Mawson Canada Pty Ltd

Isa South East Geophysics Project

Round 2 Collaborative Exploration Incentive

CEI0034

Final Report

Tenure: EPM 26477, EPM 26479, EPM 26481, EPM 26483

Holder and Operator: Mawson Canada Pty Ltd

Authored and Submitted by: M. Carter

Date of Report: August 2019

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1. Executive Summary

This report summarises exploration activity undertaken by Mawson Canada Pty Ltd (Mawson) as part of the Queensland Government Round 2 Collaborative Exploration Incentive (CEI).

Work included an aeromagnetic survey and a ground gravity survey. These surveys have increased data density in a data-sparse environment. Preliminary visualisation of both data sets indicates they will be of positive value to ongoing exploration.

2. Introduction

Mawson's Isa South East Project represents frontier exploration terrane. The >1300 square km land package is obscured by deep post-Proterozoic cover with only historical drill holes penetrating basement. This is despite the parts of the area being underlain by (i) similar magnetostratigraphy that hosts the world class Cannington silver-lead-zinc mine and (ii) major structural boundaries, including the Cloncurry fault zone and secondary structures which may have acted as conduits for mineralising fluids.

The CEI-cofunded Isa South East Geophysical Project increased the density of existing open file geophysical coverage. This involved closing the line-spacing of the airborne magnetic coverage from 400 m to 200 m. A ground gravity grid was completed at 1km spacing compared to the existing 4 km spacing.

The new magnetic and gravity data sets will permit a refinement of existing lithostructural interpretations and be foundational for subsequent drill targeting.

3. Project Location and Access

The Isa South East Project is centred approximately 150km southeast of Cloncurry and 25km east of South 32's Cannington mine (Figure 1). A network of unsealed station tracks provides excellent access throughout the tenements. Many of these tracks were investigated as part of ground reconnaissance activities in July 2019.

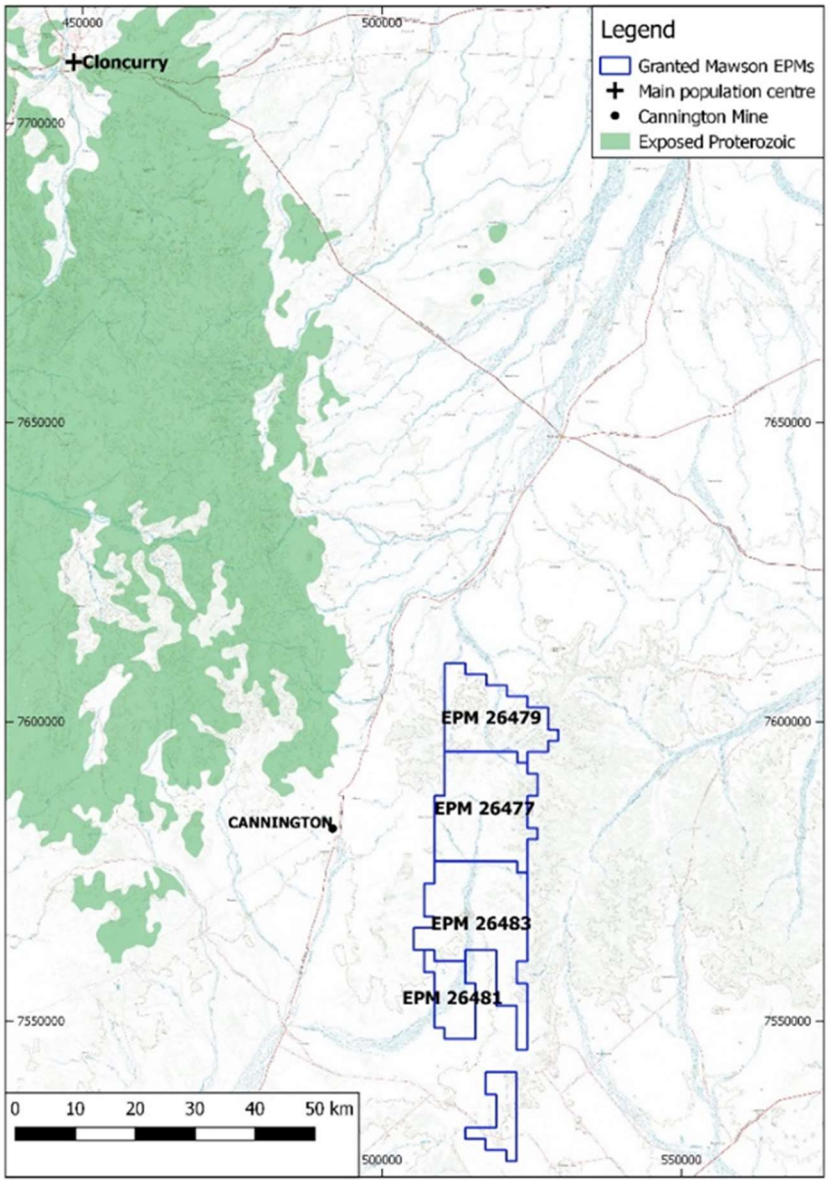

Figure 1. Location map of Mawson's Isa South East project. EPM26481 is two non-contiguous blocks.

4. Regional Geology

Throughout the project area Proterozoic basement is obscured by a thick package of Mesozoic sediments (Eromanga Basin sequence). Depth of cover, based on limited basement drilling and information from water bores, ranges from 250 m to 400 m. Exploration is therefore driven by magnetic and gravity geophysical methods with a commitment to drilling targets generated. As the cover is conductive, electromagnetic methods are unlikely to be effective in generating anomalies in the Proterozoic basement.

A recent lithostructural interpretation by Hinman (2018) provides an excellent geological context under cover (Figure 2). The interpretation is based on detailed proprietary magnetics and drill hole databases provided by South 32, Minotaur and Sandfire, as well as open file magnetics. While the raw data remains confidential, the interpretation is open file.

The project area and surrounds are interpreted to be dominated by Mount Norna Quartzite and overlying Toole Creek Volcanics, both within the Soldiers Cap Group. Mount Norna Quartzite is significant as it is the host sequence for Cannington. As an indicator of prospectivity, the project area contains ~35 km of strike of Mt Norna quartzite based on the Hinman (2018) interpretation.

The structural grain of the area is north-northwest characterised by tight folding (interpreted as D2). Intruding the sediments are Williams Suite intrusives, of which the thermal aureoles may be important drivers for IOCG mineralisation. The north-northwest trending Cannington Fault Zone is a major boundary, interpreted by some workers to be an original basin-bounding structure (e.g. Spampinato et al. 2015). Multiple thrusts cut the volcanosedimentary package. An array of northwest-trending late faults cut all earlier structures and fabrics.

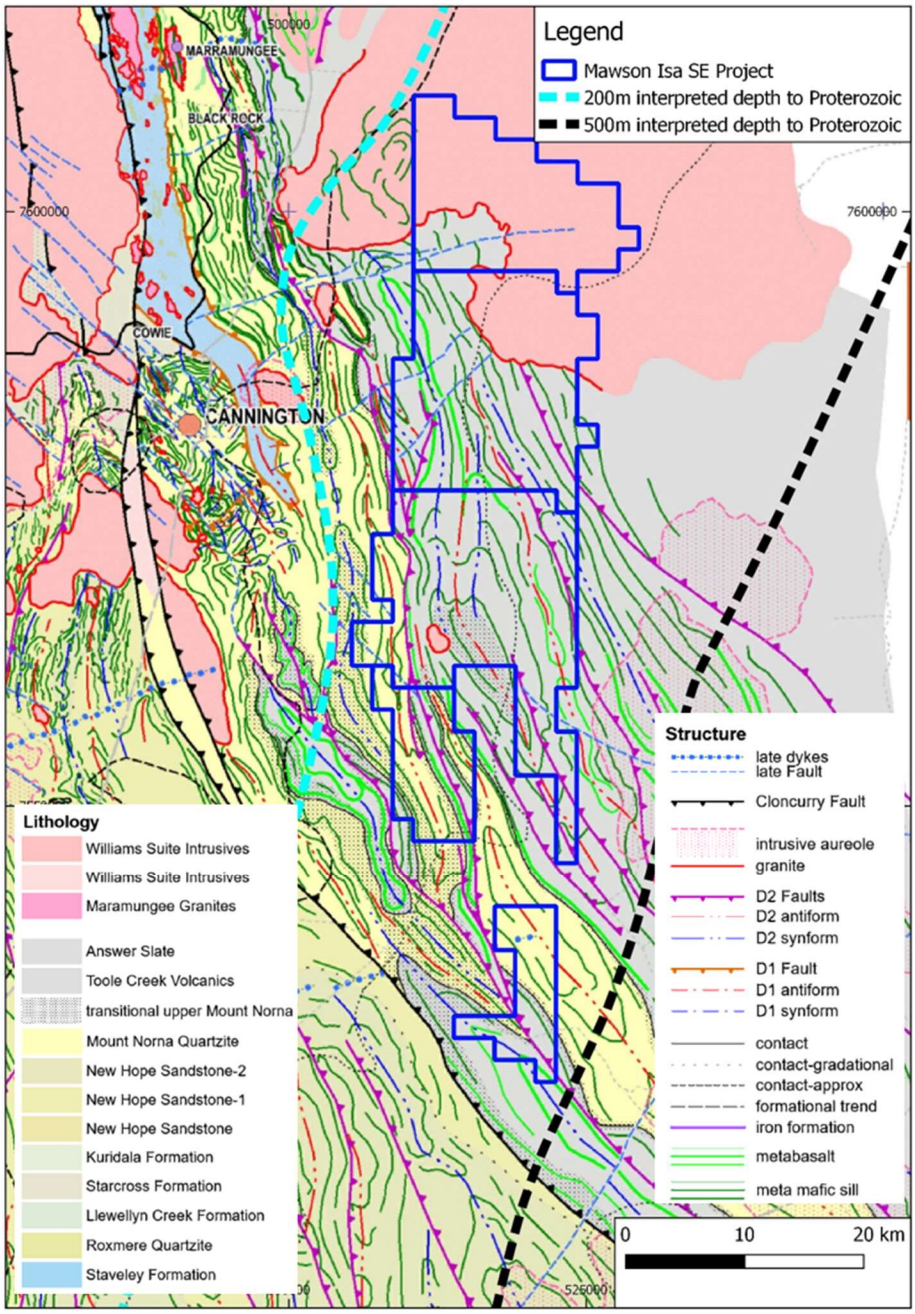

Figure 2. Current lithostructural interpretation of project area and surrounds (modified from Hinman, 2018)

5. Previous Exploration

The Mt Isa area contains a large number of mineral occurrences and world class mines. Most of these discoveries were made within the outcrop and subcrop areas. These areas continue under 100-500 metres of cover particularly to the north, east and south of the Mt Isa mineralized block. Mawson's strategy has been to acquire prospective undercover areas within prospective host sequences in data-poor environments.

In the late 1980s and early 1990s, widespread use of geophysical techniques and drilling persistence led to the discovery of a number of major deposits under cover in the Mt Isa terrain, such as Cannington (about 60 m deep), Century (40 m) and the iron oxide-copper-gold type Ernest Henry deposit (40 m). Since that time grassroots exploration worldwide has decreased, while the search space depth, driven by technology, has increased.

Following the discovery of Cannington in 1990 the area immediately west of Mawson's project area was subject to multiple drilling campaigns (Figure 3), as well as ground and airborne geophysical surveys. However, drilling is completely sparse where cover depths are greater than 200m and the project area remains almost completely unexplored.

Mawson's compilation of previous drilling from open file databases and QDEX company reports indicates only two basement drill holes have been drilled. Both holes were drilled by BHP in 2002. Despite these holes being on current Mawson tenure their details remain confidential under a group reporting technicality.

FALCON airborne gravity gradiometry was flown over the western third of the tenements for BHP in 2001 (Figure 3). However, these data and resultant imagery are considered poor quality given the FALCON technology was at an early stage of development at that time. There are no open file records of any ground geophysical surveys being conducted on current Mawson tenure. Magnetic data collected at the same time as FALCON gravity was on 200 metre line spacing on north-south flight lines (not optimally aligned to the north-northwest geological trend).

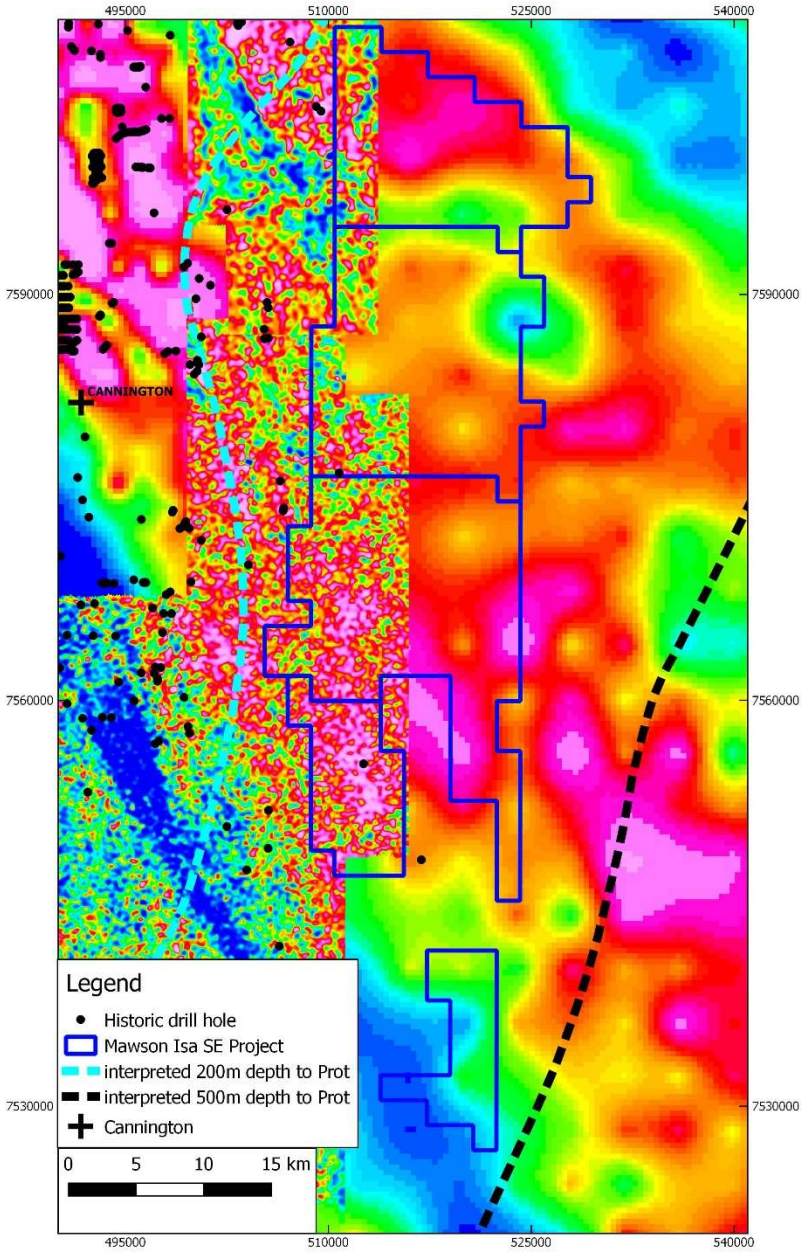

Figure 3. Previous exploration in and west of the project highlighting the lack of drilling in the project – only 2 basement drill holes. Background image covering western half of project is Falcon airborne gravity gradiometry (AGG GDD image approximating 1VD). Elsewhere the background image is Bouguer gravity 1VD as derived from the Geoscience Australia grid (4 km spacing in project area).

With the project EPMs being granted in mid-2018, Mawson has not completed any on-ground exploration work to date. Work has been limited to reprocessing of open file aeromagnetics and ground gravity, plus detailed compilation of historical drilling data.

6. Target Characteristics

Mawson's exploration premise is, despite the cover thickness, most deposits will have a detectable geophysical signature. This will be expressed by variable magnetic responses and positive gravity responses. Recent work by the CSIRO (Austin et al. 2016) summarises the magnetic-gravity properties of a range of known Cloncurry orebodies and prospects (Figure 4). While variations in host rock properties will exist at the deposit scale, most

mineralised bodies will be expressed as a gravity high compared to the host rock sequence. This relationship exists regardless of deposit or magnetic style (e.g. Maronan BHT-like vs IOCGs such as Ernest Henry and Osborne).

Mineralisation at the Cannington deposit, which is not included on Figure 4, exhibits a high correlation with magnetic susceptibility and density (Witherly and Mackee, 2015).

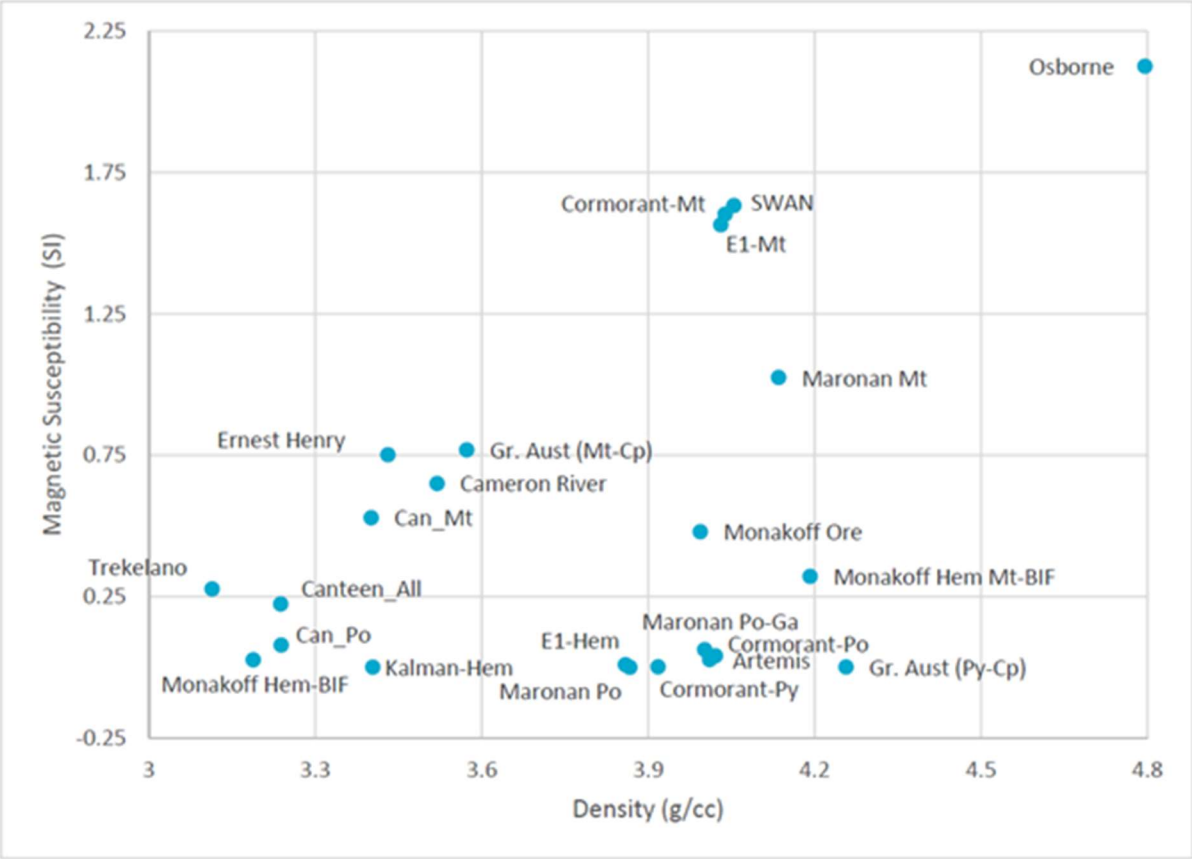

Figure 4. Plot of magnetic susceptibility vs density for ore samples from deposits/prospects assessed in the Cloncurry Uncover 2016 study (Austin et al. 2016).

7. Isa South East Geophysics Project - CEI0034

Mawson was successful in qualifying for partial funding under Round 2 of the Collaborative Exploration Incentive (CEI).

Having completed all project activity prior the Project Milestone 1 date (9 August 2019), Mawson is eligible for receipt of $100,000 representing 75% of direct activity costs.

The project consisted of two geophysical programs:

- Aeromagnetic survey at 200 m line-spacing. This was originally proposed at 100 m line-spacing, but after discussion with our geophysicist, was increased to 200 m. This spacing was considered adequate in light of the minimum 250 m cover thickness.
- Ground gravity survey at 1 km grid-spacing. Infill surveying may be undertaken at a later stage, following interpretation of the combined magnetic and gravity data sets.

8. Methods

Aeromagnetics

The aeromagnetic survey was undertaken by Thomson Aviation Pty Ltd using a Cessna C210 aircraft. The survey was completed from 13 April to 22 April 2019. In addition to the 4 EPMs part of the CEI, the survey also included 3 contiguous Mawson EPMs not part of the CEI grant.

For the CEI tenements only, a total of 4750 line-km was flown.

Survey specifications were:

- Traverse line direction: 090-270 degrees
- Traverse line spacing: 200 m
- Tie-line spacing: 2000 m
- Mean terrain clearance: 40 m

Further detail is contained in Thomson's operations report (Appendix 1), including descriptions of the magnetometer and data acquisition system.

Ground gravity

The ground gravity survey was completed by Haines Surveys from 17 June to 30 June 2019. A helicopter was used to efficiently manoeuver between the stations. Like the aeromagnetic survey, the ground gravity survey spanned 3 contiguous Mawson EPMs not part of the CEI grant.

For the CEI EPMs only, there were a total of 936 stations.

Details of the survey instrumentation and methodology are contained in the Haines Logistical Report (Appendix 2), including information on survey and gravity control.

9. Results and Preliminary Interpretation

Aeromagnetics

Preliminary processing was undertaken by Robert Smith of Greenfields Geophysics, including RTP (Figures 5 and 6) and first vertical derivative of RTP (Figures 7 and 8).

For each pair of images the left-hand side shows the preexisting magnetic data, mainly 400 m line-spacing and as processed by consultants PGN Geoscience. The right-hand side shows the newly collected data for comparison. All images are rendered using a linear scale from -400 to +500 nT.

Immediately apparent in the new data is the increased resolution of north-northwest trending magnetostratigraphy, fold closures and truncating faults. Isolated magnetic highs are better resolved and some of these may be non-stratigraphic and require follow-up assessment (Figure 5).

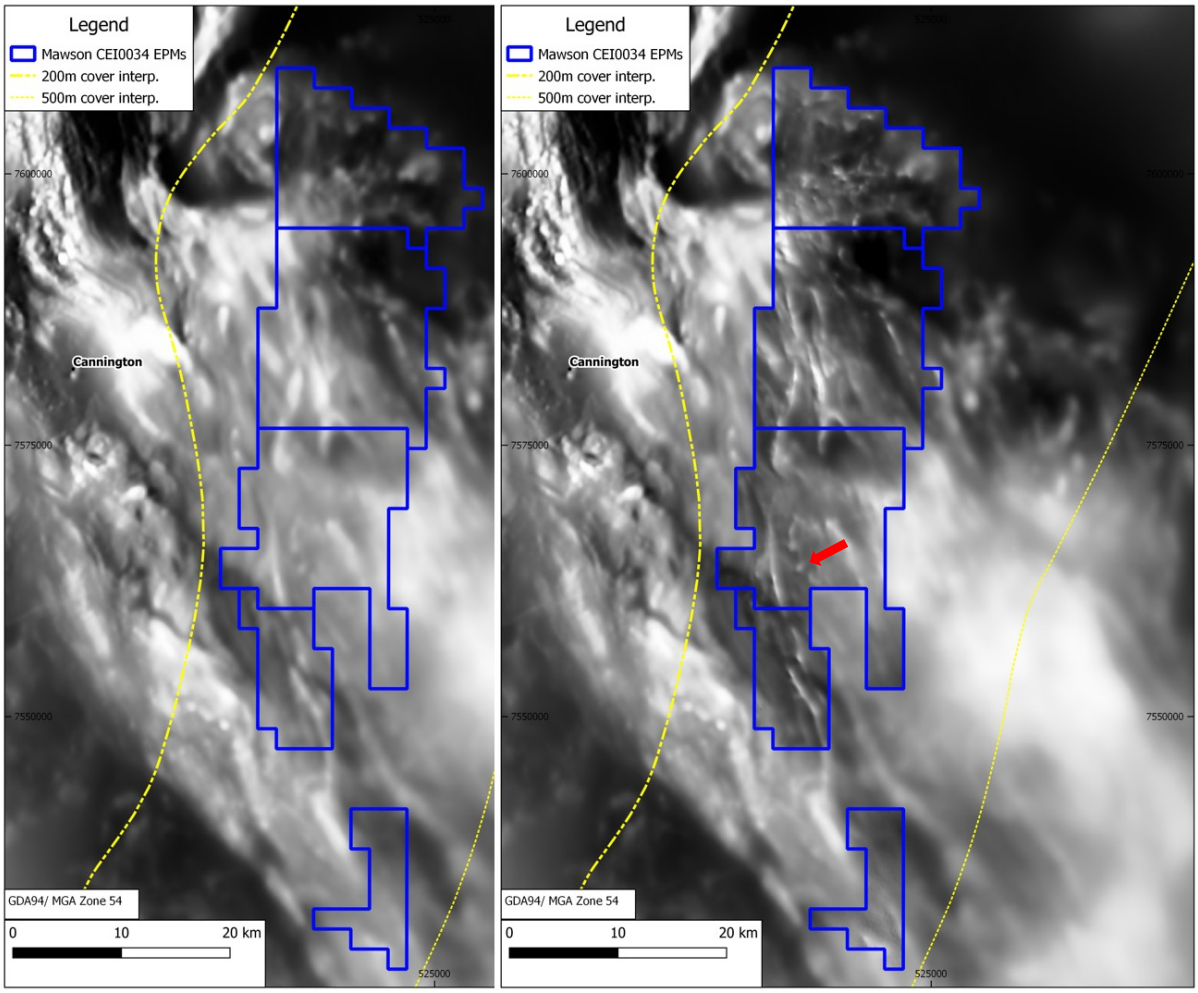

Figure 5. RTP greyscale magnetics. LHS = existing open file data, mainly 400m line-spaced. RHS shows newly collected data within CEI EPMs. Red arrow points to possible non-stratigraphic magnetic high.

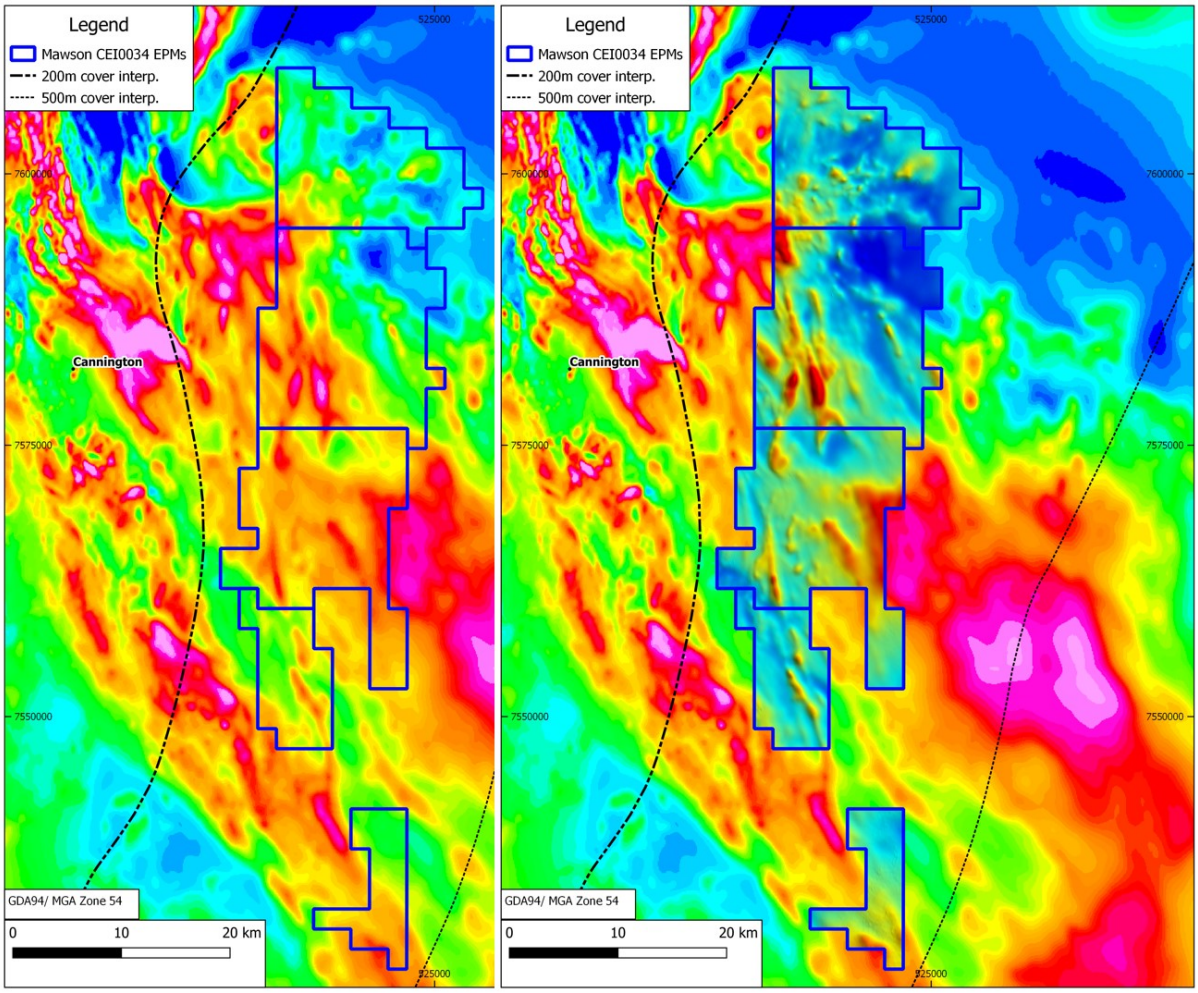

Figure 6. RTP pseudocolor magnetics.

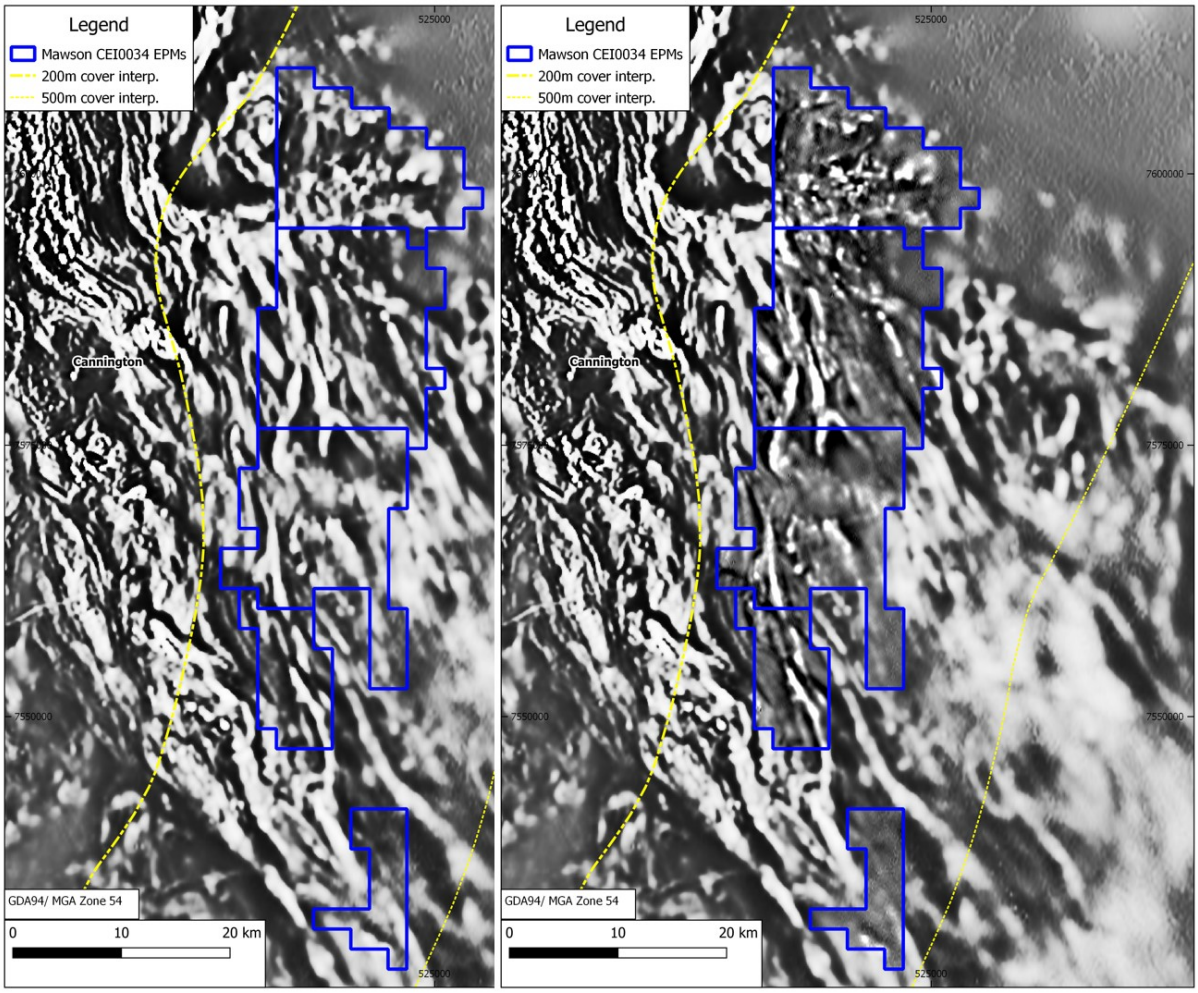

Figure 7. RTP 1VD greyscale magnetics.

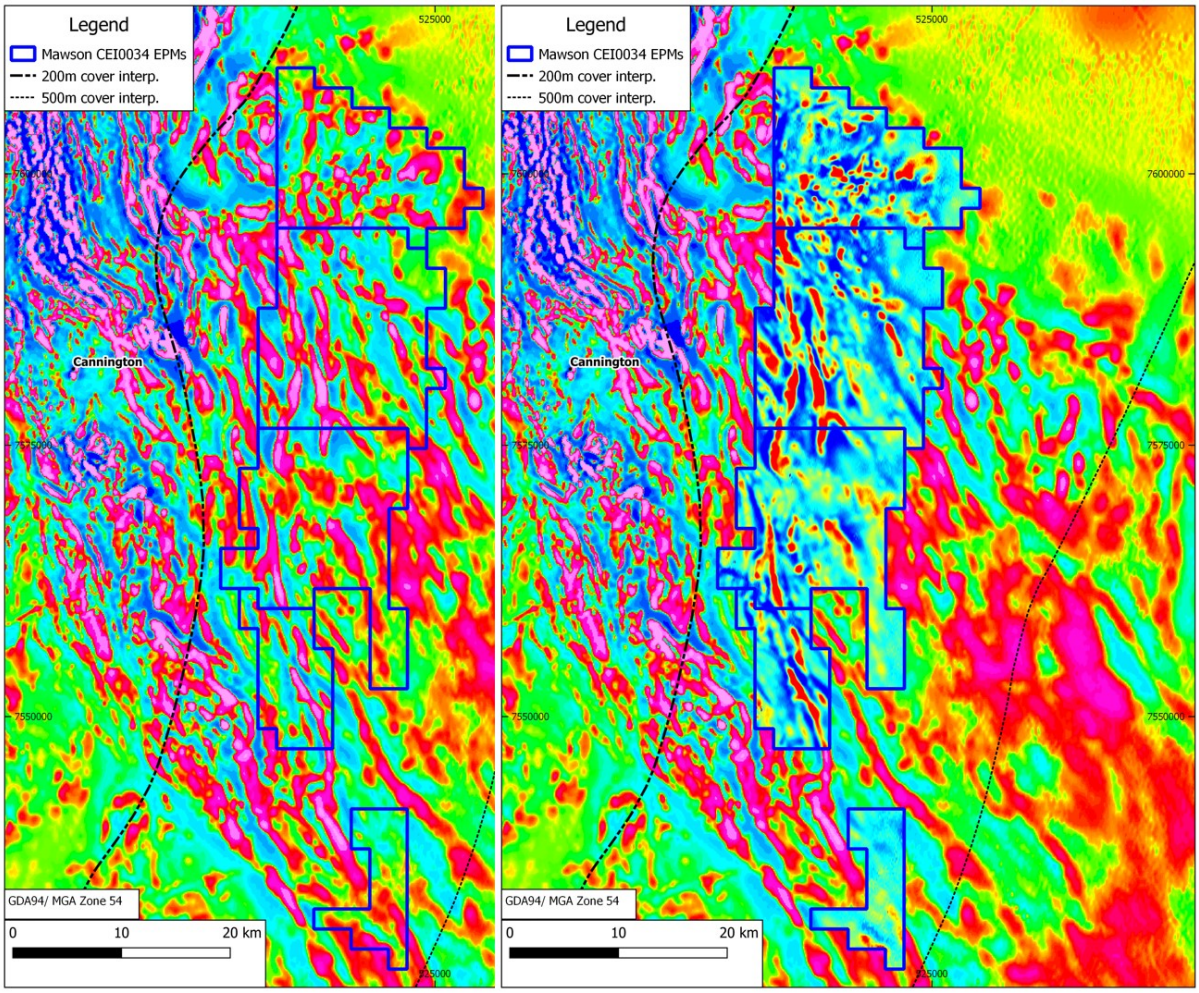

Figure 8. RTP 1VD pseudocolor magnetics.

Ground gravity

Preliminary processing of the new ground gravity data was undertaken by Robert Smith of Greenfields Geophysics. This included generation of geoTiff images of Bouguer anomaly and first vertical derivative of Bouger anomaly (Figures 9 and 10 respectively).

Initial attempts to grid this new gravity data are challenged by (i) the irregular shape of the CEI tenements and (ii) the relatively wide 1 km spacing of the gravity stations. A current compromise is application of an upward continuation (UC200) which smooths the data prior to generating a first vertical derivative. The net result, as shown in Figure 10, has removed many of the regional long wavelength features which tend to obscure features of interest.

While interpretations may be an artefact of the gridding process, the new gravity data suggest greater density heterogeneity. This is within and on the margins of the broad high-gravity domain that occupies the central and northern parts of the CEI tenements. This domain may be related to basalts in the Toole Creek volcanics interpreted east of the Cloncurry fault zone (Figure 2). Alternatively the gravity high may reflect exhumation of denser rocks of higher metamorphic grade.

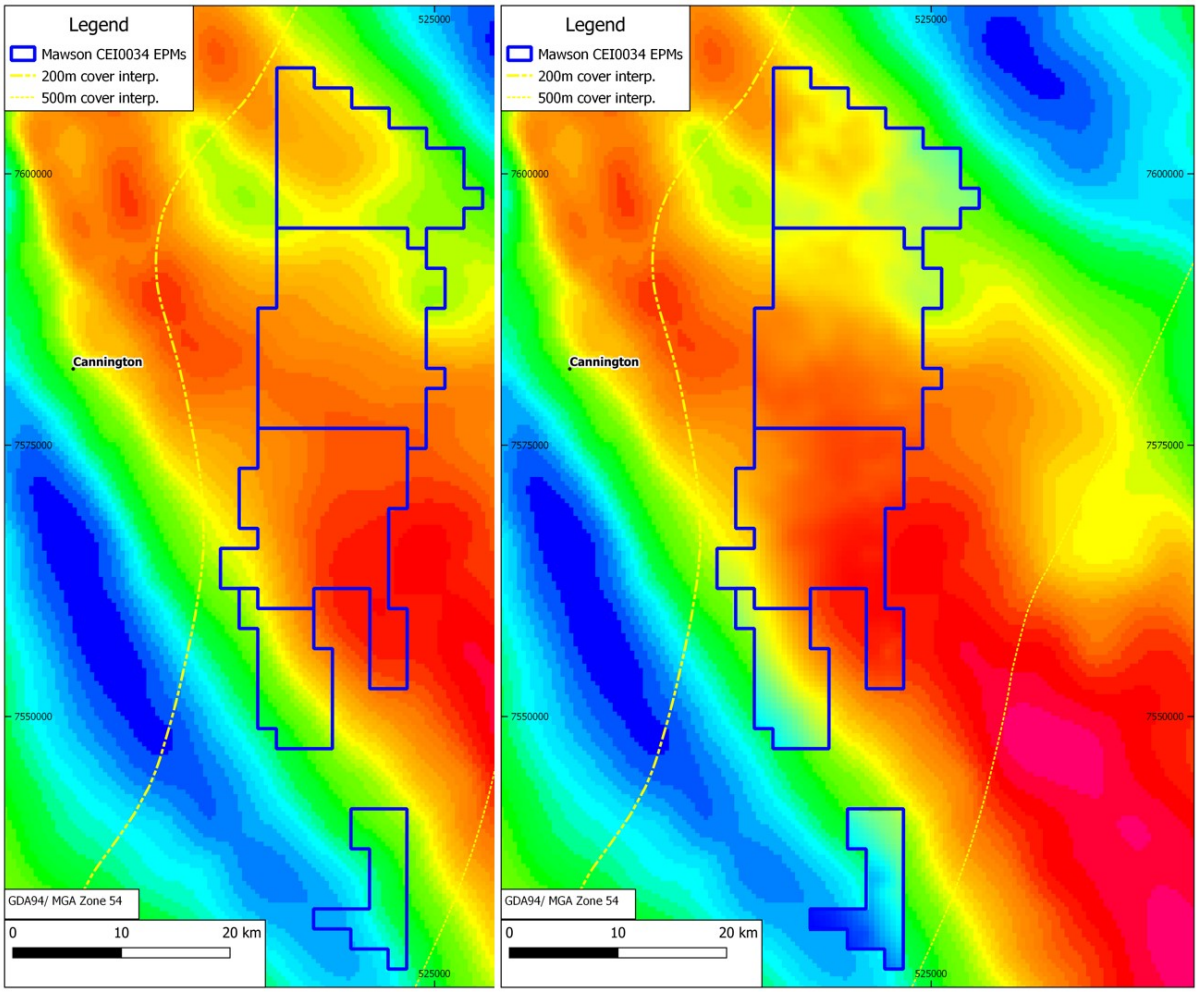

Figure 9. Ground gravity Bouguer anomaly. LHS = existing 4km grid-spaced data. RHS within CEI tenements = 1km grid-spaced data Bouguer anomaly with upward continuation (UC200).

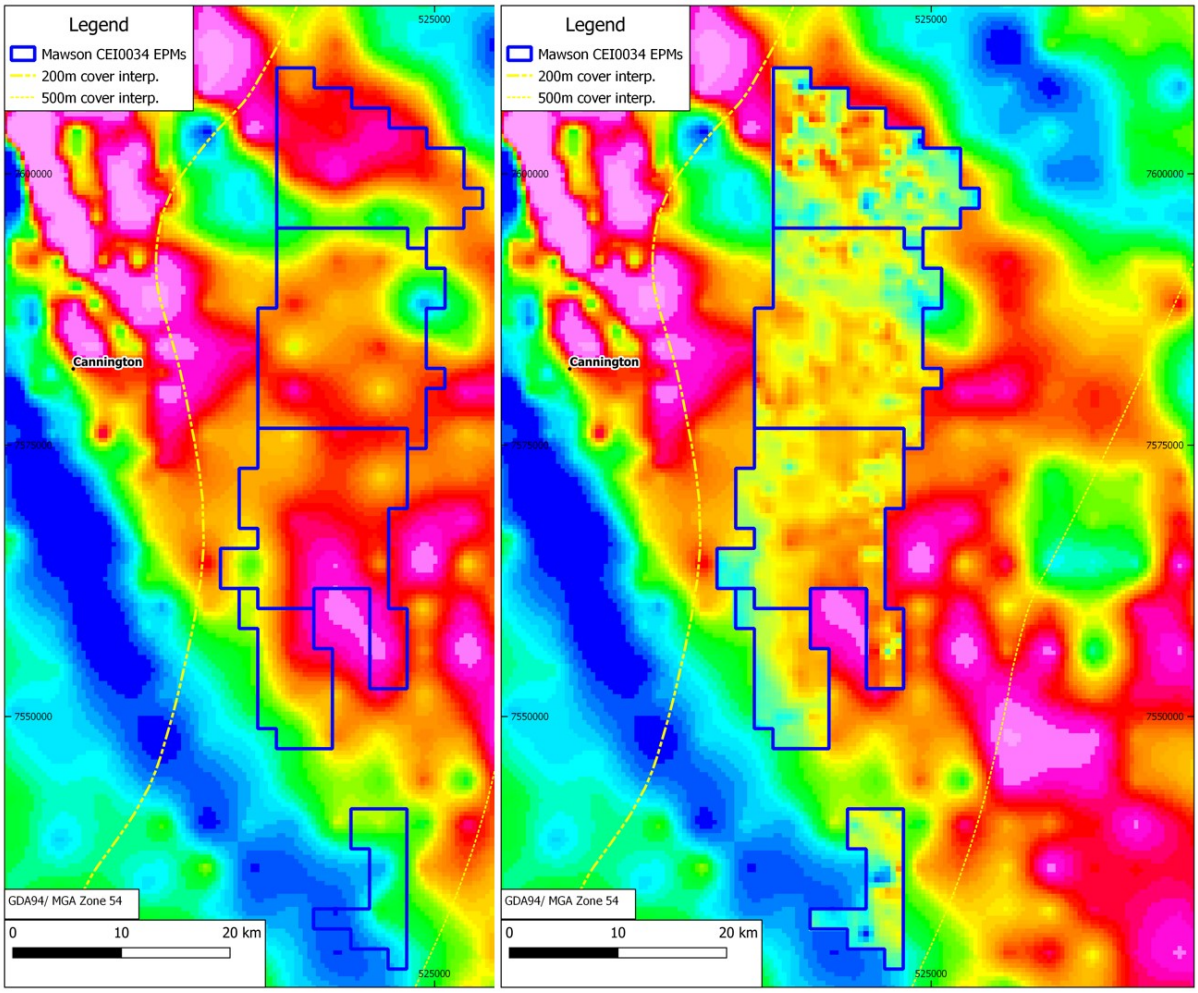

Figure 10. Ground gravity 1VD of Bouguer anomaly. LHS = existing 4km grid-spaced data. RHS within CEI tenements = 1km grid-spaced data Bouguer anomaly with upward continuation (UC200) then 1VD.

10. Overall Comments

The ground gravity and aeromagnetic surveys were completed without incident and provide valuable additional data to Mawson's Isa SE project. These new data represent the first step in progressing this early-stage conceptual project towards a next phase of interpretation and subsequent targeting.

Additional geophysical processing and lithostructural interpretation of the combined potential field datasets is planned for later in 2019. This work will refine existing interpretations of basement lithology and architecture. It may also highlight areas that require infill gravity or magnetic surveying.

The lithostructural interpretation will enable a first-principles structural-stratigraphic approach to targeting. This will include recognition of favourable host sequences and their relationship to major and second order structures. This approach will complement the identification of non-stratigraphic magnetic-gravity highs.

11. References

Austin, J.R., Gazley, M.F., Walshe, J.L. and Patterson B.O. 2016. Uncover Cloncurry – Summary Geophysical Expressions of the Cloncurry Mineral System. CSIRO report EP166451, Australia, pp. 21.

Hinman, M. 2018. Solid geology interpretation of the southern Eastern Fold Belt, Mt Isa, Northwest Queensland. University of Queensland WH Bryan Mining and Geology Research Centre.

Spampinato, G.P.T., Betts, P.G., Ailleres, L. and Armit, R.J., 2015. Structural architecture of the southern Mount Isa terrane in Queensland inferred from magnetic and gravity data. Precambrian Research, 269, pp.261-280.

Witherly, K. and Mackee, G., 2015. Geophysical Responses over the Cannington Ag-Zn-Pb Deposit, Queensland. ASEG Extended Abstract, 2015, 1-5.

12. Appendices

Appendix 1 - Aeromagnetics operations report (Thomson Aviation)

Appendix 2 - Ground gravity operations report (Haines Geophysical Surveys)

Appendix 3 - Digital data cover sheet

Mawson Canada Pty Ltd

Airborne Geophysical Survey
Operations Report

Isa SE

THOMSON AVIATION
Airborne Geophysical Survey

Thomson Aviation Job
F18063

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PART 1 - SPECIFICATIONS FOR AIRBORNE GEOPHYSICAL SURVEY

1.1 SURVEY DETAILS

Start Date	13/04/2019
End Date	22/04/2019
Time Base - Magnetics	20 Hz
Time Base - Radiometrics	2 Hz
Base Mag Locations	Cloncurry
Ground Cals Locations	Cloncurry
Test Line Locations	Cloncurry
Block 1	North Block
Block 2	South Block
Total Processed Line Kilometers	7812.4

1.2 LOCATION MAP

Figure 1 Isa SE

1.3 SURVEY SPECIFICATIONS

North Block	
Traverse line direction	90
Traverse line spacing	200 m
Tie line direction	180
Tie line spacing	2000 m
Block Traverse Kilometers	4,683
Block Tie Kilometers	559
Block Total Kilometers	5,242
Mean terrain clearance (m)	40

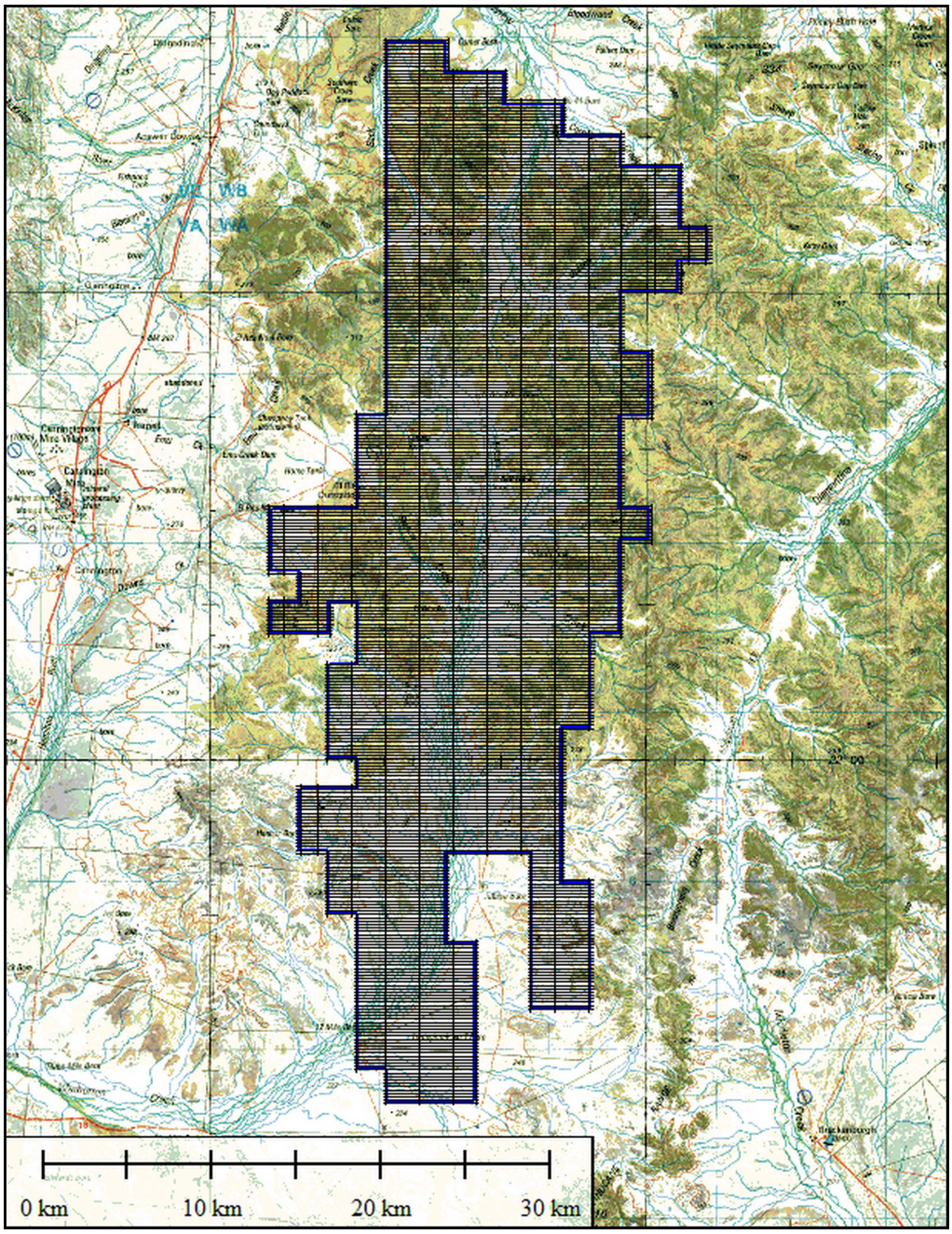

Figure 2 North Block

SURVEY SPECIFICATIONS (Cont)

South Block	
Traverse line direction	90
Traverse line spacing	200 m
Tie line direction	180
Tie line spacing	2000 m
Block Traverse Kilometers	2,207
Block Tie Kilometers	271
Block Total Kilometers	2,478
Mean terrain clearance (m)	40

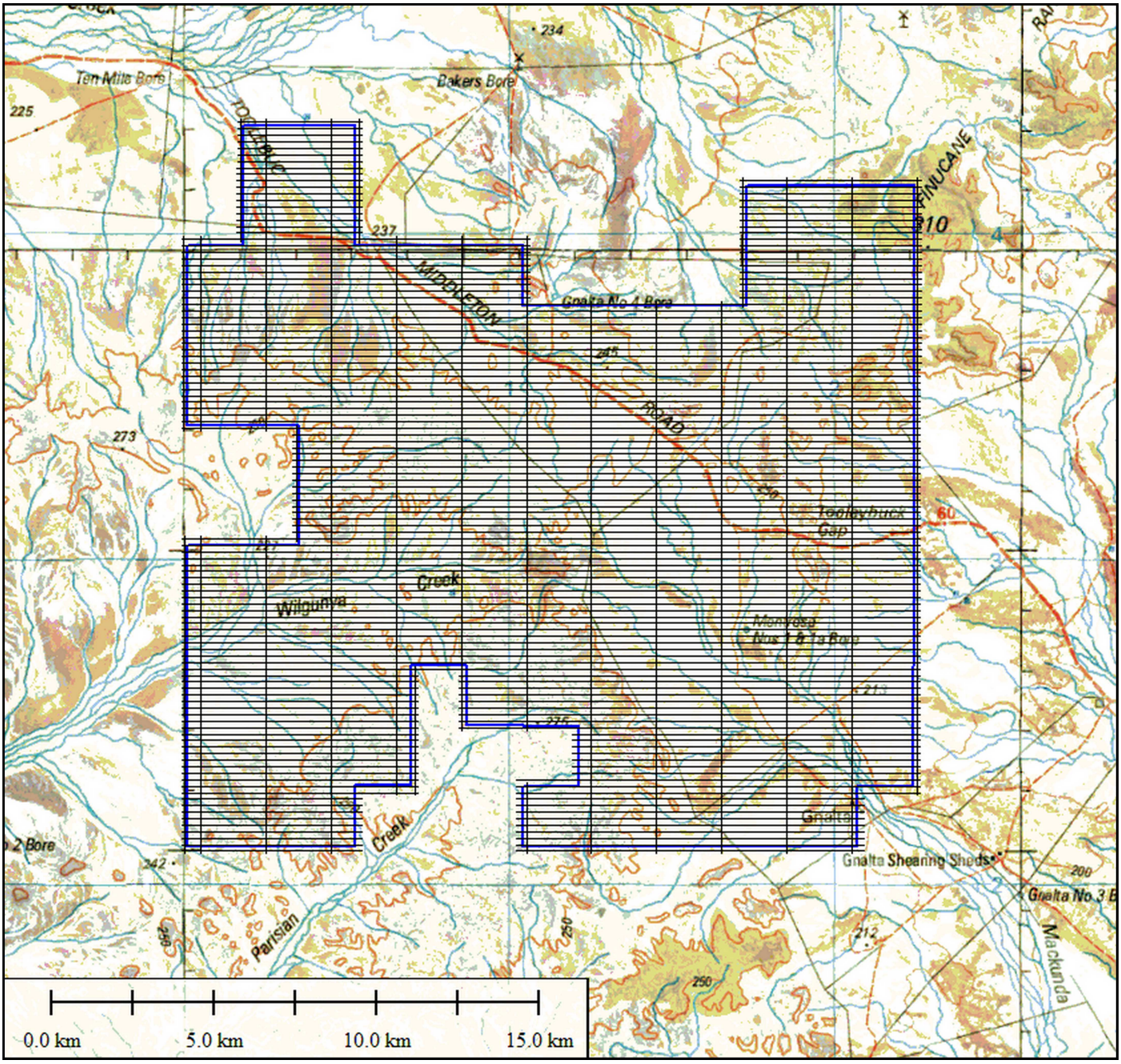

Figure 3 South Block

1.4 CALIBRATION RANGE

The radiometric systems for each aircraft were calibrated using the Geoscience Australia calibration range in Carnamah WA to determine the ground concentration coefficients for the radiometric systems.

Cosmic stacks were flown over water to determine the aircraft and cosmic coefficients.

Height attenuation coefficients were determined from IAEA recommended attenuation coefficients.

1.5 IN FIELD CALIBRATION

a) Spectrometer

The gamma ray spectrometer response was verified by exposing the system to thorium test samples for a time sufficient to accumulate 10,000 counts.

Frequency Before the first flight and after the last flight of each day when survey operations were conducted.

All background corrected counts fell within +/- 3% of the mean over the survey period.

Results of thorium test sample measurements can be found in Appendix B and Appendix C.

b) Test Line

Test lines are flown at the specified survey height to verify magnetometer, spectrometer and barometric altimeter baselines.

Length 10km
Direction Bi-Directional
Frequency Before the first flight and after the last flight of each day when survey operations were conducted.

The test line thorium counts fell within +/- 7% of the mean over the survey period.

Results of test line thorium counts can be found in Appendix B and Appendix C

c) Compensation Flight

Compensation flights for all aircraft were carried out to determine how aircraft manoeuvring effects affected the magnetic data. These aircraft induced effects are then removed from the collected magnetic data during data processing.

Frequency Before the commencement of the survey project and after each scheduled maintenance operation.

1.6 IN FIELD VERIFICATION AND PROCESSING

Thomson Aviation conducts stringent real time data validity checks.

The following products were generated on site utilising ChrisDBF and Geosoft database programs as well as Thomson Aviation proprietary software:

- Flight path plots, to demonstrate quality of navigation
- Magnetic stacked profiles, to demonstrate character of magnetic data
- Statistical summary of line data
- Magnetometer base station plots
- Progressive image presentation of magnetic and topographic data
- Daily plots of aircraft parking locations to verify GPS position

1.7 NAVIGATION AND POSITIONING

Navigation was provided using a mobile Novatel OEMV-1 VBS receiver. This equipment provides flight guidance to the pilot as well as flight path information which was recorded for subsequent processing.

Differential GPS data was obtained in real time using static GPS data obtained from the Omnistar wide area GPS service.

Position relative to the survey line was displayed to the pilot by an accurate and effective system proprietary to Thomson Aviation.

Under normal circumstances differential GPS is expected to yield positional accuracies in the order of 5 meters RMS or better.

PART 2 - AIRCRAFT

The aircraft used for survey operations combine good manoeuvrability with a magnetically clean base to provide maximum magnetic sensor performance.

2.1 VH-SUX

Aircraft Information	
Engine	Piston
Fuel	AVGAS
Fuel Burn	65 litres per hour
Typical Survey Speed	130 knots
Stall Speed	60 knots

Figure 4 Example Aircraft: Cessna C210

PART 3 - SURVEY INSTRUMENTATION

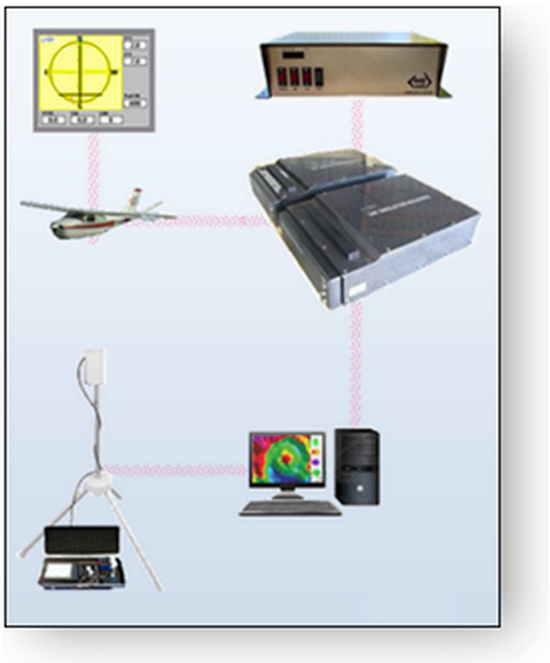

Figure 5 System Outline

3.1 MAGNETOMETER

The Geometrics G822A Magnetometer is a highly sensitive unit incorporating an optically pumped sensor. The constant harmonic frequency from the sensor is proportional to the surrounding scalar magnetic field. This frequency is resolved by the Counter / Processor which provides the magnetic field to a nominal accuracy of 0.01nT with a data capture rate of 20 times per second both in analog and digital formats.

The sensor and pre-amp are mounted in a stinger assembly which may be attached to the front or rear of the survey aircraft.

Figure 6 G822A Magnetometer and Typical Stinger Mounts

3.2 RADAR ALTIMETER

Type: King KR 495B Radar Altimeter

Figure 7 Radar Altimeter

This unit is a high resolution, short pulse ratio altitude system designed for automatic continuous operation over wide variations of terrain and weather conditions, target reflectivity, and aircraft altitude. It provides an accurate terrain clearance indication ranging from 0 to 650m (0 to 2,000ft).

3.3 BAROMETRIC ALTIMETER

Type: Setra 276 Pressure Transducer

Figure 8 Pressure transducer

This type of pressure transducer operates over a range of 600 to 1100 mB and its resolution is limited only by system noise. The sensor is referenced to the height given by the GPS.

3.4 DATA ACQUISITION SYSTEM

Type: GeOZ-DAS Digital Data Acquisition System

Figure 9 Zdas System

The GeOZ system manages the data acquisition and saves the data to removable Flash Cards.

It provides guidance and real time error diagnostics for the pilot.

Acquired data is transferred to a field computer on completion of the flight for both verification and archiving prior to being shipped to the processing centre.

3.5 NAVIGATION EQUIPMENT

Type: Novatel OEMV-1VBS GPS Receiver

Figure 10 GPS Receiver

This equipment is a 12 channel parallel tracking receiver capable of providing sub-meter resolution at 5Hz and is integrated with the GeOZ-DAS acquisition unit.

3.6 GAMMA RAY SPECTROMETER SYSTEM

Type: Radiations Solutions Inc. RS 400 Spectrometer

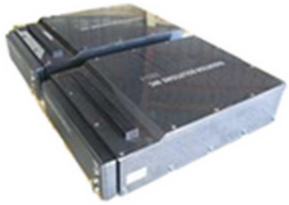

Figure 11 RS 400 Systems

These units deliver high-resolution spectral information from 0.33 MeV to 3.0 MeV including the five primary regions of interest; Total Count, Potassium, Uranium, Thorium and Cosmic.

The Gamma Ray Spectrometer is interfaced to a NaI (Tl) crystal detector pack with a total volume of 33 liters (2048 cubic inches). These detector packs embody the latest techniques whereby the elimination of dead time in the counting process yields up to 30% more counts over other commercial systems.

Superior calibration facilities included the visual real time monitoring of full spectrum data and in flight monitoring of gain drift relative to the selected isotope window maintain long-term data quality.

Enhancement of the spectrometer data is achieved by noise reduction techniques (NASVD or MNF), followed by dead time correction, energy calibration, cosmic/aircraft background correction and atmospheric radon removal all applied to the 256 channel data. Spectral stripping, height correction and conversion to radio-element concentrations are then applied prior to gridding and micro-levelling.

The gamma ray spectrometer response was verified by exposing the system to thorium test samples for a time sufficient to accumulate 10,000 counts.

3.7 BASE STATION MAGNETOMETER

Two units are used in tandem for diurnal monitoring. These units run continuously during the survey periods and record the data in digital format.

Base station magnetometer instruments record data to a sensitivity of 0.1nT every 6 seconds.

During data acquisition, if the non-linear diurnal variation was greater than 10 nT in 10 minutes, or the deviation from a straight line chord of length 10 minutes exceeded 10 nT, the line was reflown.

Figure 12 Setting up base station magnetometer

Figure 13 Magnetometer and Data Console

PART 4 - CONTACT INFORMATION

Company Name	Thomson Aviation Pty Ltd
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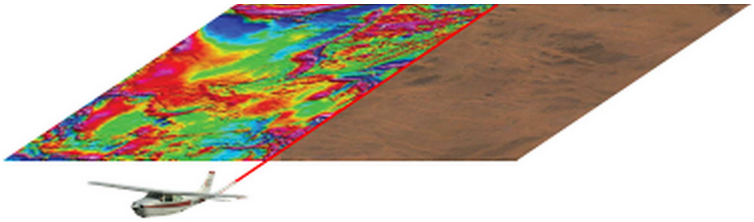


PART 5 - APPENDICES

APPENDIX A

DAILY REPORTS

Daily Log								
Date	**Flt Num**	**Block(s)**	**Operator(s)**	**Aircraft**	**SBY**	**MNT**	**SUS**	**Comments**
13/04/2019		North Block		VH-SUX				Aircraft ferried from Griffith to Wagga Wagga.
13/04/2019		North Block		VH-SUX				Aircraft ferried from Wagga to Charleville.
13/04/2019		South Block		VH-SUX				Aircraft ferried from Charleville to Cloncurry
14/04/2019		North Block		VH-SUX				Recce flight completed over survey areas to identify additional hazards not considered during additional risk assessment. Recce identified not additional hazards and confirmed proposed survey altitude of 40m AGL.
14/04/2019	1	South Block	R Butterfield	VH-SUX				Compboxes completed in preparation for the start of survey flying.
15/04/2019	2	South Block	R Butterfield	VH-SUX				L20001.0 - 20019.0 and T29001.0 - T29003.0 flown and all data accepted.
15/04/2019	3	South Block	R Butterfield	VH-SUX				L20020.0 - 20057.0 flown and all data accepted.
16/04/2019	4	South Block	R Butterfield	VH-SUX				L20058.0 - L20085.0 and T29004.0 - T29006.0 flown and all data accepted.
16/04/2019	5	North Block South Block	R Butterfield	VH-SUX				L20086.0 - L20122.0, T29007.0 - T29017.0 and L10001.0 - L10011.0 flown and all data accepted
17/04/2019	6	North Block	R Butterfield	VH-SUX				L10012.0 - L10058.0 and T19001.0 - T19006.0 flown and all data accepted
17/04/2019	7	North Block	R Butterfield	VH-SUX				L100570.0 - L10113.0 and T19007.0 - T19008.0 flown and all data accepted.
18/04/2019		North Block		VH-SUX				Aircraft taken to Mt Isa for oil and filter change as part of the scheduled maintenance program post new engine installation
18/04/2019		North Block				0.5		Aircraft in shceduled maintenance.
18/04/2019		North Block		VH-SUX				Aircraft returned to Cloncurry
18/04/2019	8	North Block	R Butterfield	VH-SUX				L101140.0 - L10139.0 and L10179.0 - L10193.0 flown and all data accepted.
19/04/2019	9	North Block	R Butterfield	VH-SUX				L10149.0 - L10177.0 and T19016.0 - T19022.0 flown and all data accepted.
19/04/2019	10	North Block	R Butterfield	VH-SUX				L10140.1 - L10212.0 and T19015.0, T19017.0, T19020.0 flown and all data accepted. First flight attempt was aborted due to a software problem with the RSI packs, this was resolved and the flight continued without issue.
20/04/2019	11	North Block	R Butterfield	VH-SUX				L10213.0 - L10245.0 and T19010.0 - T19014.0 flown and all data accepted.

Daily Log								
Date	**Flt Num**	**Block(s)**	**Operator(s)**	**Aircraft**	**SBY**	**MNT**	**SUS**	**Comments**
20/04/2019	12	North Block	R Butterfield	VH-SUX				L10246.0 - L10248.0 flown and data accepted. The flight was aborted after a powers supply failure to 1 of the crystal packs.
22/04/2019	13	North Block	R Butterfield	VH-SUX				L10249.0 - L10316.0 flown and all data accepted.

APPENDIX B

CALIBRATION AND TEST LINE VARIATION TABLES

Av Normalized Th: 274.7 Min TH: 262.3 Max TH: 283.2 Standard Deviation: 7.2

Ground Cals - VH-SUX - Cloncurry

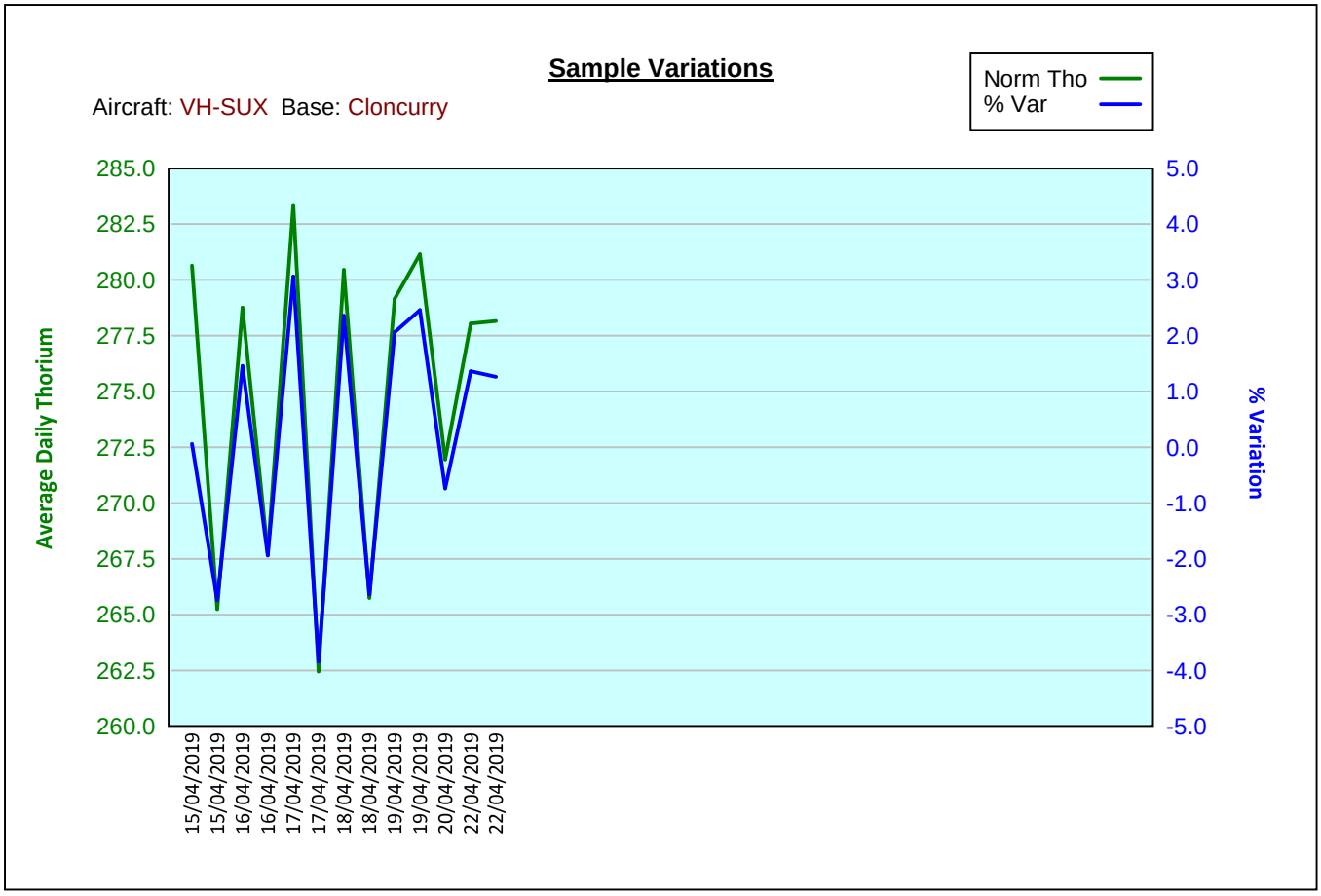
		Position			Hand Sample				Background				Normalized				Th Cal Results		TH Chg	Diff
Date	Flt	East	North	GPS Ht	TC	Pot	Ura	Tho	TC	Pot	Ura	Tho	TC	Pot	Ura	Tho	ThPeak	% FWHM	+/- 3%	5 max
15/04/2019	2	448640.65	7714458.52	190.6	8781.6	591.1	229.3	437.0	4634.5	469.5	126.5	156.5	4147.1	121.6	102.8	280.5	218.87	4.46	0.0	0.0
15/04/2019	3	448640.91	7714457.36	189.2	8575.2	575.7	212.6	412.7	4567.9	443.6	119.0	147.6	4007.3	132.1	93.6	265.1	213.31	5.05	-2.8	1.2
16/04/2019	4	448640.98	7714457.76	188.6	8829.9	596.4	231.3	435.3	4707.0	473.7	130.4	156.7	4122.9	122.7	100.9	278.6	218.58	4.50	1.4	0.8
16/04/2019	5	448641.48	7714457.25	189.6	8586.2	585.5	209.9	411.5	4522.0	444.8	117.8	143.9	4064.2	140.7	92.1	267.6	213.19	5.13	-2.0	1.5
17/04/2019	6	448641.69	7714457.53	188.8	8771.4	595.8	223.1	436.7	4590.5	463.6	124.1	153.5	4180.9	132.2	99.0	283.2	218.39	4.54	3.0	1.4
17/04/2019	7	448640.86	7714457.39	189.0	8614.9	579.1	209.7	408.8	4587.2	442.2	119.7	146.5	4027.7	136.9	90.0	262.3	212.76	5.22	-3.9	1.1
18/04/2019	8	448641.54	7714457.48	189.5	8707.8	598.5	219.9	431.2	4580.3	462.3	120.7	150.9	4127.5	136.2	99.2	280.3	212.76	5.18	2.3	1.4
18/04/2019	8	448641.42	7714457.02	189.8	8547.3	580.0	207.3	407.9	4485.1	438.0	114.4	142.3	4062.2	142.0	92.9	265.6	212.76	5.18	-2.7	1.7
19/04/2019	9	448641.51	7714457.33	189.3	8667.7	587.9	221.3	430.2	4556.8	464.9	122.7	151.2	4110.9	123.0	98.6	279.0	217.49	4.46	2.0	1.5
19/04/2019	10	448640.81	7714457.45	188.8	8796.1	592.6	224.7	437.0	4656.4	473.2	128.5	156.0	4139.7	119.4	96.2	281.0	217.67	4.52	2.4	1.1
20/04/2019	11	448641.47	7714458.12	189.5	8765.9	590.3	224.0	428.4	4670.5	471.1	128.4	156.6	4095.4	119.2	95.6	271.8	217.67	4.55	-0.8	0.9
22/04/2019	13	448641.08	7714457.78	188.7	9044.5	609.1	244.4	432.0	4938.6	485.9	143.5	154.1	4105.9	123.2	100.9	277.9	217.72	4.53	1.3	0.9
22/04/2019	13	448640.81	7714457.01	189.7	8906.7	603.4	235.0	435.1	4770.1	478.0	133.8	157.1	4136.6	125.4	101.2	278.0	217.72	4.53	1.2	1.5

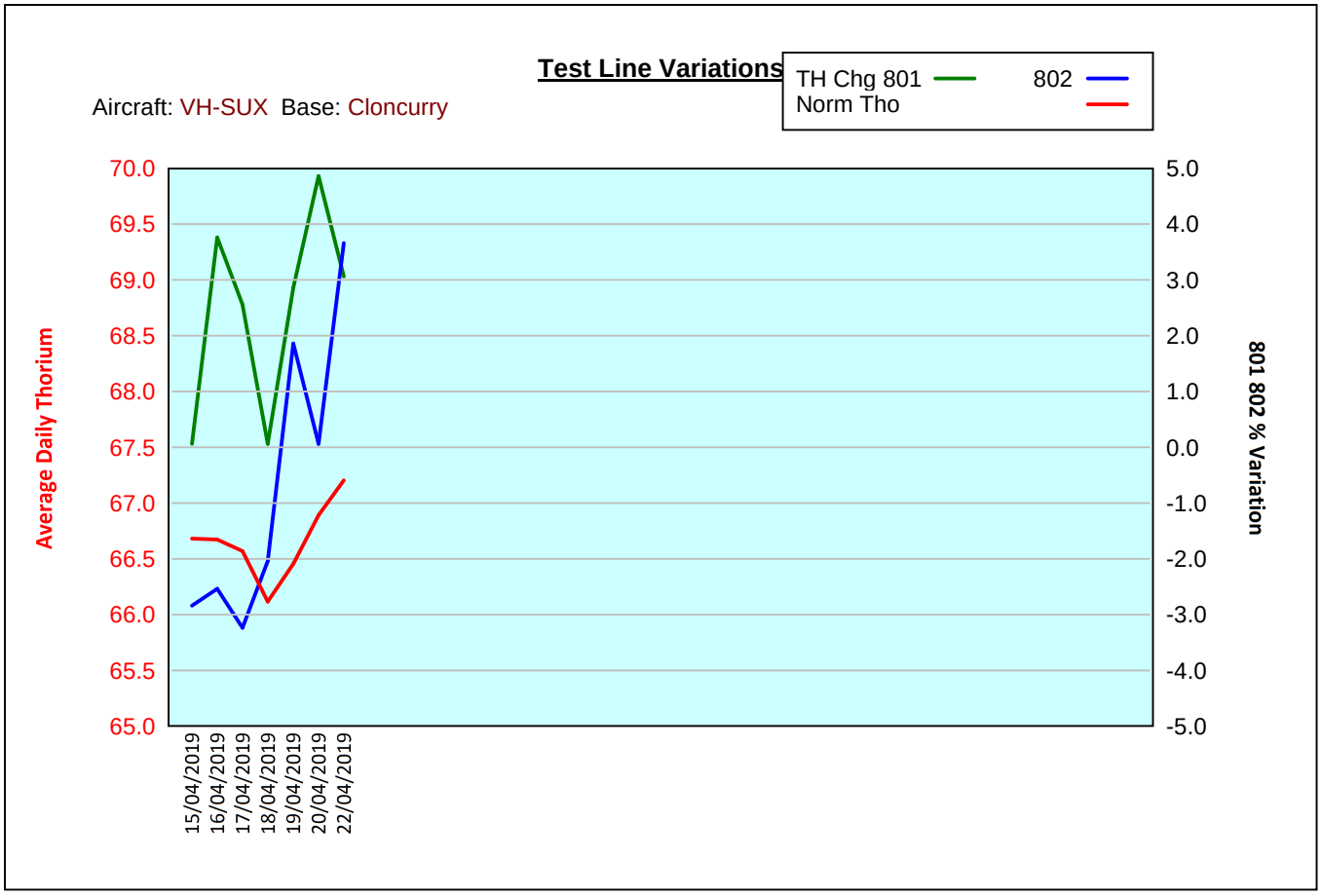
Av Normalized Th: 67.3 Min TH: 67.6 Max TH: 69.7 Standard Deviation: 2.3

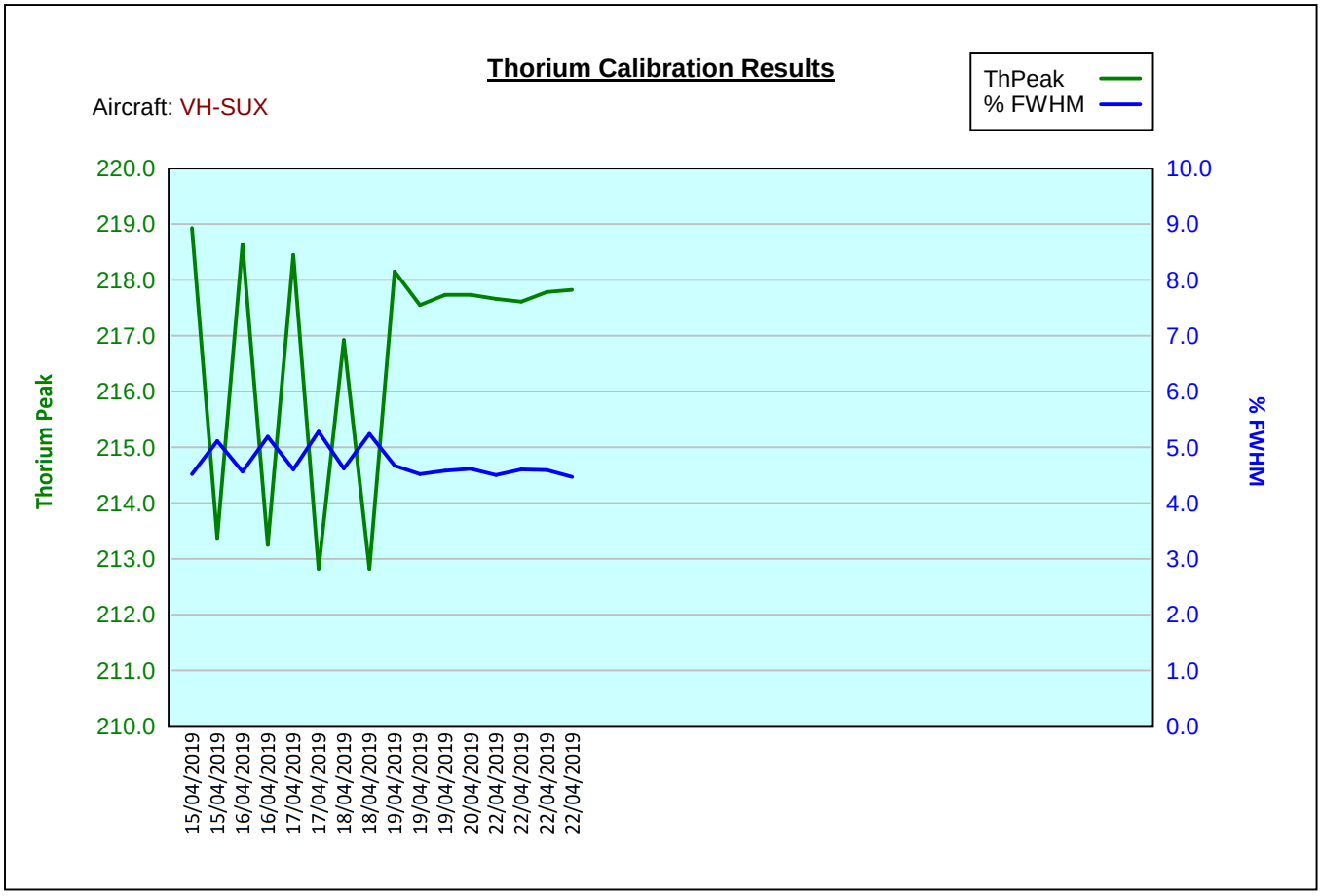
Test Lines - VH-SUX - Cloncurry												
		801				TH Chg		802				TH Chg
Date	Flt	TC	Pot	Ura	Tho	+/- 7%	Flt	TC	Pot	Ura	Tho	+/- 7%
15/04/2019	2	2059.0	209.8	54.1	67.6	0.0	3	2020.1	197.7	51.1	63.8	-2.9
16/04/2019	4	2137.2	214.2	57.7	69.4	3.7	5	2048.3	197.4	52.4	64.6	-2.6
17/04/2019	6	2082.9	210.3	55.4	68.4	2.5	7	2034.4	195.9	51.7	64.1	-3.3
18/04/2019							8	2063.0	200.7	52.6	64.7	-2.1
19/04/2019	9	2120.8	214.5	56.4	68.2	2.8	10	2066.9	210.7	52.8	67.7	1.8
20/04/2019	11	2143.7	217.3	56.4	70.1	4.8						
22/04/2019	13	2338.6	224.5	71.0	69.1	3.0	13	2200.2	213.2	66.4	69.7	3.6

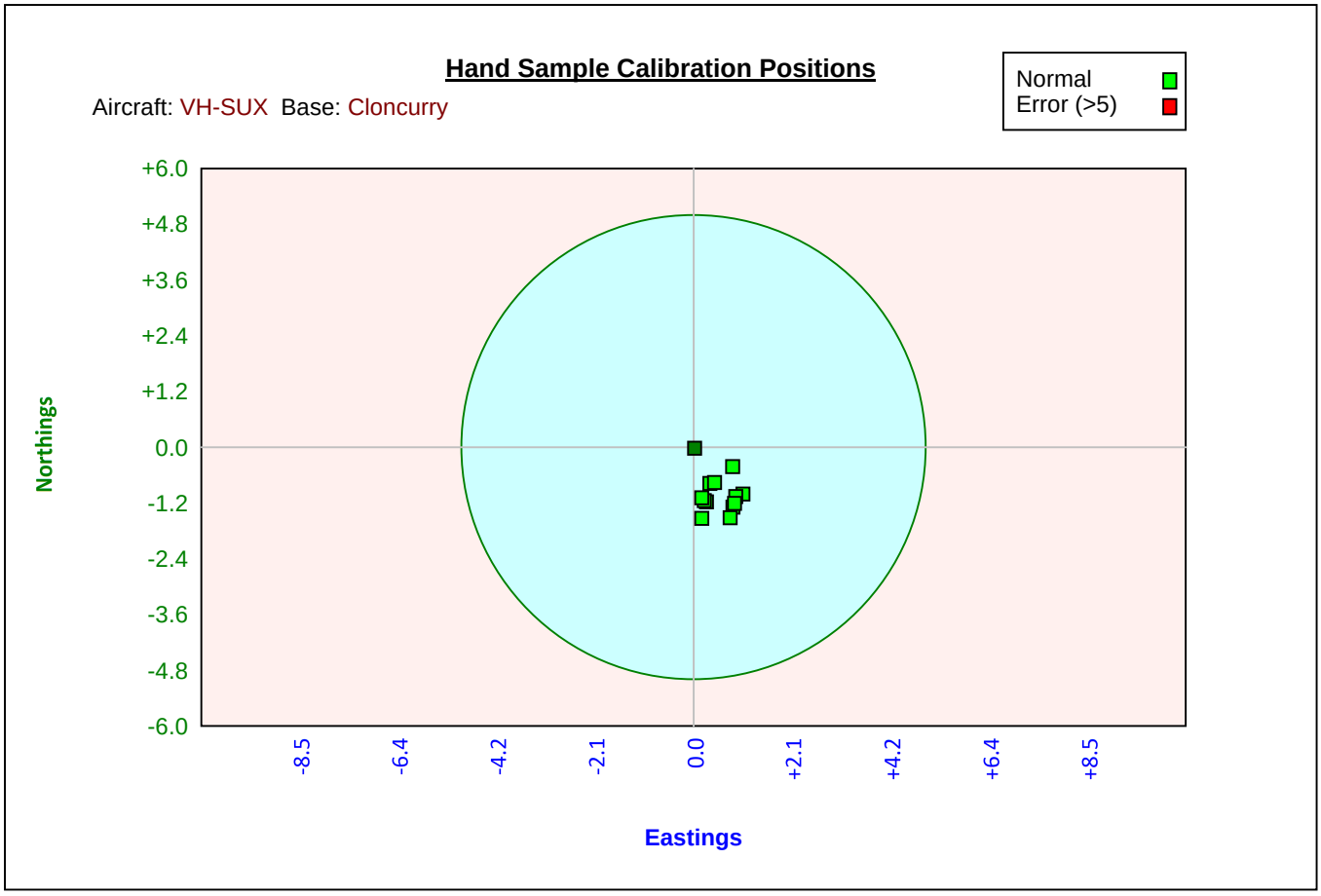
APPENDIX C

CALIBRATION AND TEST LINE VARIATION CHARTS


Sample Variations
Aircraft: VH-SUX Base: Cloncurry
Norm Tho
% Var
Average Daily Thorium
% Variation
285.0
282.5
280.0
277.5
275.0
272.5
270.0
267.5
265.0
262.5
260.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
15/04/2019
15/04/2019
16/04/2019
16/04/2019
17/04/2019
17/04/2019
18/04/2019
18/04/2019
19/04/2019
19/04/2019
20/04/2019
22/04/2019
22/04/2019


Test Line Variations
Aircraft: VH-SUX Base: Cloncurry
TH Chg 801
Norm Tho
802
Average Daily Thorium
801 802 % Variation
70.0
69.5
69.0
68.5
68.0
67.5
67.0
66.5
66.0
65.5
65.0
5.0
4.0
3.0
2.0
1.0
0.0
-1.0
-2.0
-3.0
-4.0
-5.0
15/04/2019
16/04/2019
17/04/2019
18/04/2019
19/04/2019
20/04/2019
22/04/2019


Thorium Calibration Results
Aircraft: VH-SUX
ThPeak
% FWHM
Thorium Peak
% FWHM
220.0
219.0
218.0
217.0
216.0
215.0
214.0
213.0
212.0
211.0
210.0
10.0
9.0
8.0
7.0
6.0
5.0
4.0
3.0
2.0
1.0
0.0
15/04/2019
15/04/2019
16/04/2019
16/04/2019
17/04/2019
17/04/2019
18/04/2019
18/04/2019
19/04/2019
19/04/2019
20/04/2019
22/04/2019
22/04/2019
22/04/2019
22/04/2019

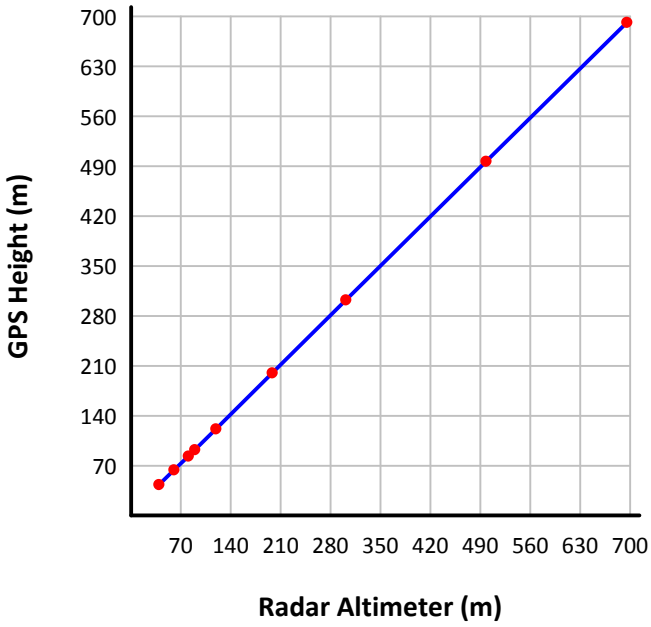

Hand Sample Calibration Positions
Aircraft: VH-SUX Base: Cloncurry
Normal
Error (>5)
+6.0
+4.8
+3.6
+2.4
+1.2
0.0
-1.2
-2.4
-3.6
-4.8
-6.0
Northings
-8.5
-6.4
-4.2
-2.1
0.0
+2.1
+4.2
+6.4
+8.5
Eastings

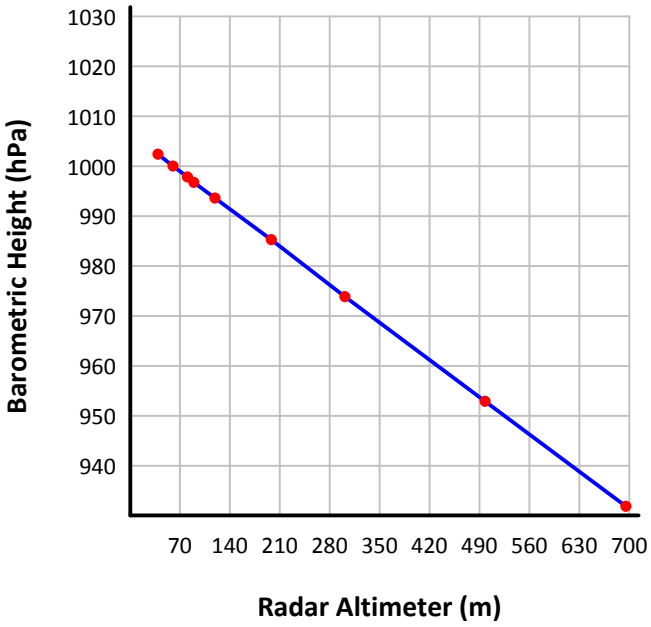
APPENDIX D

RADAR ALTIMETER AND BAROMETRIC ALTIMETER CHECKS

VH-SUX

Radar Altimeter (m)	Barometric Height (hPa)	GPS Height (m)
39.25	1002.41	43.51
60.44	999.99	63.82
80.71	997.83	83.44
89.53	996.74	92.44
119.14	993.63	121.58
198.27	985.23	199.82
301.44	973.86	302.32
498.06	952.86	496.68
695.87	931.83	691.58





Calibration flights for VH-SUX were performed within the last 12 months

APPENDIX E

BOUNDARY COORDINATES

North Block, Datum: GDA 94, Zone: 54

Eastings	Northings	Eastings	Northings
510469.58	7609764.16	515583.44	7547038.60
513919.44	7609761.57	510428.86	7547042.90
513917.85	7607916.87	510430.04	7548887.71
517367.31	7607913.54	508711.64	7548888.77
517365.32	7606068.84	508716.53	7558112.77
520814.38	7606064.77	506997.10	7558113.64
520811.98	7604220.06	506998.64	7561803.22
524260.69	7604215.26	505278.81	7561803.90
524257.90	7602370.54	505280.09	7565493.40
527706.21	7602364.98	508720.53	7565491.86
527699.83	7598675.54	508721.56	7567336.60
529423.60	7598672.48	507001.14	7567337.47
529420.21	7596827.76	507003.65	7572871.68
527696.64	7596830.82	508724.65	7572870.83
527693.45	7594986.09	508726.70	7576560.29
524246.71	7594991.66	507005.31	7576561.14
524241.22	7591302.21	507004.48	7574716.41
525964.19	7591299.51	505283.28	7574717.08
525958.30	7587610.06	503562.12	7574717.56
524235.74	7587612.74	503562.55	7576562.28
524227.49	7582078.52	505283.91	7576561.80
525949.44	7582075.83	505284.55	7578406.52
525946.48	7580231.08	503562.98	7578407.01
524224.73	7580233.78	503563.40	7580251.74
524216.37	7574699.52	503563.82	7582096.48
522495.26	7574702.06	505285.80	7582095.00
522487.50	7569167.76	507007.77	7582095.34
520766.89	7569170.12	508729.74	7582094.49
520754.95	7559946.26	508732.75	7587628.68
522474.44	7559943.86	510455.31	7587627.65
522469.22	7556254.28	510469.58	7609764.16
522464.00	7552564.68		
519026.47	7552569.22		
519035.28	7559948.39		
519037.47	7561793.17		
513877.97	7561798.61		
513873.20	7556264.25		
515592.43	7556262.62		

South Block, Datum: GDA 94, Zone: 54

Eastings	Northings	Eastings	Northings
500119.87	7530442.93	510412.87	7523060.12
501836.19	7530442.84	512128.38	7523058.88
503552.50	7530442.56	512129.80	7524903.73
503552.90	7532287.40	510414.09	7524904.97
503553.31	7534132.23	508698.39	7524906.03
501836.57	7534132.52	508699.40	7526750.88
500119.84	7534132.61	506983.50	7526751.74
500119.84	7535977.45	506982.69	7524906.89
500119.82	7537822.28	506981.87	7523062.04
500119.81	7539667.11	505266.37	7523062.71
501837.16	7539667.01	505265.76	7521217.86
501837.36	7541511.83	503550.50	7521218.31
501837.56	7543356.65	501835.23	7521218.57
503555.32	7543356.35	500119.96	7521218.64
505273.10	7543355.87	500119.94	7523063.51
505272.48	7541511.05	500119.93	7524908.37
505271.87	7539666.24	500119.90	7526753.23
506989.24	7539665.56	500119.88	7528598.08
508706.60	7539664.70		
510423.97	7539663.64		
510422.72	7537818.82		
512139.88	7537817.58		
513857.04	7537816.15		
515574.20	7537814.53		
517291.36	7537812.72		
517295.50	7541502.36		
522448.17	7541495.81		
522426.71	7526737.12		
522424.07	7524892.26		
522421.43	7523047.41		
520705.90	7523049.80		
520703.46	7521204.94		
518988.15	7521207.14		
517272.85	7521209.15		
515557.56	7521210.96		
513842.25	7521212.59		
512126.95	7521214.02		
510411.65	7521215.27		

APPENDIX F

LINE SPECIFICATIONS

Line Specifications Header Descriptions

Line	Line number
Type	Traverse or tie line
Easting	Line start easting co-ordinate
Northing	Line start northing co-ordinate
Easting	Line end easting co-ordinate
Northing	Line end northing co-ordinate
Direc	Line orientation (Degrees)
Length	Individual line length (km)
Tv Cumul	Traverse lines total cumulative distance (km)
Ti Cumul	Tie lines total cumulative distance (km)

North Block

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
100010	Trav	510228.73	7546873.44	515783.25	7546873.44	90.0	5.6	5.6	0.0
100020	Trav	510228.86	7547073.44	515783.45	7547073.44	90.0	5.6	11.1	0.0
100030	Trav	510228.99	7547273.44	515783.64	7547273.44	90.0	5.6	16.7	0.0
100040	Trav	510229.12	7547473.44	515783.84	7547473.44	90.0	5.6	22.2	0.0
100050	Trav	510229.25	7547673.44	515784.03	7547673.44	90.0	5.6	27.8	0.0
100060	Trav	510229.37	7547873.44	515784.23	7547873.44	90.0	5.6	33.3	0.0
100070	Trav	510229.50	7548073.44	515784.43	7548073.44	90.0	5.6	38.9	0.0
100080	Trav	510229.63	7548273.44	515784.62	7548273.44	90.0	5.6	44.4	0.0
100090	Trav	510229.76	7548473.44	515784.82	7548473.44	90.0	5.6	50.0	0.0
100100	Trav	508511.62	7548673.44	515785.01	7548673.44	90.0	7.3	57.3	0.0
100110	Trav	508511.63	7548873.44	515785.21	7548873.44	90.0	7.3	64.5	0.0
100120	Trav	508511.73	7549073.44	515785.40	7549073.44	90.0	7.3	71.8	0.0
100130	Trav	508511.84	7549273.44	515785.60	7549273.44	90.0	7.3	79.1	0.0
100140	Trav	508511.95	7549473.44	515785.79	7549473.44	90.0	7.3	86.4	0.0
100150	Trav	508512.05	7549673.44	515785.99	7549673.44	90.0	7.3	93.6	0.0
100160	Trav	508512.16	7549873.44	515786.18	7549873.44	90.0	7.3	100.9	0.0
100170	Trav	508512.26	7550073.44	515786.38	7550073.44	90.0	7.3	108.2	0.0
100180	Trav	508512.37	7550273.44	515786.57	7550273.44	90.0	7.3	115.5	0.0
100190	Trav	508512.47	7550473.44	515786.77	7550473.44	90.0	7.3	122.7	0.0
100200	Trav	508512.58	7550673.44	515786.96	7550673.44	90.0	7.3	130.0	0.0
100210	Trav	508512.69	7550873.44	515787.16	7550873.44	90.0	7.3	137.3	0.0
100220	Trav	508512.79	7551073.44	515787.35	7551073.44	90.0	7.3	144.6	0.0
100230	Trav	508512.90	7551273.44	515787.55	7551273.44	90.0	7.3	151.8	0.0
100240	Trav	508513.00	7551473.44	515787.74	7551473.44	90.0	7.3	159.1	0.0
100250	Trav	508513.11	7551673.44	515787.94	7551673.44	90.0	7.3	166.4	0.0
100260	Trav	508513.21	7551873.44	515788.13	7551873.44	90.0	7.3	173.7	0.0
100270	Trav	508513.32	7552073.44	515788.33	7552073.44	90.0	7.3	180.9	0.0
100280	Trav	508513.43	7552273.44	515788.52	7552273.44	90.0	7.3	188.2	0.0
100290	Trav	508513.53	7552473.44	522663.85	7552473.44	90.0	14.2	202.4	0.0
100300	Trav	508513.64	7552673.44	522664.13	7552673.44	90.0	14.2	216.5	0.0
100310	Trav	508513.74	7552873.44	522664.41	7552873.44	90.0	14.2	230.7	0.0
100320	Trav	508513.85	7553073.44	522664.69	7553073.44	90.0	14.2	244.8	0.0
100330	Trav	508513.96	7553273.44	522664.97	7553273.44	90.0	14.2	259.0	0.0
100340	Trav	508514.06	7553473.44	522665.25	7553473.44	90.0	14.2	273.1	0.0
100350	Trav	508514.17	7553673.44	522665.53	7553673.44	90.0	14.2	287.3	0.0
100360	Trav	508514.27	7553873.44	522665.81	7553873.44	90.0	14.2	301.4	0.0
100370	Trav	508514.38	7554073.44	522666.09	7554073.44	90.0	14.2	315.6	0.0
100380	Trav	508514.48	7554273.44	522666.37	7554273.44	90.0	14.2	329.7	0.0
100390	Trav	508514.59	7554473.44	522666.65	7554473.44	90.0	14.2	343.9	0.0
100400	Trav	508514.70	7554673.44	522666.93	7554673.44	90.0	14.2	358.0	0.0
100410	Trav	508514.80	7554873.44	522667.21	7554873.44	90.0	14.2	372.2	0.0
100420	Trav	508514.91	7555073.44	522667.49	7555073.44	90.0	14.2	386.3	0.0
100430	Trav	508515.01	7555273.44	522667.77	7555273.44	90.0	14.2	400.5	0.0
100440	Trav	508515.12	7555473.44	522668.05	7555473.44	90.0	14.2	414.6	0.0
100450	Trav	508515.23	7555673.44	522668.33	7555673.44	90.0	14.2	428.8	0.0
100460	Trav	508515.33	7555873.44	522668.61	7555873.44	90.0	14.2	442.9	0.0
100470	Trav	508515.44	7556073.44	522668.89	7556073.44	90.0	14.2	457.1	0.0
100480	Trav	508515.54	7556273.44	522669.16	7556273.44	90.0	14.2	471.2	0.0
100490	Trav	508515.65	7556473.44	522669.44	7556473.44	90.0	14.2	485.4	0.0
100500	Trav	508515.75	7556673.44	522669.79	7556673.44	90.0	14.2	499.6	0.0
100510	Trav	508515.86	7556873.44	522670.08	7556873.44	90.0	14.2	513.7	0.0
100520	Trav	508515.97	7557073.44	522670.36	7557073.44	90.0	14.2	527.9	0.0
100530	Trav	508516.07	7557273.44	522670.64	7557273.44	90.0	14.2	542.0	0.0
100540	Trav	508516.18	7557473.44	522670.93	7557473.44	90.0	14.2	556.2	0.0
100550	Trav	508516.28	7557673.44	522671.21	7557673.44	90.0	14.2	570.3	0.0
100560	Trav	508516.39	7557873.44	522671.50	7557873.44	90.0	14.2	584.5	0.0
100570	Trav	506797.08	7558073.44	522671.78	7558073.44	90.0	15.9	600.4	0.0
100580	Trav	506797.16	7558273.44	522672.06	7558273.44	90.0	15.9	616.2	0.0
100590	Trav	506797.24	7558473.44	522672.35	7558473.44	90.0	15.9	632.1	0.0
100600	Trav	506797.33	7558673.44	522672.63	7558673.44	90.0	15.9	648.0	0.0
100610	Trav	506797.41	7558873.44	522672.91	7558873.44	90.0	15.9	663.9	0.0
100620	Trav	506797.49	7559073.44	522673.20	7559073.44	90.0	15.9	679.7	0.0
100630	Trav	506797.58	7559273.44	522673.48	7559273.44	90.0	15.9	695.6	0.0
100640	Trav	506797.66	7559473.44	522673.77	7559473.44	90.0	15.9	711.5	0.0
100650	Trav	506797.74	7559673.44	522674.05	7559673.44	90.0	15.9	727.4	0.0

North Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
100660	Trav	506797.83	7559873.44	522675.16	7559873.44	90.0	15.9	743.2	0.0
100670	Trav	506797.91	7560073.44	522675.46	7560073.44	90.0	15.9	759.1	0.0
100680	Trav	506797.99	7560273.44	520955.79	7560273.44	90.0	14.2	773.3	0.0
100690	Trav	506798.08	7560473.44	520956.03	7560473.44	90.0	14.2	787.4	0.0
100700	Trav	506798.16	7560673.44	520956.27	7560673.44	90.0	14.2	801.6	0.0
100710	Trav	506798.25	7560873.44	520956.50	7560873.44	90.0	14.2	815.7	0.0
100720	Trav	506798.33	7561073.44	520956.74	7561073.44	90.0	14.2	829.9	0.0
100730	Trav	506798.41	7561273.44	520956.98	7561273.44	90.0	14.2	844.1	0.0
100740	Trav	506798.50	7561473.44	520957.22	7561473.44	90.0	14.2	858.2	0.0
100750	Trav	505078.74	7561673.44	520957.45	7561673.44	90.0	15.9	874.1	0.0
100760	Trav	505078.81	7561873.44	520957.69	7561873.44	90.0	15.9	890.0	0.0
100770	Trav	505078.88	7562073.44	520957.93	7562073.44	90.0	15.9	905.9	0.0
100780	Trav	505078.95	7562273.44	520958.16	7562273.44	90.0	15.9	921.7	0.0
100790	Trav	505079.02	7562473.44	520958.40	7562473.44	90.0	15.9	937.6	0.0
100800	Trav	505079.09	7562673.44	520958.64	7562673.44	90.0	15.9	953.5	0.0
100810	Trav	505079.16	7562873.44	520958.88	7562873.44	90.0	15.9	969.4	0.0
100820	Trav	505079.23	7563073.44	520959.11	7563073.44	90.0	15.9	985.3	0.0
100830	Trav	505079.30	7563273.44	520959.35	7563273.44	90.0	15.9	1001.1	0.0
100840	Trav	505079.37	7563473.44	520959.59	7563473.44	90.0	15.9	1017.0	0.0
100850	Trav	505079.44	7563673.44	520959.82	7563673.44	90.0	15.9	1032.9	0.0
100860	Trav	505079.51	7563873.44	520960.06	7563873.44	90.0	15.9	1048.8	0.0
100870	Trav	505079.58	7564073.44	520960.30	7564073.44	90.0	15.9	1064.7	0.0
100880	Trav	505079.65	7564273.44	520960.54	7564273.44	90.0	15.9	1080.5	0.0
100890	Trav	505079.72	7564473.44	520960.77	7564473.44	90.0	15.9	1096.4	0.0
100900	Trav	505079.79	7564673.44	520961.01	7564673.44	90.0	15.9	1112.3	0.0
100910	Trav	505079.86	7564873.44	520961.25	7564873.44	90.0	15.9	1128.2	0.0
100920	Trav	505079.93	7565073.44	520961.48	7565073.44	90.0	15.9	1144.1	0.0
100930	Trav	505080.00	7565273.44	520961.72	7565273.44	90.0	15.9	1159.9	0.0
100940	Trav	505080.07	7565473.44	520961.96	7565473.44	90.0	15.9	1175.8	0.0
100950	Trav	505080.14	7565673.44	520962.20	7565673.44	90.0	15.9	1191.7	0.0
100960	Trav	508265.44	7565873.44	520962.43	7565873.44	90.0	12.7	1204.4	0.0
100970	Trav	508265.55	7566073.44	520962.67	7566073.44	90.0	12.7	1217.1	0.0
100980	Trav	508265.66	7566273.44	520962.91	7566273.44	90.0	12.7	1229.8	0.0
100990	Trav	508265.77	7566473.44	520963.14	7566473.44	90.0	12.7	1242.5	0.0
101000	Trav	508265.88	7566673.44	520963.38	7566673.44	90.0	12.7	1255.2	0.0
101010	Trav	508265.99	7566873.44	520963.62	7566873.44	90.0	12.7	1267.9	0.0
101020	Trav	508266.10	7567073.44	520963.86	7567073.44	90.0	12.7	1280.6	0.0
101030	Trav	506801.10	7567273.44	520964.09	7567273.44	90.0	14.2	1294.8	0.0
101040	Trav	506801.19	7567473.44	520964.33	7567473.44	90.0	14.2	1308.9	0.0
101050	Trav	506801.28	7567673.44	520964.57	7567673.44	90.0	14.2	1323.1	0.0
101060	Trav	506801.37	7567873.44	520964.80	7567873.44	90.0	14.2	1337.2	0.0
101070	Trav	506801.46	7568073.44	520965.04	7568073.44	90.0	14.2	1351.4	0.0
101080	Trav	506801.55	7568273.44	520965.28	7568273.44	90.0	14.2	1365.6	0.0
101090	Trav	506801.65	7568473.44	520965.52	7568473.44	90.0	14.2	1379.7	0.0
101100	Trav	506801.74	7568673.44	520965.75	7568673.44	90.0	14.2	1393.9	0.0
101110	Trav	506801.83	7568873.44	520965.99	7568873.44	90.0	14.2	1408.1	0.0
101120	Trav	506801.92	7569073.44	522686.36	7569073.44	90.0	15.9	1423.9	0.0
101130	Trav	506802.01	7569273.44	522686.60	7569273.44	90.0	15.9	1439.8	0.0
101140	Trav	506802.10	7569473.44	522686.84	7569473.44	90.0	15.9	1455.7	0.0
101150	Trav	506802.19	7569673.44	522687.08	7569673.44	90.0	15.9	1471.6	0.0
101160	Trav	506802.28	7569873.44	522687.31	7569873.44	90.0	15.9	1487.5	0.0
101170	Trav	506802.37	7570073.44	522687.55	7570073.44	90.0	15.9	1503.4	0.0
101180	Trav	506802.46	7570273.44	522687.79	7570273.44	90.0	15.9	1519.3	0.0
101190	Trav	506802.55	7570473.44	522688.03	7570473.44	90.0	15.9	1535.1	0.0
101200	Trav	506802.64	7570673.44	522688.26	7570673.44	90.0	15.9	1551.0	0.0
101210	Trav	506802.73	7570873.44	522688.50	7570873.44	90.0	15.9	1566.9	0.0
101220	Trav	506802.82	7571073.44	522688.74	7571073.44	90.0	15.9	1582.8	0.0
101230	Trav	506802.91	7571273.44	522688.98	7571273.44	90.0	15.9	1598.7	0.0
101240	Trav	506803.01	7571473.44	522689.22	7571473.44	90.0	15.9	1614.6	0.0
101250	Trav	506803.10	7571673.44	522689.45	7571673.44	90.0	15.9	1630.5	0.0
101260	Trav	506803.19	7571873.44	522689.69	7571873.44	90.0	15.9	1646.3	0.0
101270	Trav	506803.28	7572073.44	522689.93	7572073.44	90.0	15.9	1662.2	0.0
101280	Trav	506803.37	7572273.44	522690.17	7572273.44	90.0	15.9	1678.1	0.0
101290	Trav	506803.46	7572473.44	522690.40	7572473.44	90.0	15.9	1694.0	0.0
101300	Trav	506803.55	7572673.44	522690.64	7572673.44	90.0	15.9	1709.9	0.0

North Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
101310	Trav	506803.64	7572873.44	522690.88	7572873.44	90.0	15.9	1725.8	0.0
101320	Trav	506800.70	7573073.44	522691.12	7573073.44	90.0	15.9	1741.7	0.0
101330	Trav	508258.53	7573273.44	522691.36	7573273.44	90.0	14.4	1756.1	0.0
101340	Trav	508258.64	7573473.44	522691.59	7573473.44	90.0	14.4	1770.5	0.0
101350	Trav	508258.76	7573673.44	522691.83	7573673.44	90.0	14.4	1785.0	0.0
101360	Trav	508258.87	7573873.44	522692.07	7573873.44	90.0	14.4	1799.4	0.0
101370	Trav	508258.98	7574073.44	522692.31	7574073.44	90.0	14.4	1813.8	0.0
101380	Trav	508259.09	7574273.44	522692.54	7574273.44	90.0	14.4	1828.3	0.0
101390	Trav	508259.20	7574473.44	524415.99	7574473.44	90.0	16.2	1844.4	0.0
101400	Trav	503362.09	7574673.44	524416.30	7574673.44	90.0	21.1	1865.5	0.0
101410	Trav	503362.14	7574873.44	524416.60	7574873.44	90.0	21.1	1886.5	0.0
101420	Trav	503362.18	7575073.44	524416.90	7575073.44	90.0	21.1	1907.6	0.0
101430	Trav	503362.23	7575273.44	524417.20	7575273.44	90.0	21.1	1928.6	0.0
101440	Trav	503362.28	7575473.44	524417.51	7575473.44	90.0	21.1	1949.7	0.0
101450	Trav	503362.33	7575673.44	524417.81	7575673.44	90.0	21.1	1970.8	0.0
101460	Trav	503362.38	7575873.44	524418.11	7575873.44	90.0	21.1	1991.8	0.0
101470	Trav	503362.42	7576073.44	524418.42	7576073.44	90.0	21.1	2012.9	0.0
101480	Trav	503362.47	7576273.44	524418.72	7576273.44	90.0	21.1	2033.9	0.0
101490	Trav	503362.52	7576473.44	524419.02	7576473.44	90.0	21.1	2055.0	0.0
101500	Trav	503362.57	7576673.44	524419.33	7576673.44	90.0	21.1	2076.0	0.0
101510	Trav	505084.94	7576873.44	524419.63	7576873.44	90.0	19.3	2095.4	0.0
101520	Trav	505085.01	7577073.44	524419.93	7577073.44	90.0	19.3	2114.7	0.0
101530	Trav	505085.08	7577273.44	524420.24	7577273.44	90.0	19.3	2134.0	0.0
101540	Trav	505085.15	7577473.44	524420.54	7577473.44	90.0	19.3	2153.4	0.0
101550	Trav	505085.22	7577673.44	524420.84	7577673.44	90.0	19.3	2172.7	0.0
101560	Trav	505085.28	7577873.44	524421.15	7577873.44	90.0	19.3	2192.0	0.0
101570	Trav	505085.35	7578073.44	524421.45	7578073.44	90.0	19.3	2211.4	0.0
101580	Trav	503362.93	7578273.44	524421.75	7578273.44	90.0	21.1	2232.4	0.0
101590	Trav	503362.97	7578473.44	524422.06	7578473.44	90.0	21.1	2253.5	0.0
101600	Trav	503363.02	7578673.44	524422.36	7578673.44	90.0	21.1	2274.6	0.0
101610	Trav	503363.06	7578873.44	524422.66	7578873.44	90.0	21.1	2295.6	0.0
101620	Trav	503363.11	7579073.44	524422.96	7579073.44	90.0	21.1	2316.7	0.0
101630	Trav	503363.16	7579273.44	524423.27	7579273.44	90.0	21.1	2337.7	0.0
101640	Trav	503363.20	7579473.44	524423.57	7579473.44	90.0	21.1	2358.8	0.0
101650	Trav	503363.25	7579673.44	524423.87	7579673.44	90.0	21.1	2379.9	0.0
101660	Trav	503363.30	7579873.44	524424.18	7579873.44	90.0	21.1	2400.9	0.0
101670	Trav	503363.34	7580073.44	526146.22	7580073.44	90.0	22.8	2423.7	0.0
101680	Trav	503363.39	7580273.44	526146.54	7580273.44	90.0	22.8	2446.5	0.0
101690	Trav	503363.44	7580473.44	526146.86	7580473.44	90.0	22.8	2469.3	0.0
101700	Trav	503363.48	7580673.44	526147.18	7580673.44	90.0	22.8	2492.1	0.0
101710	Trav	503363.53	7580873.44	526147.50	7580873.44	90.0	22.8	2514.8	0.0
101720	Trav	503363.58	7581073.44	526147.82	7581073.44	90.0	22.8	2537.6	0.0
101730	Trav	503363.62	7581273.44	526148.14	7581273.44	90.0	22.8	2560.4	0.0
101740	Trav	503363.67	7581473.44	526148.46	7581473.44	90.0	22.8	2583.2	0.0
101750	Trav	503363.72	7581673.44	526148.78	7581673.44	90.0	22.8	2606.0	0.0
101760	Trav	503363.76	7581873.44	526149.11	7581873.44	90.0	22.8	2628.8	0.0
101770	Trav	503363.81	7582073.44	526149.43	7582073.44	90.0	22.8	2651.6	0.0
101780	Trav	503363.85	7582273.44	526149.75	7582273.44	90.0	22.8	2674.3	0.0
101790	Trav	508529.94	7582473.44	524428.07	7582473.44	90.0	15.9	2690.2	0.0
101800	Trav	508530.05	7582673.44	524428.37	7582673.44	90.0	15.9	2706.1	0.0
101810	Trav	508530.15	7582873.44	524428.67	7582873.44	90.0	15.9	2722.0	0.0
101820	Trav	508530.26	7583073.44	524428.96	7583073.44	90.0	15.9	2737.9	0.0
101830	Trav	508530.37	7583273.44	524429.26	7583273.44	90.0	15.9	2753.8	0.0
101840	Trav	508530.48	7583473.44	524429.56	7583473.44	90.0	15.9	2769.7	0.0
101850	Trav	508530.59	7583673.44	524429.86	7583673.44	90.0	15.9	2785.6	0.0
101860	Trav	508530.70	7583873.44	524430.16	7583873.44	90.0	15.9	2801.5	0.0
101870	Trav	508530.81	7584073.44	524430.45	7584073.44	90.0	15.9	2817.4	0.0
101880	Trav	508530.92	7584273.44	524430.75	7584273.44	90.0	15.9	2833.3	0.0
101890	Trav	508531.03	7584473.44	524431.05	7584473.44	90.0	15.9	2849.2	0.0
101900	Trav	508531.13	7584673.44	524431.35	7584673.44	90.0	15.9	2865.1	0.0
101910	Trav	508531.24	7584873.44	524431.65	7584873.44	90.0	15.9	2881.0	0.0
101920	Trav	508531.35	7585073.44	524431.94	7585073.44	90.0	15.9	2896.9	0.0
101930	Trav	508531.46	7585273.44	524432.24	7585273.44	90.0	15.9	2912.8	0.0
101940	Trav	508531.57	7585473.44	524432.54	7585473.44	90.0	15.9	2928.7	0.0
101950	Trav	508531.68	7585673.44	524432.84	7585673.44	90.0	15.9	2944.6	0.0

North Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
101960	Trav	508531.79	7585873.44	524433.14	7585873.44	90.0	15.9	2960.5	0.0
101970	Trav	508531.90	7586073.44	524433.43	7586073.44	90.0	15.9	2976.4	0.0
101980	Trav	508532.00	7586273.44	524433.73	7586273.44	90.0	15.9	2992.3	0.0
101990	Trav	508532.11	7586473.44	524434.03	7586473.44	90.0	15.9	3008.2	0.0
102000	Trav	508532.22	7586673.44	524434.33	7586673.44	90.0	15.9	3024.1	0.0
102010	Trav	508532.33	7586873.44	524434.63	7586873.44	90.0	15.9	3040.0	0.0
102020	Trav	508532.44	7587073.44	524434.92	7587073.44	90.0	15.9	3055.9	0.0
102030	Trav	508532.55	7587273.44	524435.22	7587273.44	90.0	15.9	3071.8	0.0
102040	Trav	508532.66	7587473.44	526158.07	7587473.44	90.0	17.6	3089.5	0.0
102050	Trav	508532.77	7587673.44	526158.39	7587673.44	90.0	17.6	3107.1	0.0
102060	Trav	510255.45	7587873.44	526158.71	7587873.44	90.0	15.9	3123.0	0.0
102070	Trav	510255.58	7588073.44	526159.03	7588073.44	90.0	15.9	3138.9	0.0
102080	Trav	510255.71	7588273.44	526159.35	7588273.44	90.0	15.9	3154.8	0.0
102090	Trav	510255.84	7588473.44	526159.67	7588473.44	90.0	15.9	3170.7	0.0
102100	Trav	510255.97	7588673.44	526159.99	7588673.44	90.0	15.9	3186.6	0.0
102110	Trav	510256.10	7588873.44	526160.31	7588873.44	90.0	15.9	3202.5	0.0
102120	Trav	510256.22	7589073.44	526160.63	7589073.44	90.0	15.9	3218.4	0.0
102130	Trav	510256.35	7589273.44	526160.95	7589273.44	90.0	15.9	3234.3	0.0
102140	Trav	510256.48	7589473.44	526161.27	7589473.44	90.0	15.9	3250.2	0.0
102150	Trav	510256.61	7589673.44	526161.58	7589673.44	90.0	15.9	3266.1	0.0
102160	Trav	510256.74	7589873.44	526161.90	7589873.44	90.0	15.9	3282.0	0.0
102170	Trav	510256.87	7590073.44	526162.22	7590073.44	90.0	15.9	3297.9	0.0
102180	Trav	510257.00	7590273.44	526162.54	7590273.44	90.0	15.9	3313.9	0.0
102190	Trav	510257.13	7590473.44	526162.86	7590473.44	90.0	15.9	3329.8	0.0
102200	Trav	510257.26	7590673.44	526163.18	7590673.44	90.0	15.9	3345.7	0.0
102210	Trav	510257.39	7590873.44	526163.50	7590873.44	90.0	15.9	3361.6	0.0
102220	Trav	510257.52	7591073.44	526163.82	7591073.44	90.0	15.9	3377.5	0.0
102230	Trav	510257.64	7591273.44	526164.14	7591273.44	90.0	15.9	3393.4	0.0
102240	Trav	510257.77	7591473.44	526164.46	7591473.44	90.0	15.9	3409.3	0.0
102250	Trav	510257.90	7591673.44	524441.77	7591673.44	90.0	14.2	3423.5	0.0
102260	Trav	510258.03	7591873.44	524442.06	7591873.44	90.0	14.2	3437.7	0.0
102270	Trav	510258.16	7592073.44	524442.36	7592073.44	90.0	14.2	3451.8	0.0
102280	Trav	510258.29	7592273.44	524442.66	7592273.44	90.0	14.2	3466.0	0.0
102290	Trav	510258.42	7592473.44	524442.96	7592473.44	90.0	14.2	3480.2	0.0
102300	Trav	510258.55	7592673.44	524443.26	7592673.44	90.0	14.2	3494.4	0.0
102310	Trav	510258.68	7592873.44	524443.55	7592873.44	90.0	14.2	3508.6	0.0
102320	Trav	510258.81	7593073.44	524443.85	7593073.44	90.0	14.2	3522.8	0.0
102330	Trav	510258.94	7593273.44	524444.15	7593273.44	90.0	14.2	3537.0	0.0
102340	Trav	510259.06	7593473.44	524444.45	7593473.44	90.0	14.2	3551.1	0.0
102350	Trav	510259.19	7593673.44	524444.74	7593673.44	90.0	14.2	3565.3	0.0
102360	Trav	510259.32	7593873.44	524445.04	7593873.44	90.0	14.2	3579.5	0.0
102370	Trav	510259.45	7594073.44	524445.34	7594073.44	90.0	14.2	3593.7	0.0
102380	Trav	510259.58	7594273.44	524445.64	7594273.44	90.0	14.2	3607.9	0.0
102390	Trav	510259.71	7594473.44	524445.94	7594473.44	90.0	14.2	3622.1	0.0
102400	Trav	510259.84	7594673.44	524446.23	7594673.44	90.0	14.2	3636.3	0.0
102410	Trav	510259.97	7594873.44	527893.23	7594873.44	90.0	17.6	3653.9	0.0
102420	Trav	510260.10	7595073.44	527893.58	7595073.44	90.0	17.6	3671.5	0.0
102430	Trav	510260.23	7595273.44	527893.93	7595273.44	90.0	17.6	3689.2	0.0
102440	Trav	510260.36	7595473.44	527894.28	7595473.44	90.0	17.6	3706.8	0.0
102450	Trav	510260.48	7595673.44	527894.62	7595673.44	90.0	17.6	3724.4	0.0
102460	Trav	510260.61	7595873.44	527894.97	7595873.44	90.0	17.6	3742.1	0.0
102470	Trav	510260.74	7596073.44	527895.32	7596073.44	90.0	17.6	3759.7	0.0
102480	Trav	510260.87	7596273.44	527895.67	7596273.44	90.0	17.6	3777.3	0.0
102490	Trav	510261.00	7596473.44	527896.02	7596473.44	90.0	17.6	3795.0	0.0
102500	Trav	510261.13	7596673.44	529619.90	7596673.44	90.0	19.4	3814.3	0.0
102510	Trav	510261.26	7596873.44	529620.27	7596873.44	90.0	19.4	3833.7	0.0
102520	Trav	510261.39	7597073.44	529620.64	7597073.44	90.0	19.4	3853.0	0.0
102530	Trav	510261.52	7597273.44	529621.01	7597273.44	90.0	19.4	3872.4	0.0
102540	Trav	510261.65	7597473.44	529621.38	7597473.44	90.0	19.4	3891.8	0.0
102550	Trav	510261.78	7597673.44	529621.74	7597673.44	90.0	19.4	3911.1	0.0
102560	Trav	510261.90	7597873.44	529622.11	7597873.44	90.0	19.4	3930.5	0.0
102570	Trav	510262.03	7598073.44	529622.48	7598073.44	90.0	19.4	3949.8	0.0
102580	Trav	510262.16	7598273.44	529622.85	7598273.44	90.0	19.4	3969.2	0.0
102590	Trav	510262.29	7598473.44	529623.22	7598473.44	90.0	19.4	3988.6	0.0
102600	Trav	510262.42	7598673.44	529623.58	7598673.44	90.0	19.4	4007.9	0.0

North Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
102610	Trav	510262.55	7598873.44	529623.39	7598873.44	90.0	19.4	4027.3	0.0
102620	Trav	510262.68	7599073.44	527900.51	7599073.44	90.0	17.6	4044.9	0.0
102630	Trav	510262.81	7599273.44	527900.86	7599273.44	90.0	17.6	4062.6	0.0
102640	Trav	510262.94	7599473.44	527901.20	7599473.44	90.0	17.6	4080.2	0.0
102650	Trav	510263.07	7599673.44	527901.55	7599673.44	90.0	17.6	4097.8	0.0
102660	Trav	510263.20	7599873.44	527901.90	7599873.44	90.0	17.6	4115.5	0.0
102670	Trav	510263.33	7600073.44	527902.24	7600073.44	90.0	17.6	4133.1	0.0
102680	Trav	510263.45	7600273.44	527902.59	7600273.44	90.0	17.6	4150.8	0.0
102690	Trav	510263.58	7600473.44	527902.93	7600473.44	90.0	17.6	4168.4	0.0
102700	Trav	510263.71	7600673.44	527903.28	7600673.44	90.0	17.6	4186.0	0.0
102710	Trav	510263.84	7600873.44	527903.63	7600873.44	90.0	17.6	4203.7	0.0
102720	Trav	510263.97	7601073.44	527903.97	7601073.44	90.0	17.6	4221.3	0.0
102730	Trav	510264.10	7601273.44	527904.32	7601273.44	90.0	17.6	4238.9	0.0
102740	Trav	510264.23	7601473.44	527904.66	7601473.44	90.0	17.6	4256.6	0.0
102750	Trav	510264.36	7601673.44	527905.01	7601673.44	90.0	17.6	4274.2	0.0
102760	Trav	510264.49	7601873.44	527905.35	7601873.44	90.0	17.6	4291.9	0.0
102770	Trav	510264.62	7602073.44	527905.70	7602073.44	90.0	17.6	4309.5	0.0
102780	Trav	510264.75	7602273.44	527906.05	7602273.44	90.0	17.6	4327.2	0.0
102790	Trav	510264.87	7602473.44	527906.39	7602473.44	90.0	17.6	4344.8	0.0
102800	Trav	510265.00	7602673.44	524458.35	7602673.44	90.0	14.2	4359.0	0.0
102810	Trav	510265.13	7602873.44	524458.65	7602873.44	90.0	14.2	4373.2	0.0
102820	Trav	510265.26	7603073.44	524458.95	7603073.44	90.0	14.2	4387.4	0.0
102830	Trav	510265.39	7603273.44	524459.25	7603273.44	90.0	14.2	4401.6	0.0
102840	Trav	510265.52	7603473.44	524459.56	7603473.44	90.0	14.2	4415.8	0.0
102850	Trav	510265.65	7603673.44	524459.86	7603673.44	90.0	14.2	4430.0	0.0
102860	Trav	510265.78	7603873.44	524460.16	7603873.44	90.0	14.2	4444.2	0.0
102870	Trav	510265.91	7604073.44	524460.46	7604073.44	90.0	14.2	4458.3	0.0
102880	Trav	510266.04	7604273.44	524460.77	7604273.44	90.0	14.2	4472.5	0.0
102890	Trav	510266.17	7604473.44	521012.29	7604473.44	90.0	10.7	4483.3	0.0
102900	Trav	510266.29	7604673.44	521012.55	7604673.44	90.0	10.7	4494.0	0.0
102910	Trav	510266.42	7604873.44	521012.82	7604873.44	90.0	10.7	4504.8	0.0
102920	Trav	510266.55	7605073.44	521013.08	7605073.44	90.0	10.7	4515.5	0.0
102930	Trav	510266.68	7605273.44	521013.34	7605273.44	90.0	10.7	4526.3	0.0
102940	Trav	510266.81	7605473.44	521013.60	7605473.44	90.0	10.7	4537.0	0.0
102950	Trav	510266.94	7605673.44	521013.86	7605673.44	90.0	10.7	4547.8	0.0
102960	Trav	510267.07	7605873.44	521014.13	7605873.44	90.0	10.7	4558.5	0.0
102970	Trav	510267.20	7606073.44	521014.39	7606073.44	90.0	10.7	4569.3	0.0
102980	Trav	510267.33	7606273.44	521016.82	7606273.44	90.0	10.7	4580.0	0.0
102990	Trav	510267.46	7606473.44	517565.75	7606473.44	90.0	7.3	4587.3	0.0
103000	Trav	510267.59	7606673.44	517565.96	7606673.44	90.0	7.3	4594.6	0.0
103010	Trav	510267.71	7606873.44	517566.18	7606873.44	90.0	7.3	4601.9	0.0
103020	Trav	510267.84	7607073.44	517566.39	7607073.44	90.0	7.3	4609.2	0.0
103030	Trav	510267.97	7607273.44	517566.61	7607273.44	90.0	7.3	4616.5	0.0
103040	Trav	510268.10	7607473.44	517566.82	7607473.44	90.0	7.3	4623.8	0.0
103050	Trav	510268.23	7607673.44	517567.04	7607673.44	90.0	7.3	4631.1	0.0
103060	Trav	510268.36	7607873.44	517567.25	7607873.44	90.0	7.3	4638.4	0.0
103070	Trav	510268.49	7608073.44	517567.47	7608073.44	90.0	7.3	4645.7	0.0
103080	Trav	510268.62	7608273.44	514393.16	7608273.44	90.0	4.1	4649.8	0.0
103090	Trav	510268.75	7608473.44	514393.33	7608473.44	90.0	4.1	4653.9	0.0
103100	Trav	510268.88	7608673.44	514393.50	7608673.44	90.0	4.1	4658.1	0.0
103110	Trav	510269.01	7608873.44	514393.67	7608873.44	90.0	4.1	4662.2	0.0
103120	Trav	510269.13	7609073.44	514393.84	7609073.44	90.0	4.1	4666.3	0.0
103130	Trav	510269.26	7609273.44	514394.02	7609273.44	90.0	4.1	4670.4	0.0
103140	Trav	510269.39	7609473.44	514394.19	7609473.44	90.0	4.1	4674.6	0.0
103150	Trav	510269.52	7609673.44	514394.36	7609673.44	90.0	4.1	4678.7	0.0
103160	Trav	510269.65	7609873.44	514394.53	7609873.44	90.0	4.1	4682.8	0.0
190010	Tie	529327.32	7598971.14	529327.32	7596564.35	180.0	2.4	4682.8	2.4
190020	Tie	527829.66	7602586.30	527829.66	7594752.59	180.0	7.8	4682.8	10.2
190030	Tie	526327.31	7602585.87	526327.31	7594752.38	180.0	7.8	4682.8	18.1
190040	Tie	526066.19	7591582.32	526066.19	7579956.50	180.0	11.6	4682.8	29.7
190050	Tie	524327.32	7604384.51	524327.32	7574363.95	180.0	30.0	4682.8	59.7
190060	Tie	522327.32	7604384.51	522327.32	7552385.94	180.0	52.0	4682.8	111.7
190070	Tie	520936.85	7606377.86	520936.85	7604180.06	180.0	2.2	4682.8	113.9
190080	Tie	520327.32	7606376.96	520327.32	7552385.94	180.0	54.0	4682.8	167.9
190090	Tie	518327.32	7606376.96	518327.32	7552385.94	180.0	54.0	4682.8	221.9

North Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
190100	Tie	517453.61	7608143.80	517453.61	7606184.90	180.0	2.0	4682.8	223.9
190110	Tie	516327.32	7608153.44	516327.32	7552385.94	180.0	55.8	4682.8	279.6
190120	Tie	515703.25	7552572.13	515703.25	7546778.61	180.0	5.8	4682.8	285.4
190130	Tie	514327.32	7609956.37	514327.32	7546780.88	180.0	63.2	4682.8	348.6
190140	Tie	512327.32	7609954.09	512327.32	7546780.88	180.0	63.2	4682.8	411.8
190150	Tie	510327.32	7609954.09	510327.32	7546780.88	180.0	63.2	4682.8	474.9
190160	Tie	508612.44	7587782.28	508612.44	7582170.55	180.0	5.6	4682.8	480.6
190170	Tie	508598.17	7558155.49	508598.17	7548583.14	180.0	9.6	4682.8	490.1
190180	Tie	508327.32	7582359.76	508327.32	7557983.19	180.0	24.4	4682.8	514.5
190190	Tie	506875.91	7582359.76	506875.91	7557980.62	180.0	24.4	4682.8	538.9
190200	Tie	505327.32	7565797.06	505327.32	7561573.07	180.0	4.2	4682.8	543.1
190210	Tie	505169.80	7582359.75	505169.80	7574561.36	180.0	7.8	4682.8	550.9
190220	Tie	503449.28	7582359.75	503449.28	7574556.07	180.0	7.8	4682.8	558.7

South Block

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
200010	Trav	499919.96	7521056.85	520903.27	7521056.85	90.0	21.0	21.0	0.0
200020	Trav	499919.96	7521256.85	520903.53	7521256.85	90.0	21.0	42.0	0.0
200030	Trav	499919.95	7521456.85	520903.80	7521456.85	90.0	21.0	63.0	0.0
200040	Trav	499919.95	7521656.85	520904.06	7521656.85	90.0	21.0	83.9	0.0
200050	Trav	499919.95	7521856.85	520904.33	7521856.85	90.0	21.0	104.9	0.0
200060	Trav	499919.95	7522056.85	520904.59	7522056.85	90.0	21.0	125.9	0.0
200070	Trav	499919.95	7522256.85	520904.86	7522256.85	90.0	21.0	146.9	0.0
200080	Trav	499919.94	7522456.85	520905.12	7522456.85	90.0	21.0	167.9	0.0
200090	Trav	499919.94	7522656.85	520905.39	7522656.85	90.0	21.0	188.9	0.0
200100	Trav	499919.94	7522856.85	522621.14	7522856.85	90.0	22.7	211.6	0.0
200110	Trav	499919.94	7523056.85	522621.43	7523056.85	90.0	22.7	234.3	0.0
200120	Trav	499919.93	7523256.85	522621.72	7523256.85	90.0	22.7	257.0	0.0
200130	Trav	499919.93	7523456.85	522622.01	7523456.85	90.0	22.7	279.7	0.0
200140	Trav	499919.93	7523656.85	522622.30	7523656.85	90.0	22.7	302.4	0.0
200150	Trav	499919.93	7523856.85	522622.59	7523856.85	90.0	22.7	325.1	0.0
200160	Trav	499919.93	7524056.85	522622.88	7524056.85	90.0	22.7	347.8	0.0
200170	Trav	499919.92	7524256.85	522623.17	7524256.85	90.0	22.7	370.5	0.0
200180	Trav	499919.92	7524456.85	522623.46	7524456.85	90.0	22.7	393.2	0.0
200190	Trav	499919.92	7524656.85	522623.75	7524656.85	90.0	22.7	415.9	0.0
200200	Trav	499919.92	7524856.85	522624.04	7524856.85	90.0	22.7	438.6	0.0
200210	Trav	499919.91	7525056.85	522624.33	7525056.85	90.0	22.7	461.3	0.0
200220	Trav	499919.91	7525256.85	522624.62	7525256.85	90.0	22.7	484.0	0.0
200230	Trav	499919.91	7525456.85	522624.91	7525456.85	90.0	22.7	506.7	0.0
200240	Trav	499919.91	7525656.85	522625.20	7525656.85	90.0	22.7	529.4	0.0
200250	Trav	499919.90	7525856.85	522625.49	7525856.85	90.0	22.7	552.1	0.0
200260	Trav	499919.90	7526056.85	522625.78	7526056.85	90.0	22.7	574.8	0.0
200270	Trav	499919.90	7526256.85	522626.07	7526256.85	90.0	22.7	597.5	0.0
200280	Trav	499919.90	7526456.85	522626.36	7526456.85	90.0	22.7	620.2	0.0
200290	Trav	499919.90	7526656.85	522626.65	7526656.85	90.0	22.7	642.9	0.0
200300	Trav	499919.89	7526856.85	522626.94	7526856.85	90.0	22.7	665.6	0.0
200310	Trav	499919.89	7527056.85	522627.23	7527056.85	90.0	22.7	688.4	0.0
200320	Trav	499919.89	7527256.85	522627.52	7527256.85	90.0	22.7	711.1	0.0
200330	Trav	499919.89	7527456.85	522627.81	7527456.85	90.0	22.7	733.8	0.0
200340	Trav	499919.88	7527656.85	522628.10	7527656.85	90.0	22.7	756.5	0.0
200350	Trav	499919.88	7527856.85	522628.39	7527856.85	90.0	22.7	779.2	0.0
200360	Trav	499919.88	7528056.85	522628.68	7528056.85	90.0	22.7	801.9	0.0
200370	Trav	499919.88	7528256.85	522628.97	7528256.85	90.0	22.7	824.6	0.0
200380	Trav	499919.87	7528456.85	522629.26	7528456.85	90.0	22.7	847.3	0.0
200390	Trav	499919.87	7528656.85	522629.55	7528656.85	90.0	22.7	870.0	0.0
200400	Trav	499919.87	7528856.85	522629.84	7528856.85	90.0	22.7	892.7	0.0
200410	Trav	499919.87	7529056.85	522630.13	7529056.85	90.0	22.7	915.4	0.0
200420	Trav	499919.87	7529256.85	522630.42	7529256.85	90.0	22.7	938.2	0.0
200430	Trav	499919.86	7529456.85	522630.71	7529456.85	90.0	22.7	960.9	0.0
200440	Trav	499919.86	7529656.85	522631.00	7529656.85	90.0	22.7	983.6	0.0
200450	Trav	499919.86	7529856.85	522631.29	7529856.85	90.0	22.7	1006.3	0.0
200460	Trav	499919.86	7530056.85	522631.58	7530056.85	90.0	22.7	1029.0	0.0
200470	Trav	499919.85	7530256.85	522631.87	7530256.85	90.0	22.7	1051.7	0.0
200480	Trav	499919.85	7530456.85	522632.16	7530456.85	90.0	22.7	1074.4	0.0
200490	Trav	499918.17	7530656.85	522632.45	7530656.85	90.0	22.7	1097.1	0.0
200500	Trav	503352.58	7530856.85	522632.74	7530856.85	90.0	19.3	1116.4	0.0
200510	Trav	503352.62	7531056.85	522633.03	7531056.85	90.0	19.3	1135.7	0.0
200520	Trav	503352.67	7531256.85	522633.32	7531256.85	90.0	19.3	1155.0	0.0
200530	Trav	503352.71	7531456.85	522633.61	7531456.85	90.0	19.3	1174.3	0.0
200540	Trav	503352.76	7531656.85	522633.90	7531656.85	90.0	19.3	1193.5	0.0
200550	Trav	503352.80	7531856.85	522634.19	7531856.85	90.0	19.3	1212.8	0.0
200560	Trav	503352.84	7532056.85	522634.48	7532056.85	90.0	19.3	1232.1	0.0
200570	Trav	503352.89	7532256.85	522634.77	7532256.85	90.0	19.3	1251.4	0.0
200580	Trav	503352.93	7532456.85	522635.06	7532456.85	90.0	19.3	1270.7	0.0
200590	Trav	503352.98	7532656.85	522635.35	7532656.85	90.0	19.3	1289.9	0.0
200600	Trav	503353.02	7532856.85	522635.64	7532856.85	90.0	19.3	1309.2	0.0
200610	Trav	503353.07	7533056.85	522635.93	7533056.85	90.0	19.3	1328.5	0.0
200620	Trav	503353.11	7533256.85	522636.22	7533256.85	90.0	19.3	1347.8	0.0
200630	Trav	503353.15	7533456.85	522636.51	7533456.85	90.0	19.3	1367.1	0.0
200640	Trav	503353.20	7533656.85	522636.80	7533656.85	90.0	19.3	1386.4	0.0
200650	Trav	503353.24	7533856.85	522637.09	7533856.85	90.0	19.3	1405.6	0.0

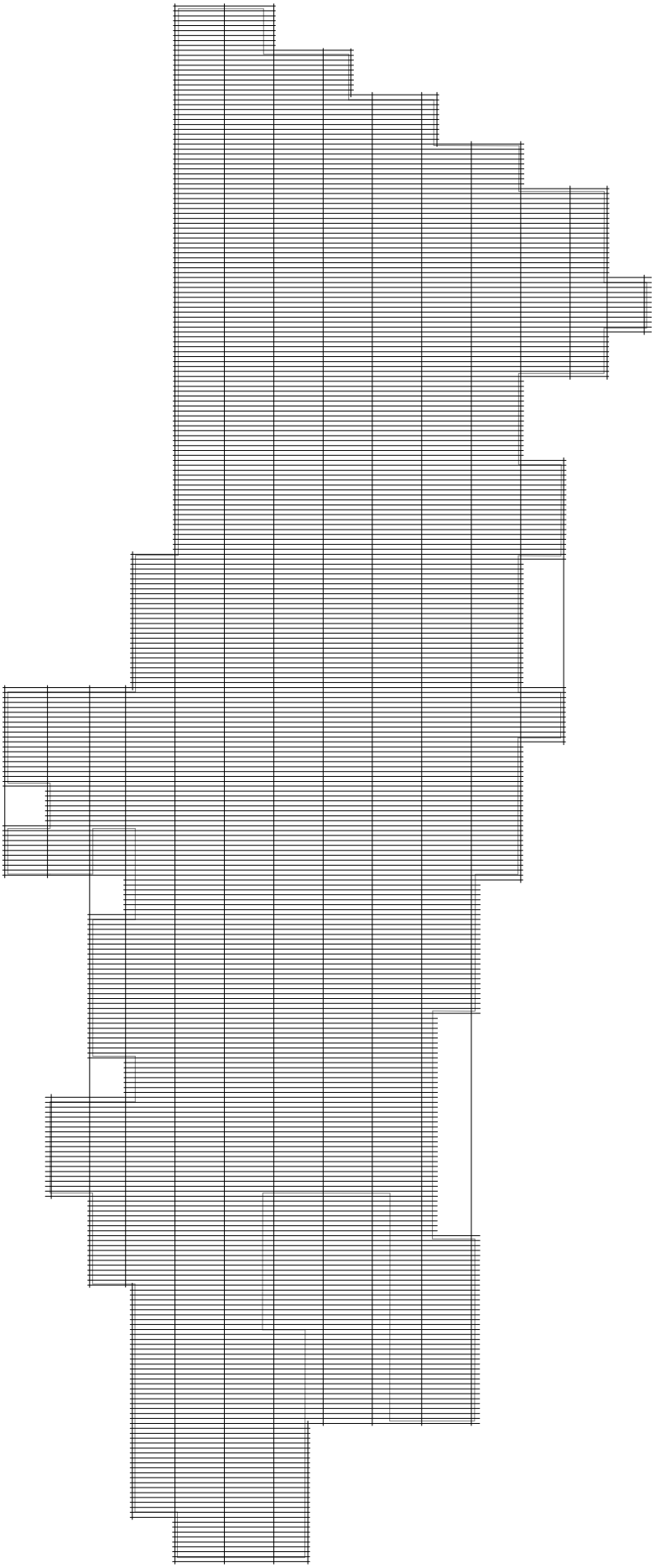
South Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
200660	Trav	499919.84	7534056.85	522637.38	7534056.85	90.0	22.7	1428.4	0.0
200670	Trav	499919.84	7534256.85	522637.67	7534256.85	90.0	22.7	1451.1	0.0
200680	Trav	499919.84	7534456.85	522637.96	7534456.85	90.0	22.7	1473.8	0.0
200690	Trav	499919.83	7534656.85	522638.25	7534656.85	90.0	22.7	1496.5	0.0
200700	Trav	499919.83	7534856.85	522638.54	7534856.85	90.0	22.7	1519.2	0.0
200710	Trav	499919.83	7535056.85	522638.83	7535056.85	90.0	22.7	1542.0	0.0
200720	Trav	499919.83	7535256.85	522639.12	7535256.85	90.0	22.7	1564.7	0.0
200730	Trav	499919.83	7535456.85	522639.41	7535456.85	90.0	22.7	1587.4	0.0
200740	Trav	499919.83	7535656.85	522639.70	7535656.85	90.0	22.7	1610.1	0.0
200750	Trav	499919.82	7535856.85	522639.99	7535856.85	90.0	22.7	1632.8	0.0
200760	Trav	499919.82	7536056.85	522640.28	7536056.85	90.0	22.7	1655.6	0.0
200770	Trav	499919.82	7536256.85	522640.57	7536256.85	90.0	22.7	1678.3	0.0
200780	Trav	499919.82	7536456.85	522640.86	7536456.85	90.0	22.7	1701.0	0.0
200790	Trav	499919.82	7536656.85	522641.15	7536656.85	90.0	22.7	1723.7	0.0
200800	Trav	499919.82	7536856.85	522641.44	7536856.85	90.0	22.7	1746.4	0.0
200810	Trav	499919.81	7537056.85	522641.73	7537056.85	90.0	22.7	1769.2	0.0
200820	Trav	499919.81	7537256.85	522642.02	7537256.85	90.0	22.7	1791.9	0.0
200830	Trav	499919.81	7537456.85	522642.31	7537456.85	90.0	22.7	1814.6	0.0
200840	Trav	499919.81	7537656.85	522642.60	7537656.85	90.0	22.7	1837.3	0.0
200850	Trav	499919.81	7537856.85	522642.89	7537856.85	90.0	22.7	1860.1	0.0
200860	Trav	499919.81	7538056.85	522643.18	7538056.85	90.0	22.7	1882.8	0.0
200870	Trav	499919.80	7538256.85	522643.47	7538256.85	90.0	22.7	1905.5	0.0
200880	Trav	499919.80	7538456.85	522643.76	7538456.85	90.0	22.7	1928.2	0.0
200890	Trav	499919.80	7538656.85	522644.05	7538656.85	90.0	22.7	1951.0	0.0
200900	Trav	499919.80	7538856.85	522644.34	7538856.85	90.0	22.7	1973.7	0.0
200910	Trav	499919.80	7539056.85	522644.63	7539056.85	90.0	22.7	1996.4	0.0
200920	Trav	499919.80	7539256.85	522644.92	7539256.85	90.0	22.7	2019.1	0.0
200930	Trav	499919.79	7539456.85	522645.21	7539456.85	90.0	22.7	2041.9	0.0
200940	Trav	499919.79	7539656.85	522645.50	7539656.85	90.0	22.7	2064.6	0.0
200950	Trav	499919.79	7539856.85	522645.78	7539856.85	90.0	22.7	2087.3	0.0
200960	Trav	501637.18	7540056.85	505471.98	7540056.85	90.0	3.8	2091.1	0.0
200970	Trav	517093.87	7540056.85	522646.07	7540056.85	90.0	5.6	2096.7	0.0
200980	Trav	501637.20	7540256.85	505472.05	7540256.85	90.0	3.8	2100.5	0.0
200990	Trav	517094.10	7540256.85	522646.36	7540256.85	90.0	5.6	2106.1	0.0
201000	Trav	501637.23	7540456.85	505472.12	7540456.85	90.0	3.8	2109.9	0.0
201010	Trav	517094.32	7540456.85	522646.65	7540456.85	90.0	5.6	2115.5	0.0
201020	Trav	501637.25	7540656.85	505472.18	7540656.85	90.0	3.8	2119.3	0.0
201030	Trav	517094.55	7540656.85	522646.94	7540656.85	90.0	5.6	2124.9	0.0
201040	Trav	501637.27	7540856.85	505472.25	7540856.85	90.0	3.8	2128.7	0.0
201050	Trav	517094.77	7540856.85	522647.23	7540856.85	90.0	5.6	2134.2	0.0
201060	Trav	501637.29	7541056.85	505472.32	7541056.85	90.0	3.8	2138.1	0.0
201070	Trav	517095.00	7541056.85	522647.52	7541056.85	90.0	5.6	2143.6	0.0
201080	Trav	501637.31	7541256.85	505472.38	7541256.85	90.0	3.8	2147.5	0.0
201090	Trav	517095.22	7541256.85	522647.81	7541256.85	90.0	5.6	2153.0	0.0
201100	Trav	501637.34	7541456.85	505472.45	7541456.85	90.0	3.8	2156.8	0.0
201110	Trav	517095.44	7541456.85	522648.10	7541456.85	90.0	5.6	2162.4	0.0
201120	Trav	501637.36	7541656.85	505472.52	7541656.85	90.0	3.8	2166.2	0.0
201130	Trav	517095.67	7541656.85	522648.39	7541656.85	90.0	5.6	2171.8	0.0
201140	Trav	501637.38	7541856.85	505472.58	7541856.85	90.0	3.8	2175.6	0.0
201150	Trav	501637.40	7542056.85	505472.65	7542056.85	90.0	3.8	2179.5	0.0
201160	Trav	501637.43	7542256.85	505472.72	7542256.85	90.0	3.8	2183.3	0.0
201170	Trav	501637.45	7542456.85	505472.78	7542456.85	90.0	3.8	2187.1	0.0
201180	Trav	501637.47	7542656.85	505472.85	7542656.85	90.0	3.8	2191.0	0.0
201190	Trav	501637.49	7542856.85	505472.92	7542856.85	90.0	3.8	2194.8	0.0
201200	Trav	501637.51	7543056.85	505472.98	7543056.85	90.0	3.8	2198.6	0.0
201210	Trav	501637.54	7543256.85	505473.05	7543256.85	90.0	3.8	2202.5	0.0
201220	Trav	501637.56	7543456.85	505473.12	7543456.85	90.0	3.8	2206.3	0.0
290010	Tie	522522.96	7541739.89	522522.96	7522779.44	180.0	19.0	2206.3	19.0
290020	Tie	520522.96	7541739.89	520522.96	7520978.70	180.0	20.8	2206.3	39.7
290030	Tie	518522.96	7541739.89	518522.96	7520978.70	180.0	20.8	2206.3	60.5
290040	Tie	517186.97	7541742.03	517186.97	7539783.61	180.0	2.0	2206.3	62.4
290050	Tie	516522.96	7539936.78	516522.96	7520978.70	180.0	19.0	2206.3	81.4
290060	Tie	514522.96	7539936.78	514522.96	7520978.70	180.0	19.0	2206.3	100.4
290070	Tie	512522.96	7539936.78	512522.96	7520978.70	180.0	19.0	2206.3	119.3
290080	Tie	510522.96	7539935.75	510522.96	7520982.48	180.0	19.0	2206.3	138.3

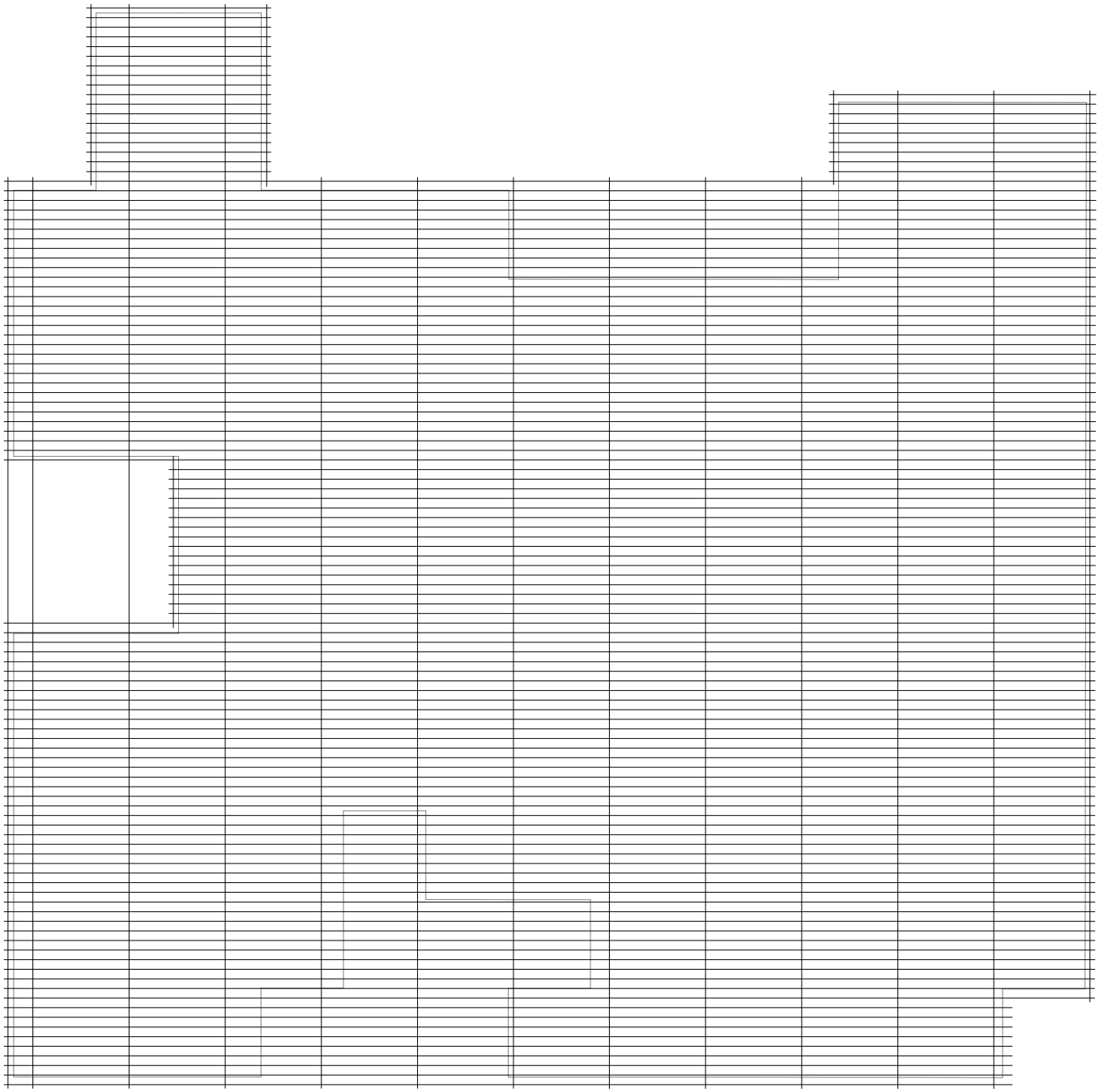
South Block (Cont)

Line	Type	Easting	Northing	Easting	Northing	Direc	Length	Tv Cumul	Ti Cumul
290090	Tie	508522.96	7539935.75	508522.96	7520982.48	180.0	19.0	2206.3	157.2
290100	Tie	506522.96	7539935.75	506522.96	7520982.48	180.0	19.0	2206.3	176.2
290110	Tie	505385.26	7543535.87	505385.26	7539748.05	180.0	3.8	2206.3	180.0
290120	Tie	504522.96	7543534.81	504522.96	7520983.02	180.0	22.6	2206.3	202.5
290130	Tie	502522.96	7543534.82	502522.96	7520983.02	180.0	22.6	2206.3	225.1
290140	Tie	501728.58	7543535.37	501728.58	7539774.88	180.0	3.8	2206.3	228.8
290150	Tie	500522.96	7539936.10	500522.96	7520983.02	180.0	19.0	2206.3	247.8
290160	Tie	500000.28	7539935.30	500000.28	7520983.73	180.0	19.0	2206.3	266.7
290170	Tie	503442.91	7534133.84	503442.91	7530558.55	180.0	3.6	2206.3	270.3

North Block



South Block



HAINES SURVEYS

GRAVITY SURVEY SPECIALISTS

Job No. 1908

ISA B GRAVITY SURVEY

Mawson Resources Ltd.

June 2019

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Contents

Introduction

A GPS gravity survey designated as Isa B Gravity Survey has been carried out in an area approximately 70 kilometres south of McKinlay in Queensland over 14 days from 17th June 2019 to 30th June 2019 on behalf of Mawson Resources Ltd.

The proposed Isa B Gravity Survey consisted of 1236 gravity stations in an irregular grid comprising 84 West-East trending lines coincident with GDA94 with a line spacing of 1000 metres and station intervals of 1000 metres. The lines of irregular length were bounded in the west by GDA94 Zone 54 501000E, in the east by 529000E, in the south by 7522000N and in the north by 7609000N. The line lengths ranged from 3000 metres to 21000 metres.

The completed Isa B Gravity Survey comprised of 1236 stations in 84 lines. All proposed gravity stations were completed. Note; some of the stations may have been slightly offset from their planned position due to vegetation and terrain.

There were 15 observations repeated for quality control purposes, giving a repeat percentage of 1.2%.

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

Figure 1 identifies the location of the survey area.

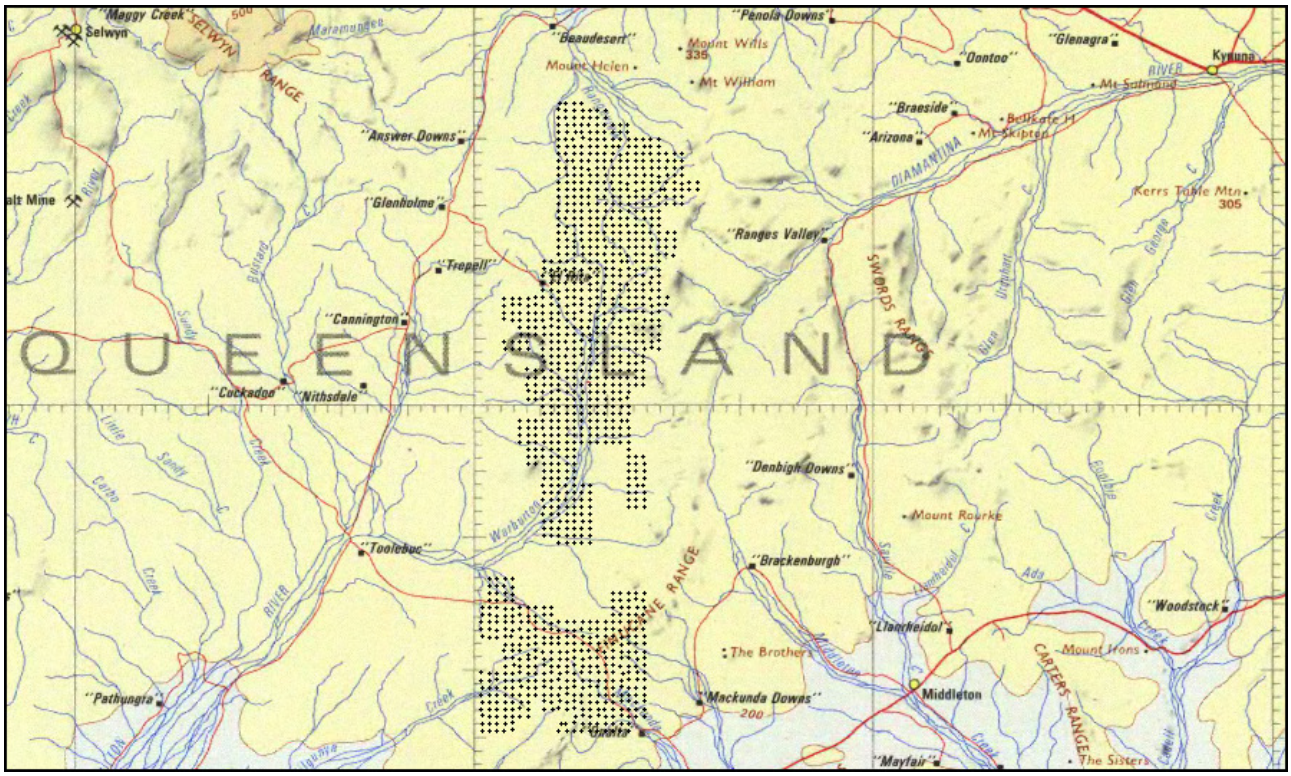


Figure 1. General Location Diagram

GPS Survey and Gravity Datum

Horizontal Datum:	Geocentric Datum of Australia1994 (GDA94) Map Grid of Australia 1994 (MGA94) Zone 54
Vertical Datum:	Australian Height Datum (AHD)
Gravity Datum:	Australian Absolute Gravity Datum 2007 (AAGD07)

Survey and Gravity Base Stations

Three base stations were established in the survey area. The base locations were selected to ensure all processed GPS baselines were stored within an accurate range, ensuring accurate GPS collection. The bases were designated 2019.0801, 2019.0803 and 2019.0804. The actual bases were marked with a short star picket driven flush with the natural surface. The bases were witnessed by 1m long star pickets within 0.3m of the ground marks. A single aluminium tag is attached to the witnessed post. These tags are inscribed "Haines Surveys" and "Gravity 2019.0801" etc.

Survey Control

Horizontal and vertical control has been established using the AUSPOS online GPS processing service provided by Geoscience Australia. This method provides control within the GDA94 Datum to within +/- 5 cm. It largely replaces the need for finding local survey marks or allows accurate control to be established when local marks are not available.

A total of 92.4 hours (at 5 second intervals) of observations were logged over 7 days. The following outlines the Cartesian coordinate precision attained per day.

1 Sigma	sX(m)	sY(m)	sZ(m)	yyyy/mm/dd
0801	0.008	0.009	0.009	2019/06/17
0801	0.008	0.008	0.009	2019/06/18
0801	0.009	0.009	0.009	2019/06/19
0803	0.011	0.011	0.012	2019/06/18
0803	0.009	0.009	0.010	2019/06/19
0803	0.008	0.009	0.009	2019/06/20
0804	0.010	0.011	0.011	2019/06/23
0804	0.009	0.009	0.010	2019/06/25
0804	0.008	0.009	0.009	2019/06/26

Since GDA94 and WGS84 (Global Positioning System Datum) are virtually equivalent the GDA94 values can be directly input into the GPS processing software for all calculations.

Vertical control has been converted to an Australian Height Datum (AHD) height using the GDA94 height determined from AUSPOS and the AUSGEOID09 gravimetric geoid.

Gravity Control

Gravity control for base station 2019.0801 was established on the Australian Absolute Gravity Datum 2007 (AAGD07) using a series of single one-way ties during mobilisation both to and from Answer Downs Station.

One-way ties were completed to Gravity Stations 2012999054 (Longreach) and 1964911032 (Winton). The values for Gravity Stations 2012999054 (Longreach) and 1964911032 (Winton) were attained from Geoscience Australia in Canberra.

Gravity Control for base stations 2019.0803 and 2019.0804 was established on the Australian Absolute Gravity Datum 2007 (AAGD07) using a series of A-B-B-A ties base station 2019.0801 (Answer Downs Station).

All completed gravity ties ensured that Gravity Control was established to within 0.01 milligals.

Survey and Gravity Control Values

Control information (**WGS84 heights have been derived using AusGeoid09**):

	GDA 94			MGA94 Zone 54		AHD	AAGD07	
Station	Latitude	Longitude	Height	Easting	Northing	Height	Gravity mgal	Comments
2019.0801	-21 40 11.91262	140 59 36.93826	286.792	499337.244	7603701.357	244.077	978688.402	Base 0801
2019.0803	-22 16 49.85012	141 06 45.00269	288.372	511589.451	7536119.237	247.847	978705.410	Base 0803
2019.0804	-21 50 55.10698	141 06 20.24109	313.761	510913.982	7583922.483	271.512	978695.893	Base 0804
2012999054	-23 26 21.696	144 16 16.644	193.00				978776.134	Longreach
1964911032	-22 23 18.510	143 02 16.188	184.74				978730.912	Winton

GPS Observations and Processing

Carrier phase GPS data has been collected using *Trimble R8 GNSS* series geodetic receivers.

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

Static baseline and RTK processing has been done using Trimble Business Centre Version 2.50 software.

Details of Horizontal and Vertical control are provided in the section above.

Gravity Observations

Gravity measurements have been made using *Scintrex CG5 Autograv* instruments. Instrument numbers 080440381 and 99080474 were used in this project.

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

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

All Autograv instruments apply 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 instruments also apply Earth Tide Corrections to their final gravity reading at each station. The various instrument calibration constants are contained in the daily gravity data files.

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 lines are West-East and the 8 digits are constructed from the planned GDA coordinates for each gravity station using

Line No = (GDA N – 7500000) / 10) Stn No = (GDA E – 500000) / 10

eg. Planned gravity station GDA coordinates

7539000.000N 501000.000E

Line No = 3900 Station No = 0100

Ie, Pt No = 3900.0100

The gravity stations have not been marked in the field.

Gravity Processing

The gravity values for this survey are related to the *Australian National Gravity Database* using the *Australian Absolute Gravity Datum 2007 (AAGD07)* values at known Gravity Stations as provided by *Geoscience Australia*.

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 as documented by *Geoscience Australia* 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.

Reference:
V_GRAV_JETSTREAM_AAGD07_final_REVISED_NOV_2008.pdf

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.

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

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

Observed Gravity

This is the observed gravity value in milligals.

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

b_g = base stn gravity value (AAGD07)
r_n = meter reading at each station as shown in the gravity meter log file
drift = residual drift correction as shown above
b_1 = base meter reading prior to station reading

Atmospheric Correction

$$Atmos = 8.74 - (0.00099 * h) + (0.0000000356 * h^2) / 10$$

h = height above ellipsoid

Anomaly

This is the difference between the observed gravity and the theoretical gravity value at each station. The theoretical value is calculated using the *1980 International Gravity Formula (Moritz, 1980)*.

$$g_{th} = 978032.67715 (1+ 0.001931851353(\sin^2 f)) / \sqrt{(1 - 0.0066943800229(\sin^2 f))}$$

f = GDA94 Latitude

$$Anom = Obs\_g - g_{th} - Atmos$$

Obs = observed gravity as explained above

Free Air Correction

The freeair correction is calculated using

$$Freeair = (3.087691 - 0.004398 \sin^2 f) * h - 7.2125 * 10^{-7} h^2) / 10$$

h = height above ellipsoid

Bouguer Correction

This uses the closed form equation for the gravity effect of a spherical cap of radius 166.7 km based on a spherical Earth with a mean radius of 6,371.0087714 km, height relative to the ellipsoid.

$$Bouguer = -(2 \pi G \rho ((1+ \mu) * h - \lambda R)) / 10$$

where

π is pi

G is the gravitational constant

= 6.67428×10^{-11} $m^3 kg^{-1} s^{-2}$ (Mohr and Taylor 2001);

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

h is the ellipsoid height in metres of the station

$R = (R_o + h)$ the radius of the earth at the station

R_o is the mean radius of the earth = 6,371.0087714 km

GRS 80 value from Moritz or 6,371 km (LaFehr)

μ & λ are dimensionless coefficients with following definitions

$\mu = ((1/3)*\eta^2 - \eta)$

where $\eta = h/R$

$\lambda = (1/3)\{(d + f\delta + \delta^2)[(f - \delta)^2 + k]^{1/2} + p + m*\ln(n/(f - \delta + [(f - \delta)^2 + k]^{1/2})\}$

where:

$d = 3*\cos^2\alpha - 2$

$f = \cos\alpha$

$k = \sin^2\alpha$

$p = -6*\cos^2\alpha\sin(\alpha/2) + 4*\sin^3(\alpha/2)$

$\delta = R_o/R$

$m = -3*\sin^2\alpha\cos\alpha = -3*k*f$

$$n = 2*[\sin(\alpha/2) - \sin^2(\alpha/2)]$$

$$\alpha = S/R_o$$

S = Bullard B Surface radius = 166.735 km.

Bouguer Anomaly

Bouguer Anomaly = Anomaly + Freeair + Bouguer

Geoidal Bouguer Anomaly

Free Air Anomalies and Bouguer Anomalies are also provided using geoid heights and an infinite slab Bouguer correction. They are designated as Geoidal Free Air Anomaly and Geoidal Bouguer Anomaly respectively.

These anomalies are calculated with the formulae in use prior to 5 February 2008 when the AAGD07 gravity datum was implemented. These formulae are:

Theoretical gravity based on the 1967 international gravity formula:

$$G_{th} = 978031.8456 * (1 + 0.005278895 \sin^2\varphi + 0.000023462 \sin^4\varphi)$$

$$\text{Geoidal FreeAir} = ((3.08768 - 0.00440 \sin^2\varphi) * H - 0.000001442 * H^2) / 10$$

GFreeAirAnom = Obs_g - Gth + Geoidal FreeAir

Geoidal Bouguer = -0.04191 * H * r

f = GDA94 Latitude
H = Geoid Height (ground elevation)
r = density (2.67 g/cc used for this survey)

Geoidal Bouguer Anomaly = GObs - Gth + Geoidal FreeAir + Geoidal Bouguer

NOTE: The Geoidal Free Air and Geoidal Bouguer Anomalies calculated using geoid heights and the infinite slab model will NOT be the same as those obtained prior to 5 February 2008. The data are now referenced to the new gravity datum AAGD07. Data prior to 5 February 2008 were in the ISOGAL84 gravity datum.

To convert observed gravity values from ISOGAL84 to AAGD07, the following formula can be used:

g(AAGD07) = g(ISOGAL84) – 0.078 mGal

Results Formats

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#"	Station identifiers used in data loggers, line and station numbers combined
"Line"	Station line number
"Stn"	Station number
"Date"	Date of observation
"Day"	GPS day number
"Time"	Time of observation
"GDA94_Lat"	WGS84/GDA94 Latitude used in GPS observation
"GDA94_Long"	WGS84/GDA94 Longitude used in GPS observation
"GDA94_Ht"	Height above the ellipsoid defined by the WGS84 Datum
"MGA94(ZONE54)E"	Easting value for observation on the MGA94/GDA94 Datum
"MGA94(ZONE54)N"	Northing value for observation on the MGA94/GDA94 Datum
"AHD_Ht"	Height of observation in the Australian Height Datum
"Meter_Ser_No"	Gravity meter serial number
"Meter_Rdg"	Gravity meter observation value in mGals
"Meter_Error"	Measurement of the quality of the gravity observation (a function of the SD of the observation set used and the duration of the set)
"ETC"	Earth Tide Correction applied to the gravity observation
"Drift"	The component of the meter drift between opening and closing gravity base observations applied to the observation
"Corr_Meter"	The meter observation with the drift applied
"dg"	The difference in gravity between the base and the observation
"Obs_g"	Observed gravity of the station
"Anom"	Difference between observed and theoretical gravity minus atmospheric corn.
"Freeair"	Free air correction (see above)
"Bouguer(2.67)"	Bouguer correction using a density of 2.67g/cc (see above)
"Bouguer_Anom"	Bouguer anomaly (see above)
“Geoid_Anom”	Difference between observed and theoretical gravity
“Geoid_Freeair”	Geoid Free air correction (see above)
“Geoid_Bouguer”	Geoid Bouguer correction using a density of 2.67g/cc (see above)
“Geoid_Bouguer_Anom”	Geoid Bouguer anomaly (see above)

Production Log

Date	Day#	Obs	Repeats	Crews	Comments
17/06/2019	168	96	0	1	Bases 2019.0801 and 2019.0802 established
18/06/2019	169	100	2	1	Base 2019.0803 established
19/06/2019	170	106	2	1	
20/06/2019	171	91	1	1	
21/06/2019	172	94	1	1	
22/06/2019	173	92	1	1	
23/06/2019	174	103	1	1	Base 2019.0804 established
24/06/2019	175	0	0	1	Standby, Scheduled Helicopter Service
25/06/2019	176	102	1	1	
26/06/2019	177	105	1	1	
27/06/2019	178	104	1	1	
28/06/2019	179	101	1	1	
29/06/2019	180	98	1	1	
30/06/2019	181	44	2	1	Survey completed
	Total	**1236**	**15**		

Repeat Observation Results

ISA B GRAVITY SURVEY

Pt #	Day	E	N	H	G	Bouguer
1001500	D168	514,948.401	7,600,959.156	256.644	978,686.854	+7.536
1001500	D169	514,948.397	7,600,959.148	256.681	978,686.847	+7.536
		+0.004	+0.008	-0.037	+0.007	+0.000
1001600	D168	516,003.848	7,600,963.376	249.902	978,688.539	+7.906
1001600	D181	516,003.897	7,600,963.332	249.916	978,688.513	+7.883
		-0.049	+0.044	-0.014	+0.026	+0.023
4001100	D168	511,018.611	7,604,026.700	235.109	978,690.547	+8.751
4001100	D169	511,018.478	7,604,026.675	235.103	978,690.577	+8.780
		+0.133	+0.025	+0.006	-0.030	-0.029
36002200	D169	521,953.597	7,536,003.700	245.701	978,718.093	-0.511
36002200	D170	521,953.832	7,536,003.554	245.699	978,718.089	-0.515
		-0.235	+0.146	+0.002	+0.004	+0.004
37001200	D169	512,018.203	7,536,990.209	245.538	978,706.592	-11.504
37001200	D170	512,018.178	7,536,990.222	245.536	978,706.571	-11.526
		+0.025	-0.013	+0.002	+0.021	+0.022
30000800	D170	508,043.589	7,529,979.740	241.851	978,713.025	-9.854
30000800	D171	508,043.596	7,529,979.750	241.855	978,713.046	-9.832
		-0.007	-0.010	-0.004	-0.021	-0.022
26001200	D171	512,002.253	7,525,941.635	271.663	978,710.780	-8.611
26001200	D172	512,002.257	7,525,941.643	271.652	978,710.792	-8.601
		-0.004	-0.008	+0.011	-0.012	-0.010
50001200	D172	511,995.518	7,549,976.788	234.098	978,712.151	-0.672
50001200	D173	511,995.487	7,549,976.798	234.078	978,712.143	-0.684
		+0.031	-0.010	+0.020	+0.008	+0.012

60000900	D173	508,989.861	7,560,003.282	246.548	978,709.023	+4.401
60000900	D174	508,989.861	7,560,003.323	246.551	978,709.014	+4.393
		+0.000	−0.041	−0.003	+0.009	+0.008
68001100	D174	511,000.548	7,567,998.719	252.772	978,708.817	+10.008
68001100	D176	511,000.531	7,567,998.699	252.783	978,708.770	+9.963
		+0.017	+0.020	−0.011	+0.047	+0.045
75001200	D176	512,004.027	7,575,009.139	260.569	978,703.760	+10.487
75001200	D177	512,004.037	7,575,009.153	260.552	978,703.773	+10.498
		−0.010	−0.014	+0.017	−0.013	−0.011
80001100	D177	511,017.547	7,580,000.985	262.620	978,701.034	+11.007
80001100	D178	511,017.538	7,580,001.002	262.621	978,701.001	+10.974
		+0.009	−0.017	−0.001	+0.033	+0.033
86002000	D178	520,020.998	7,585,985.132	304.766	978,686.008	+7.625
86002000	D179	520,021.030	7,585,985.153	304.790	978,685.966	+7.587
		−0.032	−0.021	−0.024	+0.042	+0.038
92001500	D179	514,994.611	7,592,016.152	274.287	978,687.188	+6.263
92001500	D180	514,994.591	7,592,016.144	274.281	978,687.236	+6.310
		+0.020	+0.008	+0.006	−0.048	−0.047
98001700	D180	517,005.890	7,597,950.799	241.863	978,690.073	+6.169
98001700	D181	517,005.897	7,597,950.823	241.853	978,690.062	+6.156
		−0.007	−0.024	+0.010	+0.011	+0.013

Bouguer – Elevation Profiles

Please refer to the folder titled 'Bouguer – Elevation Profiles' on the accompanying CD for bit map images of all the lines completed throughout the project.

Isa B Gravity Survey, Bouguer – Elevation Profiles available for the following lines:

Line
2200
2300
2400
2500
2600
2700
2800
2900
3000
3100
3200
3300
3400
3500
3600
3700
3800

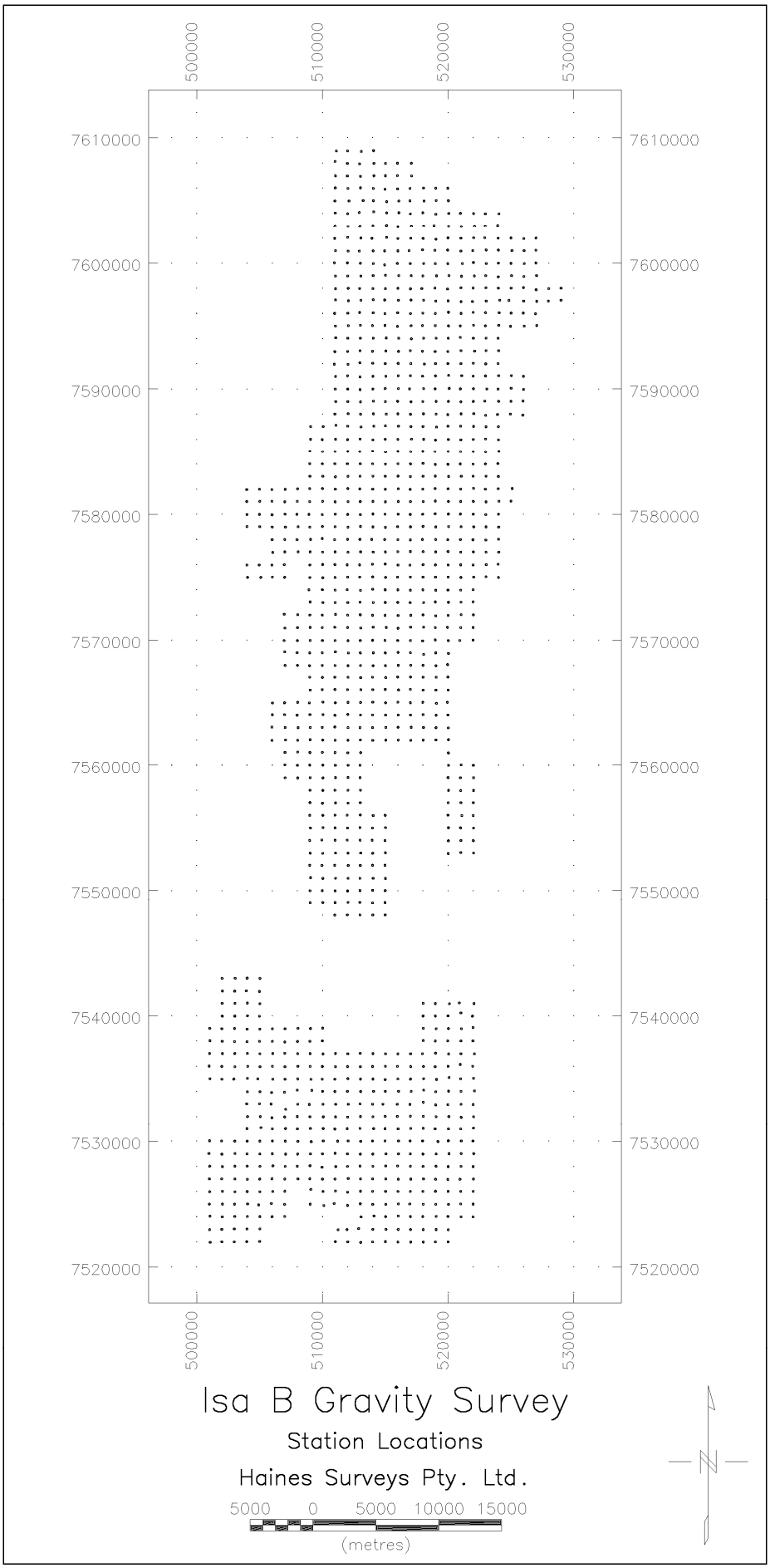
Line
3900
4000
4100
4200
4300
4800
4900
5000
5100
5200
5300
5400
5500
5600
5700
5800
5900

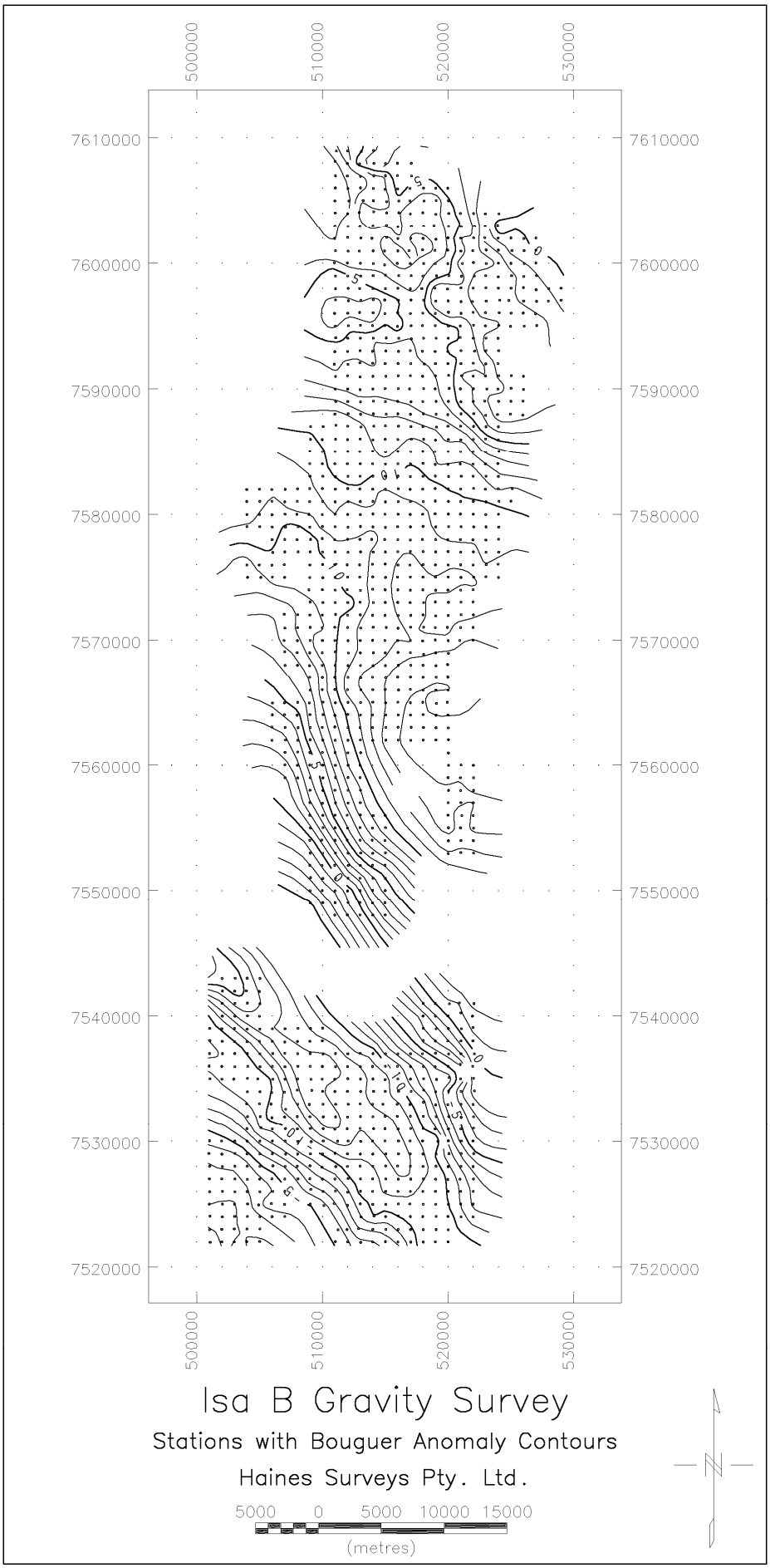
Line
6000
6100
6200
6300
6400
6500
6600
6700
6800
6900
7000
7100
7200
7300
7400
7500
7600

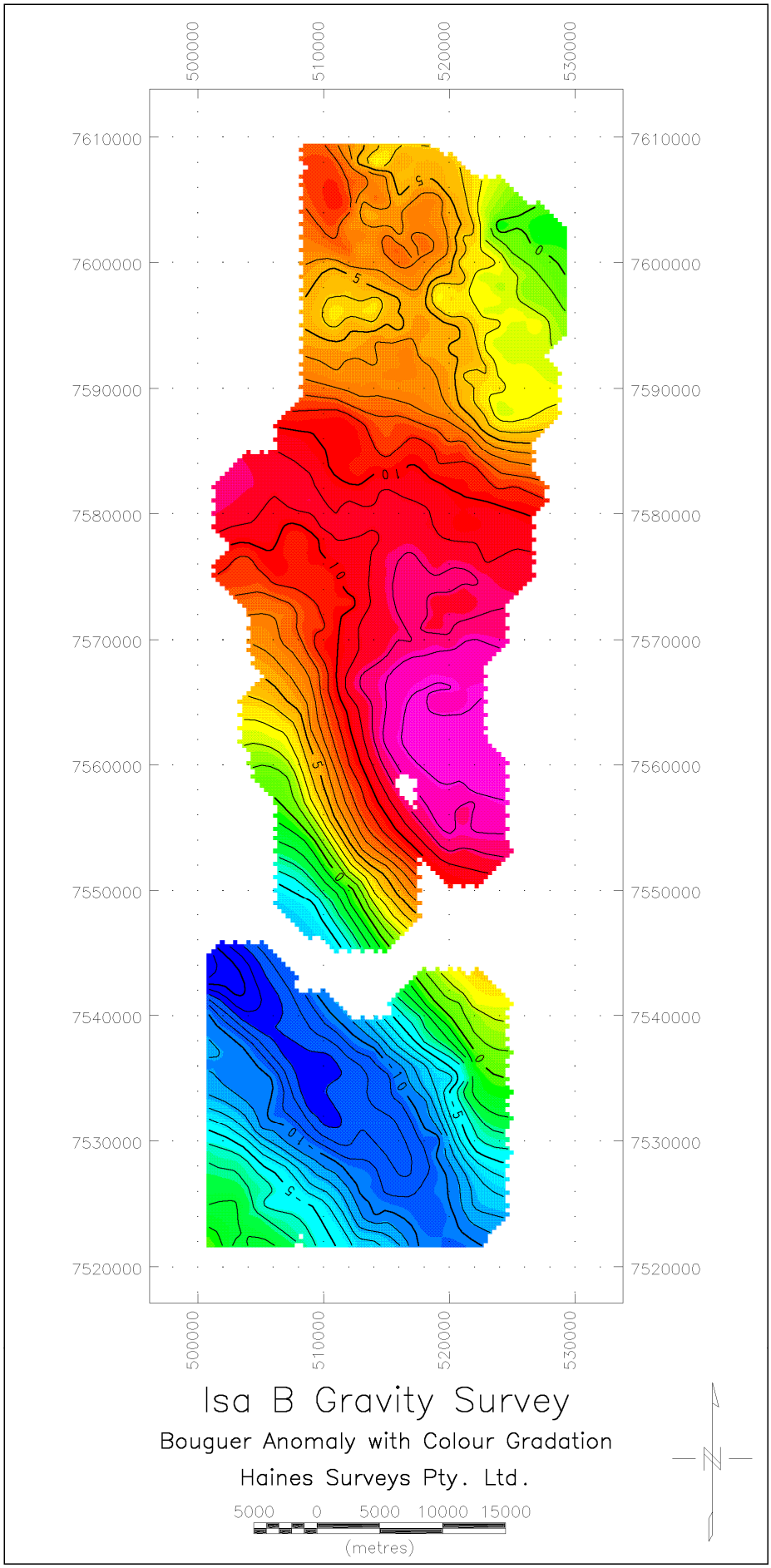
Line
7700
7800
7900
8000
8100
8200
8300
8400
8500
8600
8700
8800
8900
9000
9100
9200
9300

Line
9400
9500
9600
9700
9800
9900
0
100
200
300
400
500
600
700
800
900

Plots


500000
510000
520000
530000
7610000
7600000
7590000
7580000
7570000
7560000
7550000
7540000
7530000
7520000
Isa B Gravity Survey
Station Locations
Haines Surveys Pty. Ltd.
5000 0 5000 10000 15000
(metres)


500000
510000
520000
530000
7610000
7600000
7590000
7580000
7570000
7560000
7550000
7540000
7530000
7520000
Isa B Gravity Survey
Stations with Bouguer Anomaly Contours
Haines Surveys Pty. Ltd.
5000 0 5000 10000 15000
(metres)


500000
510000
520000
530000
7610000
7600000
7590000
7580000
7570000
7560000
7550000
7540000
7530000
7520000
Isa B Gravity Survey
Bouguer Anomaly with Colour Gradation
Haines Surveys Pty. Ltd.
5000 0 5000 10000 15000
(metres)

PROCESSED RESULTS

ISA B GRAVITY SURVEY

/ COORDS		GRID		drift	corr'd	obs	anom	freeair	bouguer	bouguer	height
/ E	N	x	y	meter	mgal		corrn	corrn	anom	(AHD)	
/						(2.67)					
/D168											
/ 499337.2	7603701.4	0	801	+0.000	5300.189	978688.402	-47.853	88.529	-32.503	8.174	244.077
/ 499337.2	7603701.4	0	801	+0.000	5300.189	978688.402	-47.853	88.529	-32.503	8.174	244.077
/ 499337.2	7603701.4	0	801	-0.026	5300.189	978688.402	-47.853	88.529	-32.503	8.174	244.077
/ 499337.2	7603701.4	0	801	+0.000	5300.215	978688.402	-47.853	88.529	-32.503	8.174	244.077
514948.4	7600959.2	100	1500	-0.025	5298.641	978686.854	-50.933	92.386	-33.918	7.536	256.644
516003.8	7600963.4	100	1600	-0.024	5300.326	978688.539	-49.244	90.304	-33.154	7.906	249.902
516895.9	7600978.6	100	1700	-0.024	5295.798	978684.011	-53.765	95.140	-34.928	6.448	265.572
517965.6	7601045.9	100	1800	-0.024	5302.600	978690.813	-46.921	85.759	-31.487	7.352	235.186
518945.2	7601009.7	100	1900	-0.024	5301.347	978689.560	-48.194	87.173	-32.005	6.974	239.771
519964.3	7601027.8	100	2000	-0.024	5300.195	978688.408	-49.336	87.412	-32.093	5.984	240.548
521016.2	7600951.2	100	2100	-0.024	5296.825	978685.038	-52.749	91.018	-33.415	4.853	252.233
521968.9	7600982.1	100	2200	-0.023	5285.417	978673.630	-64.144	106.098	-38.946	3.008	301.093
523030.5	7601034.3	100	2300	-0.023	5284.323	978672.536	-65.208	107.241	-39.366	2.667	304.801
523998.1	7601024.2	100	2400	-0.023	5284.107	978672.320	-65.429	106.240	-38.999	1.813	301.562
525083.5	7600987.7	100	2500	-0.023	5281.631	978669.844	-67.925	108.407	-39.793	0.689	308.590
526043.9	7600980.2	100	2600	-0.023	5287.540	978675.753	-62.016	99.025	-36.353	0.656	278.199
526983.7	7601020.4	100	2700	-0.023	5286.868	978675.081	-62.665	99.044	-36.359	0.020	278.265
510977.1	7601955.2	200	1100	-0.019	5302.521	978690.734	-46.495	86.214	-31.653	8.066	236.623
512006.3	7602044.7	200	1200	-0.020	5292.442	978680.655	-56.528	100.280	-36.813	6.939	282.191
513059.5	7601985.6	200	1300	-0.020	5294.183	978682.396	-54.819	97.712	-35.871	7.023	273.875
513936.1	7601962.6	200	1400	-0.020	5288.725	978676.938	-60.291	105.184	-38.611	6.281	298.081
515101.1	7602042.6	200	1500	-0.020	5297.193	978685.406	-51.774	93.684	-34.394	7.516	260.827
516000.1	7601948.4	200	1600	-0.021	5287.636	978675.849	-61.388	106.342	-39.036	5.919	301.842
517028.9	7601964.9	200	1700	-0.021	5299.270	978687.483	-49.739	89.933	-33.018	7.177	248.686
518010.7	7601954.1	200	1800	-0.021	5301.728	978689.941	-47.285	86.112	-31.616	7.211	236.310
519030.8	7601892.3	200	1900	-0.021	5301.942	978690.155	-47.105	85.095	-31.243	6.748	233.023
519991.5	7601996.2	200	2000	-0.021	5300.005	978688.218	-48.983	86.578	-31.787	5.808	237.828
521018.9	7601971.4	200	2100	-0.021	5290.762	978678.975	-58.243	97.880	-35.933	3.705	274.448
522035.6	7601998.1	200	2200	-0.022	5295.003	978683.216	-53.984	91.704	-33.667	4.052	254.442
522912.1	7602014.0	200	2300	-0.022	5283.094	978671.307	-65.888	106.720	-39.174	1.657	303.094
523984.1	7601971.8	200	2400	-0.022	5281.163	978669.376	-67.843	108.383	-39.785	0.756	308.492
525004.7	7601989.9	200	2500	-0.022	5288.298	978676.511	-60.693	97.462	-35.779	0.990	273.115
526023.8	7601943.4	200	2600	-0.022	5288.909	978677.122	-60.107	95.453	-35.042	0.304	266.612
526997.2	7601985.7	200	2700	-0.022	5286.324	978674.537	-62.668	97.392	-35.754	-1.029	272.900
510996.2	7602975.9	300	1100	-0.019	5301.757	978689.970	-46.688	86.979	-31.934	8.357	239.079
512032.4	7602937.4	300	1200	-0.019	5288.903	978677.116	-59.568	104.303	-38.288	6.446	295.206
512980.3	7602955.7	300	1300	-0.019	5287.552	978675.765	-60.909	106.265	-39.008	6.348	301.562
514015.4	7602990.0	300	1400	-0.019	5286.234	978674.447	-62.208	107.404	-39.425	5.770	305.253
515098.0	7603021.5	300	1500	-0.018	5285.786	978673.999	-62.638	108.316	-39.760	5.918	308.212
516011.1	7602916.1	300	1600	-0.018	5286.355	978674.568	-62.127	107.050	-39.296	5.627	304.116
517076.4	7602969.3	300	1700	-0.018	5298.381	978686.594	-50.065	89.652	-32.914	6.672	247.754
518051.0	7602969.4	300	1800	-0.018	5300.235	978688.448	-48.210	86.474	-31.749	6.515	237.463
518879.8	7603005.0	300	1900	-0.018	5301.566	978689.779	-46.858	84.404	-30.989	6.557	230.763
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515108.0	7604034.6	400	1500	-0.014	5285.330	978673.543	-62.527	107.666	-39.522	5.618	306.085
516085.4	7604045.6	400	1600	-0.014	5289.465	978677.678	-58.384	101.624	-37.306	5.935	286.513
516989.8	7603949.0	400	1700	-0.014	5298.494	978686.707	-49.404	89.423	-32.831	7.188	246.995

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 519026.2 7603919.9   400  1900 -0.016 5301.014 978689.227 -46.898 83.919 -30.811 6.210 229.175
 520059.4 7603986.3   400  2000 -0.016 5299.971 978688.184 -47.903 84.114 -30.883 5.328 229.813
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 522965.7 7603964.8   400  2300 -0.017 5291.790 978680.003 -56.096 91.615 -33.635 1.885 254.132
 524051.0 7603965.6   400  2400 -0.017 5291.703 978679.916 -56.181 90.380 -33.182 1.017 250.134
 510991.2 7604988.3   500  1100 -0.012 5303.068 978691.281 -44.250 84.377 -30.980 9.148 230.609
 512115.3 7604992.7   500  1200 -0.012 5299.127 978687.340 -48.190 89.268 -32.774 8.304 246.453
 513239.9 7605022.8   500  1300 -0.012 5287.040 978675.253 -60.264 104.339 -38.302 5.774 295.284
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 515108.6 7604927.6   500  1500 -0.012 5291.260 978679.473 -56.095 98.931 -36.318 6.518 277.768
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 516958.9 7604993.6   500  1700 -0.011 5290.476 978678.689 -56.841 98.895 -36.305 5.749 277.664
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 515981.2 7605943.0   600  1600 -0.010 5285.841 978674.054 -60.947 103.759 -38.089 4.723 293.400
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504000.8	7530984.8	3100	400	+0.037	5327.723	978714.477	-62.949	87.822	-32.244	-7.371	244.165
505106.3	7531057.4	3100	500	+0.037	5320.758	978707.512	-69.875	95.795	-35.168	-9.248	269.994
506005.7	7530973.2	3100	600	+0.036	5326.274	978713.028	-64.404	87.532	-32.137	-9.009	243.224
507057.6	7530984.3	3100	700	+0.035	5325.363	978712.117	-65.309	87.562	-32.148	-9.895	243.317
508007.2	7530968.0	3100	800	+0.035	5323.765	978710.519	-66.916	88.736	-32.579	-10.759	247.118
509038.3	7530998.6	3100	900	+0.034	5321.429	978708.183	-69.235	90.762	-33.322	-11.795	253.679
510063.5	7530988.1	3100	1000	+0.033	5318.937	978705.691	-71.733	92.915	-34.112	-12.930	260.651
510989.1	7530955.3	3100	1100	+0.033	5320.690	978707.444	-69.998	90.034	-33.055	-13.019	251.317
511975.8	7530980.8	3100	1200	+0.032	5321.921	978708.675	-68.751	88.508	-32.495	-12.738	246.371
512985.3	7531005.3	3100	1300	+0.031	5323.888	978710.642	-66.769	86.660	-31.817	-11.927	240.380
514072.7	7530982.2	3100	1400	+0.031	5322.481	978709.235	-68.189	87.858	-32.257	-12.588	244.256
514985.8	7530979.7	3100	1500	+0.030	5324.113	978710.867	-66.557	85.504	-31.393	-12.447	236.625
516019.2	7530960.9	3100	1600	+0.030	5325.171	978711.925	-65.509	84.644	-31.078	-11.943	233.832
517024.6	7531000.6	3100	1700	+0.029	5323.620	978710.374	-67.038	88.159	-32.367	-11.247	245.206
518026.0	7531008.9	3100	1800	+0.028	5325.916	978712.670	-64.736	86.717	-31.838	-9.857	240.525
518966.7	7530966.9	3100	1900	+0.027	5323.605	978710.359	-67.072	91.573	-33.620	-9.119	256.248
520028.8	7530961.2	3100	2000	+0.027	5328.358	978715.112	-62.320	87.686	-32.194	-6.828	243.644
521006.7	7530956.3	3100	2100	+0.026	5332.883	978719.637	-57.796	83.326	-30.594	-5.064	229.509

522014.6	7531022.7	3100	2200	+0.025	5333.539	978720.293	-57.102	84.013	-30.846	-3.935	231.720
504037.5	7532001.3	3200	400	+0.013	5326.420	978713.174	-63.670	87.606	-32.165	-8.228	243.439
505051.1	7532001.4	3200	500	+0.013	5323.907	978710.661	-66.183	89.974	-33.033	-9.242	251.111
505971.9	7531907.1	3200	600	+0.014	5318.988	978705.742	-71.158	95.611	-35.101	-10.648	269.371
506990.8	7531971.6	3200	700	+0.015	5322.751	978709.505	-67.356	89.730	-32.943	-10.570	250.311
507993.1	7532009.5	3200	800	+0.016	5321.913	978708.667	-68.172	89.673	-32.922	-11.422	250.122
509002.5	7531986.4	3200	900	+0.016	5320.141	978706.895	-69.957	90.945	-33.389	-12.401	254.244
510067.0	7531979.5	3200	1000	+0.017	5317.527	978704.281	-72.576	93.569	-34.352	-13.358	262.742
511041.8	7531978.8	3200	1100	+0.018	5318.600	978705.354	-71.502	91.910	-33.743	-13.335	257.365
512004.0	7531965.5	3200	1200	+0.018	5321.779	978708.533	-68.329	88.273	-32.409	-12.465	245.576
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514012.4	7531985.4	3200	1400	+0.020	5321.695	978708.449	-68.401	88.424	-32.464	-12.442	246.054
514989.0	7532020.2	3200	1500	+0.020	5323.430	978710.184	-66.645	86.191	-31.645	-12.099	238.810
515959.4	7532027.9	3200	1600	+0.021	5322.969	978709.723	-67.101	87.434	-32.101	-11.768	242.830
517003.8	7532034.4	3200	1700	+0.022	5323.469	978710.223	-66.597	88.429	-32.466	-10.634	246.040
518029.9	7532028.2	3200	1800	+0.022	5324.284	978711.038	-65.785	89.269	-32.775	-9.290	248.751
519041.9	7531996.9	3200	1900	+0.023	5322.212	978708.966	-67.876	94.070	-34.536	-8.341	264.295
520061.7	7532008.5	3200	2000	+0.024	5328.569	978715.323	-61.510	87.836	-32.249	-5.922	244.086
521043.7	7531945.1	3200	2100	+0.024	5328.993	978715.747	-61.121	89.001	-32.676	-4.796	247.853
522031.7	7531985.4	3200	2200	+0.025	5334.014	978720.768	-56.075	83.489	-30.654	-3.240	229.981
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507076.3	7532578.3	3300	700	+0.010	5316.547	978703.301	-73.215	97.529	-35.804	-11.490	275.562
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519981.7	7532953.1	3300	2000	+0.071	5327.726	978714.408	-61.884	89.183	-32.743	-5.444	248.411
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512998.4	7554018.0	5400	1300	-0.028	5332.632	978717.344	-46.931	84.879	-31.164	6.784	233.720
513961.4	7554015.7	5400	1400	-0.029	5333.293	978718.005	-46.271	85.209	-31.285	7.653	234.772
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520022.6	7553972.4	5400	2000	+0.004	5334.684	978719.350	-44.949	91.114	-33.451	12.714	253.808
521019.7	7553989.6	5400	2100	+0.004	5333.140	978717.806	-46.483	93.186	-34.211	12.491	260.504
522006.1	7553982.6	5400	2200	+0.003	5331.984	978716.650	-47.643	95.322	-34.995	12.685	267.414
509042.8	7554994.5	5500	900	-0.035	5325.911	978710.623	-53.099	85.091	-31.242	0.751	234.440
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511994.1	7554984.2	5500	1200	-0.033	5331.191	978715.903	-47.823	84.928	-31.182	5.923	233.858
512986.4	7555020.9	5500	1300	-0.032	5332.630	978717.342	-46.363	85.010	-31.212	7.435	234.104
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520024.3	7555009.9	5500	2000	+0.005	5334.015	978718.681	-45.028	92.114	-33.818	13.268	257.008
520990.4	7555003.3	5500	2100	+0.005	5332.303	978716.969	-46.744	94.300	-34.620	12.936	264.075
522018.5	7554978.0	5500	2200	+0.005	5331.231	978715.897	-47.830	96.300	-35.353	13.116	270.543
508988.6	7556003.0	5600	900	-0.036	5325.715	978710.427	-52.722	86.267	-31.673	1.872	238.210
510027.8	7555997.1	5600	1000	-0.036	5327.632	978712.344	-50.808	86.011	-31.579	3.624	237.362
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511960.2	7556007.5	5600	1200	-0.038	5331.131	978715.843	-47.302	85.211	-31.286	6.624	234.736
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514037.9	7555981.1	5600	1400	-0.039	5333.591	978718.303	-44.856	85.361	-31.341	9.165	235.185
514989.1	7556000.3	5600	1500	-0.040	5334.032	978718.744	-44.404	85.929	-31.549	9.976	237.006
519994.8	7556016.8	5600	2000	+0.007	5334.624	978719.290	-43.847	91.278	-33.511	13.920	254.258
521096.6	7555980.3	5600	2100	+0.007	5323.248	978707.914	-55.247	105.838	-38.851	11.739	301.418
521998.3	7555984.9	5600	2200	+0.006	5331.102	978715.768	-47.387	96.210	-35.320	13.502	270.211
509007.9	7557017.4	5700	900	-0.043	5325.531	978710.243	-52.330	87.280	-32.045	2.905	241.447
509999.6	7556962.2	5700	1000	-0.043	5327.065	978711.777	-50.827	86.944	-31.921	4.196	240.345
511047.8	7556989.0	5700	1100	-0.042	5329.705	978714.417	-48.171	85.706	-31.467	6.068	236.314
512041.5	7556976.2	5700	1200	-0.041	5331.227	978715.939	-46.656	85.479	-31.384	7.440	235.563
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520012.7	7556996.9	5700	2000	+0.007	5333.500	978718.166	-44.414	91.900	-33.739	13.746	256.237
521019.6	7557009.3	5700	2100	+0.008	5331.552	978716.218	-46.355	94.300	-34.620	13.325	264.001
522007.3	7556998.2	5700	2200	+0.008	5322.162	978706.828	-55.755	108.039	-39.659	12.626	308.501
509012.3	7557996.4	5800	900	+0.016	5325.164	978709.830	-52.187	87.930	-32.283	3.460	243.512
510029.3	7557984.1	5800	1000	+0.016	5327.209	978711.875	-50.148	86.946	-31.922	4.876	240.308
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512025.5	7557992.0	5800	1200	+0.015	5330.740	978715.406	-46.612	86.118	-31.618	7.888	237.592
513021.6	7558004.3	5800	1300	+0.014	5331.971	978716.637	-45.373	85.850	-31.520	8.957	236.706
520034.3	7557986.4	5800	2000	+0.010	5332.448	978717.114	-44.904	92.708	-34.036	13.768	258.820
521007.7	7557976.5	5800	2100	+0.009	5330.318	978714.984	-47.040	95.617	-35.103	13.474	268.233
522021.5	7557982.3	5800	2200	+0.009	5331.523	978716.189	-45.831	95.308	-34.990	14.488	267.220
507026.2	7558984.0	5900	700	+0.017	5318.332	978702.998	-58.461	93.665	-34.387	0.818	262.086
508028.9	7558977.0	5900	800	+0.017	5321.663	978706.329	-55.132	90.640	-33.277	2.231	252.270
509023.4	7558998.1	5900	900	+0.017	5324.778	978709.444	-52.004	88.379	-32.448	3.927	244.927
510035.3	7558979.2	5900	1000	+0.018	5327.223	978711.889	-49.569	86.962	-31.928	5.465	240.322
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512989.9	7559002.2	5900	1300	+0.019	5331.654	978716.320	-45.124	86.117	-31.618	9.376	237.534
519996.6	7559005.7	5900	2000	+0.010	5333.237	978717.903	-43.536	91.581	-33.622	14.422	255.133
520980.6	7558993.0	5900	2100	+0.011	5331.626	978716.292	-45.154	93.669	-34.388	14.126	261.886
522026.5	7558991.6	5900	2200	+0.011	5330.416	978715.082	-46.365	96.407	-35.393	14.649	270.747
508989.9	7560003.3	6000	900	+0.021	5324.357	978709.023	-51.855	88.892	-32.636	4.401	246.548
510030.8	7559997.7	6000	1000	+0.021	5325.851	978710.517	-50.364	88.363	-32.442	5.558	244.820
511027.1	7559990.4	6000	1100	+0.020	5328.357	978713.023	-47.861	87.578	-32.154	7.563	242.261
512043.5	7559991.1	6000	1200	+0.020	5330.366	978715.032	-45.851	86.714	-31.837	9.026	239.445
512988.1	7559990.7	6000	1300	+0.019	5330.963	978715.629	-45.254	87.331	-32.063	10.014	241.427
520033.8	7559989.0	6000	2000	+0.013	5333.510	978718.176	-42.705	90.630	-33.274	14.652	252.020
521037.1	7560015.6	6000	2100	+0.012	5332.125	978716.791	-44.075	92.639	-34.011	14.554	258.516
522007.2	7559988.1	6000	2200	+0.012	5331.331	978715.997	-44.884	94.409	-34.660	14.866	264.242
520020.4	7560965.1	6100	2000	+0.013	5332.061	978716.727	-43.600	91.457	-33.577	14.280	254.666

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508022.0	7561035.7	6100	800	+0.000	5322.472	978706.420	-53.873	90.399	-33.189	3.337	251.405
509004.5	7560999.7	6100	900	+0.000	5324.588	978708.536	-51.777	89.446	-32.839	4.831	248.307
509993.2	7561016.3	6100	1000	+0.000	5326.808	978710.756	-49.546	88.293	-32.416	6.330	244.552
510999.0	7560997.7	6100	1100	+0.000	5328.564	978712.512	-47.801	88.188	-32.378	8.010	244.198
512012.0	7560980.2	6100	1200	+0.000	5329.882	978713.830	-46.492	88.116	-32.351	9.273	243.950
513038.8	7560993.2	6100	1300	+0.000	5331.648	978715.596	-44.718	87.217	-32.021	10.477	241.020
505985.6	7561969.8	6200	600	+0.000	5320.686	978704.634	-55.130	91.039	-33.424	2.486	253.473
507058.5	7561996.3	6200	700	+0.000	5321.550	978705.498	-54.250	90.244	-33.132	2.862	250.881
508020.8	7561979.1	6200	800	+0.000	5322.990	978706.938	-52.819	89.372	-32.812	3.741	248.042
509025.6	7562017.1	6200	900	+0.000	5325.107	978709.055	-50.680	88.813	-32.607	5.526	246.215
510025.9	7561990.5	6200	1000	+0.000	5326.909	978710.857	-48.893	88.262	-32.405	6.964	244.415
511015.5	7561979.6	6200	1100	+0.000	5328.128	978712.076	-47.680	88.527	-32.502	8.345	245.259
512028.1	7561982.3	6200	1200	+0.000	5329.303	978713.251	-46.503	88.620	-32.536	9.581	245.545
513015.8	7561996.1	6200	1300	+0.000	5331.057	978715.005	-44.740	87.745	-32.215	10.790	242.695
514003.7	7561964.8	6200	1400	+0.000	5332.833	978716.781	-42.981	86.926	-31.915	12.030	240.028
515035.1	7561987.1	6200	1500	+0.000	5334.099	978718.047	-41.702	86.996	-31.941	13.354	240.240
516030.7	7561991.4	6200	1600	+0.000	5334.402	978718.350	-41.396	87.446	-32.106	13.944	241.684
517030.6	7561975.5	6200	1700	+0.000	5334.369	978718.317	-41.438	88.184	-32.376	14.370	244.063
518014.5	7561989.4	6200	1800	+0.000	5334.028	978717.976	-41.771	89.354	-32.805	14.778	247.839
519032.4	7561998.8	6200	1900	+0.000	5333.057	978717.005	-42.736	89.959	-33.027	14.196	249.787
520025.8	7562020.9	6200	2000	+0.000	5332.728	978716.676	-43.052	90.746	-33.316	14.378	252.327
505977.8	7563027.5	6300	600	+0.000	5320.691	978704.639	-54.525	91.030	-33.420	3.085	253.400
507027.4	7562998.2	6300	700	+0.000	5321.289	978705.237	-53.943	90.426	-33.199	3.284	251.428
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509029.0	7563000.2	6300	900	+0.000	5324.555	978708.503	-50.675	89.943	-33.022	6.247	249.837
509984.7	7563001.8	6300	1000	+0.000	5325.962	978709.910	-49.267	89.531	-32.870	7.394	248.485
510988.1	7563039.7	6300	1100	+0.000	5328.026	978711.974	-47.180	88.416	-32.461	8.774	244.857
512032.4	7562991.6	6300	1200	+0.000	5329.657	978713.605	-45.576	87.784	-32.229	9.978	242.795
512986.5	7562983.8	6300	1300	+0.000	5330.793	978714.741	-44.444	87.597	-32.161	10.992	242.177
513982.3	7562989.1	6300	1400	+0.000	5332.214	978716.162	-43.020	87.188	-32.011	12.157	240.837
515042.4	7562999.4	6300	1500	+0.000	5333.311	978717.259	-41.916	87.221	-32.023	13.282	240.930
516019.5	7563009.7	6300	1600	+0.000	5333.509	978717.457	-41.712	87.708	-32.202	13.794	242.497
517060.2	7563008.8	6300	1700	+0.000	5333.718	978717.666	-41.503	88.260	-32.404	14.353	244.274
518038.0	7562992.7	6300	1800	+0.000	5333.477	978717.425	-41.753	88.941	-32.654	14.534	246.467
519036.1	7562981.8	6300	1900	+0.000	5332.596	978716.544	-42.639	89.833	-32.981	14.213	249.348
520018.8	7562968.5	6300	2000	+0.000	5332.238	978716.186	-43.005	90.643	-33.278	14.360	251.962
506019.1	7564004.7	6400	600	+0.000	5319.032	978702.980	-55.630	93.317	-34.259	3.428	260.770
506982.8	7564012.4	6400	700	+0.000	5320.670	978704.618	-53.988	91.885	-33.734	4.164	256.117
507982.8	7563977.2	6400	800	+0.000	5319.581	978703.529	-55.097	94.368	-34.645	4.626	264.147
509005.7	7564018.2	6400	900	+0.000	5322.717	978706.665	-51.937	92.229	-33.860	6.433	257.203
510039.3	7564020.9	6400	1000	+0.000	5324.879	978708.827	-49.772	90.980	-33.402	7.806	253.141
510994.4	7563965.2	6400	1100	+0.000	5327.011	978710.959	-47.671	89.509	-32.862	8.976	248.364
512017.0	7564035.9	6400	1200	+0.000	5328.589	978712.537	-46.052	88.747	-32.583	10.112	245.878
513033.5	7563996.2	6400	1300	+0.000	5329.722	978713.670	-44.941	88.697	-32.564	11.191	245.703
513988.9	7563992.3	6400	1400	+0.000	5331.419	978715.367	-43.246	87.396	-32.087	12.063	241.474
515022.9	7563983.6	6400	1500	+0.000	5332.397	978716.345	-42.272	87.463	-32.112	13.079	241.683
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 515018.8 7599025.2  9900  1500 -0.007 5308.642 978687.934 -50.935 90.009 -33.046 6.028 248.986
 516074.6 7598998.2  9900  1600 -0.008 5309.976 978689.268 -49.615 88.446 -32.472 6.359 243.926
 517062.7 7598985.9  9900  1700 -0.008 5311.066 978690.358 -48.531 87.176 -32.006 6.638 239.814
 517995.8 7598971.3  9900  1800 -0.008 5310.445 978689.737 -49.160 87.227 -32.025 6.043 239.984
 519083.2 7598979.3  9900  1900 -0.009 5307.851 978687.143 -51.750 90.078 -33.071 5.258 249.222
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520068.1	7598989.8	9900	2000	-0.009	5307.625	978686.917	-51.969	90.114	-33.084	5.061	249.342
521069.0	7598944.7	9900	2100	-0.010	5306.060	978685.352	-53.559	91.706	-33.668	4.479	254.501
522083.7	7598971.9	9900	2200	-0.010	5297.001	978676.293	-62.606	103.147	-37.864	2.677	291.570
522996.6	7598989.0	9900	2300	-0.011	5295.471	978674.763	-64.126	104.613	-38.402	2.086	296.325
523990.9	7598900.5	9900	2400	-0.011	5301.357	978680.649	-58.286	96.213	-35.321	2.606	269.115
525048.9	7598990.9	9900	2500	-0.012	5300.928	978680.220	-58.663	96.347	-35.370	2.313	269.554
526020.1	7598923.1	9900	2600	-0.013	5300.122	978679.414	-59.507	96.769	-35.525	1.738	270.927
527040.7	7599003.7	9900	2700	-0.013	5298.073	978677.365	-61.510	98.819	-36.277	1.032	277.571