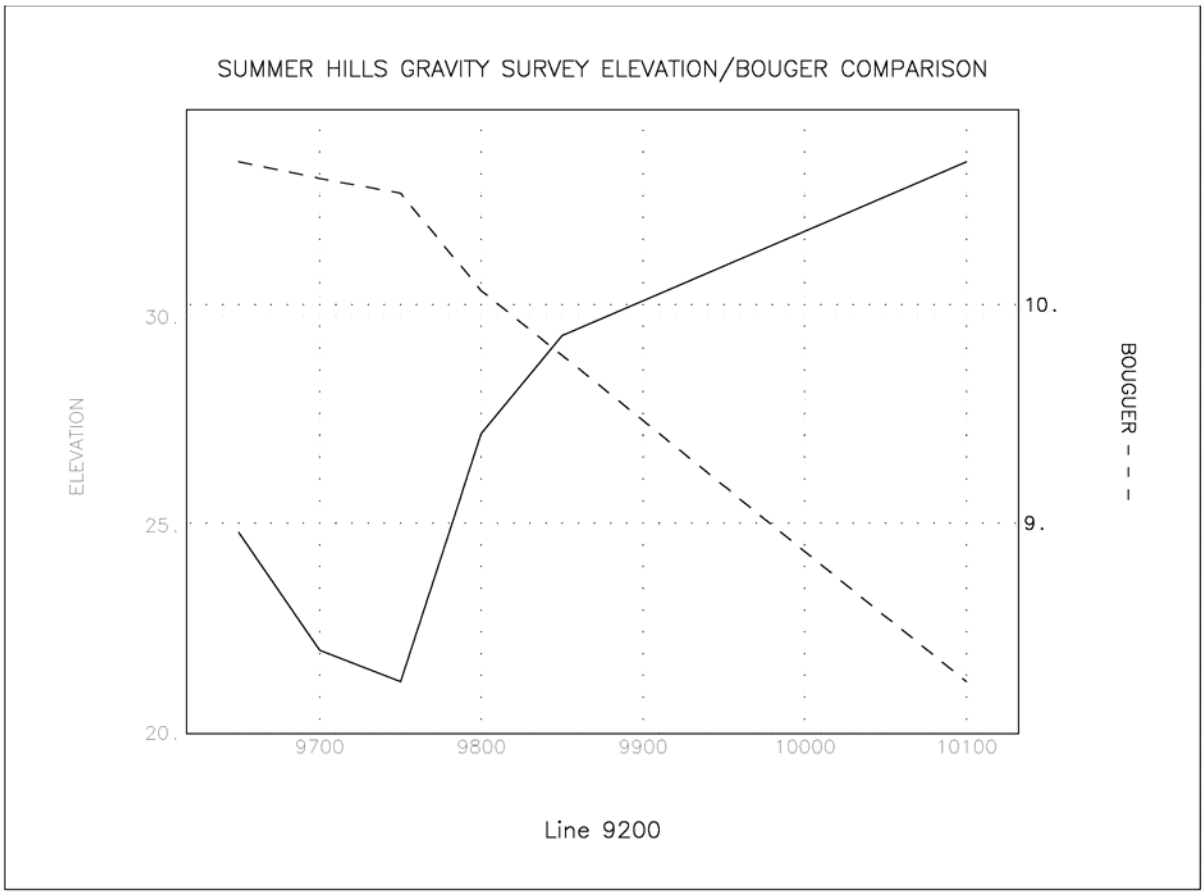
ELEVATION
15.
10.
12.1
12.0
11.9
11.8
11.7
11.6
11.5
11.4
11.3
11.2
BOUGUER - - -
9700
9750
9800
9850
Line 9025

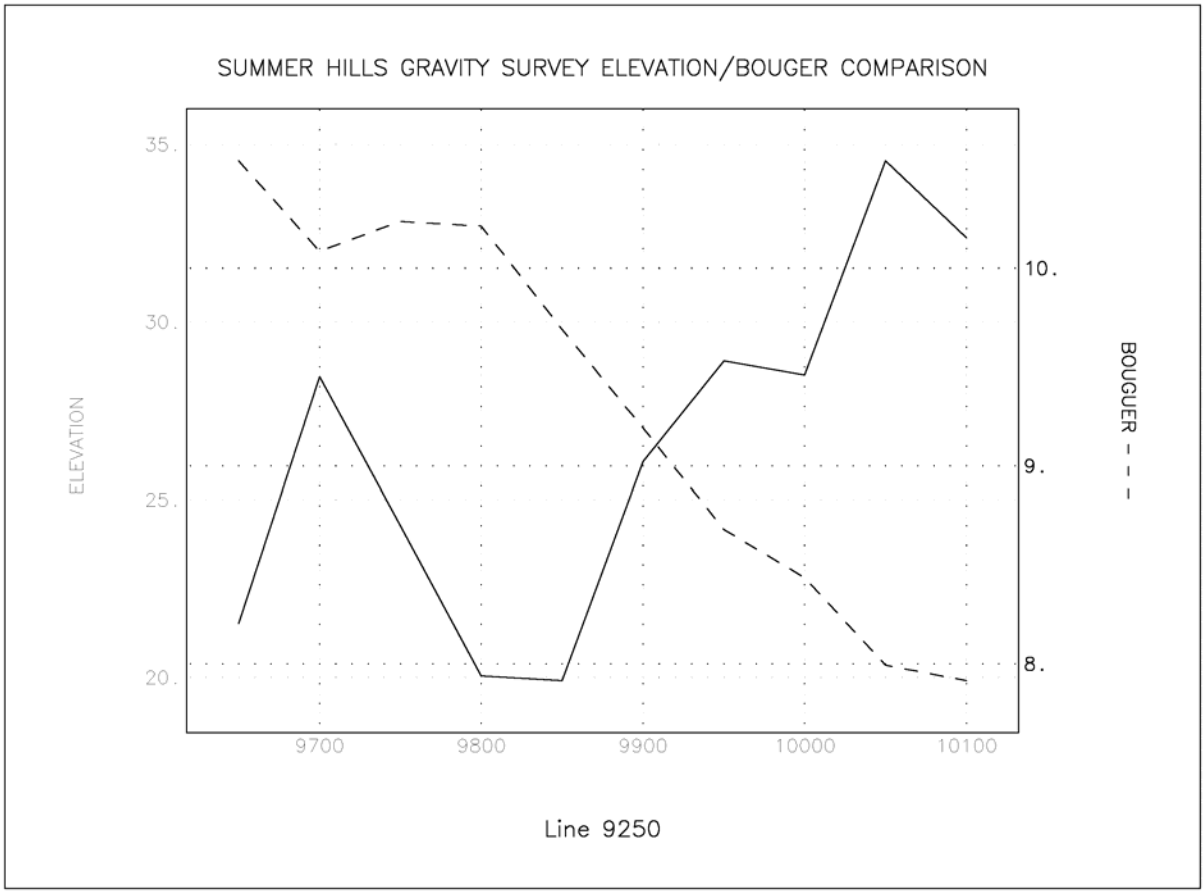

SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
ELEVATION
17.
16.
15.
14.
13.
12.
11.
10.
9.
8.
7.
12.
11.
10.
BOUGUER - - -
9700
9800
9900
10000
10100
Line 9050


SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
ELEVATION
25.
20.
15.
11.9
11.8
11.7
11.6
11.5
11.4
11.3
11.2
BOUGUER - - -
9675
9700
9725
9750
9775
9800
9825
9850
Line 9075


SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
ELEVATION
20.
15.
10.
12.
11.
10.
BOUGUER - - -
9700
9800
9900
10000
Line 9100


SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
ELEVATION
30.
25.
20.
11.
10.
9.
BOUGUER - - -
9700
9800
9900
10000
10100
Line 9150


SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
ELEVATION
30.
25.
20.
10.
9.
BOUGUER - - -
9700
9800
9900
10000
10100
Line 9200


SUMMER HILLS GRAVITY SURVEY ELEVATION/BOUGER COMPARISON
ELEVATION
35.
30.
25.
20.
10.
9.
8.
BOUGUER - - -
9700
9800
9900
10000
10100
Line 9250

Gravity Processing Results

COORDS E	COORDS N	GRID x	GRID y	drift	corr'd meter	obs mgal	anom	freeair corrn	bouguer corrn (2.67)	bouguer anom	height (AHD)
D299											
496818.9	5788789.6	0	1331	+0.000	6181.109	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.000	6181.109	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.002	6181.109	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.007	6181.107	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.013	6181.100	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.001	6181.113	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.046	6181.112	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.000	6181.158	979999.869	3.710	11.266	-4.085	10.891	36.508
496748.5	5789002.7	8900	9675	-0.032	6184.182	980002.939	6.949	7.267	-2.635	11.580	23.547
496999.3	5788999.8	8900	9700	-0.034	6187.553	980006.310	10.317	3.196	-1.159	12.354	10.355
497249.6	5788999.2	8900	9725	-0.034	6186.909	980005.666	9.673	4.306	-1.561	12.418	13.953
497485.8	5789003.5	8900	9750	-0.035	6187.622	980006.379	10.389	2.995	-1.086	12.298	9.705
497751.1	5789000.9	8900	9775	-0.037	6188.599	980007.356	11.364	1.581	-0.573	12.372	5.123
496748.4	5789249.4	8925	9675	-0.031	6186.657	980005.414	9.619	4.076	-1.478	12.217	13.209
496999.3	5789248.9	8925	9700	-0.042	6186.718	980005.475	9.680	4.287	-1.554	12.412	13.891
497250.1	5789251.0	8925	9725	-0.041	6186.220	980004.977	9.183	4.778	-1.733	12.229	15.484
497519.6	5789245.6	8925	9750	-0.039	6187.166	980005.923	10.125	3.258	-1.181	12.201	10.556
496751.6	5789498.9	8950	9675	-0.030	6187.697	980006.454	10.856	2.585	-0.937	12.504	8.375
496998.9	5789501.0	8950	9700	-0.043	6186.324	980005.081	9.485	4.546	-1.648	12.383	14.731
497250.7	5789500.1	8950	9725	-0.043	6187.115	980005.872	10.275	3.187	-1.155	12.306	10.326
497499.4	5789500.5	8950	9750	-0.044	6186.777	980005.534	9.937	3.527	-1.279	12.185	11.429
496749.7	5789750.5	8975	9675	-0.029	6187.535	980006.292	10.893	2.894	-1.049	12.738	9.377
496749.3	5789998.0	9000	9675	-0.028	6186.687	980005.444	10.241	3.595	-1.304	12.533	11.650
496750.2	5790251.0	9025	9675	-0.027	6185.025	980003.782	8.779	5.183	-1.879	12.083	16.795
496750.2	5790500.6	9050	9675	-0.026	6186.096	980004.853	10.048	3.423	-1.241	12.230	11.093
496749.1	5790751.6	9075	9675	-0.024	6184.911	980003.668	9.061	4.398	-1.595	11.864	14.251
496751.2	5791000.9	9100	9675	-0.023	6184.812	980003.569	9.159	4.163	-1.510	11.813	13.491
496502.8	5791498.2	9150	9650	-0.021	6182.095	980000.852	6.836	6.749	-2.447	11.138	21.871
496519.0	5792000.3	9200	9650	-0.019	6180.634	979999.391	5.772	7.661	-2.778	10.655	24.825
496498.6	5792498.5	9250	9650	-0.018	6180.779	979999.536	6.311	6.640	-2.408	10.543	21.516
D300											
496818.9	5788789.6	0	1331	+0.000	6180.910	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.002	6180.910	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.031	6180.912	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.004	6180.943	979999.869	3.710	11.266	-4.085	10.891	36.508
496496.5	5788250.5	8825	9650	-0.030	6189.115	980008.072	11.487	1.884	-0.683	12.687	6.104
496495.0	5788504.1	8850	9650	-0.030	6189.214	980008.171	11.787	1.614	-0.585	12.815	5.230
496747.5	5788499.2	8850	9675	-0.030	6188.331	980007.288	10.900	2.744	-0.995	12.649	8.893
496501.3	5788751.7	8875	9650	-0.029	6185.062	980004.019	7.830	6.415	-2.326	11.919	20.788
496746.1	5788752.1	8875	9675	-0.029	6182.542	980001.499	5.311	9.463	-3.431	11.343	30.665
496748.5	5789249.3	8925	9675	-0.002	6186.473	980005.430	9.635	4.077	-1.478	12.234	13.212
500001.9	5789497.2	8950	9999	-0.025	6184.466	980003.423	7.824	4.065	-1.474	10.415	13.172
498520.3	5789505.9	8950	9850	-0.023	6182.973	980001.930	6.337	7.096	-2.573	10.861	22.995
498751.2	5789497.5	8950	9875	-0.022	6181.824	980000.781	5.182	8.416	-3.052	10.546	27.270
498997.4	5789502.5	8950	9900	-0.026	6180.709	979999.666	4.071	9.518	-3.451	10.138	30.843
499249.4	5789499.2	8950	9925	-0.025	6180.701	979999.658	4.060	9.426	-3.418	10.068	30.543
499495.1	5789501.8	8950	9950	-0.025	6180.883	979999.840	4.244	9.098	-3.299	10.043	29.483
496995.1	5789754.3	8975	9700	-0.020	6186.280	980005.237	9.841	3.995	-1.448	12.387	12.944
497248.5	5789750.2	8975	9725	-0.018	6185.746	980004.703	9.304	4.439	-1.609	12.133	14.383
497498.5	5789747.5	8975	9750	-0.018	6186.381	980005.338	9.937	3.531	-1.280	12.187	11.441
497751.7	5789748.7	8975	9775	-0.017	6185.846	980004.803	9.403	3.991	-1.447	11.946	12.931
497998.7	5789750.7	8975	9800	-0.017	6185.971	980004.928	9.529	3.587	-1.301	11.816	11.625
499980.8	5789962.5	9000	9999	-0.027	6184.552	980003.509	8.278	3.164	-1.147	10.294	10.252
497002.4	5790001.8	9000	9700	-0.019	6185.580	980004.537	9.337	4.467	-1.620	12.184	14.476
497250.1	5790001.3	9000	9725	-0.019	6185.372	980004.329	9.128	4.513	-1.637	12.005	14.625
497501.3	5789996.9	9000	9750	-0.019	6185.122	980004.079	8.875	4.654	-1.688	11.841	15.081
497745.9	5790004.0	9000	9775	-0.017	6185.805	980004.762	9.563	3.717	-1.348	11.933	12.045
497996.9	5789999.4	9000	9800	-0.017	6185.361	980004.318	9.116	4.018	-1.457	11.677	13.021
498248.6	5790000.1	9000	9825	-0.014	6186.141	980005.098	9.896	2.902	-1.052	11.746	9.404
498750.9	5790001.4	9000	9875	-0.022	6185.499	980004.456	9.255	3.325	-1.206	11.375	10.776
498961.4	5789973.4	9000	9900	-0.022	6185.100	980004.057	8.834	3.629	-1.316	11.147	11.759
499251.7	5789997.0	9000	9925	-0.026	6185.080	980004.037	8.833	3.365	-1.220	10.978	10.905
499499.6	5790001.0	9000	9950	-0.026	6185.004	980003.961	8.760	3.182	-1.154	10.788	10.311
497003.9	5790245.4	9025	9700	-0.004	6184.896	980003.853	8.846	4.669	-1.693	11.822	15.129
497248.8	5790249.1	9025	9725	-0.012	6184.116	980003.073	8.069	5.725	-2.076	11.717	18.550
497500.0	5790248.5	9025	9750	-0.012	6184.723	980003.680	8.675	4.826	-1.750	11.751	15.639
497752.1	5790248.8	9025	9775	-0.013	6185.589	980004.546	9.541	3.558	-1.290	11.809	11.530
498001.9	5790239.3	9025	9800	-0.013	6186.359	980005.316	10.304	2.583	-0.937	11.950	8.371
496998.6	5790499.1	9050	9700	-0.005	6186.116	980005.073	10.266	2.954	-1.071	12.149	9.572
497249.3	5790495.6	9050	9725	-0.005	6186.367	980005.324	10.514	2.541	-0.921	12.134	8.234
497502.3	5790499.8	9050	9750	-0.005	6184.677	980003.634	8.828	4.491	-1.629	11.691	14.554
497747.9	5790499.1	9050	9775	-0.006	6184.467	980003.424	8.617	4.634	-1.680	11.571	15.017
498002.2	5790496.6	9050	9800	-0.006	6184.858	980003.815	9.006	4.046	-1.467	11.585	13.110
498250.9	5790499.4	9050	9825	-0.006	6185.206	980004.163	9.356	4.710	-1.708	11.749	15.261
497251.8	5790752.5	9075	9725	-0.011	6182.038	980000.995	6.389	7.556	-2.740	11.205	24.486
497497.2	5790752.5	9075	9750	-0.007	6183.611	980002.568	7.962	5.529	-2.005	11.485	17.915

497747.6	5790749.0	9075	9775	-0.007	6184.050	980003.007	8.398	4.881	-1.770	11.509	15.815
497995.7	5790751.9	9075	9800	-0.007	6184.651	980003.608	9.001	3.944	-1.430	11.515	12.779
496998.9	5791002.1	9100	9700	-0.011	6184.580	980003.537	9.128	4.181	-1.516	11.793	13.547
497248.7	5790998.2	9100	9725	-0.011	6181.997	980000.954	6.542	7.313	-2.652	11.203	23.698
497498.1	5791000.5	9100	9750	-0.008	6183.431	980002.388	7.978	5.358	-1.943	11.393	17.361
497751.8	5790998.9	9100	9775	-0.009	6184.437	980003.394	8.982	3.822	-1.386	11.418	12.384
498003.5	5790999.2	9100	9800	-0.008	6183.653	980002.610	8.199	4.682	-1.698	11.183	15.172
498218.3	5790927.3	9100	9825	-0.009	6183.585	980002.542	8.074	4.949	-1.795	11.229	16.038
497000.5	5791502.6	9150	9700	-0.011	6180.144	979999.101	5.088	8.804	-3.192	10.699	28.528
497496.7	5791501.2	9150	9750	-0.010	6182.461	980001.418	7.404	5.642	-2.046	11.000	18.283
D301											
496818.9	5788789.6	0	1331	+0.000	6180.730	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.010	6180.730	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.025	6180.720	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.009	6180.745	979999.869	3.710	11.266	-4.085	10.891	36.508
496992.2	5788116.7	8800	9700	-0.012	6190.030	980009.179	12.488	0.873	-0.316	13.044	2.828
497489.8	5788009.3	8800	9750	-0.014	6189.774	980008.923	12.147	0.638	-0.232	12.554	2.069
498001.7	5788025.1	8800	9800	-0.016	6189.712	980008.861	12.097	0.545	-0.198	12.445	1.766
498498.4	5788033.2	8800	9850	-0.016	6189.392	980008.541	11.784	0.619	-0.224	12.178	2.005
498974.9	5787995.9	8800	9900	-0.016	6188.803	980007.952	11.165	0.935	-0.339	11.761	3.030
497000.0	5788253.1	8825	9700	-0.011	6190.103	980009.252	12.669	0.947	-0.343	13.272	3.068
497498.1	5788251.2	8825	9750	-0.013	6189.506	980008.655	12.070	0.625	-0.226	12.468	2.024
497995.5	5788248.3	8825	9800	-0.015	6189.519	980008.668	12.081	0.569	-0.206	12.443	1.843
498495.1	5788232.3	8825	9850	-0.020	6188.860	980008.009	11.409	1.025	-0.372	12.062	3.322
499002.2	5788244.1	8825	9900	-0.017	6188.970	980008.119	11.528	0.347	-0.126	11.749	1.124
496997.0	5788502.3	8850	9700	-0.011	6188.369	980007.518	11.132	2.877	-1.043	12.966	9.323
497246.2	5788502.0	8850	9725	-0.011	6187.148	980006.297	9.911	4.016	-1.456	12.471	13.015
497496.4	5788499.6	8850	9750	-0.013	6188.506	980007.655	11.267	1.749	-0.634	12.382	5.669
497747.5	5788498.7	8850	9775	-0.013	6189.304	980008.453	12.064	0.629	-0.228	12.465	2.039
497998.3	5788502.4	8850	9800	-0.015	6189.025	980008.174	11.788	0.961	-0.349	12.400	3.115
498249.6	5788495.9	8850	9825	-0.020	6188.856	980008.005	11.614	0.903	-0.327	12.189	2.926
498507.5	5788496.3	8850	9850	-0.019	6188.855	980008.004	11.613	0.490	-0.178	11.926	1.589
498751.4	5788480.6	8850	9875	-0.019	6188.858	980008.007	11.604	0.412	-0.149	11.866	1.334
496501.3	5788752.3	8875	9650	-0.002	6184.814	980003.963	7.775	6.426	-2.330	11.871	20.823
496999.7	5788755.3	8875	9700	-0.002	6186.276	980005.425	9.239	4.658	-1.689	12.208	15.094
497249.6	5788750.1	8875	9725	-0.003	6186.071	980005.220	9.030	5.151	-1.868	12.313	16.692
497499.3	5788749.6	8875	9750	-0.003	6187.676	980006.825	10.634	2.539	-0.921	12.253	8.229
497748.6	5788750.8	8875	9775	-0.004	6188.340	980007.489	11.299	1.492	-0.541	12.251	4.836
497998.5	5788753.3	8875	9800	-0.004	6183.487	980002.636	6.448	7.218	-2.617	11.049	23.390
498243.6	5788753.2	8875	9825	-0.021	6186.840	980005.989	9.801	3.124	-1.133	11.793	10.124
498000.3	5788996.4	8900	9800	-0.004	6188.157	980007.306	11.311	1.398	-0.507	12.202	4.531
498246.7	5788997.6	8900	9825	-0.006	6186.983	980006.132	10.138	2.668	-0.967	11.838	8.645
498498.3	5788999.4	8900	9850	-0.007	6187.735	980006.884	10.891	1.503	-0.545	11.849	4.870
498749.5	5789003.2	8900	9875	-0.007	6186.738	980005.887	9.897	2.523	-0.915	11.505	8.177
497749.8	5789250.6	8925	9775	-0.005	6186.956	980006.105	10.311	2.866	-1.039	12.137	9.286
497998.4	5789250.0	8925	9800	-0.005	6185.891	980005.040	9.245	3.949	-1.432	11.762	12.797
498246.6	5789252.0	8925	9825	-0.022	6185.389	980004.538	8.745	4.390	-1.592	11.543	14.225
498498.4	5789251.8	8925	9850	-0.023	6184.917	980004.066	8.273	4.782	-1.734	11.321	15.496
498716.7	5789252.9	8925	9875	-0.024	6183.997	980003.146	7.353	5.642	-2.046	10.950	18.284
497748.1	5789497.6	8950	9775	-0.005	6184.670	980003.819	8.220	5.444	-1.974	11.690	17.641
497998.9	5789499.9	8950	9800	-0.006	6183.936	980003.085	7.488	6.055	-2.196	11.347	19.621
498225.0	5789500.1	8950	9825	-0.006	6183.283	980002.432	6.835	6.651	-2.412	11.074	21.551
D302											
496818.9	5788789.6	0	1331	+0.000	6180.632	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.007	6180.632	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.015	6180.625	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.011	6180.640	979999.869	3.710	11.266	-4.085	10.891	36.508
499997.2	5787312.3	8750	0	-0.011	6188.935	980008.179	10.851	0.392	-0.142	11.101	1.271
500499.3	5787251.6	8750	50	-0.011	6188.544	980007.788	10.412	0.788	-0.286	10.914	2.552
500996.2	5787597.4	8750	100	-0.010	6185.350	980004.594	7.492	3.745	-1.358	9.879	12.136
491503.5	5788586.2	8750	9150	-0.001	6190.051	980009.295	12.978	0.303	-0.110	13.172	0.983
491999.3	5788429.4	8750	9200	-0.001	6190.328	980009.572	13.131	0.277	-0.100	13.308	0.898
492499.1	5788232.6	8750	9250	-0.001	6190.447	980009.691	13.094	0.236	-0.086	13.245	0.765
493000.4	5788198.9	8750	9300	-0.002	6190.369	980009.613	12.989	0.382	-0.138	13.232	1.237
493498.6	5788141.0	8750	9350	-0.002	6190.367	980009.611	12.941	0.306	-0.111	13.136	0.991
493999.0	5788120.4	8750	9400	-0.002	6190.328	980009.572	12.885	0.326	-0.118	13.093	1.057
494499.9	5788121.7	8750	9450	-0.002	6190.430	980009.674	12.988	0.214	-0.078	13.124	0.693
495499.2	5787948.0	8750	9550	-0.002	6190.346	980009.590	12.766	0.260	-0.094	12.932	0.842
495999.6	5787879.0	8750	9600	-0.002	6190.344	980009.588	12.709	0.291	-0.105	12.894	0.942
496496.6	5787807.5	8750	9650	-0.003	6190.351	980009.595	12.660	0.364	-0.132	12.891	1.178
496997.4	5787718.3	8750	9700	-0.003	6190.362	980009.606	12.600	0.340	-0.123	12.816	1.101
497498.6	5787619.7	8750	9750	-0.003	6190.276	980009.520	12.436	0.299	-0.109	12.626	0.970
497998.8	5787522.1	8750	9800	-0.003	6190.162	980009.406	12.244	0.298	-0.108	12.434	0.965
498497.3	5787399.8	8750	9850	-0.003	6190.085	980009.329	12.070	0.329	-0.119	12.280	1.066
498901.5	5787335.8	8750	9900	-0.003	6190.122	980009.366	12.057	0.090	-0.033	12.114	0.293
499529.4	5787596.4	8750	9950	-0.011	6188.828	980008.072	10.969	0.773	-0.280	11.462	2.504
500842.2	5788002.8	8800	100	-0.010	6185.077	980004.321	7.540	3.827	-1.388	9.979	12.402
499386.1	5787764.3	8800	9950	-0.011	6187.864	980007.108	10.138	1.868	-0.677	11.329	6.054
499994.6	5788526.7	8850	0	-0.006	6187.538	980006.782	10.415	1.041	-0.378	11.078	3.374
500497.1	5788493.1	8850	50	-0.006	6187.590	980006.834	10.440	0.668	-0.242	10.866	2.163
500995.3	5788477.2	8850	100	-0.006	6185.047	980004.291	7.885	3.377	-1.225	10.037	10.943
499498.4	5788583.3	8850	9950	-0.005	6187.996	980007.240	10.918	0.847	-0.307	11.457	2.744
498999.9	5788760.3	8875	9900	-0.005	6187.917	980007.161	10.978	1.088	-0.394	11.672	3.524

499248.4	5788753.0	8875	9925	-0.005	6187.382	980006.626	10.438	1.551	-0.562	11.426	5.025
499998.5	5788986.4	8900	0	-0.010	6181.731	980000.975	4.972	7.535	-2.732	9.774	24.417
500513.1	5789014.7	8900	50	-0.007	6182.504	980001.748	5.767	6.255	-2.268	9.754	20.270
500936.6	5789010.0	8900	100	-0.007	6181.665	980000.909	4.924	6.946	-2.519	9.351	22.507
498994.0	5789000.9	8900	9900	-0.005	6186.102	980005.346	9.354	3.117	-1.130	11.341	10.100
499248.8	5788999.4	8900	9925	-0.004	6185.271	980004.515	8.522	3.937	-1.428	11.031	12.759
499498.4	5788952.8	8900	9950	-0.004	6185.368	980004.612	8.582	3.676	-1.333	10.925	11.912
498241.8	5789248.7	8925	9825	-0.012	6185.277	980004.521	8.725	4.432	-1.607	11.550	14.363
498983.8	5789266.8	8925	9900	-0.012	6183.508	980002.752	6.970	6.014	-2.181	10.804	19.488
499251.4	5789258.0	8925	9925	-0.012	6182.895	980002.139	6.350	6.576	-2.385	10.542	21.310
500502.6	5789506.8	8950	50	-0.008	6183.818	980003.062	7.470	4.036	-1.463	10.042	13.077
500973.5	5789499.0	8950	100	-0.008	6180.848	980000.092	4.494	7.373	-2.673	9.193	23.891
498247.8	5789751.8	8975	9825	-0.015	6184.445	980003.689	8.291	4.938	-1.791	11.438	16.001
498501.1	5789750.2	8975	9850	-0.014	6185.050	980004.294	8.895	3.907	-1.417	11.385	12.662
498748.5	5789750.7	8975	9875	-0.014	6183.228	980002.472	7.073	5.984	-2.170	10.888	19.392
499000.0	5789749.8	8975	9900	-0.013	6183.201	980002.445	7.045	5.787	-2.098	10.734	18.751
499247.0	5789749.5	8975	9925	-0.013	6185.646	980004.890	9.490	2.585	-0.937	11.138	8.378
500498.3	5790095.4	9000	50	-0.009	6183.994	980003.238	8.112	2.894	-1.049	9.956	9.377
500997.7	5789941.1	9000	100	-0.008	6182.605	980001.849	6.601	4.673	-1.694	9.579	15.142
498714.0	5790249.1	9025	9875	-0.014	6184.871	980004.115	9.110	3.312	-1.201	11.221	10.733
498499.6	5790750.8	9075	9850	-0.014	6183.776	980003.020	8.412	4.327	-1.569	11.170	14.022
D303											
496818.9	5788789.6	0	1331	+0.000	6180.497	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.008	6180.497	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.116	6180.505	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.006	6180.389	979999.869	3.710	11.266	-4.085	10.891	36.508
496493.8	5788104.6	8800	9650	+0.006	6189.183	980008.547	11.847	1.409	-0.511	12.745	4.565
499560.2	5788398.0	8825	9950	+0.097	6188.369	980007.733	11.264	0.342	-0.124	11.482	1.109
496496.1	5788498.4	8850	9650	+0.008	6188.799	980008.163	11.774	1.583	-0.574	12.783	5.130
498995.6	5788711.2	8850	9900	+0.099	6188.228	980007.592	11.371	0.685	-0.249	11.808	2.221
499246.9	5788566.3	8850	9925	+0.094	6188.047	980007.411	11.075	0.794	-0.288	11.581	2.573
498504.4	5788815.9	8875	9850	+0.091	6187.902	980007.266	11.128	1.278	-0.463	11.942	4.141
498751.0	5788842.7	8875	9875	+0.092	6187.710	980007.074	10.957	1.346	-0.488	11.815	4.361
496740.3	5789003.9	8900	9675	+0.081	6183.760	980003.124	7.135	7.117	-2.581	11.671	23.062
496494.3	5788996.6	8900	9650	+0.084	6184.385	980003.749	7.754	6.449	-2.339	11.865	20.899
498983.8	5789267.0	8925	9900	+0.066	6183.398	980002.762	6.981	6.016	-2.181	10.815	19.495
498247.8	5789751.3	8975	9825	+0.078	6184.346	980003.710	8.312	4.932	-1.788	11.455	15.981
498501.3	5790000.7	9000	9850	+0.070	6185.490	980004.854	9.653	3.061	-1.110	11.604	9.918
498249.8	5790250.4	9025	9825	+0.054	6184.703	980004.067	9.063	3.760	-1.363	11.460	12.183
498499.4	5790250.2	9025	9850	+0.071	6185.533	980004.897	9.893	2.639	-0.957	11.575	8.552
499806.8	5790497.1	9050	0	+0.033	6183.870	980003.234	8.425	3.070	-1.113	10.382	9.948
500685.1	5790497.9	9050	50	+0.035	6183.379	980002.743	7.935	3.189	-1.156	9.968	10.334
500999.0	5790394.2	9050	100	+0.036	6182.591	980001.955	7.065	4.043	-1.466	9.642	13.100
498245.8	5790747.7	9075	9825	+0.051	6184.023	980003.387	8.777	4.134	-1.499	11.412	13.396
499970.8	5790903.6	9100	0	+0.031	6181.951	980001.315	6.828	4.744	-1.720	9.852	15.373
500499.9	5790837.2	9100	50	+0.038	6180.997	980000.361	5.822	5.772	-2.093	9.501	18.705
497748.0	5790999.4	9100	9775	+0.048	6183.962	980003.326	8.915	3.847	-1.395	11.367	12.465
498496.6	5790998.9	9100	9850	+0.074	6182.766	980002.130	7.718	4.804	-1.742	10.780	15.566
497001.2	5792193.3	9200	9700	+0.022	6180.356	979999.720	6.253	6.787	-2.461	10.579	21.992
496935.2	5792504.3	9250	9700	+0.018	6178.346	979997.710	4.489	8.781	-3.184	10.086	28.455
D304											
496818.9	5788789.6	0	1331	+0.000	6180.242	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.008	6180.242	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	-0.042	6180.234	979999.869	3.710	11.266	-4.085	10.891	36.508
496818.9	5788789.6	0	1331	+0.004	6180.276	979999.869	3.710	11.266	-4.085	10.891	36.508
499005.8	5790472.4	9050	9900	-0.025	6182.526	980002.161	7.333	5.217	-1.892	10.658	16.904
500500.1	5790837.3	9100	50	-0.037	6180.777	980000.412	5.873	5.775	-2.094	9.553	18.713
499547.1	5790957.4	9100	9950	-0.034	6182.901	980002.536	8.091	3.457	-1.254	10.295	11.202
499930.7	5791301.5	9150	0	-0.031	6180.010	979999.645	5.472	6.378	-2.313	9.538	20.669
500561.6	5791568.8	9150	50	-0.008	6176.747	979996.382	2.421	9.592	-3.478	8.535	31.082
500835.1	5791721.1	9150	100	-0.010	6176.350	979995.985	2.144	9.675	-3.508	8.311	31.351
498492.2	5791526.3	9150	9850	-0.023	6178.482	979998.117	4.122	8.989	-3.260	9.852	29.129
498965.3	5791410.3	9150	9900	-0.029	6180.223	979999.858	5.772	6.493	-2.354	9.911	21.041
499471.8	5791395.2	9150	9950	-0.030	6179.983	979999.618	5.520	6.350	-2.302	9.567	20.576
500886.1	5792140.5	9200	100	-0.010	6175.508	979995.143	1.634	10.412	-3.775	8.271	33.740
497496.1	5791999.9	9200	9750	-0.019	6180.319	979999.954	6.334	6.553	-2.376	10.511	21.233
498016.7	5791851.1	9200	9800	-0.020	6178.818	979998.453	4.715	8.390	-3.042	10.063	27.187
498485.5	5791671.1	9200	9850	-0.021	6178.199	979997.834	3.954	9.119	-3.307	9.766	29.550
500015.4	5792780.2	9250	0	-0.012	6176.196	979995.831	2.828	8.798	-3.190	8.436	28.509
500510.8	5792701.9	9250	50	-0.012	6174.629	979994.264	1.199	10.659	-3.865	7.993	34.540
500925.3	5792504.1	9250	100	-0.011	6175.135	979994.770	1.549	9.988	-3.622	7.915	32.367
497501.2	5792564.6	9250	9750	-0.016	6179.001	979998.636	5.463	7.488	-2.715	10.236	24.266
498005.2	5792405.7	9250	9800	-0.015	6179.934	979999.569	6.270	6.186	-2.243	10.213	20.044
498505.7	5792498.7	9250	9850	-0.015	6179.364	979998.999	5.773	6.144	-2.228	9.689	19.908
499005.1	5792656.8	9250	9900	-0.014	6177.530	979997.165	4.064	8.044	-2.917	9.191	26.065
499505.5	5792748.3	9250	9950	-0.013	6176.389	979996.024	2.996	8.919	-3.234	8.680	28.900

APPENDIX 2

PERMITTING CONTRACTORS REPORT

Petroleum Support Services

ORIGIN ENERGY PEL 57 SUMMERHILL 2002 GRAVITY SURVEY (PHASE 2) PERMITTING REPORT.

Permitting for the Phase 2 survey began on Monday 16-9-2002 and was completed by 9-10-2002. A total of 19 landowners/occupiers were permitted, although not all of these landowners were affected, especially those within the township area of Nelson.

Recording began on Saturday 25-10-2002 and was completed on Thursday 31-10-2002. This was despite three mid-survey changes to the programme which saw the addition of nearly 50 recording points. This alteration to programme did not cause any problems but it did mean that several properties had to be revisited to pick up the extra points.

In the planning / permitting stage a map was made to try and show the recording points on each of the properties. This was a lesson from the first stage of the survey when blanket permitting of the whole grid occurred. The map was a composite of a 1:10,000 town boundary map, a standard 1:25,000 physical / cadastral map and an approximately 1:25,000 recording station points map. Landowners who lived within 50 metres of these programmed stations were permitted to allow for any conversion discrepancies between the different scaled maps. This was a much better system than blanket permitting whole blocks of residents in Nelson.

The flexibility of access offered by the gravity surveying method allowed many offset recording points within the township. This enabled roads or footpaths to be used for recording so that technically, no private property was entered. Similarly, the numbers of small hobby farm blocks requiring entry for recording were also reduced by offsetting points from one side of a boundary fence to the other. Given that there was no modification to fences, an offset recording could save 15-20 minutes of detour time.

Information obtained from the District Animal Health Vet at Hamilton confirmed that there were no known animal diseases or quarantined properties within the survey area.

There were no major concerns from the landowners excepting on one property where a crop of Canola was growing and was at a critical stage of growth. Damage to the crop would be permanent if driven over by the heavy tyres of the ute so the landowner asked that the quad bike be used. One landowner had a specific day that he requested we not work on his place to avoid interfering with his sorting out and movement of cattle prior to sending them off to sale. The flexibility of the Gravity acquisition method enabled this to occur.

Apart from the initial teething problems to be expected at the start of each new job, the acquisition went very smoothly. To minimise any delays due to field operators waiting on necessary equipment, Haines Surveys was sent copies of the following as they were made available.

- Potential Hazards (**Attachment 2**)

- VicRoads letter (**Attachment 5**)

It was pleasing that these comments / recommendations were noted and acted upon as the field operators arrived fully equipped and ready to start.

To start the programme an induction and safety meeting was held with the two field operators. Specific landowner requirements and operational procedures were discussed and each person was provided with a folder containing :

- Landowner names contacts and specific requests (**Attachment 1**)
- Potential hazards (**Attachment 2**)
- Detailed property boundary maps (**Attachment 3**)
- A dot map of the survey points on a 1: 25,000 physical overlay (**Attachment 4**)
- Copy of the letter from VicRoads (**Attachment 5**)

One of the people who had been part of the previous survey was again present on this survey. This had some implications for the speed of recording because he understood the layout of the area and best procedures to ensure efficient data recordings.

The quad bike was used only when necessary as the previous survey had shown it was a much slower vehicle to use when recording. At the suggestion of the landowners near the Glenelg River estuary the bike was used in these particularly wet low lying areas. Similarly, it was used within the Canola crop paddocks to avoid permanent damage to the growing crop.

Recording within the Lower Glenelg National Park was programmed to occur on existing fire and Park Management tracks. Recording was able to occur within the Park due to some commendable action by DENR personnel. Firstly, Ranger Bruce Mackereth who understood the low impact nature of the gravity survey method and was capable of making an immediate decision allowing the recording to proceed. Also Environmental Research Co-ordinator Michelle McHugh could comprehend the process and was able to co-ordinate and fast track the necessary paperwork to enable the readings to occur within the Park. The data from the Park was essential to complete the background data of the northern section of the survey grid.

The Summerhill Gravity Survey was completed successfully. There were no complaints from landowners or affected parties and recording was achieved smoothly and efficiently.

Report Submitted by :

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PHOTO 1. A standard 4WD utility and trailer were the only plant required to carry all the necessary equipment.

PHOTO 2. The Quad Bike fully set up. Infield communications with the quad bike operator were a problem sometimes. Radio transmissions were difficult to pick up through the crash helmet and over the bike engine and motion noises. As the bike was used infrequently this did not become a major problem. Change of vehicle and equipment took about 30 minutes to setup.

PHOTO 3. The Gravity metre has to sit on an independent tripod with levelling adjustment. Hand pressure is all that is required for this levelling to occur. Photo taken on track inside Lower Glenelg National Park.

PHOTO 4. Exactly the same photo monitoring point as for Photo 3.
As can be seen, the " footprint " of this tripod is virtually nil.

PHOTO 5. The Gravity metre set up on the tripod and ready to be programmed.

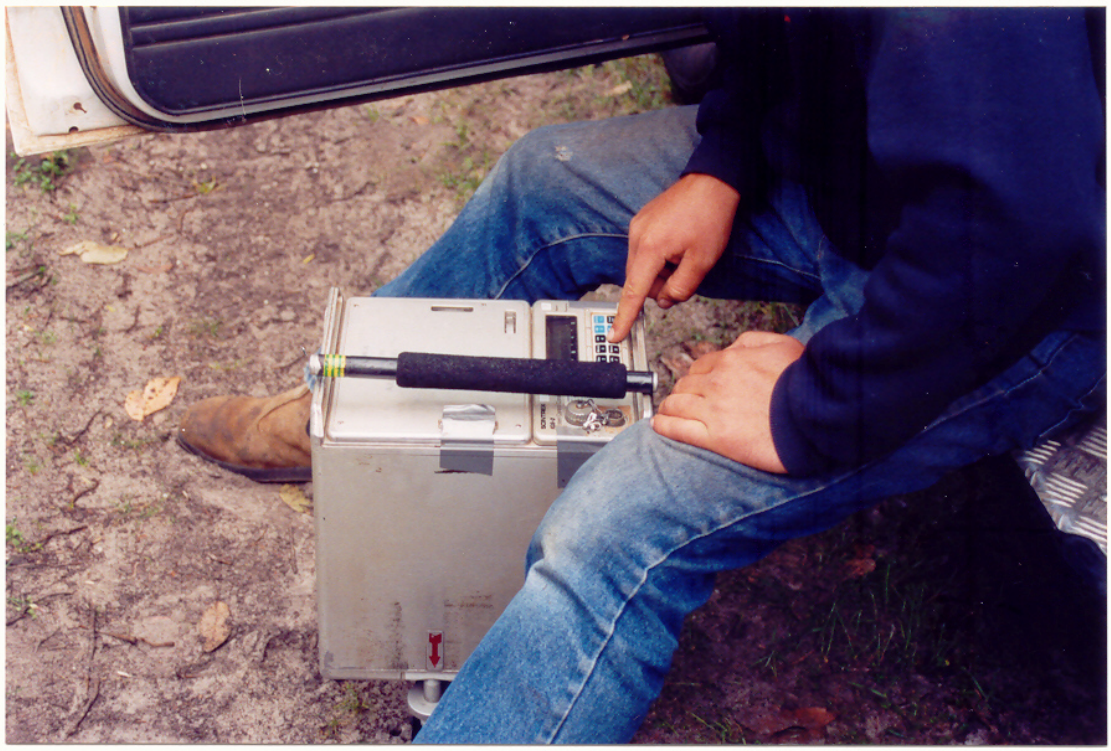

PHOTO 6. The touchpad adjustments made reprogramming for each record point rapid and simple.

PHOTO 7. Waiting for the metre to take its recording. In open country this usually only took about one minute to register the point. In forested areas or where the tree canopy was thicker the waiting time could increase up to 10 minutes. Surveying without the standard tie in to the base station could alter this timeframe.

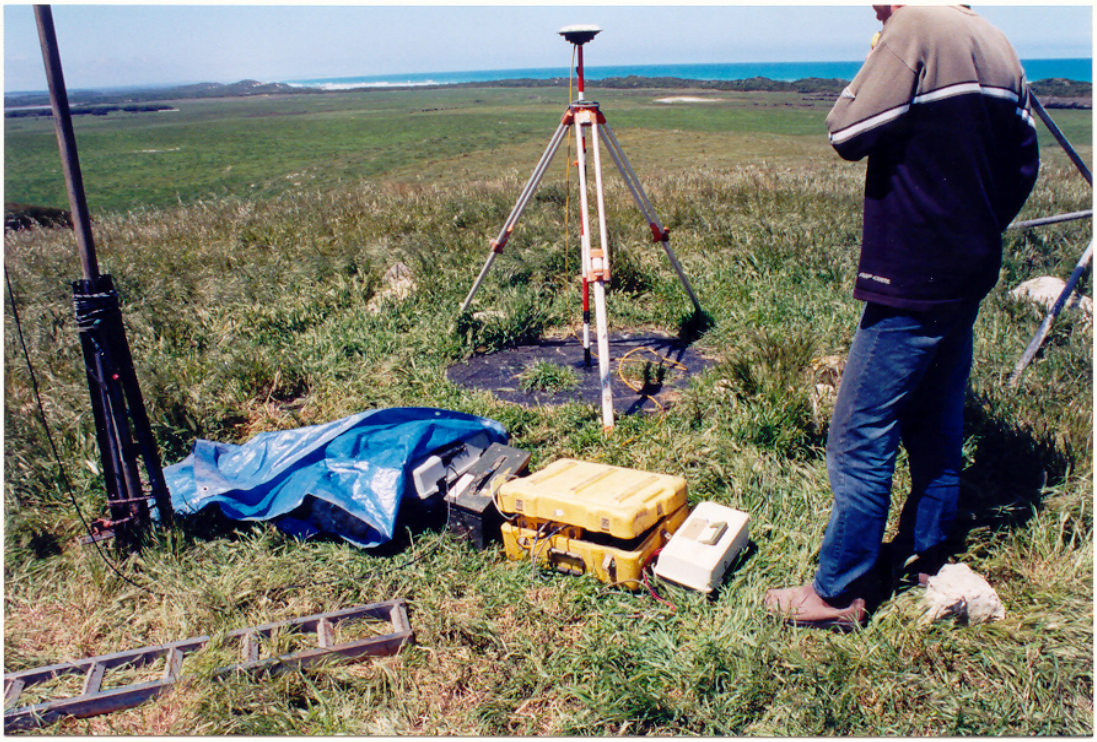

PHOTO 8. The " Base Station ".
This was set up on top of Mt Ruskin close to the South Australian / Victorian Border. Providing that there are no transmitting problems, the base station is visited each morning and night.

PETROLEUM SUPPORT SERVICES
FOR ALL PERMITTING & ASSOCIATED WORK

P.O. Box 1981
Mount Gambier, S.A. 5290
Phone (08) 8723 2082
Fax (08) 8724 9305

A/Hours (08) 8725 2339
Mobile 0407 338 228
(with Message Bank)

LANDOWNER NAME & CONTACT	SECTION No.	SPECIFIC LANDOWNER REQUIREMENTS Notes or Requests
ADAMS Garry 87384318 C/- Nelson Kiosk Nelson 3292	Lot 1 PS316633 Township of Nelson	
BAIN Lyn 87384284 Box 8086 (Shared Box) Mt Gambier East 5291	Block 6 Township of Nelson PS316633	Landowner wants to know if you can detect a cave under her block.
BOWKER Sue & Rob 87253757 Box 1245 Mt. Gambier 5290	Lot 37 OP50432	Access through gate in SW / SE corner of Bowker's / Lamond's property. **Notify** Rob beforehand. (Is locked gate near shed.)
CARRISSON Sue & Mark 87384379 Box 1390 Mt Gambier 5290	9002 . 048 Pt 44 - lot 2, LP 87554, Lot 1 - LP67508	
COX Marg & Brian 87384376 0409837095 Box 8086 (Shared Box) Mt Gambier East 5291	Lot 1 Township of Nelson. PS 348785	
FORD Gael & David 87232823 87215722 14 Reginald St Mt Gambier 5290	Lot 36 OP50432 PO9700	**SHUT** all gates. **Sinkholes.**
HILLS Annette & Chris "Summerhill" 87384110	Lot 1,2 &12. 102,103,109,330,331, 332,333,334,335,336, 345,350.	Padlocks. Beware of Sinkholes and rocky terrain
HUMPHRIES Paul 87384378 Isle of Bags Road Nelson 3292	Lot 1&2 Township of Nelson PS 442595	
KAIN John 87254611 Box 8005 Mt Gambier East 5290	Lot 29 & 34	**Hidden Key.**
KERR Neil 0355281325 Nelson Rd Drik Drik 3304	Lot 1,2,3,4,5,6,7,8,9,10,11 ,12,13,14,15,16,17,18, 19,20,23&24	Overseer **Bill Campbell**

Attachment 1 – Landowner Names and Contacts

LAMOND Peter 0428954280 97 Crouch St South Mt Gambier 5290	Lot 27, 28, 30, 31, 32A, 33, 38, 39, 40, 41, 41A	**NOT TUESDAYS** (Cattle work ready for Wednesday market).Overseer **'Tiger'.** Quad or foot only in Canola crop. Extremely boggy down near edge of Estuary and drainage channel area. **SNAKES !!**
LAPATHA Rosemary & Joe 87384222 0427011701	544,545,546,599, 600,601	Beware of sinkholes. **Shut** all gates.
LORAS Bernard SAROL Pty Ltd 0409173551 84 Radnor St Camberwell 3124	Lot 1, 3 & 4 PS 431208	Very Boggy down by river. Jump the fence.
McLEOD Alison 87384088 C/- Nelson PO 3292	Lot 48 Township of Nelson	
MOORE Kate & Bill 87384081 87251240 55 Bay Road Mt Gambier 5290	Sect 1 Scrub Block Sign on Gate --- " Kurrawong."	
NAT.Parks & Wildlife SA John Schultz 87351177	603 **Lower Glenelg National Park**	**Foot traffic only**
TELFORD Andrew & Janet 87385223	Pt310,Pt324,Pt322. Pt310 & all 311, 312&323.	Beware of rough terrain.
TELFORD May 87382349	As above. Partnership.	
VIC ROADS - South Western Victoria Region Peter Hill 0355619215 Box 775 Geelong 3220		**Letter attached.**

Attachment 1 (continued)

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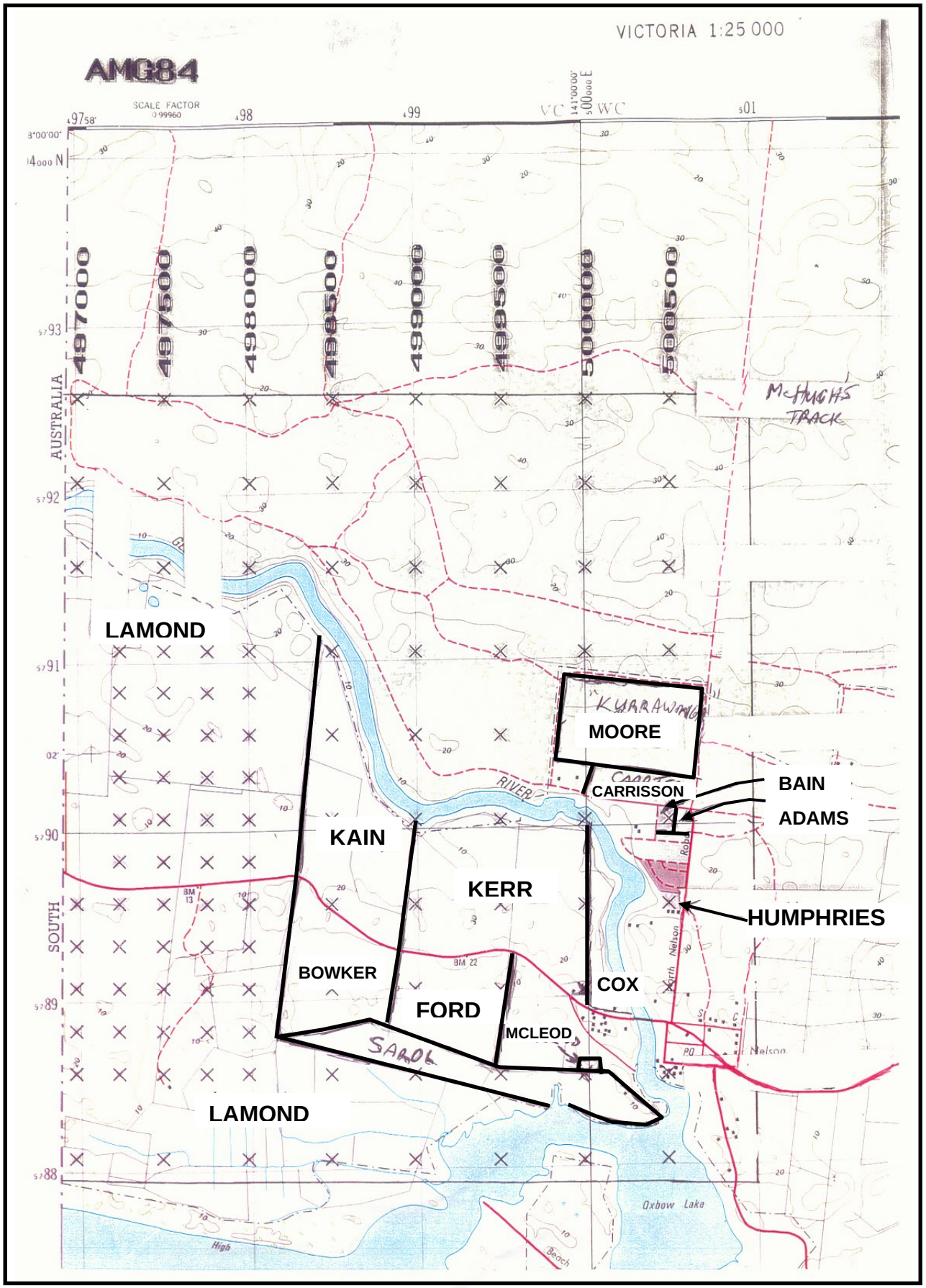
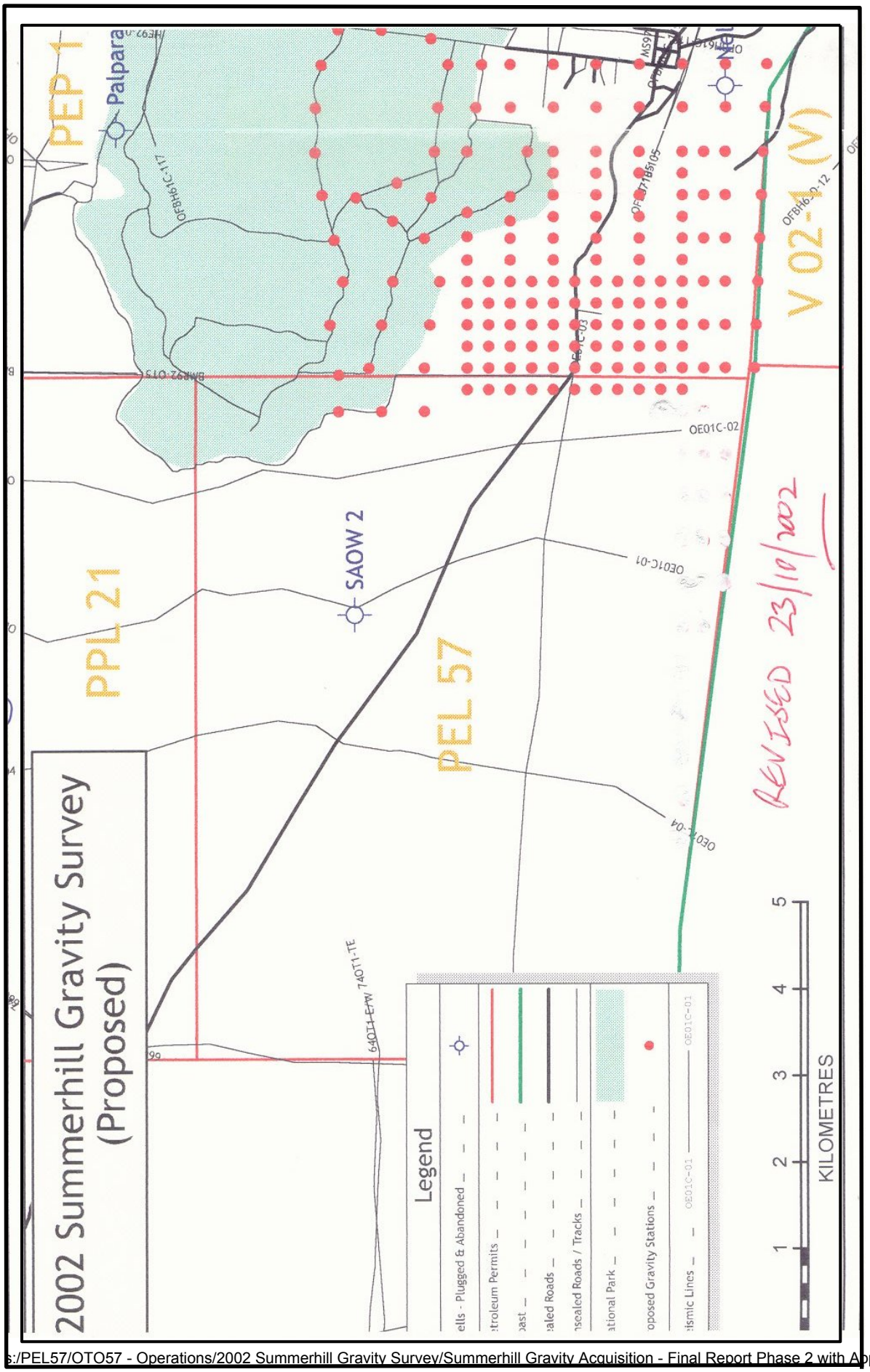
GENERAL NOTES ON HAZARDS & PROCEDURES FOR GRAVITY SURVEY						
DAIRY FARMS	SHEEP FARMS	BEEF FARMS	HOBBY FARMS	CONSERVATION PARKS	RIVERS	
Centre Pivots have deep Wheelruts.Wet peaty country has numerous drainage channels.and many frogs therefore many snakes,especially Tiger Snakes. Bulls can be dangerous, Jersey bulls are notoriously bad tempered.	Not at this time of year	Seperation of any cow from its herd can cause irrational / dangerous behaviour from that animal	Dogs,cats,ducks, geese, chooks etc. Dense bushland, fallen timber, vegetable plots. B & B guests.	Snakes, Yellow Bellied Parrot, Cliffs, especially near the river	Steep cliffs, dangerous edges. Boggy areas in Estuary.Many snakes in estuary and spring country. Waders suggested as protection against possible snakebite if too boggy for vehicle access.	

Attachment 2 – Potential Hazards



Attachment 3 – Property Boundary Map



s:/PEL57/OTO57 - Operations/2002 Summerhill Gravity Survey/Summerhill Gravity Acquisition - Final Report Phase 2 with Appendices

Attachment 4 – Dot Map of Survey Points

vic roads

ABN 61 760 960 480
South Western Victoria
180 Fyans Street
South Geelong Victoria 3220
PO Box 775 Geelong Victoria 3220

Tel: (03) 5225 2525
Fax: (03) 5221 6102
www.vicroads.vic.gov.au

13 May 2002
Contact: Peter Hill
Telephone: (03) 55 619 215
File No: AM 085 15
Your Ref:

Chris Annear
Petroleum Support Services
PO Box 1981
MOUNT GAMBIER S.A. 5290

Dear Chris,

RE : PROPOSED GRAVITY SURVEY
NELSON – MT GAMBIER ROAD

I refer to your letter dated 5 May 2002, concerning the above matter.
VicRoads does not object to the proposed activities subject to the following conditions :-

i) The Glenelg Shire has been informed and has no concerns regarding the work.

ii) Signage and traffic control is to the satisfaction of VicRoads Regional Manager South Western Victoria.

It is noted that the activities should involve minimal disturbance or damage to the land and vegetation. This being the case, the proposed activities may proceed unless upon further inspection of preparations by VicRoads, it is considered that the proposed activities constitute an unacceptable risk to traffic safety.

VicRoads accepts the consent and notice form provided, as notice to enable land access and activities required for the survey to proceed. VicRoads conditions appear on the consent and notice form enclosed.

Please contact Mr Peter Hill (ph 55619215), should you wish to discuss this matter further.

Yours sincerely,

Peter Hill

for **GRAHAM CLARKE**
MANAGER PROGRAM DEVELOPMENT
SOUTH WESTERN REGION

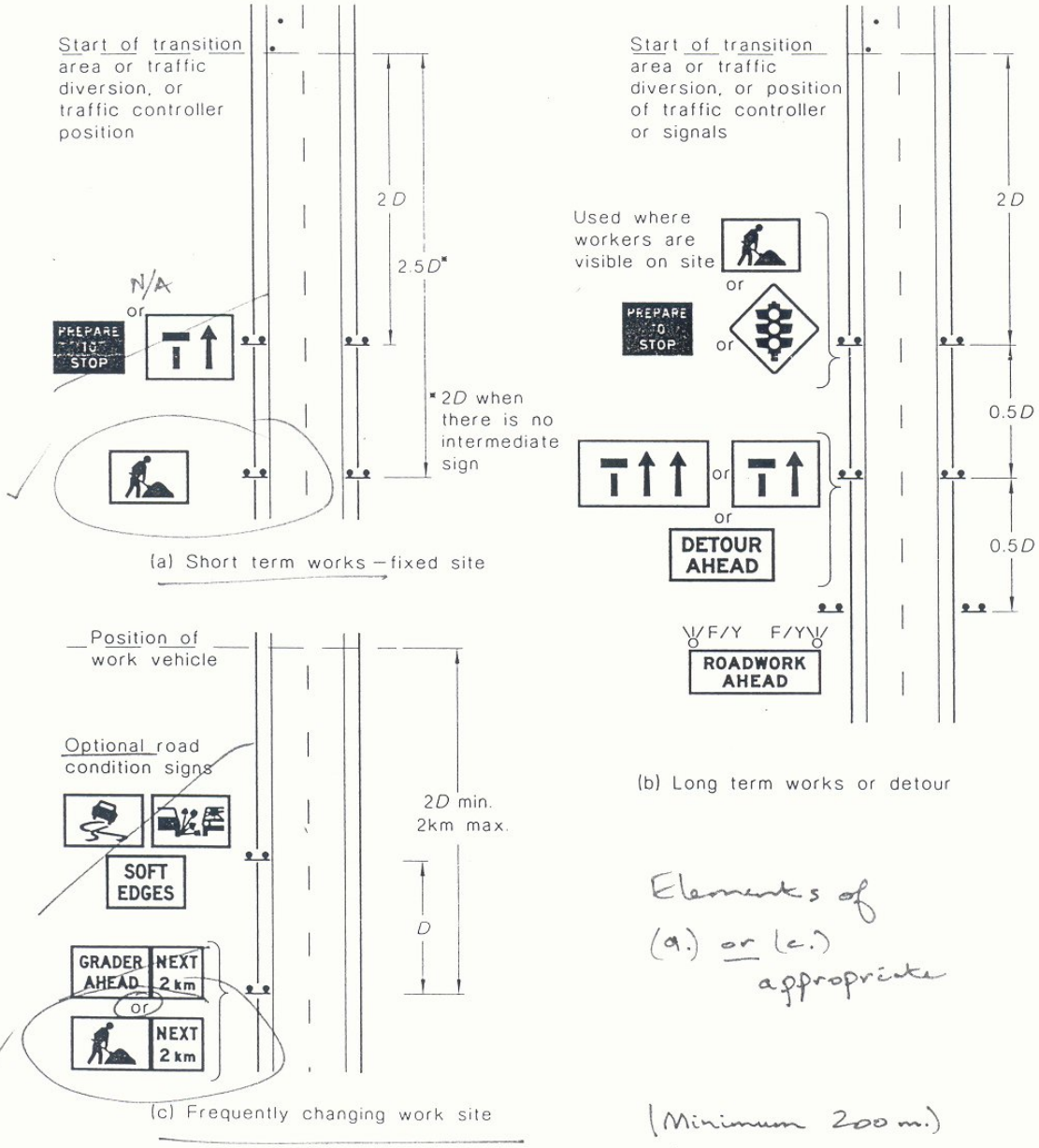
O:\AM08515\ph020735.doc

Victoria
The Place To Be

Attachment 5 - Copy of Letter from VicRoads

(iii) *Mobile works* All advance signs for mobile works are carried on vehicles (see Clause 4.7).

(iv) *Temporary or portable traffic signals* Long distance warning of the existence of unexpected traffic signals, e.g. on rural roads, may be required. The sign assembly Signals Ahead (W3-3) and 1 km (W8-5) should be used.



Elements of (a.) or (c.) appropriate

(Minimum 200 m.) Advance warning recommended Rural Situation

D = speed in kilometres per hour or the approach speed of traffic if significantly different from the speed limit

FIGURE 4.2 TYPICAL ADVANCE SIGN LAYOUTS

+ Safety Jackets

Chris,

letter reissued

(unmarked signage diagram also attached)

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