AMG
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MEMORANDUM

To:	Mr Gary Price, Chairman *via* email: gary@bowganl.com.au	**Affiliation:**	Bowgan Minerals Ltd 128/625Castlereagh St, Sydney NSW 2000
From:	J.E. Hanneson	**Costing:**	
Date:	3 May, 2018	**Reference:**	AMG18/13

Subject: **Regional Images for the Adnera Hill Area, Bowgan Minerals Ltd., Northern Territory**

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1. INTRODUCTION

Further to your "Scope of works" letter of 23 March, this report presents geophysical images for the vicinity or Adnera Hill Area which straddles the Barrow Ck (SF53-06) and Alcoota (SF53-10) topographic sheets of the Northern Territory. The compiled dataset includes a new gravity survey collected by Atlas Geophysics Ltd in March 2017, and historic aeromagnetic data and airborne radiometric data.

While this does not complete all the defined objectives of Stage 1 of your scoping study, it seems an appropriate time to summarise the results of the regional data compilation. I understand that the images are intended for qualitative interpretation, which, combined with your local knowledge and earlier work could lead to prospect identification and further assessments at a detailed scale.

It seems to the writer that the most effective exploration procedure is being followed, where the least expensive data (prospecting) was collected first, followed ground magnetics, then by gravity, of which an excellent data set is now available. More costly but perhaps more important is TEM, which was designed for the direct detection of massive sulphides and which, in the writers opinion, would be effective at Adnera Hill. Modest, localised, ground surveys are recommended for defined prospects before advancing to the most costly stage of drilling. If ground surveys confirm the effectiveness of TEM, an airborne survey for the entire area should be considered which has the potential to map the cover thickness and reveal conductors in the bedrock.

No quantitative interpretation or modelling is provided at this time, but six areas are recommended for further detailed gravity, magnetics, and possibly TEM work and are listed in Section 3.4.

2. DATA

2.1 Gravity

Gravity data was received from you in the form of an ASCII file which was reformatted and reduced (Blakley, 1995) using different Bouguer correction densities for the purpose of assessing the optimum value, as discussed below. The topography in the area is shown in Figure 1 and was deemed sufficiently subdued not to require terrain corrections. The image was derived from the gravity station elevations, and, the locations of the gravity stations are indicated with very small "+" symbols.

Industry standard gravity images use a correction density of 2.67 gm/cc because that value has been established as the average density for crustal rocks, and, Figure A1 in the Appendix is one such image. When this image is smoothed to get an estimate of the regional trends, and when the smoothed image (not shown) is subtracted from the original image, the residual gravity image in Figure A2 is obtained. Residual images tend to enhance shorter wavelength features that are more likely to be of economic importance.

The Bouguer correction is an attempt to account for added mass under the gravimeter when the traverse line crosses a hill; however, applying the correction requires knowledge of the density of each hill which is virtually never available and must be estimated. If the correction density is less than the (unknown) true density of the hill, the final gravity image tends to *mimic* the topography (positive covariance); and conversely, if it is greater, then the final gravity tends to *mirror* the topography (negative covariance). As an example, comparing Figures 1 and A2 shows a strong inverse correlation between the hill at (437000E, 7563000N) and a depression in the residual gravity at the same location suggesting the data is overcorrected at that point when using 2.67 gm/cc.

Under the Principal of Covariance Minimisation, it is assumed that the optimum correction density is the density that minimises the covariance between final gravity and topography for the entire area. Table 1 was therefore constructed to show the covariance, estimated using the method of Freund (1960), for several correction densities applied to the Adnera Hill data.

Table 1. Covariance estimates for several correction densities at Adnera Hill.

	Covariance	
Density	**Grav vs. Elev**	**R-Grav vs. R-Elev**
3.20	-0.5859	-0.0368
3.10	-0.5669	-0.0084
3.08	-0.5629	-0.0026
3.07	-0.5613	+0.0002
3.00	-0.5482	+0.0202
2.90	-0.5274	+0.0487
2.80	-0.5064	+0.0770
2.67	-0.4774	+0.1136
2.30	-0.4368	+0.1606
2.00	-0.3026	+0.2918

The Principal of Covariance is not foolproof because deep density inhomogeneities (well below the mean topographic datum where the Bouguer correction is applied) can occur that correlate with the topography. At Adnera Hill a large gravity low occurs in the south west that correlates with the hills seen there, biasing the estimate of optimum reduction density. Compare Figures 1.1 and A1. This regional bias is largely removed when the regional trends are removed as seen by comparing Figures 1.2 and A2 leaving the suggestion that the density of 3.07 gm/cc (column 3, Table 1) is the optimum reduction density.

At this stage images would normally be prepared using 3.07 as the correction density; however, we have seen that 2.67 gm/cc is already too high because of the inverse correlation at the above mentioned hill, and this indicates that densities change from hill to hill. An alternative method, described by Rimbert *et al.* (1987), where the local density used at a given point is the value that minimises the covariance using only points within a selected distance (in this case 2300m) of the point being corrected.

Applying Rimbert's method gives the result shown in Figure 2.1 and in the residual gravity image of Figure 2.2. One of the bi-products of the processing is a plot of the density used at each point, shown in Figure 2.3, which may be taken as an indication of the density of the hills. Over half of the area thus seems to be covered with material within Telford's range of densities for basalt (2.70 to 3.30 gm/cc). In creating Figure 2.1, density selections were restricted to the range for naturally occurring material from 2.2 gm/cc (unconsolidated cover) to 3.2 (mafic rock), and the low local covariance values seen in Figure 2.4, suggest that the algorithm is relatively free of the imposed range constraints.

Figure 3 is a plot of rock chip densities from a Microsoft Excell file provided by you.

2.2 Aeromagnetic Data

The aeromagnetic data is shown in Figure 4.1 was cropped to the area of the new gravity data. The data derives from two surveys: Projects P532 (1981) and P1003 (1997) covering parts of maps SF53-06 (Barrow Creek) and SF53-10 (Alcoota) available from *http://www.geoscience.gov.au/gadds* and described by Percival (2011). The survey boundary runs along latitude 22S, or approximately 7567000N. To the north the line spacing is 500m (sensor height 100m) and to the south it is 400m (height = 60m). Before concatenating the two files, and after testing, a value of 2427.4 was added to the northern survey, to produce an image for which no further adjustments seemed necessary.

Figure 4.2 is a residual magnetic image created by smoothing the original image and forming the difference.

2.3 Ground Magnetics

An early report but writer (Hanneson, 2016) presented ground magnetic data collected over four field campaigns between 2006 and 2011. Data from three other surveys carried out in 2010 were missed and are included here. Some surveys did not have time-coordinated base station records and it was decided, in light of strong local anomalies and anticipated weak diurnal variations, to plot the uncorrected data. The results, shown in Figure 4.3 are reasonable, although two east-west lines between 429400E and 434600E were adjusted. Line 7567200N was adjusted downward by subtracting 62nt, and, 100 nt was subtracted from Line 7657600N.

Figure 4.4 is a residual derive from Figure 4.3 in the usual manner

2.4 Combined Magnetic and Gravity Images

Combined magnetic and gravity images can be created by assigning a unique colour to each point depending on its gravity and magnetic values. Figure 5.1 combines the images in Figures 2.1 and 4.1 so that for areas where both gravity magnetic field strengths are low, cyan is assigned. Likewise areas that have both high gravity and high magnetics are red, high gravity and low magnetics are yellow-green, and so on. Mid-range values have colours that are consistent with the inset colour-block legend.

Residual images in Figures 2.2 and 4.2 were treated in a similar manner to produce Figure 5.2.

2.5 Radiometric Images

The aeromagnetic data sets also contained radiometric information, but the two surveys had different crystal volumes and flight heights. For details see Percival, 2011. Before merging the data sets multiplicative factors were applied to the northern survey (P5312) to adjust for the different instrumentation and possibly other factors like surface moisture. The disproportionately higher total count-rates for the later (1997) survey suggest a wider instrument band width.

Following the adjustments indicated at the bottom of Table 2, Figure 6.1 for the potassium channel was obtained, and no further adjustments (such as stretching the range to make the standard deviations conform) seemed necessary. Figures 6.2 and 6.3 present the Uranium and Thorium channels.

Table 2. Statistics Report for radiometric data from

Input File = ADNERA_N.RAD   Number of records = 18350   Survey P532

Variable	Columns	Min	Max	Average	Std Dev
Potassium	119-127	0.11000E+00	0.28400E+01	0.83843E+00	0.38333E+00
Uranium	128-136	0.90000E-01	0.67800E+01	0.14092E+01	0.38501E+00
Thorium	137-145	0.15700E+01	0.23720E+02	0.58516E+01	0.15039E+01
Total Count	146-156	0.30400E+01	0.22740E+02	0.64941E+01	0.18506E+01

Input File = ADNERA_S.RAD		Number of records = 9762			Survey P1003
Variable	Columns	Min	Max	Average	Std Dev
Potassium	119-127	0.40000E-01	0.23000E+01	0.91932E+00	0.25663E+00
Uranium	128-136	0.00000E+00	0.65900E+01	0.22223E+01	0.60478E+00
Thorium	137-145	0.25500E+01	0.29300E+02	0.91847E+01	0.21039E+01
Total Count	146-156	0.82690E+03	0.34811E+04	0.16130E+04	0.21760E+03

FIELD	Multiplicative factor applied to field in ADNERA N.RAD
Potassium	0.919322 / 0.838438 = 1.0964694
Uranium	2.222403 / 1.409238 = 1.5770246
Thorium	9.184785 / 5.851624 = 1.5696130
Total Count	not used

Channel count rates are often divided by total count to normalise out variations in surface moisture, but because this channel exhibited a strong discrepancy between surveys, Figures 7.1, 7.2 and 7.3 were instead normalised to the sum of the three separate channels. The images are not significantly different from the un-normalised amplitudes, but this couldn't be known before being tested.

Three final images are presented in Figures 8.1 to 8.3 that show ratios of the individual components.

3. DISCUSSION AND CONCLUSION

3.1 Gravity.

High values on the density map in Figure 2.4 might indicate mafic rocks but needs to be assessed in light of local knowledge and if it is significantly at variance with ground truth then the processing should be questioned. For these images a search radius of 2300m was deemed best, so that the inferred density at a given point should be considered as an average density for that size of area. More detailed estimates of the density require more detailed data. The plot of the rock chip densities (Figure 3) was created as a test for the apparent surface density derived from the gravity processing, but it seems that the sampling may be too detailed to extrapolate the results to the wide-area averages derived from the gravity processing.

The problem with the hill near (437000E, 7563000N) is better with the variable density processing, but one point (at the above coordinates) still appears to be overcorrected. The problem is that the lateral extent of the hill is comparable to the station interval and adequate statistics cannot be obtained for search radiuses less than about 2 km. There might also be terrain effects not evident in the coarse sampling of the elevations. The corrections would change if more local data were available.

3.2 Radiometrics.

Radiometric component ratios are often diagnostic of rock changes but the Adnera Hill test images (Figures 8.1 to 8.3) seem to be of limited value. Clearly, images involving Potassium count rate show meaningful variations, the interpretation of which is best left to one familiar with the surface conditions. In the hope of assisting with a qualitative interpretation I prepared Table 3 (following Section 4), based largely on the work of Tye, *et al* (2017). Potassium concentrations are generally higher for felsic to intermediate rocks than mafic rocks and one might therefore expect Figures 6.1 and 7.1 to exhibit lows over the density highs in Figure 2.3. Such a correlation is disappointing at best, and, it may be necessary to conclude that material in the top few centimetres (which control the count-rate) may be transported sediments that do not reflect the bedrock geology. .

3.3 Transient Electromagnetics.

I searched for NTG/CSIRO regional AEM which you advise is an airborne TEM survey currently in progress, but was unsuccessful. If you can advise on how the data can be acquired I would be pleased to assess it as a possible exploration method for Adnera Hill area. In lieu of data from that survey, I include a personal archive image (Figure A3) which presents the TEM channel amplitudes (upper panel) and a CDI (conductivity depth image) created from them using a method similar to that of Fullagar (1989). The data is from South Australia and shows 20 metres of conductive cover over a more resistive bedrock (10mS/m = 100 ohm-m). A highway interrupts the conductive cover at 761400, power lines occur at 761900 and 762600, but significantly, deep mineralisation occurs near 763600. The second deep conductive lobe at 764500 has not been drilled, and thick highly conductive cover occurs east of 764800 that the system does not penetrate.

For mineralised rocks to occur at surface at Adnera Hill, suggests that conductive cover will be thin or absent, and that in this environment TEM would be able to detect massive sulphides directly. AEM methods were developed to detect volcanogenic massive sulphides in resistive areas like the Canadian Shield, and contrary to a pessimistic view expressed by the writer in regard for the near-ubiquitous conductive cover in Australia (Hanneson, 1998), the present area might well be amenable to AEM surveying -- to the benefit of the project.

3.4 Further work.

Faults are often associated with zones of economic mineralisation and can be directly detectable in geophysical images provided they have some physical property contrast such as low density or susceptibility due, perhaps, to deep weathering/oxidation, or elevated susceptibility caused by alteration fluids. Such manifestations of faults are not readily apparent at Adnera Hill; however, implied faulting is suggested by truncations and discontinuities that line up as though constrained by otherwise invisible faults.

I also note that a north-south zone through the area more than two kilometres wide centred on 425000E, seems be a demarcation between domains to the east and west. The demarcation is most evident in Figures 1.1, 2.1, 4.1 and 5.1, but may also be evident in Figures 6.1, 7.1 and 8.2.

Your request for recommendations led to the preparation of Figures 9.1 and 9.2. The images have been presented above but I have added annotations that may be of interest. Possible faults implied from truncations and discontinuities (derived mainly from the magnetics which has a higher sampling density) are indicated as dotted lines, and areas to consider for further work are indicated as rectangles annotated A01 to A06. Two areas, already defined and indicated by the detailed gravity in Figure 2.1 to 2.4, are dominated by red and yellow in Figure 5.2, and, areas A01 to A06 have been outlined because of similar characteristics. Area A02 seems most prospective by this measure, but the numbering is not intended to indicate priority. If further ground work is contemplated then detailed gravity and magnetics, and selected TEM, in some or all of these area would likely be benefit the project.

Table 4. Areas recommended for further ground gravity and magnetics

Area	E min	N min	E max	N max
01	415000	7572600	416400	7573600
02	415800	7576400	419000	7578000
03	421400	7570200	422600	7572200
04	426000	7570600	427600	7571600
05	427400	7566600	429800	7568400
06	432200	7565000	434600	7566400

Considering the detailed data in Figures 2,1 and 4.4, two areas centred near (425000E, 7568000N) and (431000E, 7567000N) now have enough data to warrant detailed modelling to estimate sizes, depths and concentrations of gross mineral species like magnetite and hematite+sulphides. A method described by the writer (Hanneson, 2003) is recommended.

4. REFERENCES

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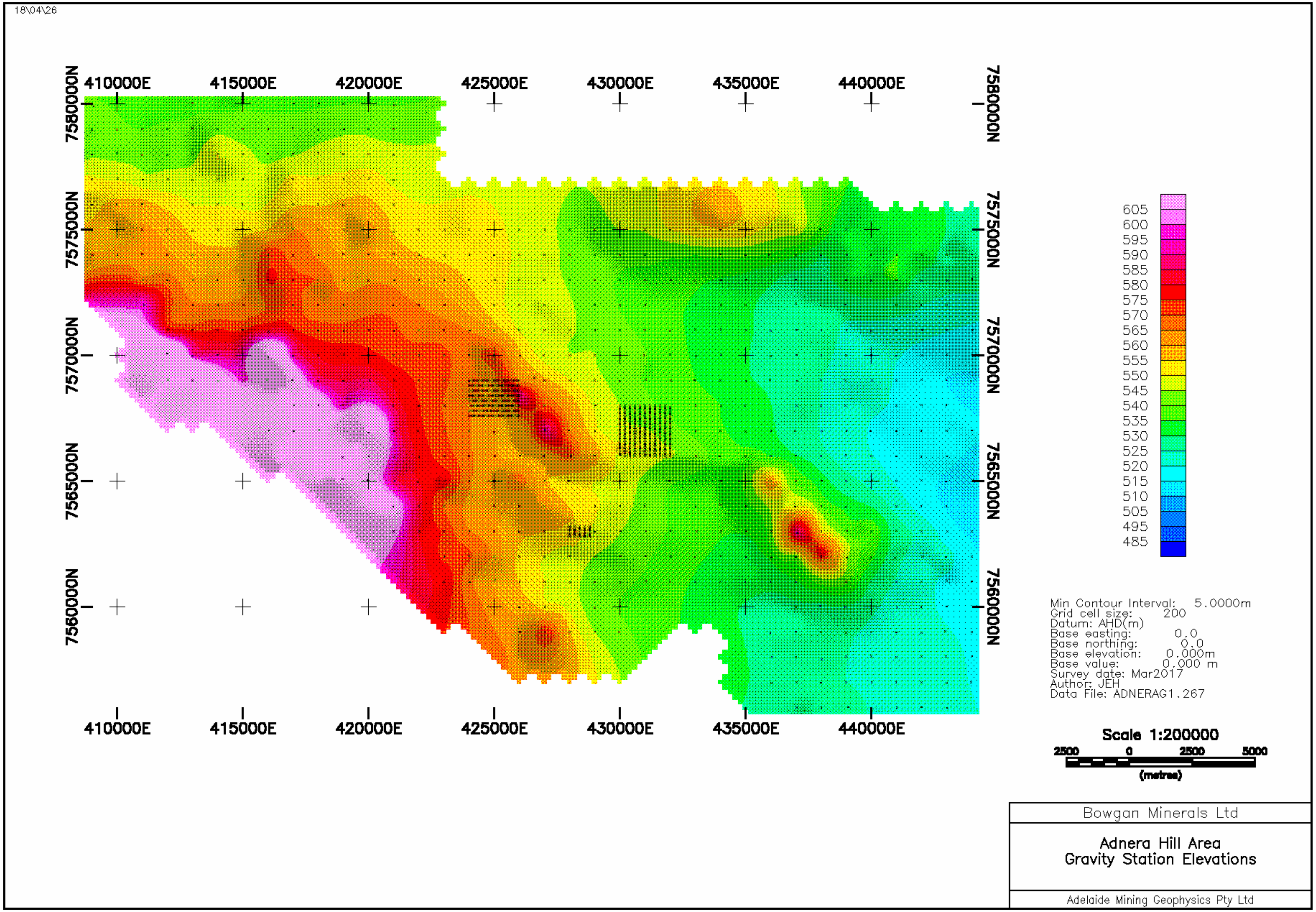
Tye, A.M., Milodowski, A.E., and Smedley, P.L., 2017; Distribution of natural radioactivity in rocks; British Geological Survey Internal Report OR/17/001. (see http//earthwise.bgs.ac.uk/index/OR/17/001_ The_distirbuion_of_natural_radioactivity_in_rocks)

Table 3. Abundance of some radioactive elements in rocks (ppm) based on Tye, *et al*, 2017, Berkman, 1989, Telford, *et al*, 1980. Averages and ratios estimated by author of present report.

Rock Type	Uranium	U Average (Arith,Log)	Thorium	Th Average (Arith,Log)	Potassium	K Average (Arith,Log)	Ratios of Log Averages K/U	K/Th	U/Th
Igneous Rocks									
Syenites and phonolites`	0.1 - 26	(13, 1.6)	0.7 - 35	(17, 5)	30000 - 60000	(45000,43000)	27000	8600	0.32
Granites and rhyolites	2.0 - 50	(24, 10)	8 - 56	(28,20)	25000 - 45000	(35000,33000)	3300	1600	0.50
Intermediate rocks	1.0 - 6	(3, 2.5)	8 - 56	(28,20)	25000 - 45000	(35000,33000)	13000	1600	0.12
Basalts and other mafics	0.1 - 1	(.5, .3)	0.1 - 4	(2, 1)	10000 - 20000	(15000,14000)	45000	14000	0.30
Ultramafic	.001 - 1	(.1, .03)	<0.1	(.1,.1)	~ 6000	(6000, 6000)	200000	60000	0.30
Sedimentary Rocks									
Shales, clays, mudrocks	1 - 5	(3, 2.2)	10 - 13	(12,11)	100 - 71000	(35000, 2600)	1200	240	0.20
Sandstones	0.5 - 4	(2, 1.4)	1 - 7	(4, 3)	100 - 56000	(20000, 2300)	1600	770	0.47
Limestone, dolomites	<0.1 - 1	(.5, .32)	<0.05 - 3	(2,.4)	3000 - 6000	(4500, 4000)	12500	10000	0.80
Metamorphic Rocks									
Low-grade	< 1 - 5	(2, 2.2)	6 - 10	(8,7.8)	depends		-	-	0.28
Medium-grade	< 1 - 5	(2, 2,2)	6 - 10	(8,7.8)	on		-	-	0.28
High-grade	< 1 - 7	(3, 2.6)	6 - 10	(8,7.8)	parent		-	-	0.33



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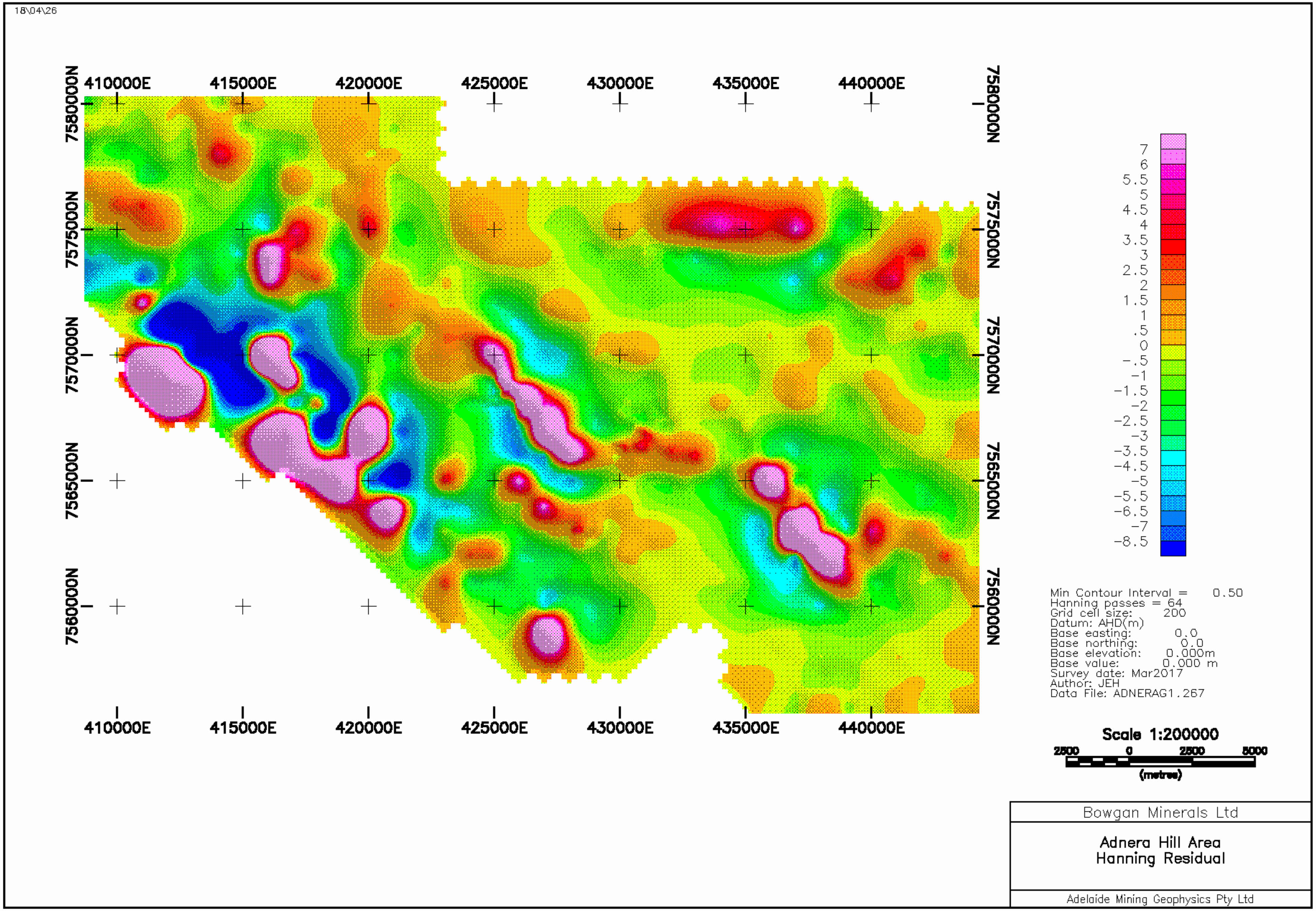
Bowgan Minerals Ltd
Adnera Hill Area
Gravity Station Elevations
Adelaide Mining Geophysics Pty Ltd

Figure 1.1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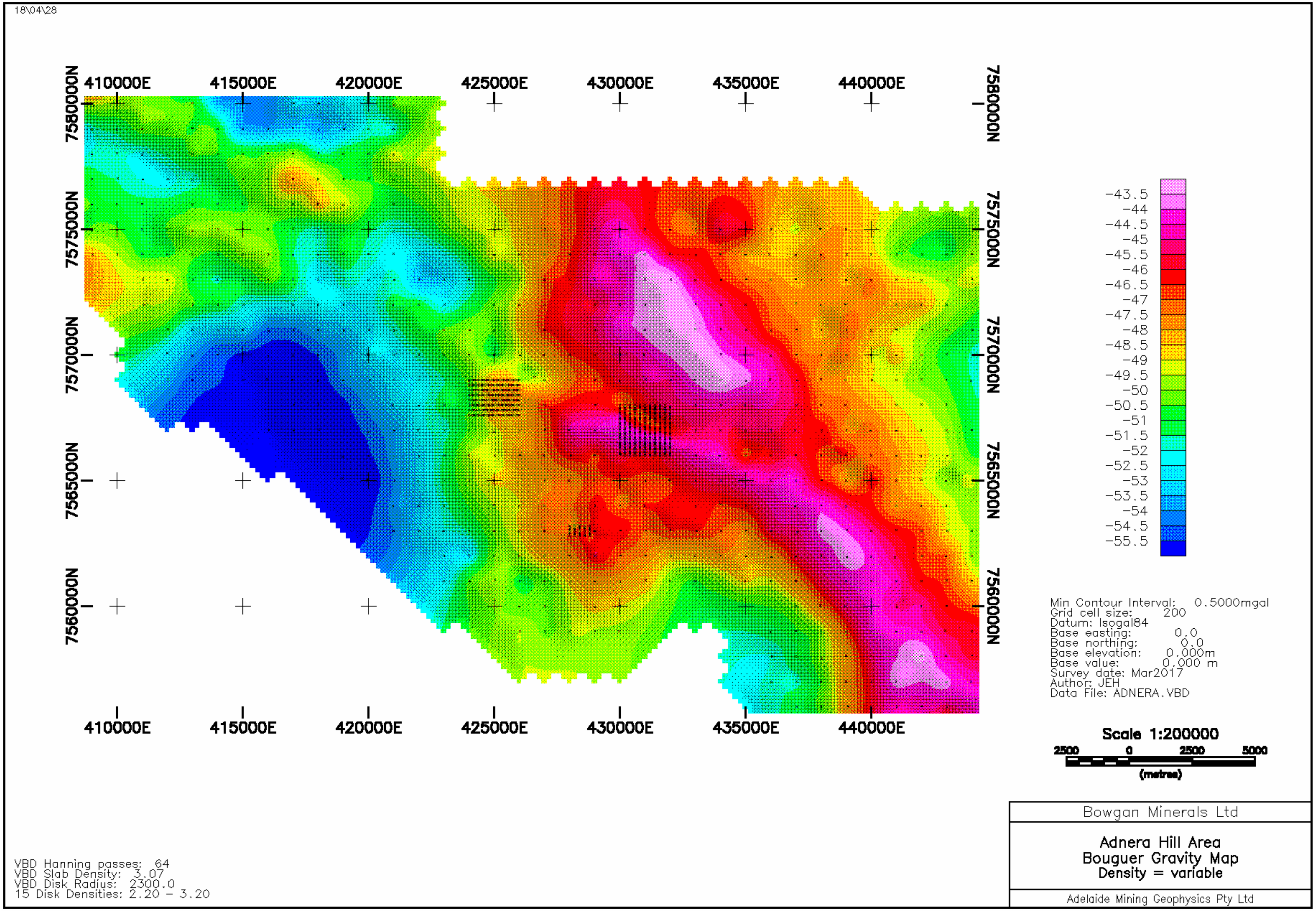
Adelaide Mining Geophysics Pty Ltd

Figure 1.2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Bowgan Minerals Ltd
Adnera Hill Area
Bouguer Gravity Map
Density = variable
Adelaide Mining Geophysics Pty Ltd
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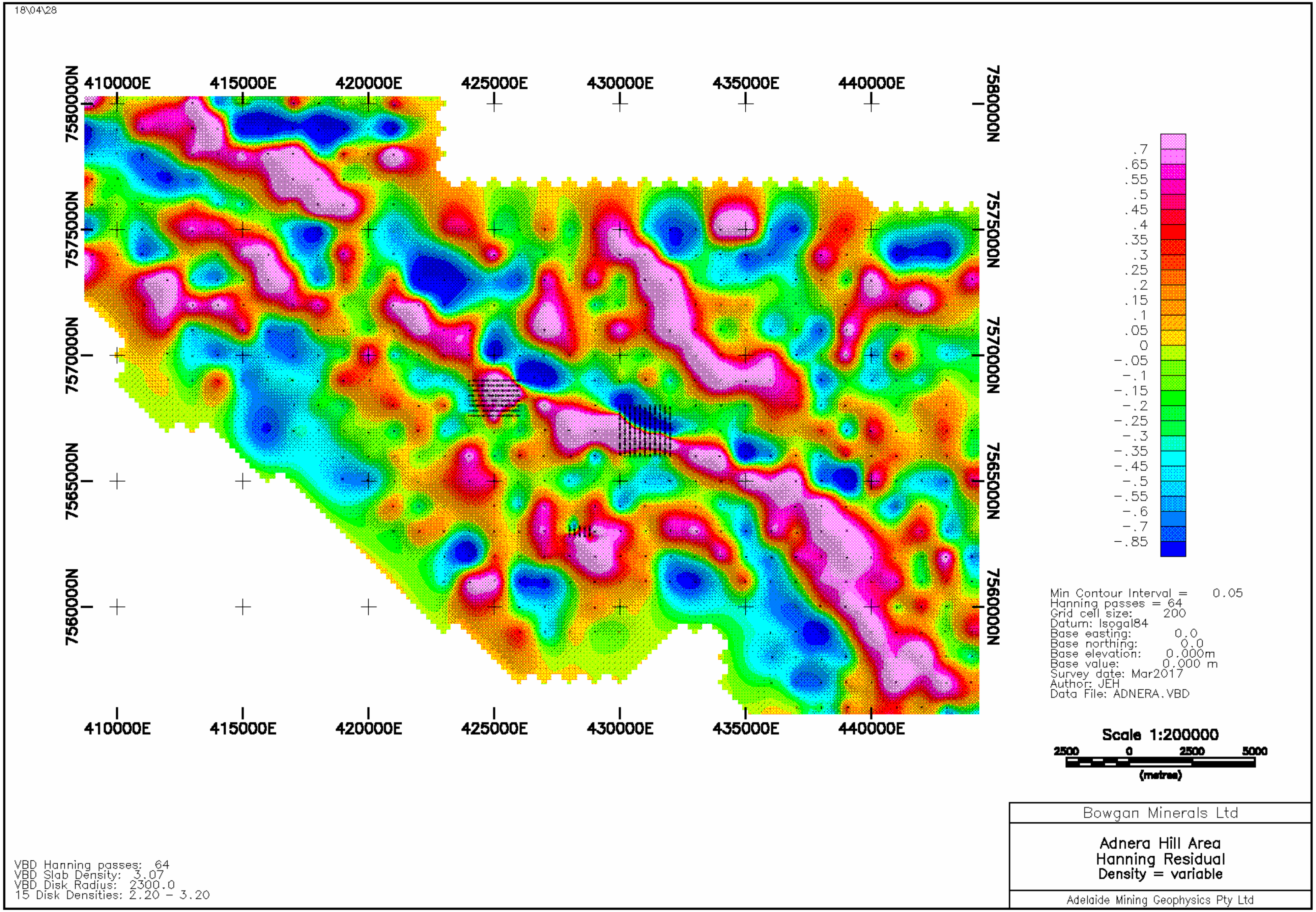
Figure 2.1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Bowgan Minerals Ltd
Adnera Hill Area
Hanning Residual
Density = variable
Adelaide Mining Geophysics Pty Ltd
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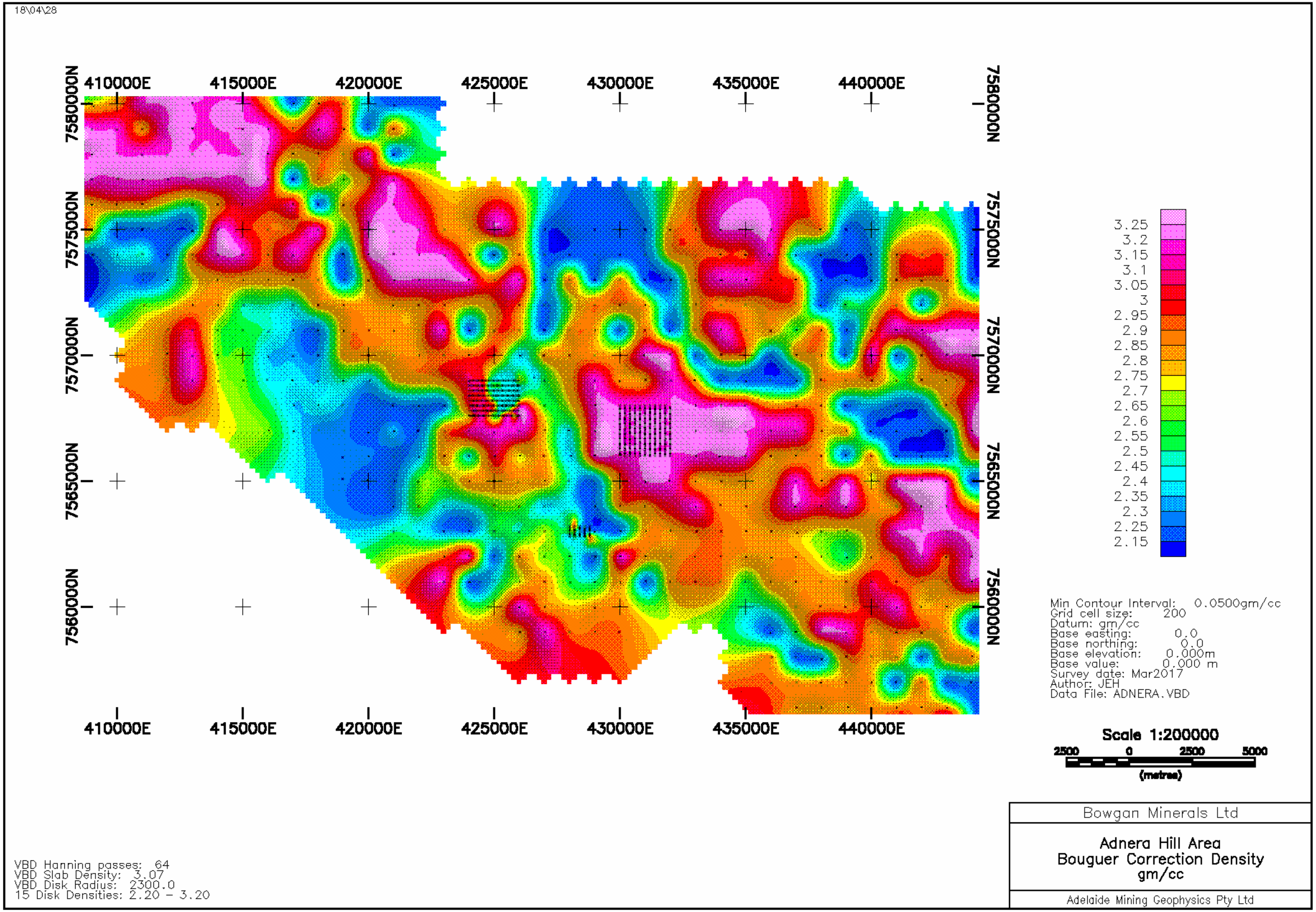
VBD Slab Density: 3.07
VBD Disk Radius: 2300.0
15 Disk Densities: 2.20 - 3.20

Figure 2.2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Bowgan Minerals Ltd
Adnera Hill Area
Bouguer Correction Density
gm/cc
Adelaide Mining Geophysics Pty Ltd
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Figure 2.3

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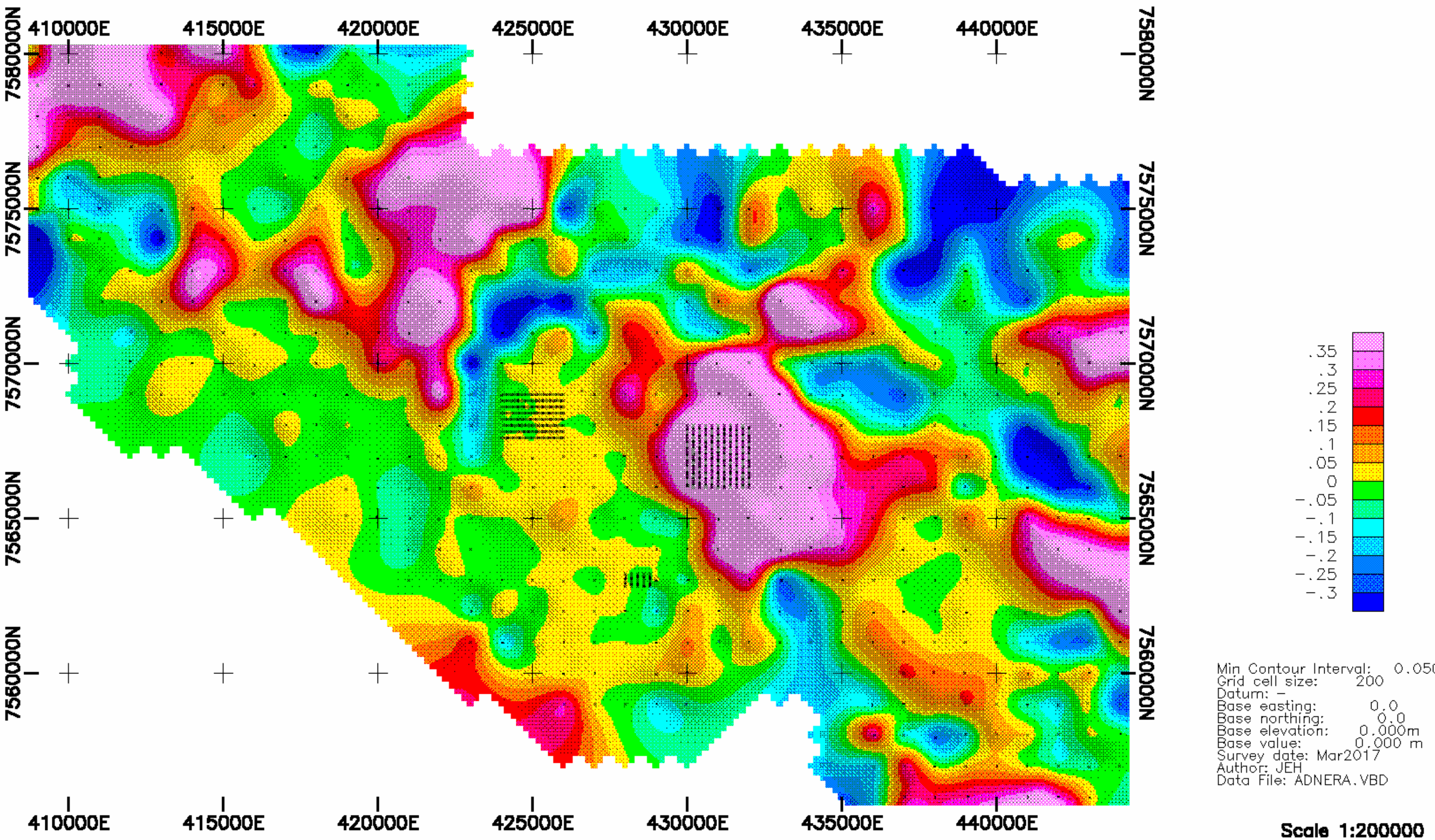

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(metres)

VBD Hanning passes: 64
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VBD Disk Radius: 2300.0
15 Disk Densities: 2.20 - 3.20

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Adnera Hill Area
Covariance

Adelaide Mining Geophysics Pty Ltd

Figure 2.4

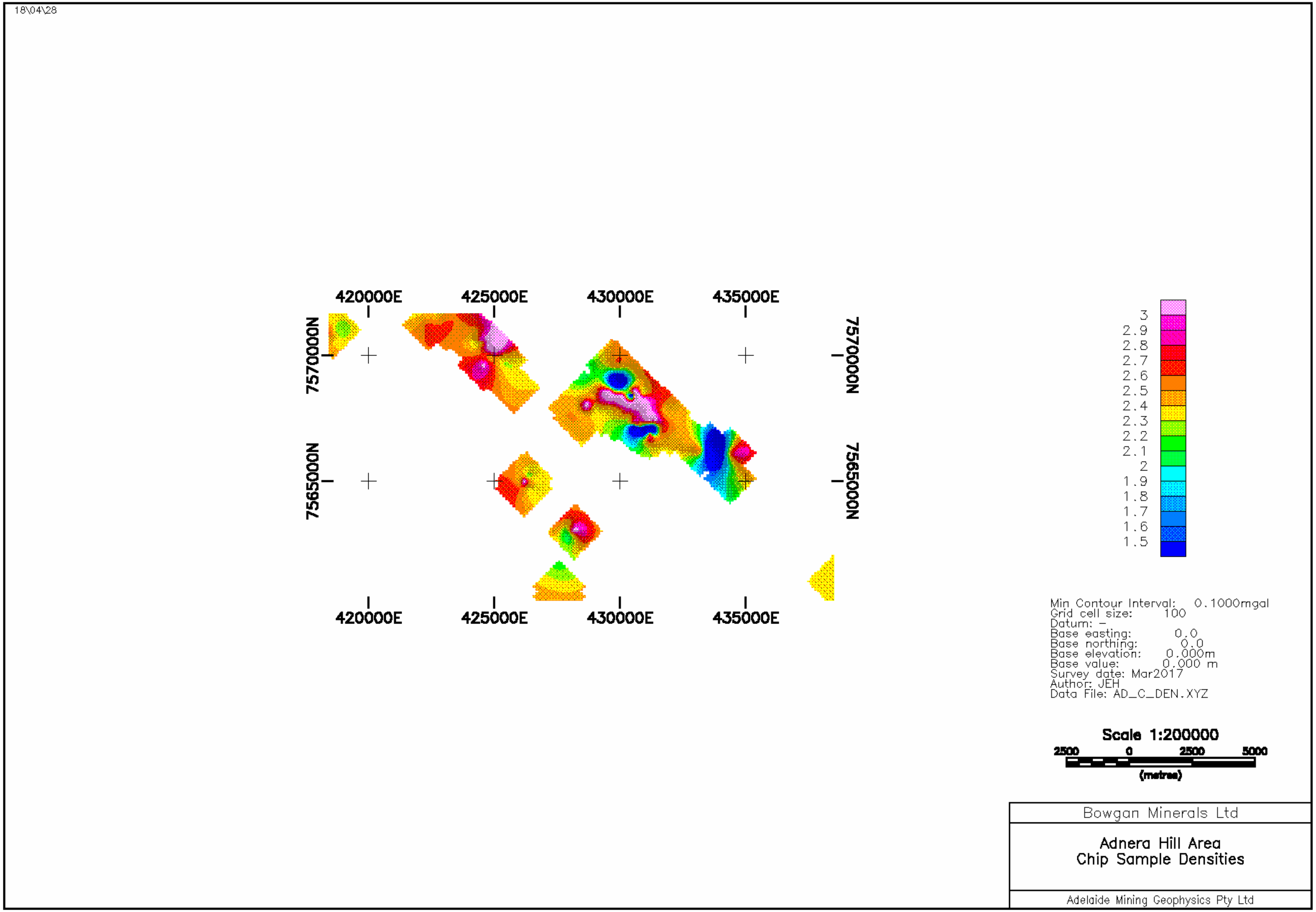
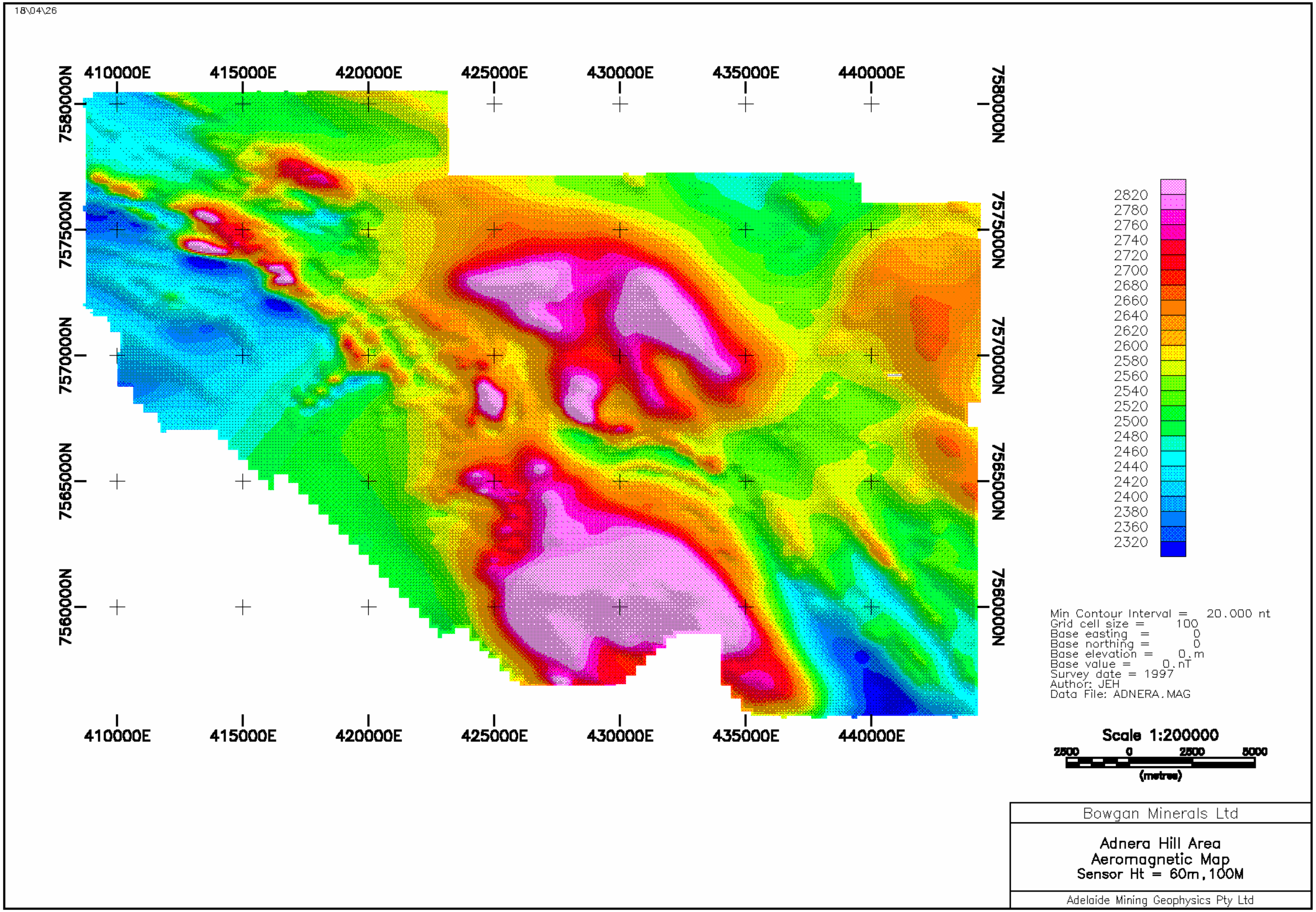

18\04\28
420000E
425000E
430000E
435000E
7570000N
7565000N
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
Min Contour Interval: 0.1000mgal
Grid cell size: 100
Datum: –
Base easting: 0.0
Base northing: 0.0
Base elevation: 0.000m
Base value: 0.000 m
Survey date: Mar2017
Author: JEH
Data File: AD_C_DEN.XYZ
Scale 1:200000
2500
0
2500
5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Chip Sample Densities
Adelaide Mining Geophysics Pty Ltd

Figure 3.


18\04\26
410000E
415000E
420000E
425000E
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435000E
440000E
7580000N
7575000N
7570000N
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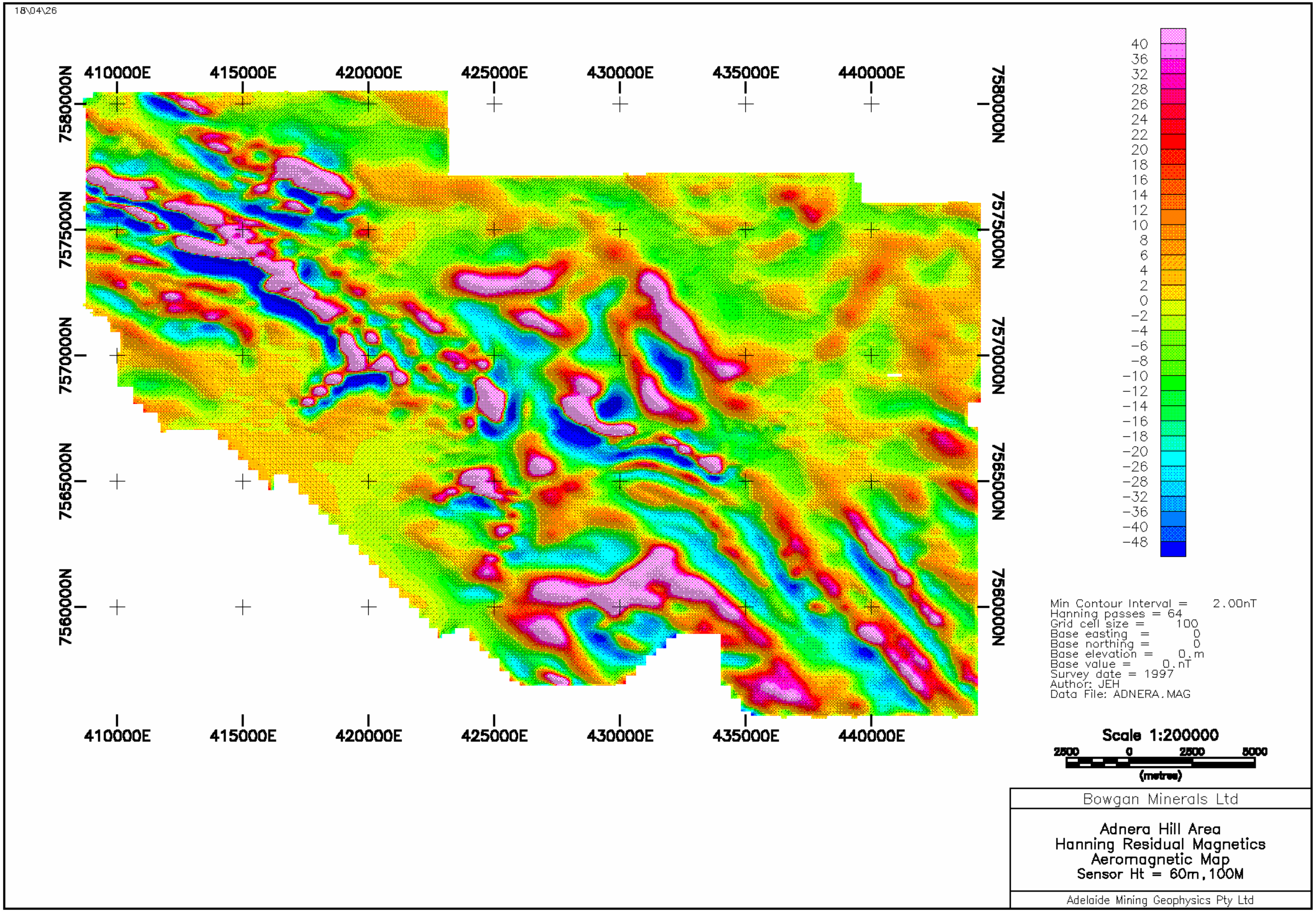
7560000N
2820
2780
2760
2740
2720
2700
2680
2660
2640
2620
2600
2580
2560
2540
2520
2500
2480
2460
2440
2420
2400
2380
2360
2320
Min Contour Interval = 20.000 nt
Grid cell size = 100
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1997
Author: JEH
Data File: ADNERA.MAG
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Aeromagnetic Map
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 4.1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440000E
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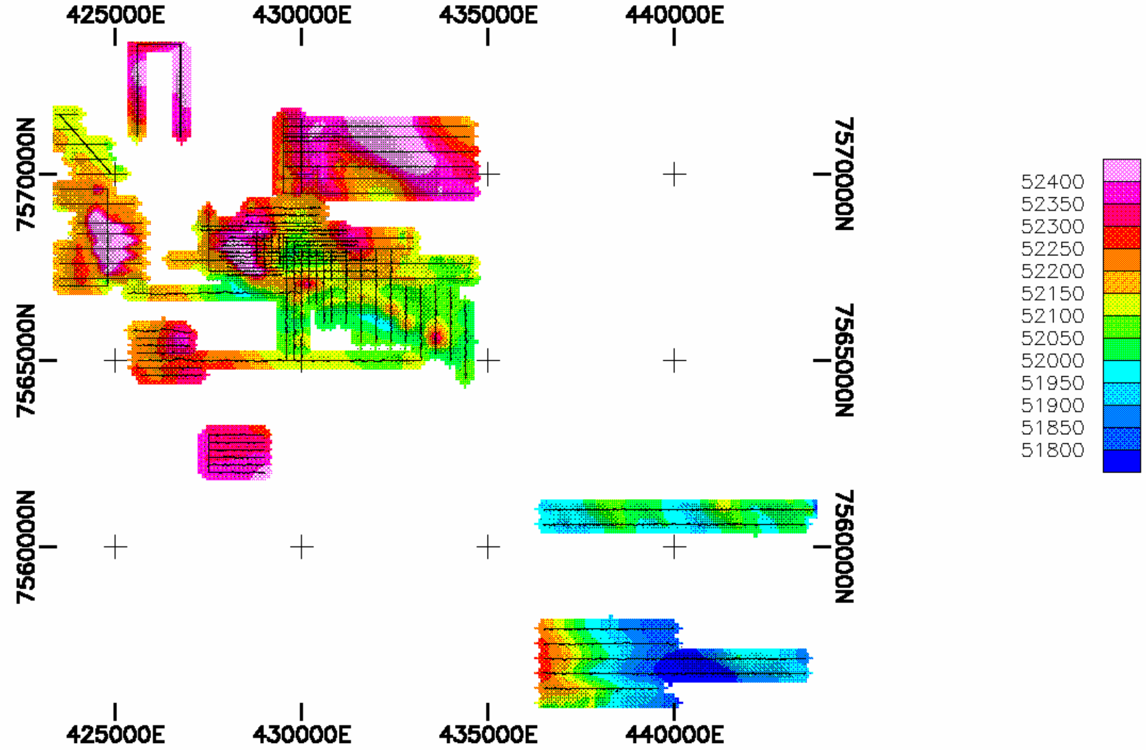
7570000N
7565000N
7560000N
40
36
32
28
26
24
22
20
18
16
14
12
10
8
6
4
2
0
-2
-4
-6
-8
-10
-12
-14
-16
-18
-20
-26
-28
-32
-36
-40
-48
Min Contour Interval = 2.00nT
Hanning passes = 64
Grid cell size = 100
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1997
Author: JEH
Data File: ADNERA.MAG
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Hanning Residual Magnetics
Aeromagnetic Map
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 4.2

18\05\04



Min Contour Interval: 50.0000nT
Grid cell size: 100
Datum: nT
Base easting: 0.0
Base northing: 0.0
Base elevation: 0.000m
Base value: 0.000 m
Survey date: 2006-2015
Author: JEH
Data File: AD_GRND.MAG

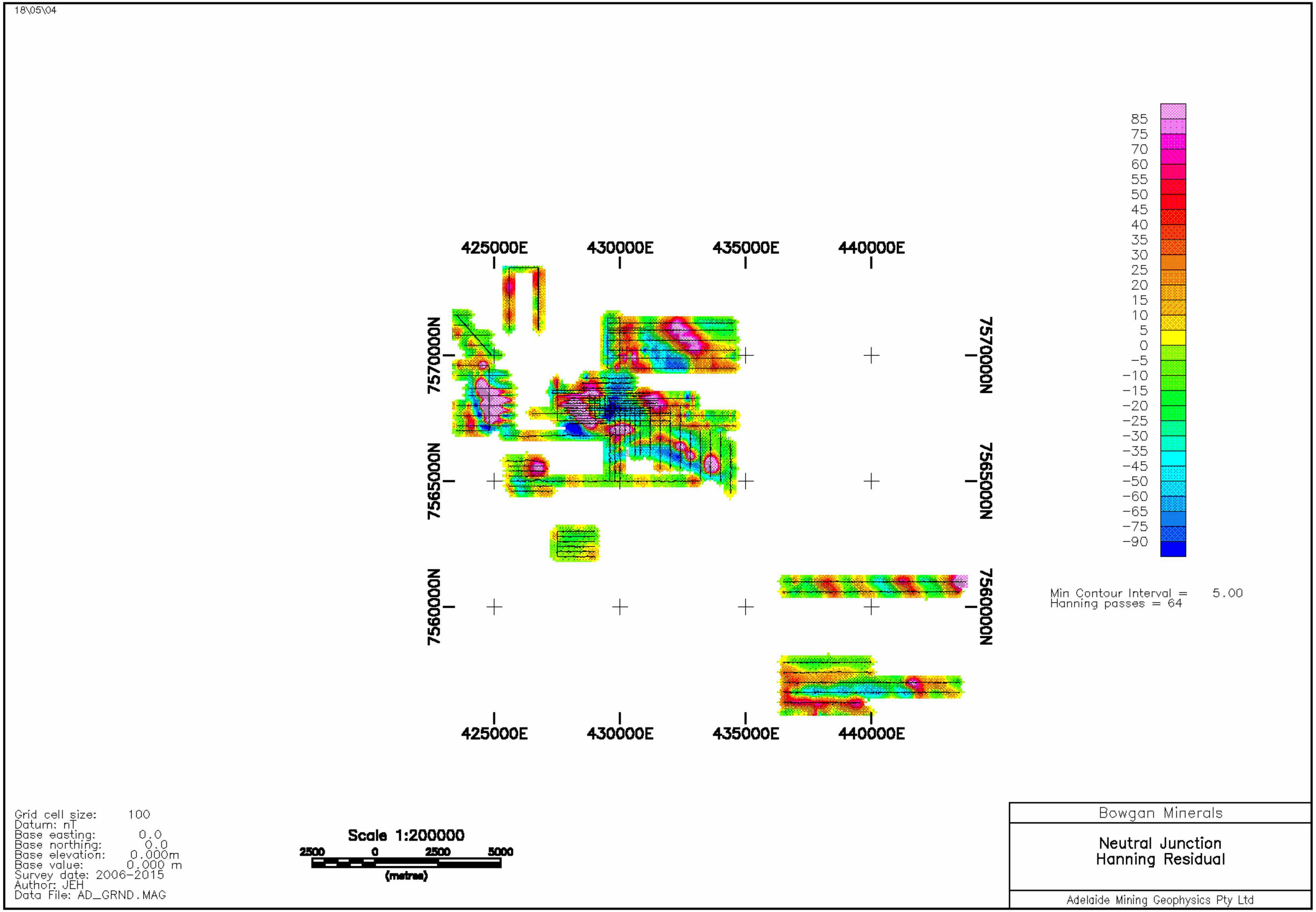
Scale 1:200000
2500 0 2500 5000
(metres)

Bowgan Minerals

Neutral Junction
Ground Magnetic Map

Adelaide Mining Geophysics Pty Ltd

Figure 4.3



18\05\04
425000E
430000E
435000E
440000E
7570000N
7565000N
7560000N
85
75
70
60
55
50
45
40
35
30
25
20
15
10
5
0
-5
-10
-15
-20
-25
-30
-35
-45
-50
-60
-65
-75
-90
Min Contour Interval = 5.00
Hanning passes = 64
Grid cell size: 100
Datum: nT
Base easting: 0.0
Base northing: 0.0
Base elevation: 0.000m
Base value: 0.000 m
Survey date: 2006-2015
Author: JEH
Data File: AD_GRND.MAG
Scale 1:200000
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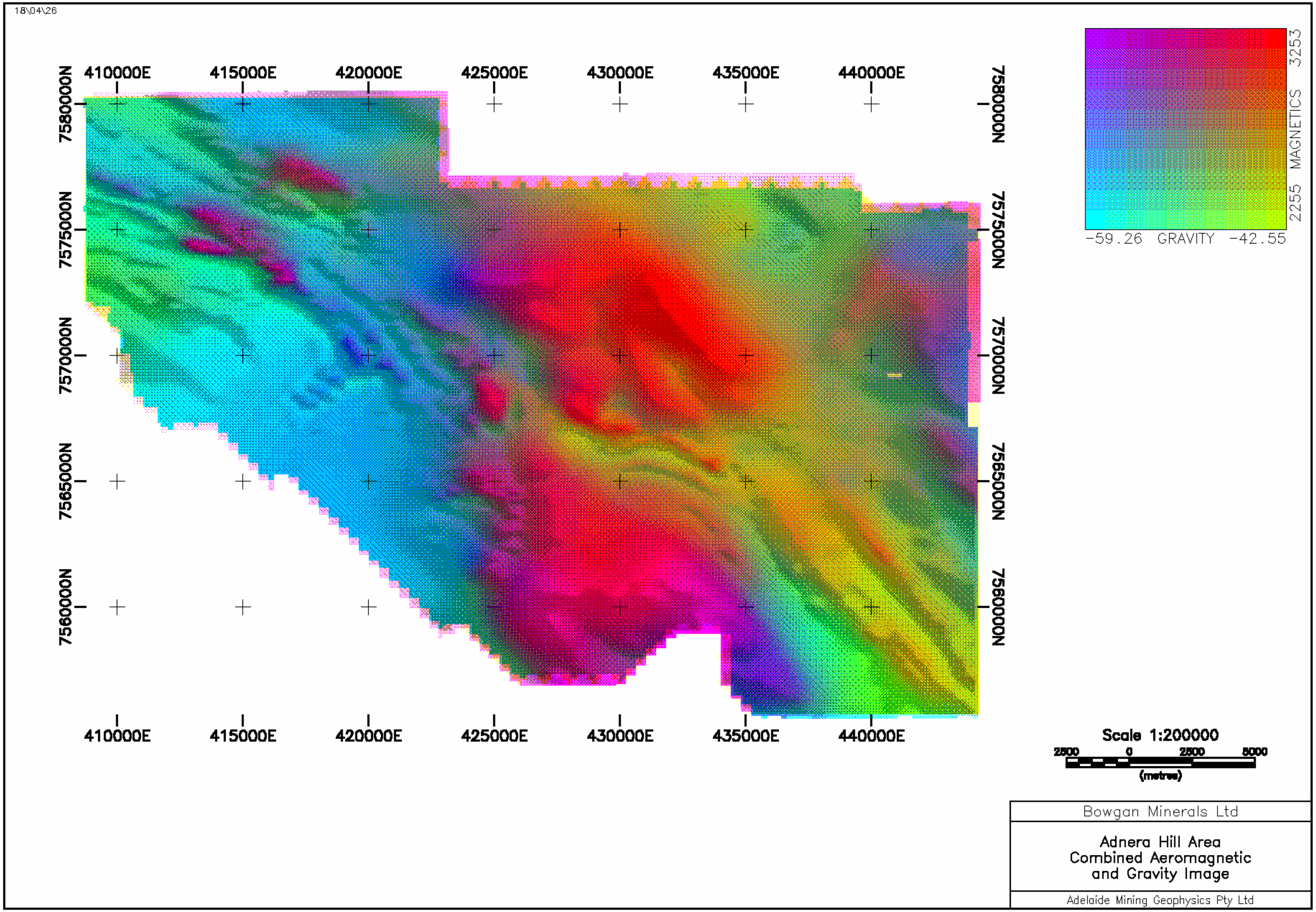
(metres)
Bowgan Minerals
Neutral Junction
Hanning Residual
Adelaide Mining Geophysics Pty Ltd

Figure 4.4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425000E
430000E
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440000E
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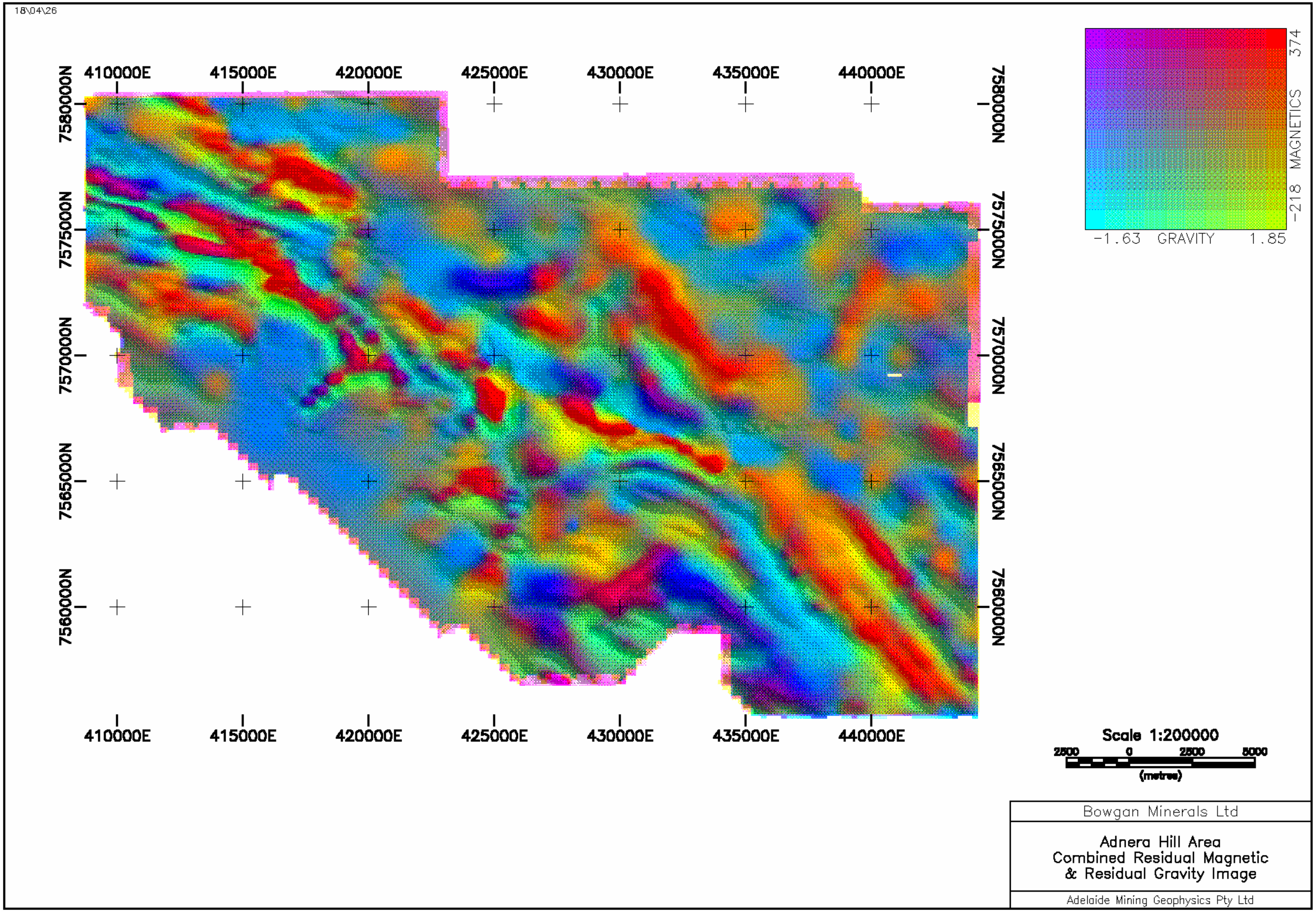
7575000N
7570000N
7565000N
7560000N
3253
MAGNETICS
2255
-59.26 GRAVITY -42.55
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Combined Aeromagnetic
and Gravity Image
Adelaide Mining Geophysics Pty Ltd

Figure 5.1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415000E
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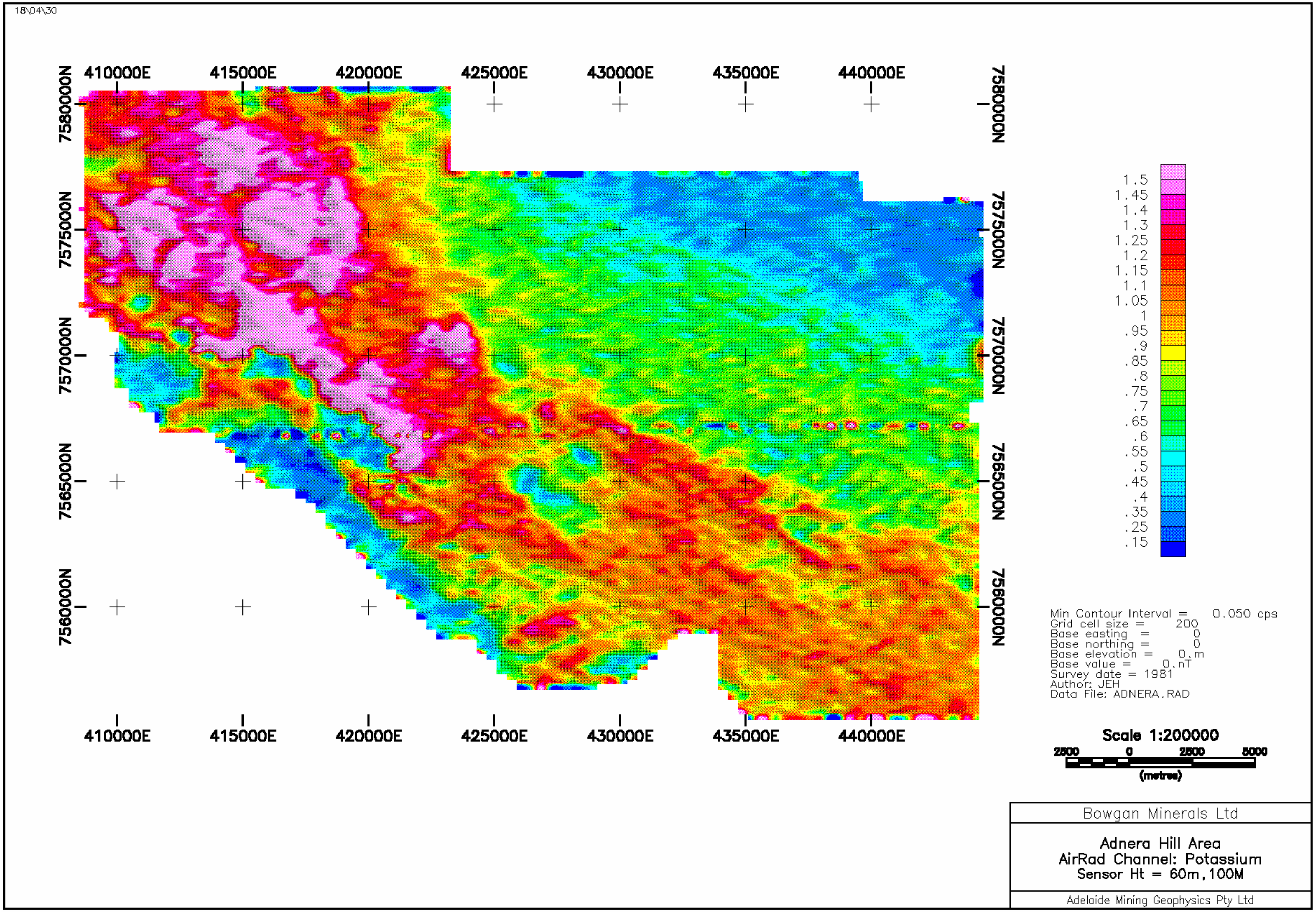
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
7565000N
7560000N
374
MAGNETICS
-218
-1.63
GRAVITY
1.85
Scale 1:200000
2500
0
2500
5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Combined Residual Magnetic
& Residual Gravity Image
Adelaide Mining Geophysics Pty Ltd

Figure 5.2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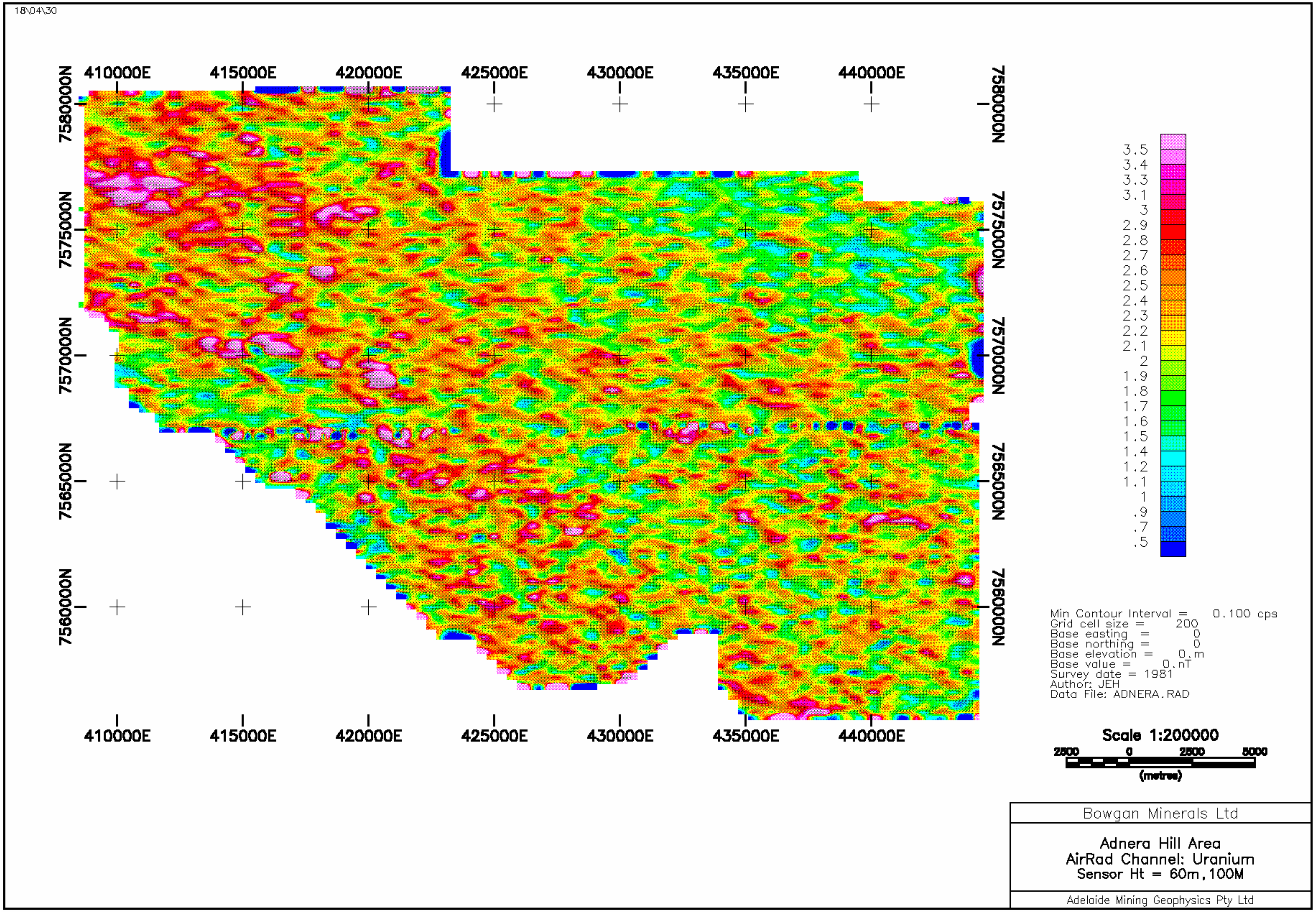
415000E
420000E
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
7565000N
7560000N
1.5
1.45
1.4
1.3
1.25
1.2
1.15
1.1
1.05
1
.95
.9
.85
.8
.75
.7
.65
.6
.55
.5
.45
.4
.35
.25
.15
Min Contour Interval = 0.050 cps
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: Potassium
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 6.1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430000E
435000E
440000E
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7575000N
7570000N
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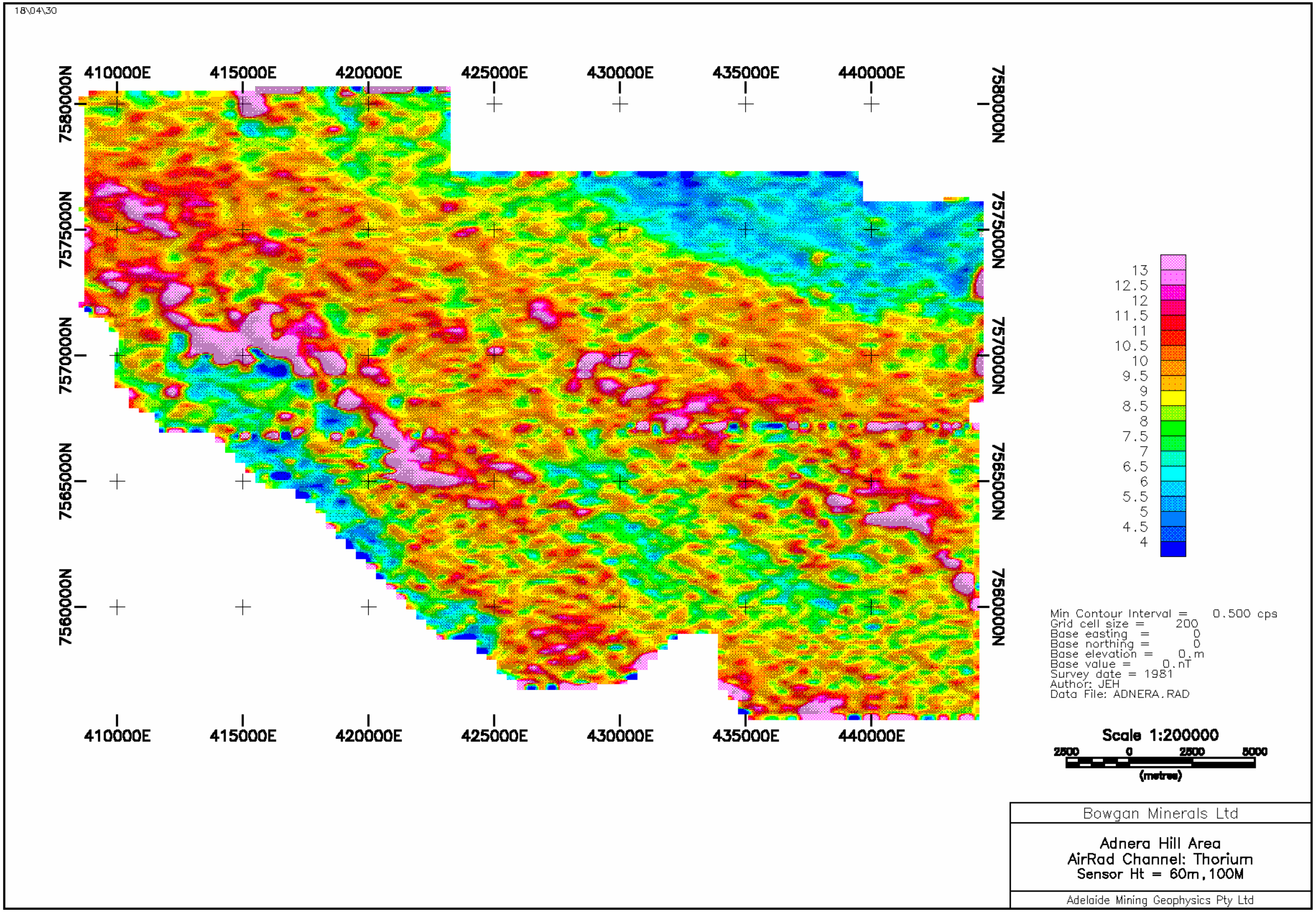
7560000N
3.5
3.4
3.3
3.1
3
2.9
2.8
2.7
2.6
2.5
2.4
2.3
2.2
2.1
2
1.9
1.8
1.7
1.6
1.5
1.4
1.2
1.1
1
.9
.7
.5
Min Contour Interval = 0.100 cps
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: Uranium
Sensor Ht = 60m, 100M
Adelaide Mining Geophysics Pty Ltd

Figure 6.2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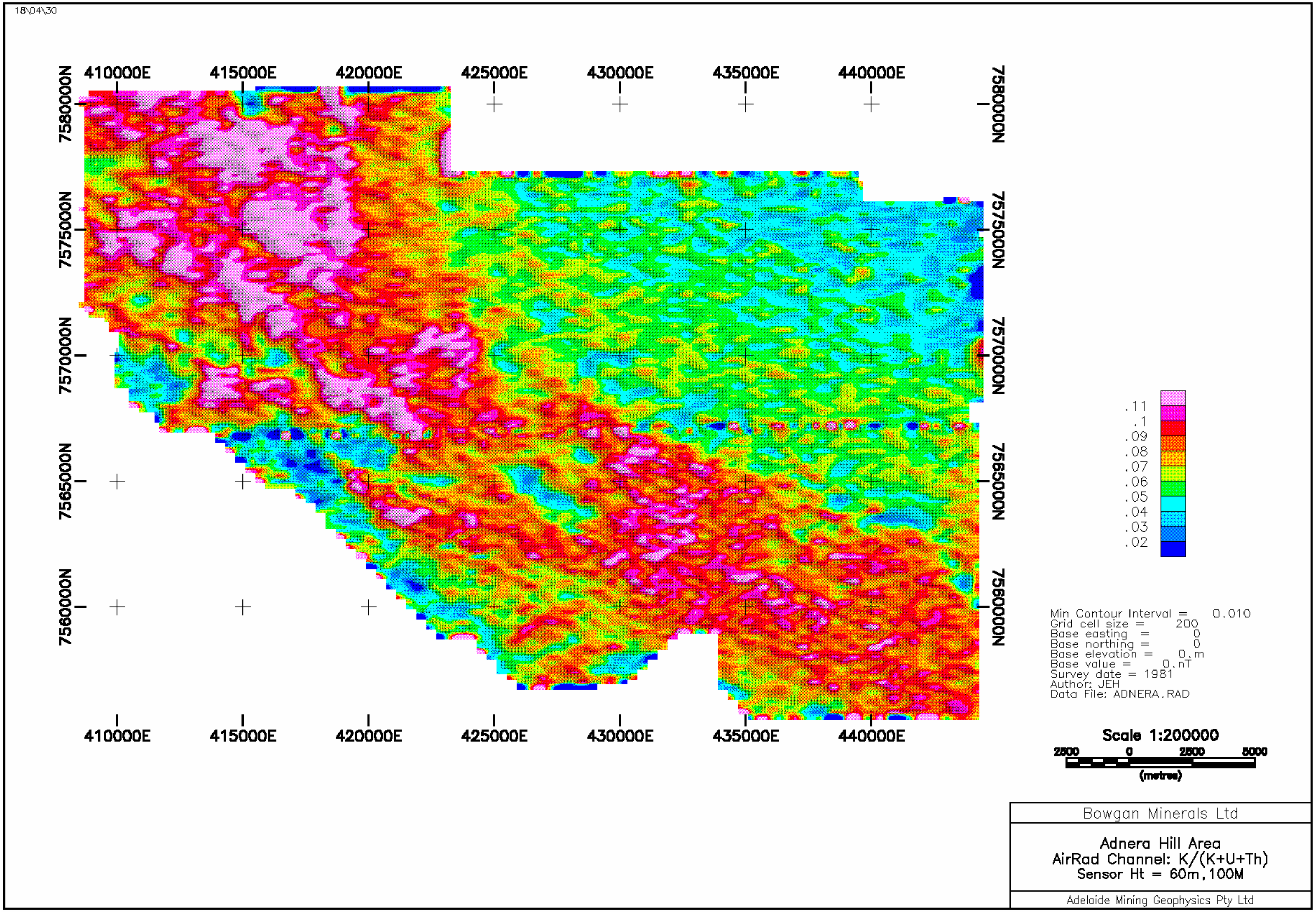
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
7565000N
7560000N
13
12.5
12
11.5
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
5.5
5
4.5
4
Min Contour Interval = 0.500 cps
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500
0
2500
5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: Thorium
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 6.3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415000E
420000E
425000E
430000E
435000E
440000E
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7575000N
7570000N
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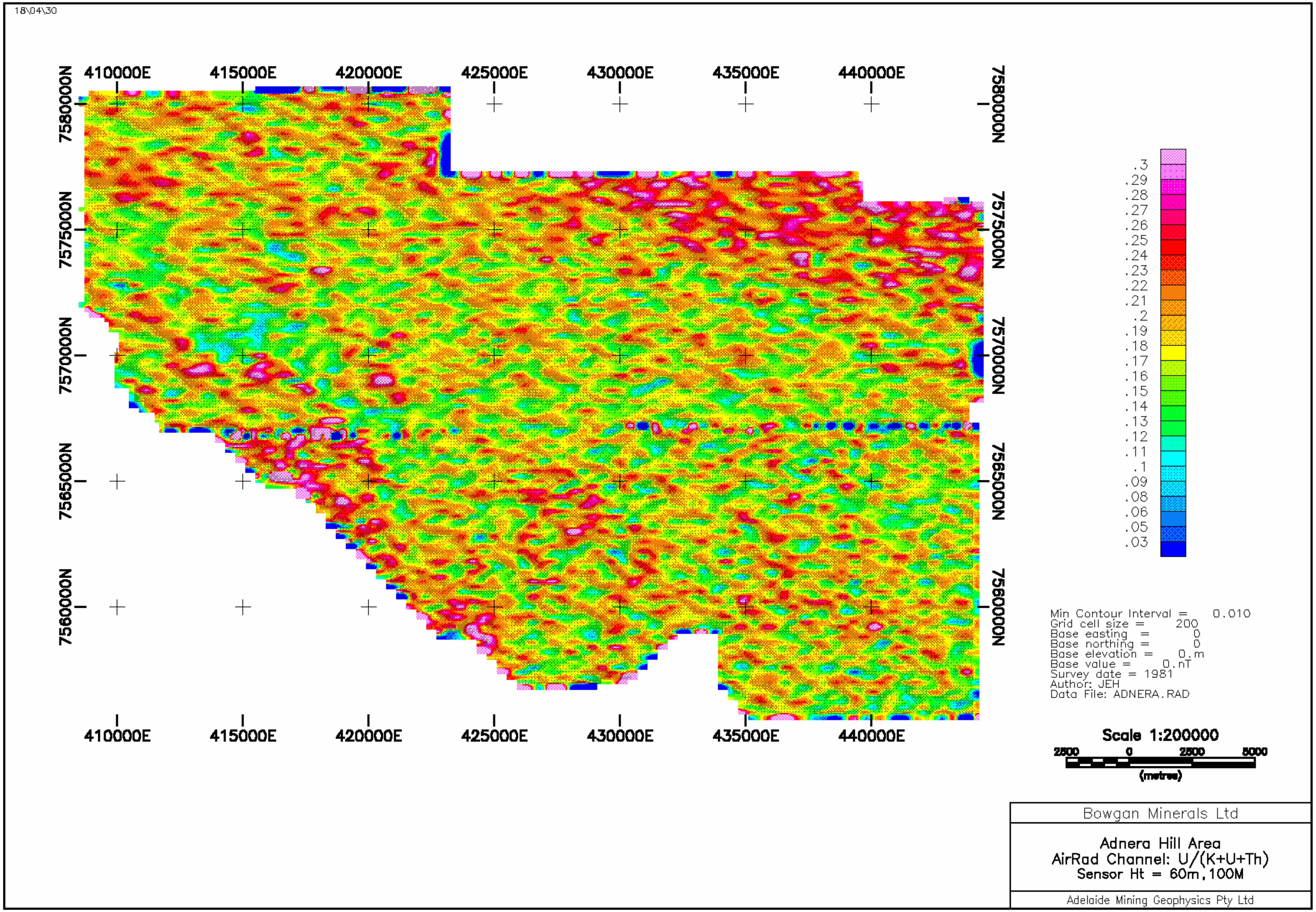
.1
.09
.08
.07
.06
.05
.04
.03
.02
Min Contour Interval = 0.010
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: K/(K+U+Th)
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 7.1


18\04\30
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415000E
420000E
425000E
430000E
435000E
440000E
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7575000N
7570000N
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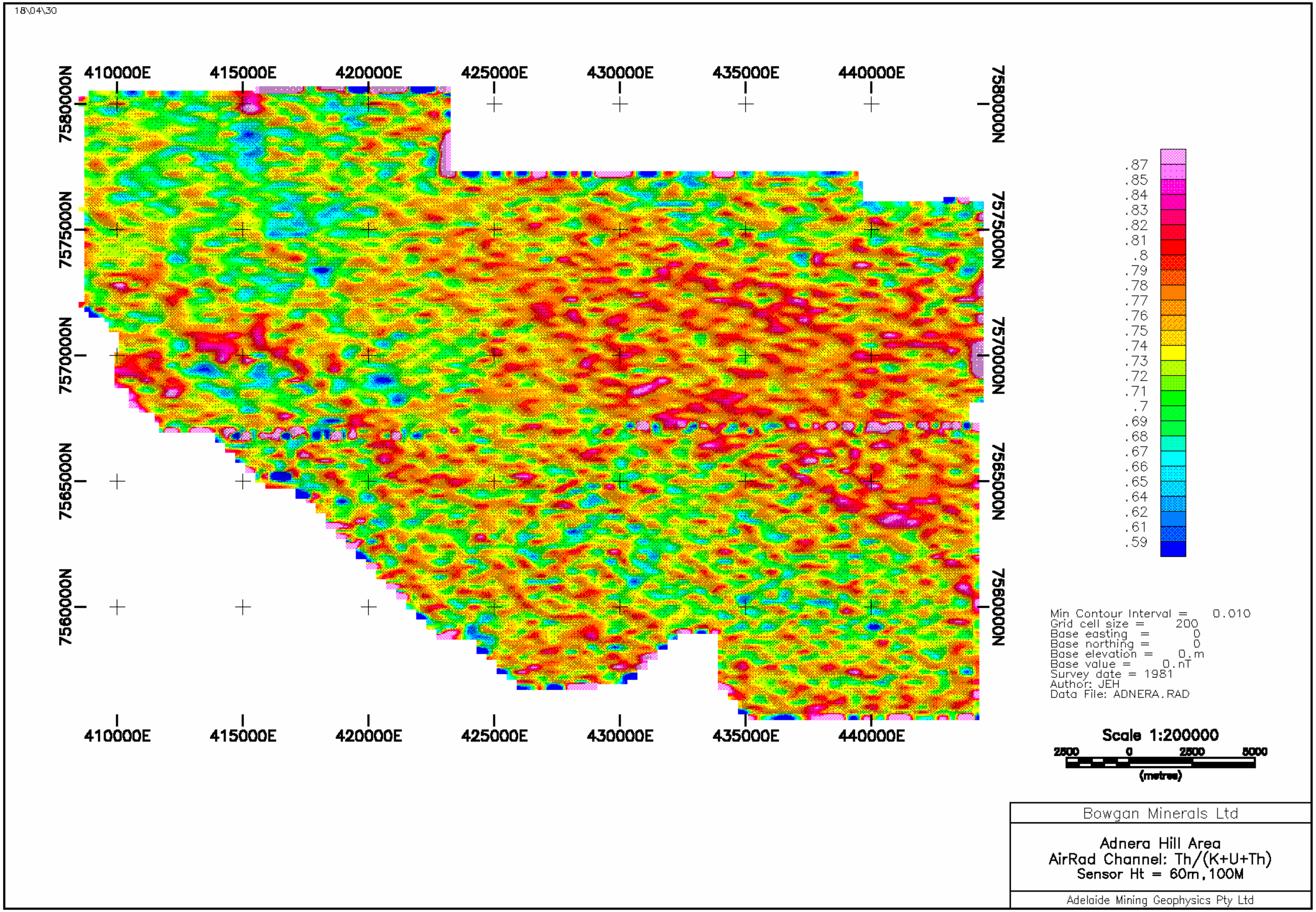
7560000N
.3
.29
.28
.27
.26
.25
.24
.23
.22
.21
.2
.19
.18
.17
.16
.15
.14
.13
.12
.11
.1
.09
.08
.06
.05
.03
Min Contour Interval = 0.010
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: U/(K+U+Th)
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 7.2


18\04\30
410000E
415000E
420000E
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
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7560000N
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.76
.75
.74
.73
.72
.71
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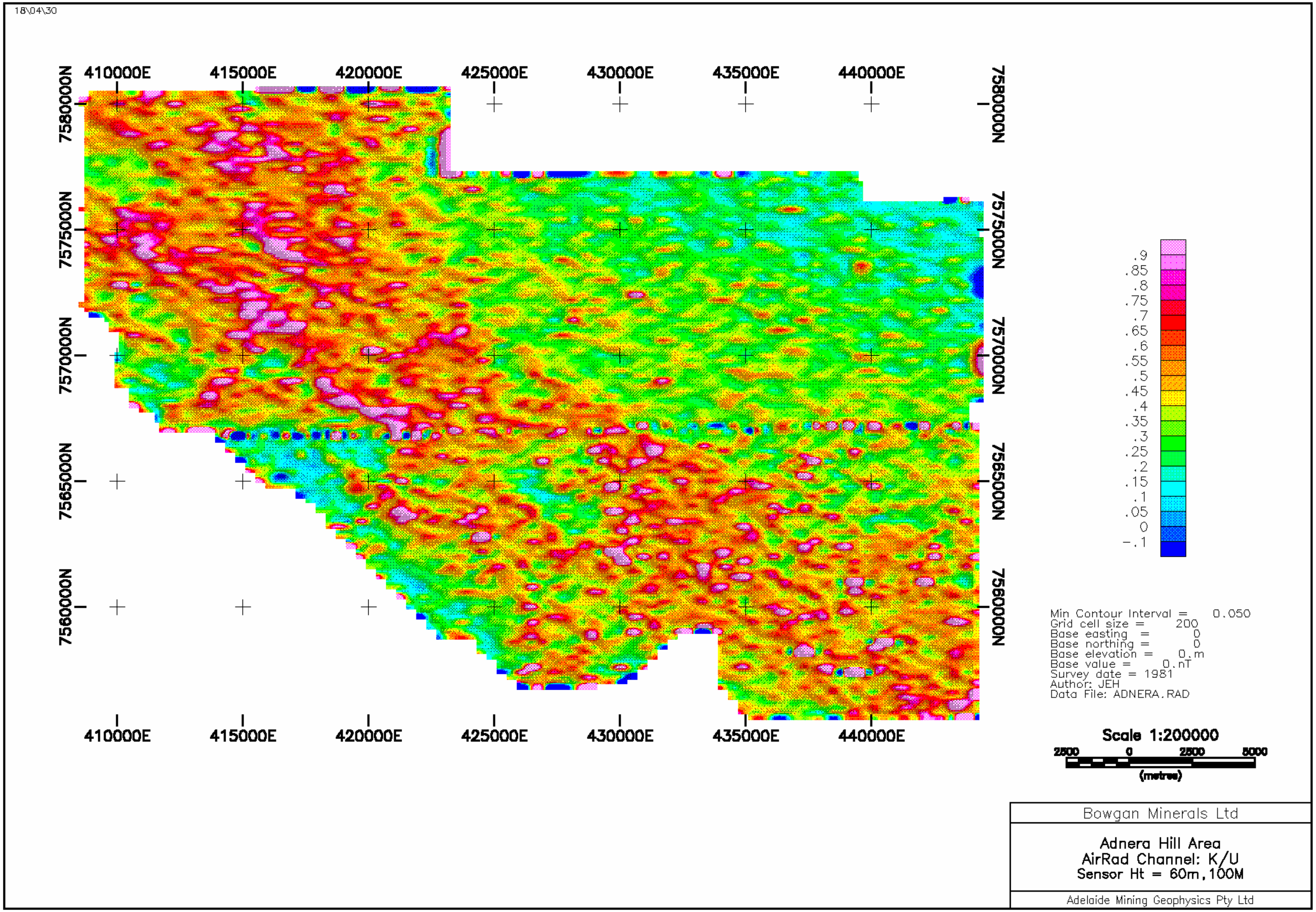
.66
.65
.64
.62
.61
.59
Min Contour Interval = 0.010
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: Th/(K+U+Th)
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 7.3


18\04\30
410000E
415000E
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425000E
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435000E
440000E
7580000N
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7570000N
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.2
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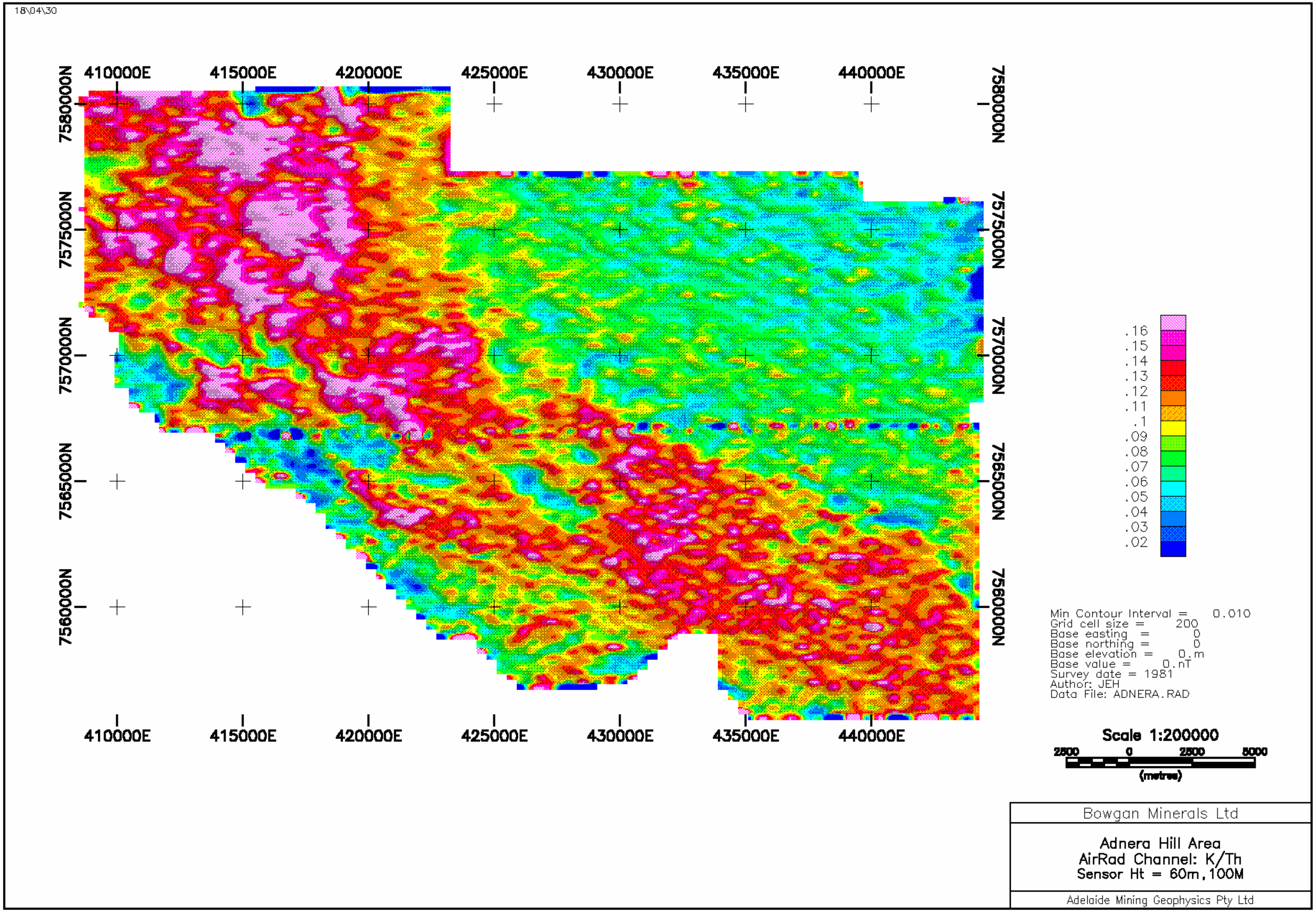
.1
.05
0
-.1
Min Contour Interval = 0.050
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: K/U
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 8.1


18\04\30
410000E
415000E
420000E
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
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7560000N
.16
.15
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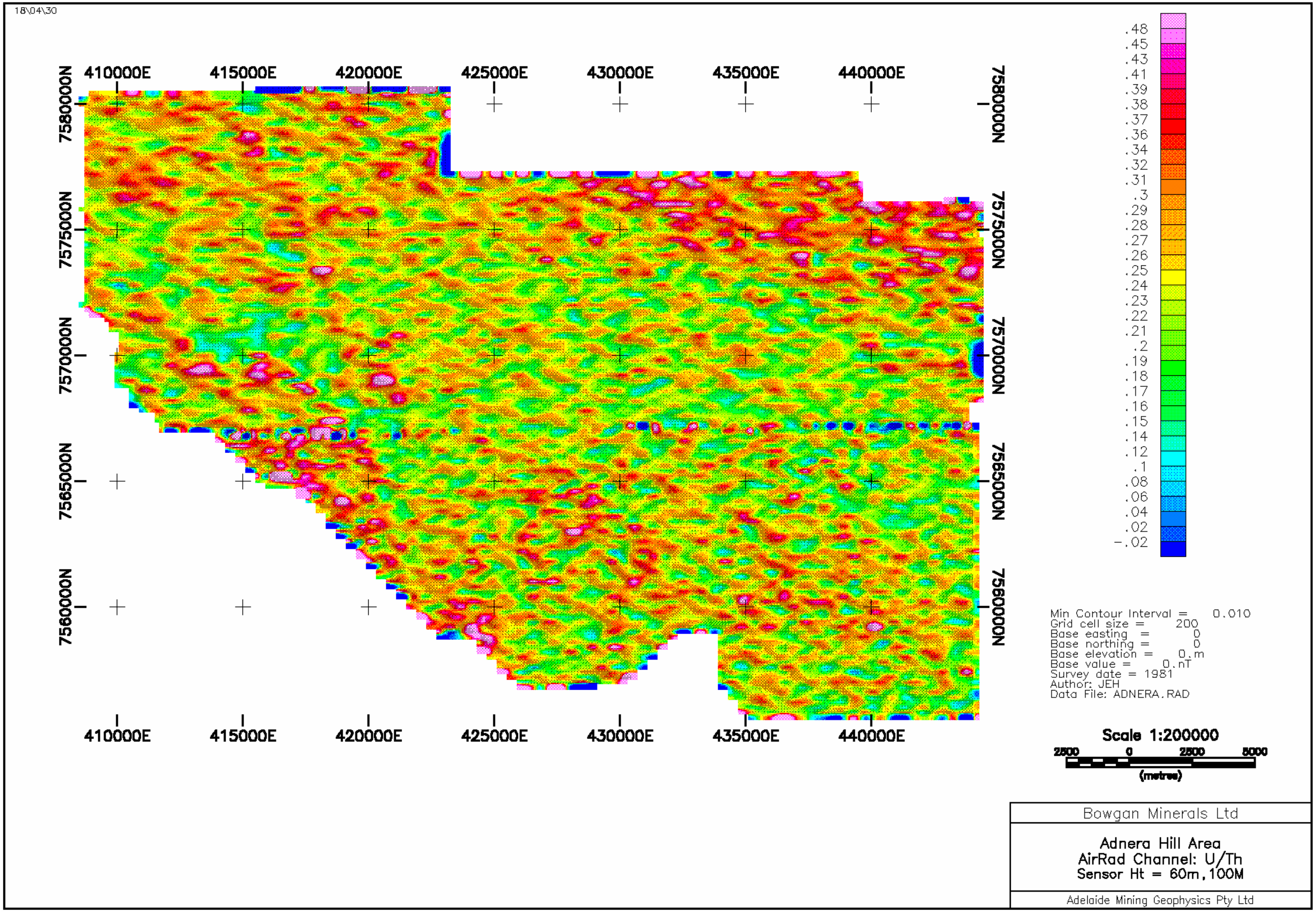
.11
.1
.09
.08
.07
.06
.05
.04
.03
.02
Min Contour Interval = 0.010
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: K/Th
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 8.2


18\04\30
410000E
415000E
420000E
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
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.41
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.18
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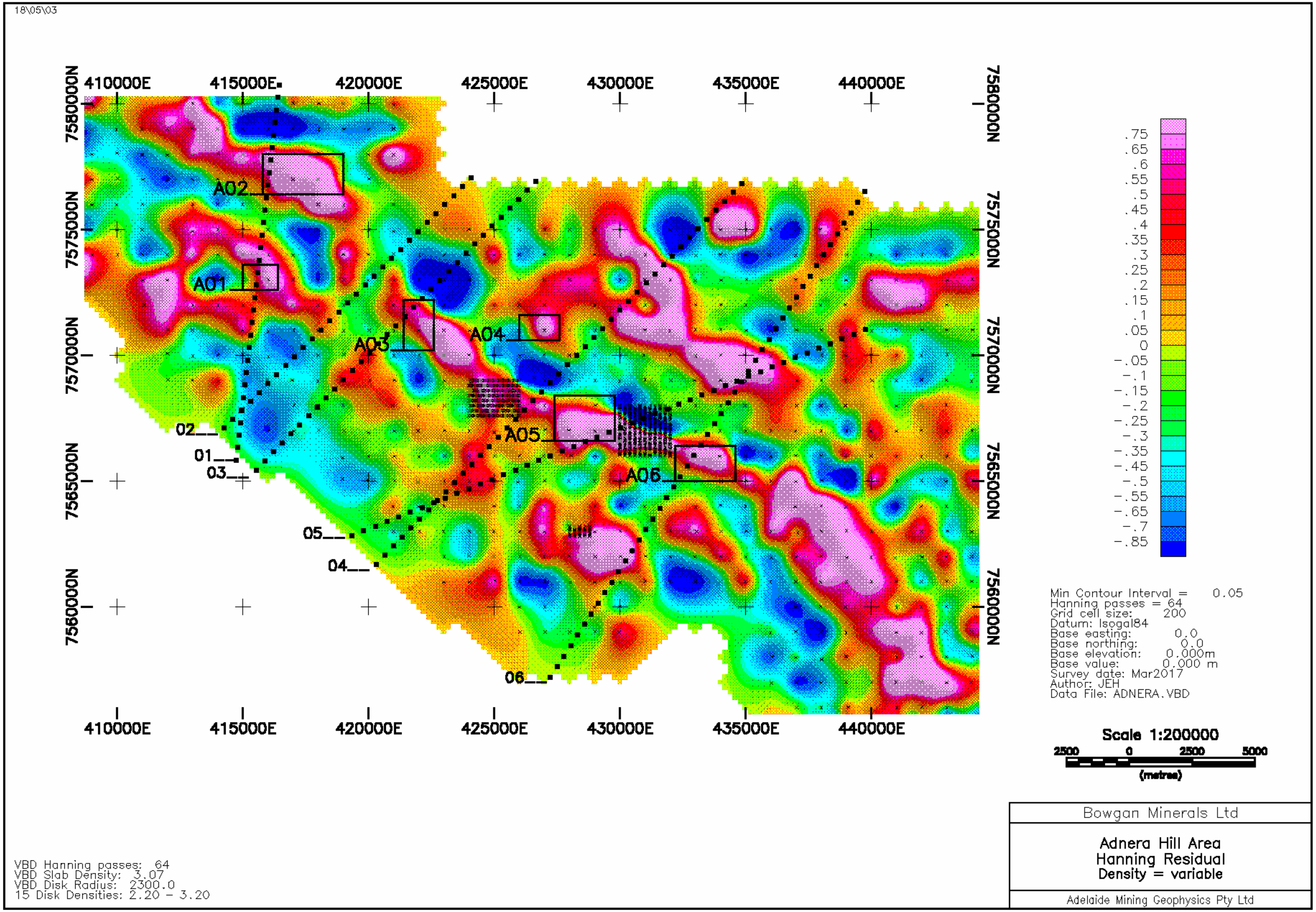
.15
.14
.12
.1
.08
.06
.04
.02
-.02
Min Contour Interval = 0.010
Grid cell size = 200
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1981
Author: JEH
Data File: ADNERA.RAD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
AirRad Channel: U/Th
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 8.3


18\05\03
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420000E
425000E
430000E
435000E
440000E
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7575000N
7570000N
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7560000N
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A02
A03
A04
A05
A06
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06
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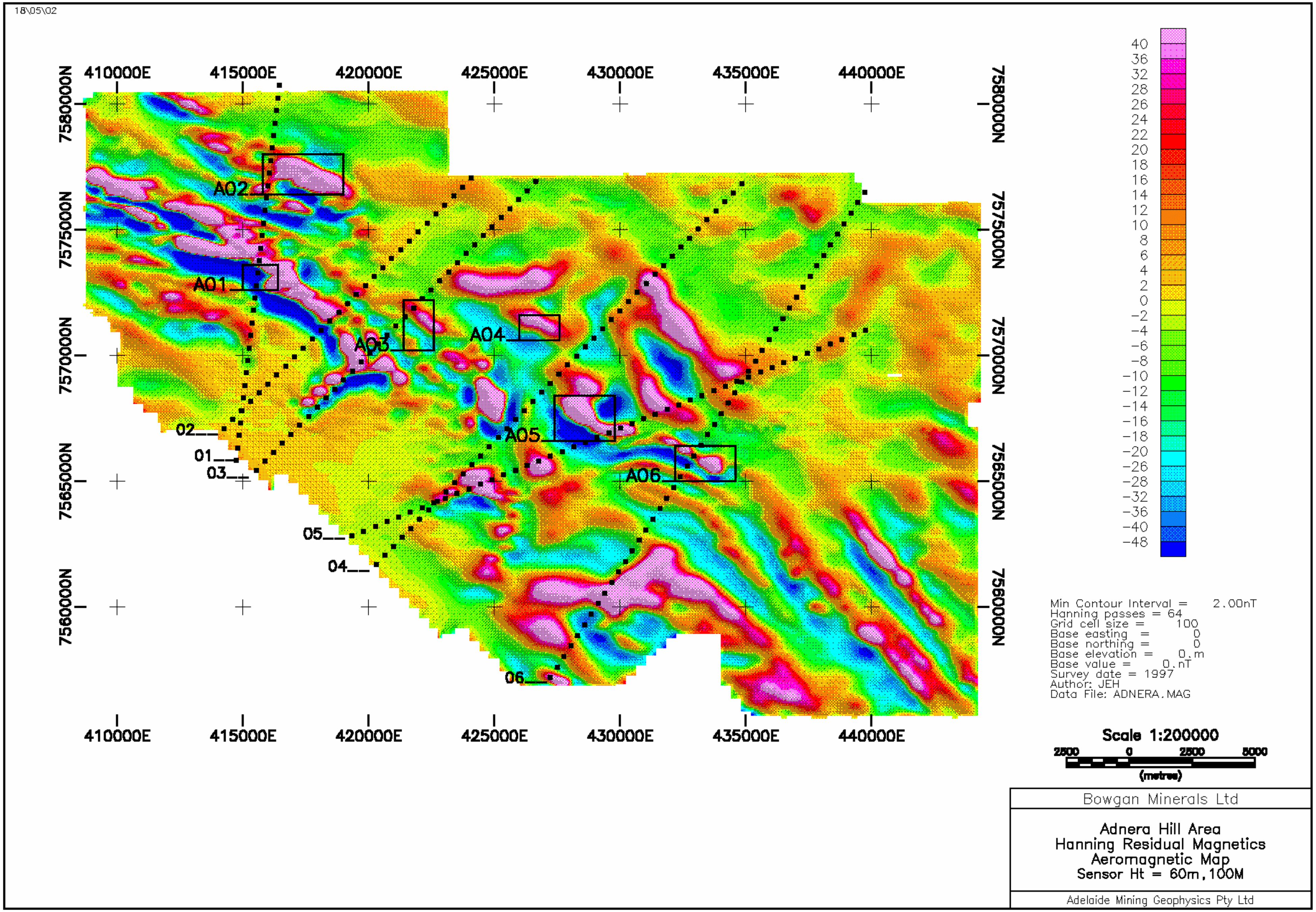
.65
.6
.55
.5
.45
.4
.35
.3
.25
.2
.15
.1
.05
0
-.05
-.1
-.15
-.2
-.25
-.3
-.35
-.45
-.5
-.55
-.65
-.7
-.85
Min Contour Interval = 0.05
Hanning passes = 64
Grid cell size: 200
Datum: Isogal84
Base easting: 0.0
Base northing: 0.0
Base elevation: 0.000m
Base value: 0.000 m
Survey date: Mar2017
Author: JEH
Data File: ADNERA.VBD
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Hanning Residual
Density = variable
Adelaide Mining Geophysics Pty Ltd
VBD Hanning passes: 64
VBD Slab Density: 3.07
VBD Disk Radius: 2300.0
15 Disk Densities: 2.20 - 3.20

Figure 9.1


18\05\02
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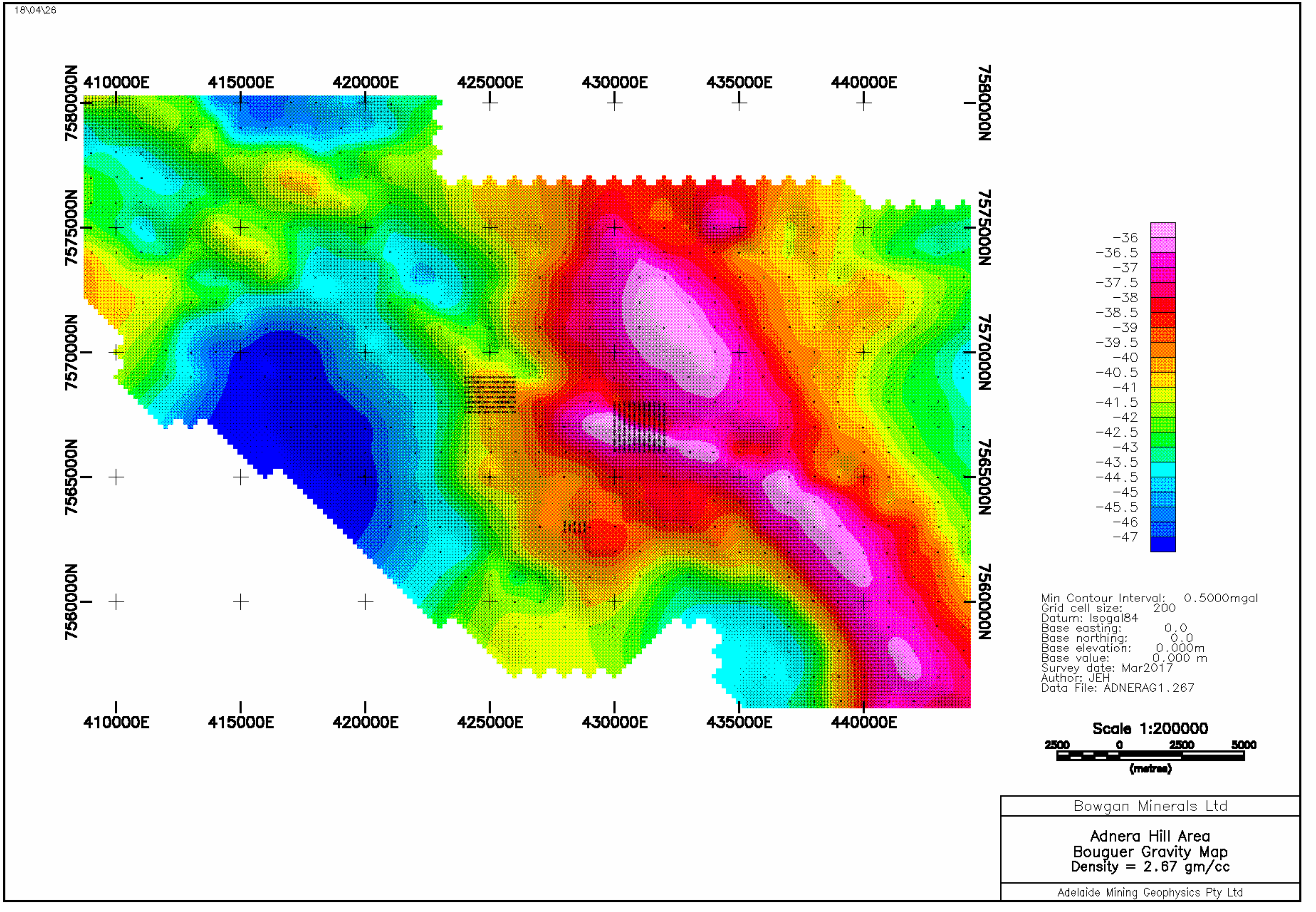
-10
-12
-14
-16
-18
-20
-26
-28
-32
-36
-40
-48
Min Contour Interval = 2.00nT
Hanning passes = 64
Grid cell size = 100
Base easting = 0
Base northing = 0
Base elevation = 0.m
Base value = 0.nT
Survey date = 1997
Author: JEH
Data File: ADNERA.MAG
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Hanning Residual Magnetics
Aeromagnetic Map
Sensor Ht = 60m,100M
Adelaide Mining Geophysics Pty Ltd

Figure 9.2

APPENDIX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425000E
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435000E
440000E
7580000N
7575000N
7570000N
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7560000N
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-37.5
-38
-38.5
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-39.5
-40
-40.5
-41
-41.5
-42
-42.5
-43
-43.5
-44.5
-45
-45.5
-46
-47
Min Contour Interval: 0.5000mgal
Grid cell size: 200
Datum: Isogal84
Base easting: 0.0
Base northing: 0.0
Base elevation: 0.000m
Base value: 0.000 m
Survey date: Mar2017
Author: JEH
Data File: ADNERAG1.267
Scale 1:200000
2500 0 2500 5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Bouguer Gravity Map
Density = 2.67 gm/cc
Adelaide Mining Geophysics Pty Ltd

Figure A1

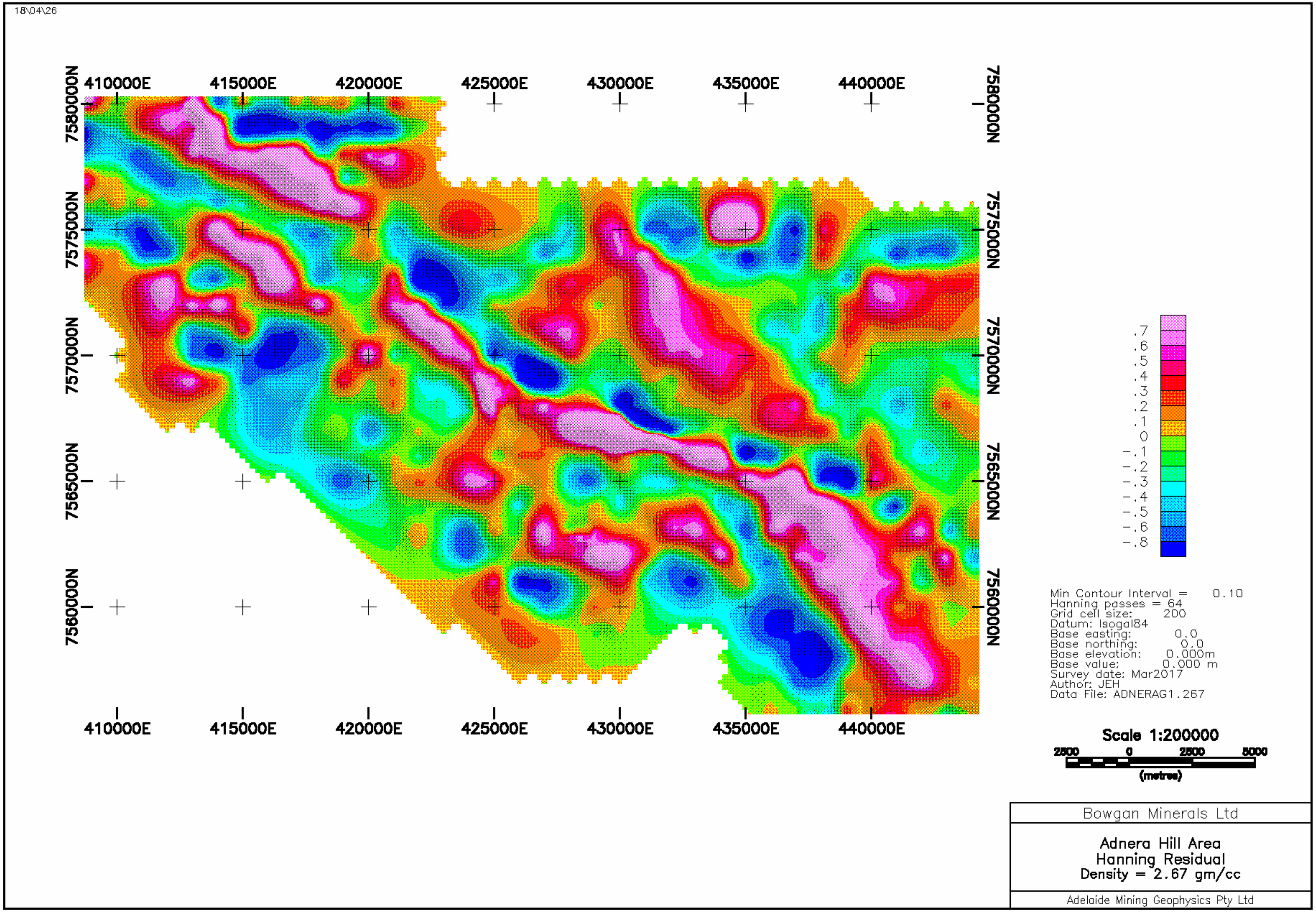
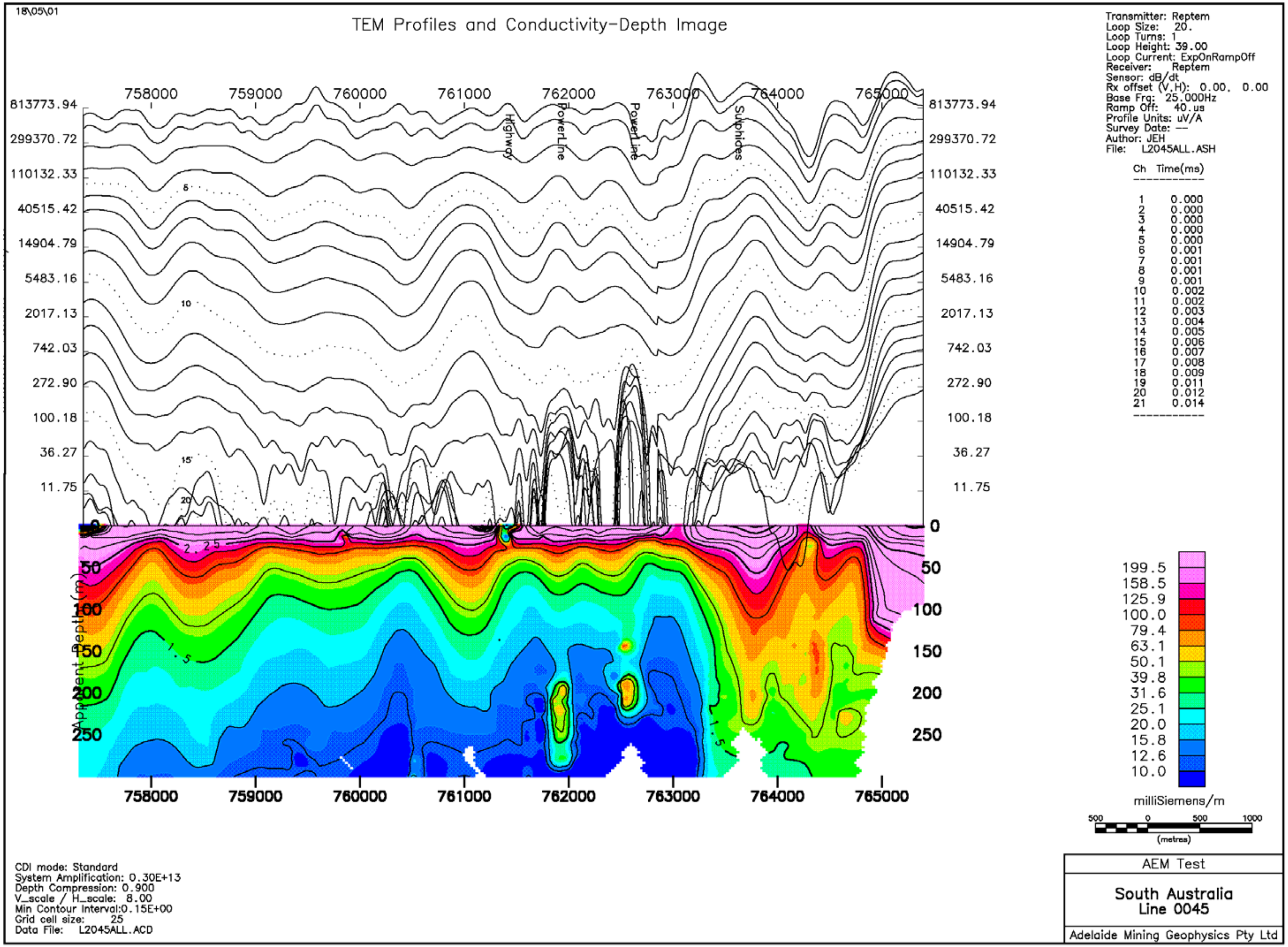

18\04\26
410000E
415000E
420000E
425000E
430000E
435000E
440000E
7580000N
7575000N
7570000N
7565000N
7560000N
.7
.6
.5
.4
.3
.2
.1
0
-.1
-.2
-.3
-.4
-.5
-.6
-.8
Min Contour Interval = 0.10
Hanning passes = 64
Grid cell size: 200
Datum: Isogal84
Base easting: 0.0
Base northing: 0.0
Base elevation: 0.000m
Base value: 0.000 m
Survey date: Mar2017
Author: JEH
Data File: ADNERAG1.267
Scale 1:200000
2500
0
2500
5000
(metres)
Bowgan Minerals Ltd
Adnera Hill Area
Hanning Residual
Density = 2.67 gm/cc
Adelaide Mining Geophysics Pty Ltd

Figure A2



A3 Sample AEM data with observed channel profiles (top) and derived CDI (bottom). Drilled sulphides occur at 763600E.