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## Anglo American Exploration (Australia) Pty. Ltd.
## A.C.N. 006 195 982

# EPM16070
# Clayhole Creek
# Partial Surrender Report

## For the Period 14/03/2008 to 13/03/2010

| | |
|---|---|
| **Tenure Holder:** | **Anglo American Exploration (Australia) Pty Ltd** |
| **Tenement Operator:** | **Anglo American Exploration (Australia) Pty Ltd** |
| **Compiled By:** | **Kylie Dixon** |
| **Date:** | **June 2010** |

***Distribution***

***Department of Natural Resources and Mines Queensland - (1)***
***Anglo American Exploration (Australia) Pty Ltd – Perth Office (1)***

# SUMMARY

EPM16070, Clayhole Creek, originally covered an area of 116.8km$^2$ and is located within the Georgetown Inlier, Queensland. Anglo American Exploration Australia Pty Ltd (AAEA) was granted the tenement on 14th March 2008 for a period of five years. This tenement along with EPM15915, EPM15646 and the applications EPM17806, EPM17983, EPM18023 and EPM18056, make up the Lynd Project.

AAEA is seeking to discover significant NiS deposits in the Lynd area using a variety of magmatic NiS related empirical criteria and models.

The tenement area predominantly consists of Cambrian to Ordovician metasediments intruded by a Silurian mafic complex with minor Quaternary cover. The exploration target is a Voisey's Bay style NiS Deposit and the area has not seen NiS exploration. Anglo American has the rights to proprietary technology that the company believes will be able to detect massive NiS at significant depths.

During the reporting period exploration consisted of a Spectrem Airborne Geophysics Survey (TMI, EM and Radiometrics), 1:50,000 scale geological mapping and 1:50,000 scale regolith mapping over the surrendered portion of the tenement.

A total of 16 blocks were surrendered as part of the compulsory partial surrender and this report summarises the exploration activities conducted on the surrendered portion of EPM16070 for the reporting period 14th March 2008 to 13th March 2010.

Acknowledgement and Warranty



## Keywords

Geographical (Greenvale)
Commodities (nickel, copper, PGE)
Ages (Proterozoic)
Geological Province (Georgetown Inlier, Tasman Orogenic Zone)
Exploration (Geology, Regolith, Aerial Geophysical Survey)

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# 1. INTRODUCTION

EPM16070, Clayhole Creek is located 24 km southwest of the township of Greenvale and 215km west northwest of Townsville. Access to the tenement, from Townsville, is via the Gregory Development Rd that links Charters Towers to the Lynd Junction and then on station tracks. The tenement is on the Clarke River (SE55-13) 1:250,000 map sheet and the Burges (7,859) 1:100,000 map sheet.

AAEA was granted the tenement on 14th March 2008 for a period of five years. EPM16070 originally consisted of 36 graticular blocks covering an area of approximately 116km$^2$ within the Georgetown Inlier. A total of 16 blocks were surrendered as part of the compulsory partial surrender. This report summarises the exploration activities conducted on the surrendered portion of EPM16070 during the reporting period 14th March 2008 to 13th March 2010.

# 2. TENURE

The tenement EPM16070, was granted to AAEA on 14th March 2008 and originally consisted of 36 graticule blocks covering an area of 116km2. The tenement details are in Table 1 below and the tenement location plan is presented as Figure 1.

**Table 1: Original Tenements Details**

| Tenement | Holder | Date Granted | Expiry Date | Original Area Km$^2$ | Original No Sub Blocks | No Blocks surrendered |
|---|---|---|---|---|---|---|
| EPM16070 | AAEA | 14/03/2008 | 13/03/2013 | 116.8 | 36 | 16 |

Table 2 and Figure 2 details the 16 graticular blocks that were surrendered.

**Table 2: Surrendered Graticular Block Details - EPM16070.**

| 1:1,000,000 Plan Name | Primary Number | Graticular Section | No of Blocks |
|---|---|---|---|
| Townsville | 2674 | w | 1 |
| | 2744 | p u z | 3 |
| | 2745 | f g h j k l q v | 8 |
| | 2746 | a b f g | 4 |
| | | ***TOTAL*** | ***16*** |

# 3. REGIONAL GEOLOGY

EPM16070 (part of the Lynd project) is located in northeast Queensland along the Tasman Orogenic zone, on the south eastern margin of the predominantly Palaeoproterozoic to Early Mesoproterozoic Georgetown Inlier (Figure 3). At this location Palaeoproterozoic rocks of the Georgetown inlier are in faulted contact with younger Ordovician to Carboniferous sediments of the Broken River Province further east (Fergusson et al., 2007). Recent geological work has moved the western contact of the Tasman Orogenic zone from the Burdekin River Fault westward along the Lynd Mylonite Zone; the area between the two structural elements is named the Greenvale Province (Nishiya et al., 2003 and Fergusson et al., 2007).

The roughly N-S trending Balcooma Mylonite Zone and Nickel Mine Fault further divide the Greenvale Province between the Lynd Mylonite Zone and the Burdekin River Fault (Fergusson *et al.*, 2007). Early Palaeozoic metamorphic units and intrusions make up the majority of rocks in the Greenvale province (Whitnall *et al.*, 1991). The stratigraphy is younging towards the East from the Cambrian (486±5 to 477±6 Ma) Oasis Metamorphics and Lynwater complex west of the Balcooma Mylonite zone; the Ordovician (471±4 Ma) Balcooma Meta Volcanic Group and Silurian (431±7 Ma) Dido Tonalite East of the Balcooma Mylonite Zone (Whitnall *et al.*, 1991; Fergusson *et al.*, 2007). An increase in age is documented through the stratigraphy further east with the Ordovician Lugano Metamorphics, Cockiespring Tonalite, Eland Metavolcanics and Paddys Creek Phyllite west of the Nickel Mine Fault; through to the Cambrian Halls Reward Metamorphics located between the Nickel Mine Fault and the Burdekin River Fault (Fergusson *et al.*, 2007; Nishiya *et al.*, 2003).

The older units in the Greenvale province; Oasis Metamorphics, Lynwater Complex and Halls Reward Metamorphics, have been affected by amphibolite grade metamorphism related to the Cambrian Delamerian Orogeny (Fergusson *et al.*, 2007). Deposition of the Balcooma Volcanic group took place in a back-arc setting (Withnall *et al.*, 1991). Subsequent amphibolite grade metamorphism during the Silurian to Early Devonian deformed the Balcooma Volcanic Group (Withnall *et al.*, 1991). The emplacement of the Dido Tonalite, the focus of this study, is associated with this Silurian deformation event (Withnall *et al.*, 1991). Later deformation produced the predominantly N-S trending foliation found in the Greenvale Province (Fergusson *et al.*, 2007).

The rocks to the west and centre within tenement EPM16070 comprise small intrusions of Gabbros within Dido Tonalite associated Diorites. The surrounding geology is composed of Granites to the east and folded Silurian – Early Devonian sediments are to the south bounded to the diorites by a major structural fault trending EEN-WWS. A large magnetic high and northward trending major faults as well as minor NE-SW trending faults are also situated in this area.

# 4. EXPLORATION CONDUCTED

Exploration completed during the reporting period 14/03/2008 to 13/03/2010, consisted of a Spectrem Airborne Geophysics Survey (TMI, EM and Radiometrics), 1:50,000 scale geological mapping and 1:50,000 scale regolith mapping over the surrendered portion of the tenement. The location of this activity is shown on the Exploration Index Plan in Figure 4.

## 4.1 Aerial Geophysics – Spectrem Air Survey

In late 2009, Spectrem Air Limited conducted an Airborne Electromagnetic, Magnetic and Radiometric survey over The Lynd - Block 1 area. The survey covered approximately 50% of EPM16070. and a total of 5,070 line km was surveyed for the whole of The Lynd - Block 1 area and 32.54 line km (Figure 5) was surveyed within the surrendered portion of EPM16070. The digital data is included in Appendix I, details of the survey, the system specifications, standard Spectrem Air data processing stream and an atlas of images are described and presented in Appendix II.

The aerial geophysics revealed that the thickness of the survey area varies 0 to around 70 meters cover. In most areas, the cover is relatively thin (i.e. probably less than 20 meters). However, within EPM16070, there were some areas where the cover was up to 70 meters thick with conductance values as high as 14 siemens.

## 4.2 Geological Mapping

The geology map of the Lynd project area was complied at a scale 1:50,000 scale. The objective of the mapping was to get a better insight in the local geology and gain an understanding of the dimensions and geological setting of the mafic intrusives from within the Lynd Project. The mapping was compiled with the following datasets: AAEA aeromagnetic survey 1VD and RTP data; RTP open file aeromagnetic data; all geological data collected by AAEA during the course of the project; thin section analysis of all the drilling completed on the project and hand samples. The 1:50,000 scale geology map is presented as Figure 6.

### 4.3 Regolith Mapping Compilation

A 1:50,000 scale regolith map was complied for the greater Lynd Project area from a range of data that included satellite images, radiometric data, aerial photography, Google Earth and ground traversing. The regolith map (Figure 7) was used to identify different soil types in the area and helped identify which areas are suitable for soil sampling (i.e. thin soils developed in situ over basement rocks) from areas where alternative exploration methods are required (i.e. transported soils and sand not conducive to soil sampling).

## 5. CONCLUSION

During the reporting period, exploration completed within the 16 surrendered blocks of the tenement included a Spectrem Airborne Geophysics Survey (TMI, EM and Radiometrics), 1:50,000 scale geological mapping and 1:50,000 scale regolith mapping. No significant anomalies or areas of prospectivity were reported from the exploration undertaken and so the decision was made to surrender 16 blocks from the southern half of the tenement.

# 6. REFERENCES

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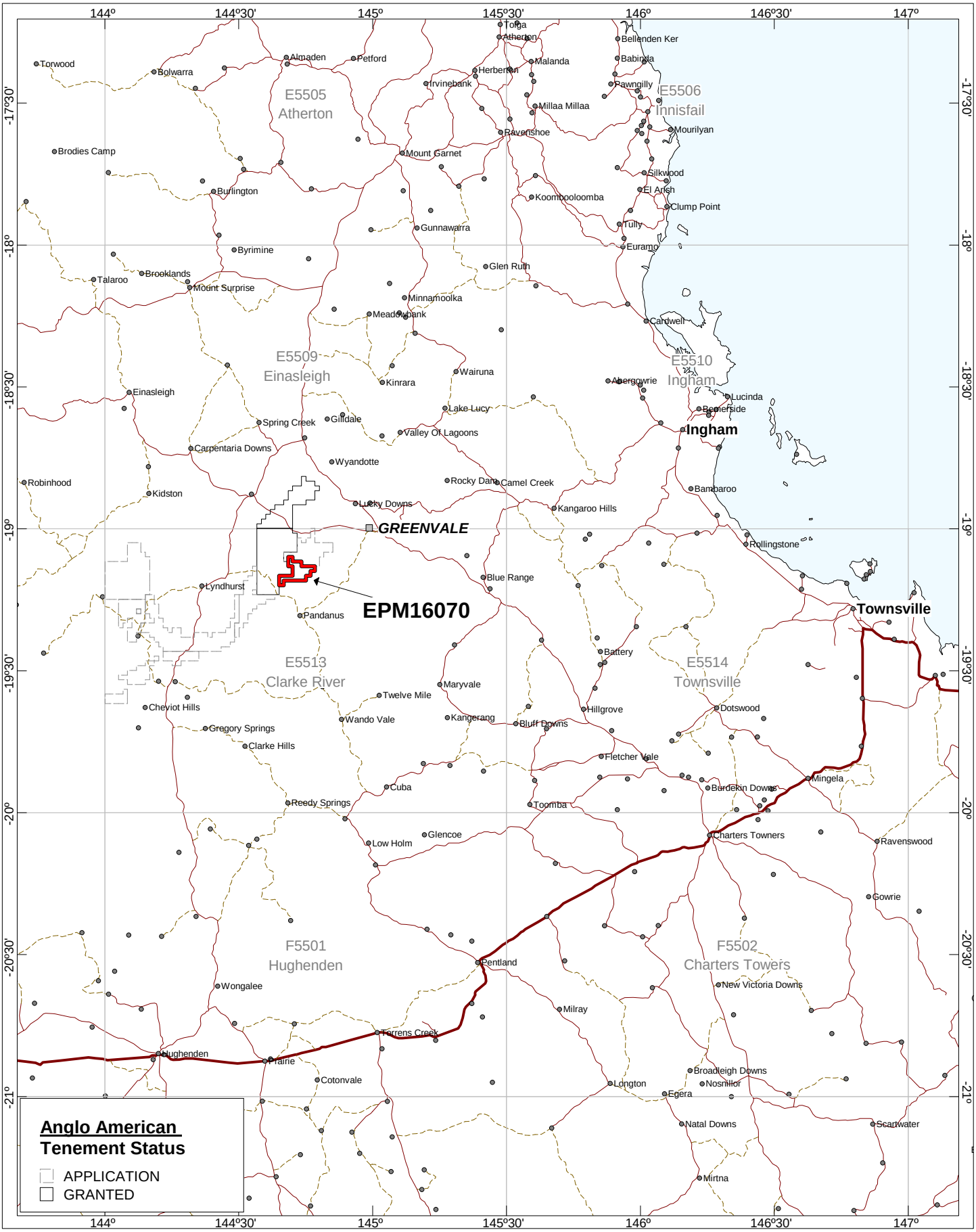
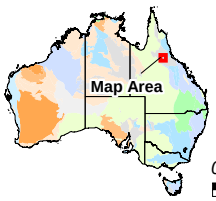
Dixon. K, 2009. *EPM16070 "Clayhole Creek" Second Annual Report for the Period 14/03/2009 -13/03/2010*. AAEA Confidential Report to Queensland Department of Mines and Energy.




## LOCATION MAP




N
W E
S

0 50 100

Kilometres

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_TN_12710_EPM16070.wor

AUTHOR: K Dixon

COMPILED BY: C Lucy

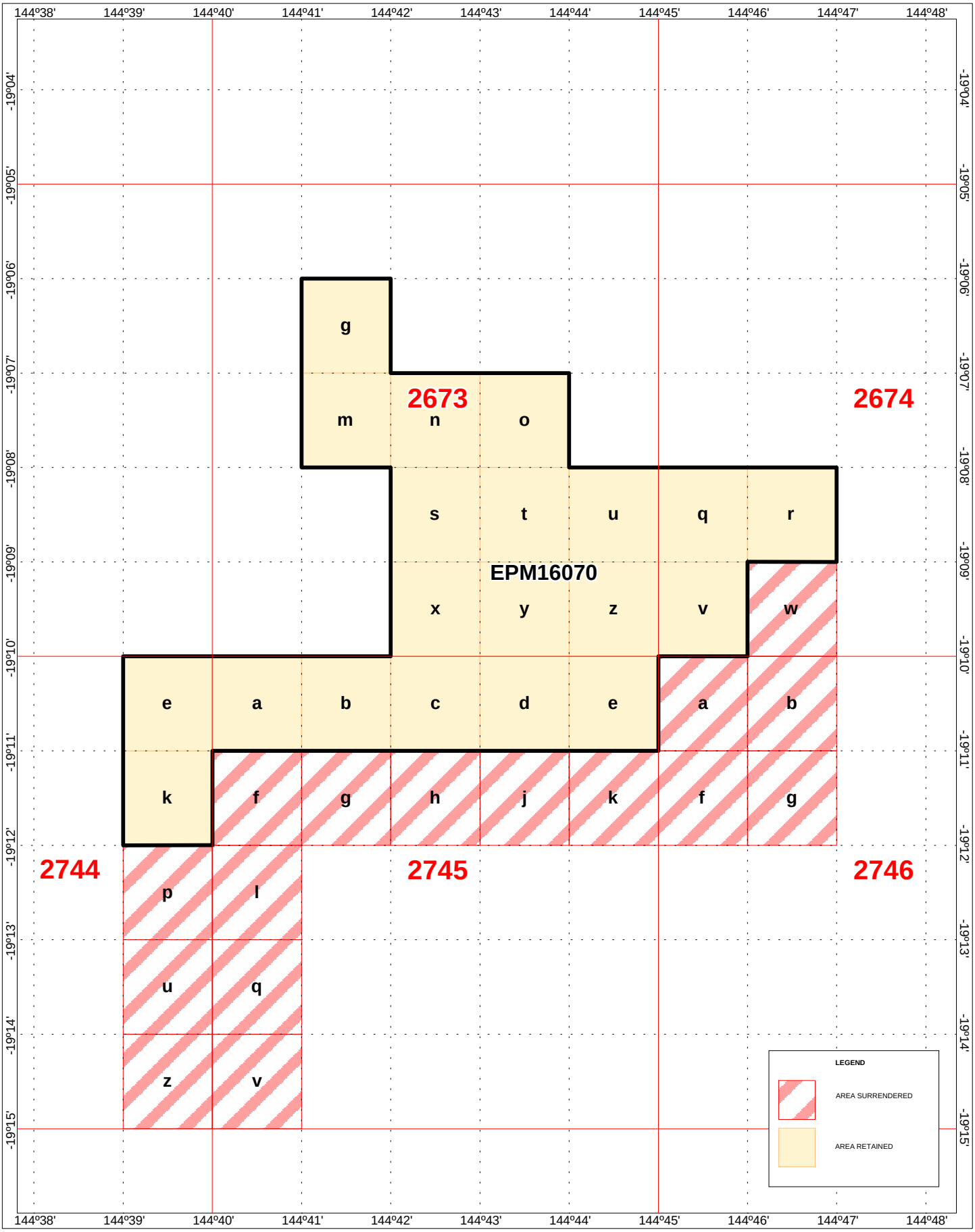
DATE: 01/06/2010

PROJECTION: Long/Lat (WGS 84)

SCALE: 1:2,000,000

Figure 1

# LYND PROJECT
# EPM16070
# TENEMENT LOCATION PLAN




## LOCATION MAP


N
W E
S

0 2 4
kilometres

ANGLO AMERICAN

REGION: Georgetown

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_TN_13034.wor

AUTHOR: K Dixon

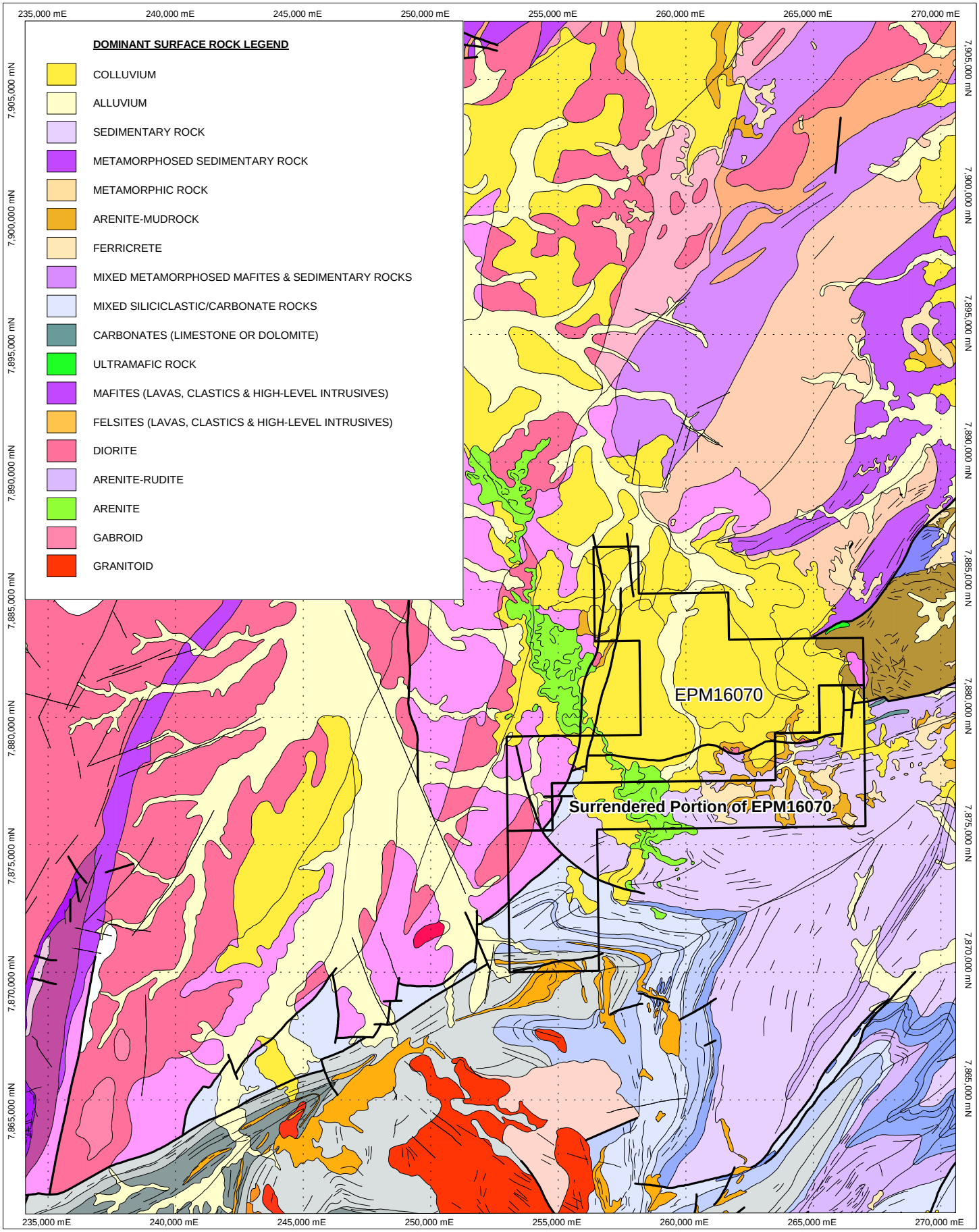
COMPILED BY: C Lucy

DATE: 04/02/2010

PROJECTION: Long/Lat (AGD66)

SCALE: 1:100,000

# Figure 2
# LYND PROJECT
# EPM16070
# TENEMENT SURRENDER PLAN




## LOCATION MAP


N
W E
S

0 5 10
Kilometres

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_12711_EPM16070.wor

AUTHOR: K Dixon

COMPILED BY: C Lucy

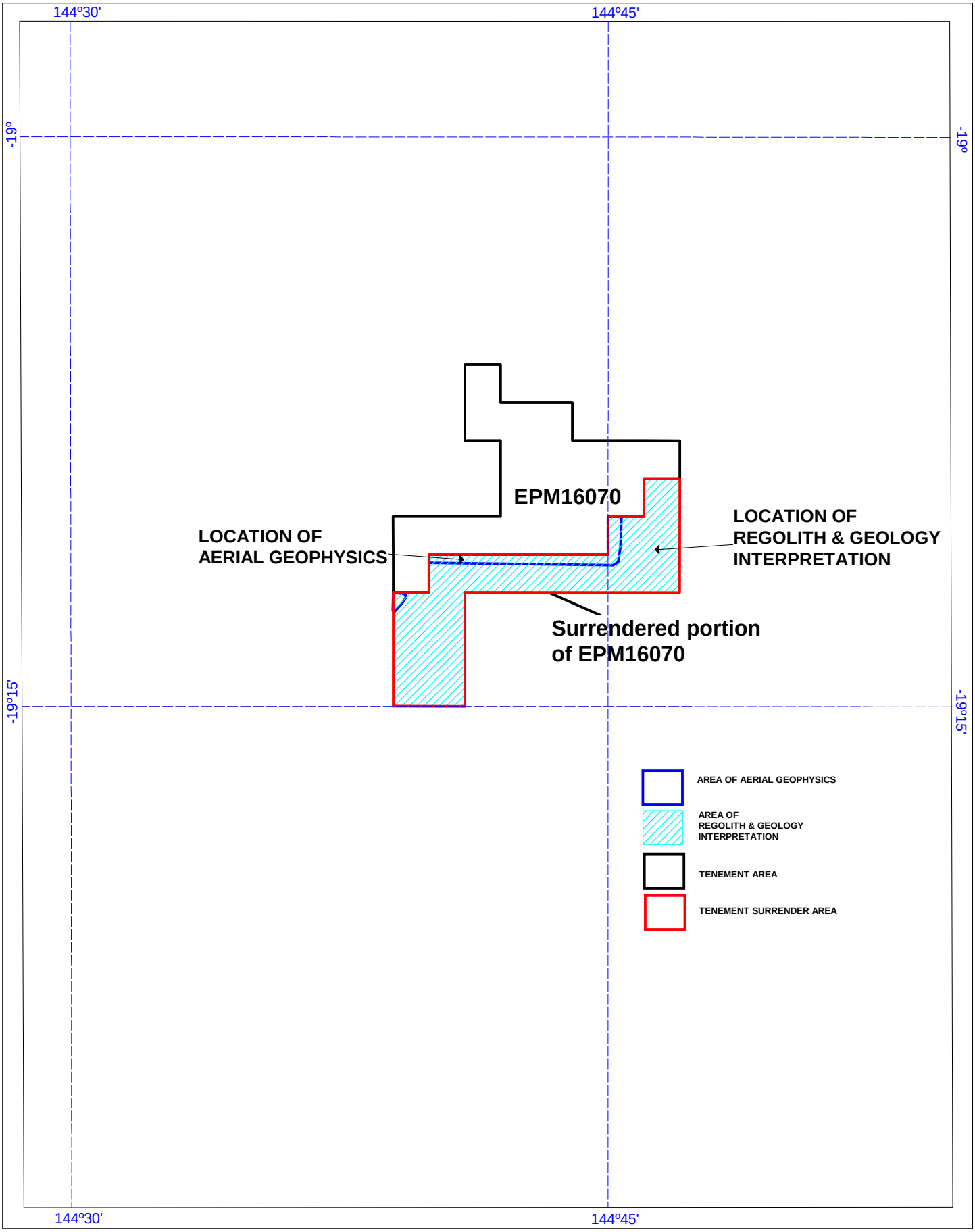
DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:200,000

Figure 3

**LYND PROJECT**
**EPM16070 (portion surrendered)**
**REGIONAL GEOLOGY (QLD NRMW)**




**LOCATION MAP**


N
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0 5 10
Kilometres

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GE_12950.wor

AUTHOR: KD

COMPILED BY: KD

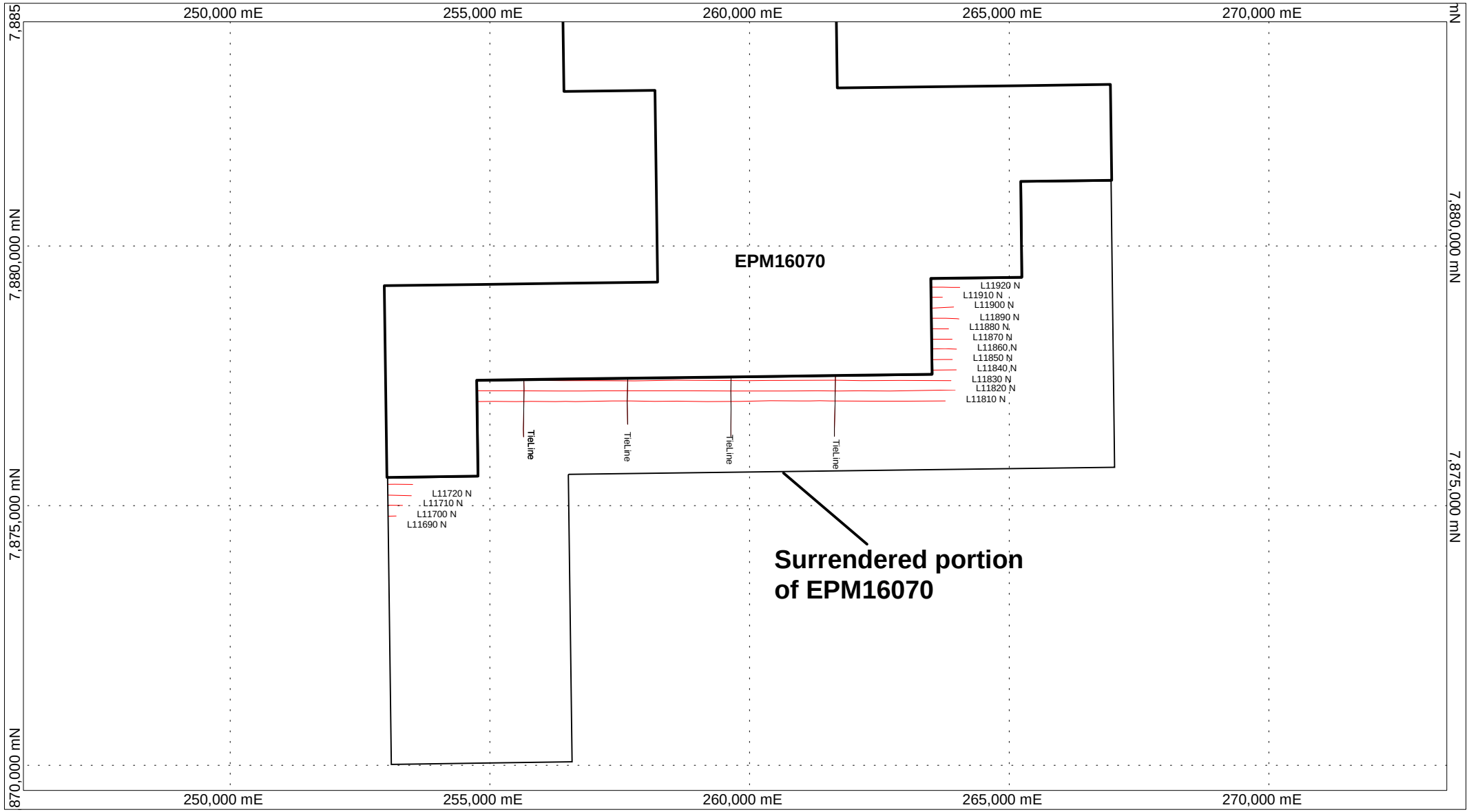
DATE: June 2010

PROJECTION: Long/Lat (AGD66)

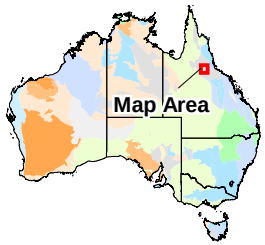
SCALE: 1:250,000

Figure 4

# LYND PROJECT
# EPM16070 (portion surrendered)
# EXPLORATION INDEX PLAN




**LOCATION MAP**




N
W E
S

0 1 2
kilometres

Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

# Figure 5

## EPM16070 -SURRENDER AREA SPECTREM AERIAL GEOPHYSICS SURVEY

### Flight Lines

255,000 mE
257,500 mE
260,000 mE
262,500 mE
265,000 mE

7,887,500 mN
7,885,000 mN
7,882,500 mN
7,880,000 mN
7,877,500 mN
7,875,000 mN
7,872,500 mN
7,870,000 mN

**EPM16070**

**Regolith Legend**

**Bedrock**
- Bs Sedimentary
- Bm Mafic
- Bg Felsic
- Bvf Felsic volcanic
- Tc Tertiary (acid Jurassic) capping

**Erosional**
- Em Saprolite developed over mafic terrain
- Eg Saprolite developed over felsic terrain
- Evm Saprolite developed over mafic volcanics
- Evf Saprolite developed over felsic volcanics
- Ess Sandy soil
- Esb Black soil
- Esm Mixed soil

**Depositional**
- Dra Regional alluvium
- Dea Local alluvium
- Dc Colluvium undifferentiated

**LOCATION MAP**

Map Area

N
W E
S

0 2 4
kilometres

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GE_13059.wor

Figure 6

# LYND PROJECT
# EPM16070 (portion surrendered)
# INTERPRETED REGOLITH

AUTHOR: K Dixon

COMPILED BY: C Lucy

DATE: 30/03/2010

PROJECTION: GDA94 MGA Zone 55

SCALE: 1:50,000

255,000 mE
257,500 mE
260,000 mE
262,500 mE
265,000 mE

7,887,500 mN
7,885,000 mN
7,882,500 mN
7,880,000 mN
7,877,500 mN
7,875,000 mN
7,872,500 mN
7,870,000 mN

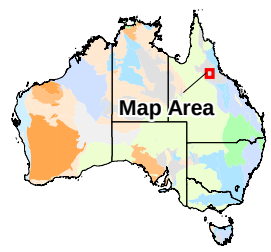
EPM16070

Surrendered Portion of EMP16070

**Geology Legend**

- Sediments
- Rhyolite
- Gabbro
- Troctolite
- Gabbronorite
- Olivine Gabbronorite
- Ultra-Mafic
- Granite/Granitoio
- Quartz Diorite
- Diorite
- Grano Diorite
- Tonalite
- Meta-Mafic Volcanics and Sediments
- Meta-Felsic Volcanics and Sediments
- Gneiss
- Schist
- Amphibolite

**LOCATION MAP**




N
W
E
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0 2 4
kilometres

ANGLO AMERICAN

REGION: GEORGETOWN
PROJECT: LYND
DRAWING No: AUS_QLD_LYN_GE_13058_Sur.wor

AUTHOR: K Dixon
COMPILED BY: C Lucy
DATE: 30/03/2010
PROJECTION: GDA94 MGA Zone 55
SCALE: 1:50,000

Figure 7

# LYND PROJECT
# EPM16070
# GEOLOGICAL INTERPRETATION

# APPENDIX I

# SPECTREM AIR LIMITED
# SPECTREM SURVEY
# OF
# THE LYND- BLOCK 1 AREA
# FOR SURRENDERED BLOCKS
# ON EPM16070
# (AUSTRALIA)

## AERIAL GEOPHYSICS

## Digital Data

# APPENDIX II

# SPECTREM AIR LIMITED
# SPECTREM SURVEY
# OF
# OF
# THE LYND- BLOCK 1 AREA
# FOR SURRENDERED BLOCKS
# ON EPM16070
# (AUSTRALIA)

## Flight Survey Details Report
## and
## Image Atlas

# SPECTREM AIR LIMITED

## ANGLO AMERICAN EXPLORATION (AUSTRALIA) PTY LTD

**SPECTREM SURVEY**
**OF THE LYND - BLOCK 1 AREA**
**(AUSTRALIA)**

**December 2009**

AMENDED FOR EPM16070

SURRENDER BLOCKS

**KEYWORDS**

**Lynd - Block 1, Australia, Anglo American Exploration (Australia) Pty Ltd, SPECTREM, Airborne, Electromagnetic, Magnetic, Radiometric**

## SUMMARY

In November 2009, Spectrem Air Limited conducted an airborne electromagnetic survey over the Lynd - Block 1 area.

Good data quality was achieved for this 25 Hz Lynd 1 survey with X9 and Z9 noise levels were fairly low at around 200 PPM.

Unfortunately despite a very careful examination of the Spectrem AEM data no good sulphide conductors were detected in the Lynd 1 area.

However a few poor conductors were detected. These AEM anomalies, which have been given a D or lower grade rating, should be integrated with the available geological / GIS information and reviewed with the Spectrem team if necessary.

## CONTRIBUTORS

Phil Klinkert

Shawn Letts

Jaco Smit

Louis Polomé

## CIRCULATION LIST

Copies of this report have been sent to:

- M Webb – Chief Geophysicists – AAEA (Perth)
- A Kneeshaw – Exploration Manager – AAEA (Perth)
- SPECTREM's Archive

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## LIST OF FIGURES

# 1 INTRODUCTION

Between 10 to 21 November 2009, Spectrem Air Limited conducted an airborne electromagnetic, magnetic and radiometric survey over the Lynd Block 1 project in Australia. A total of 5 070 line kilometres were surveyed and 32.54 Line kilometres within the surrendered portion of EPM16070. The general location of the survey is shown in Figure 1.

Details of the survey can be found in Appendix 1. The system specifications are presented in Appendix 2 and the standard Spectrem Air data processing stream is described in Appendix 3.

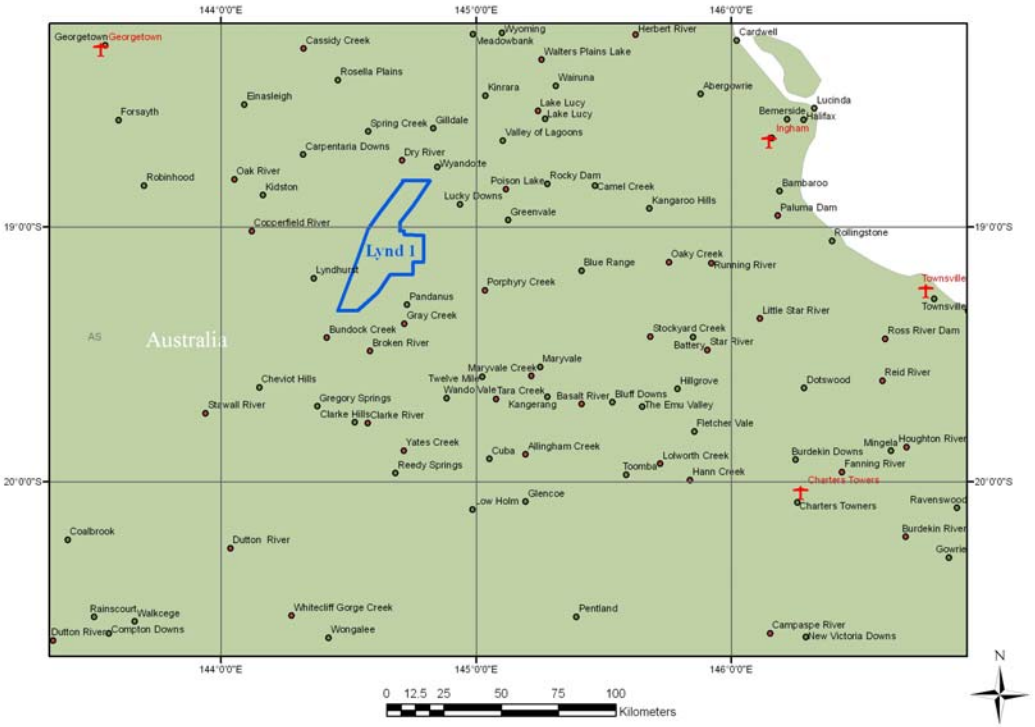



Figure 1 - Survey Location

A map of the total magnetic field (Figure 2) and of the conductivity Tau Z (Figure 3) of the Lynd Block 1 project within EMP16070 are shown below:

.

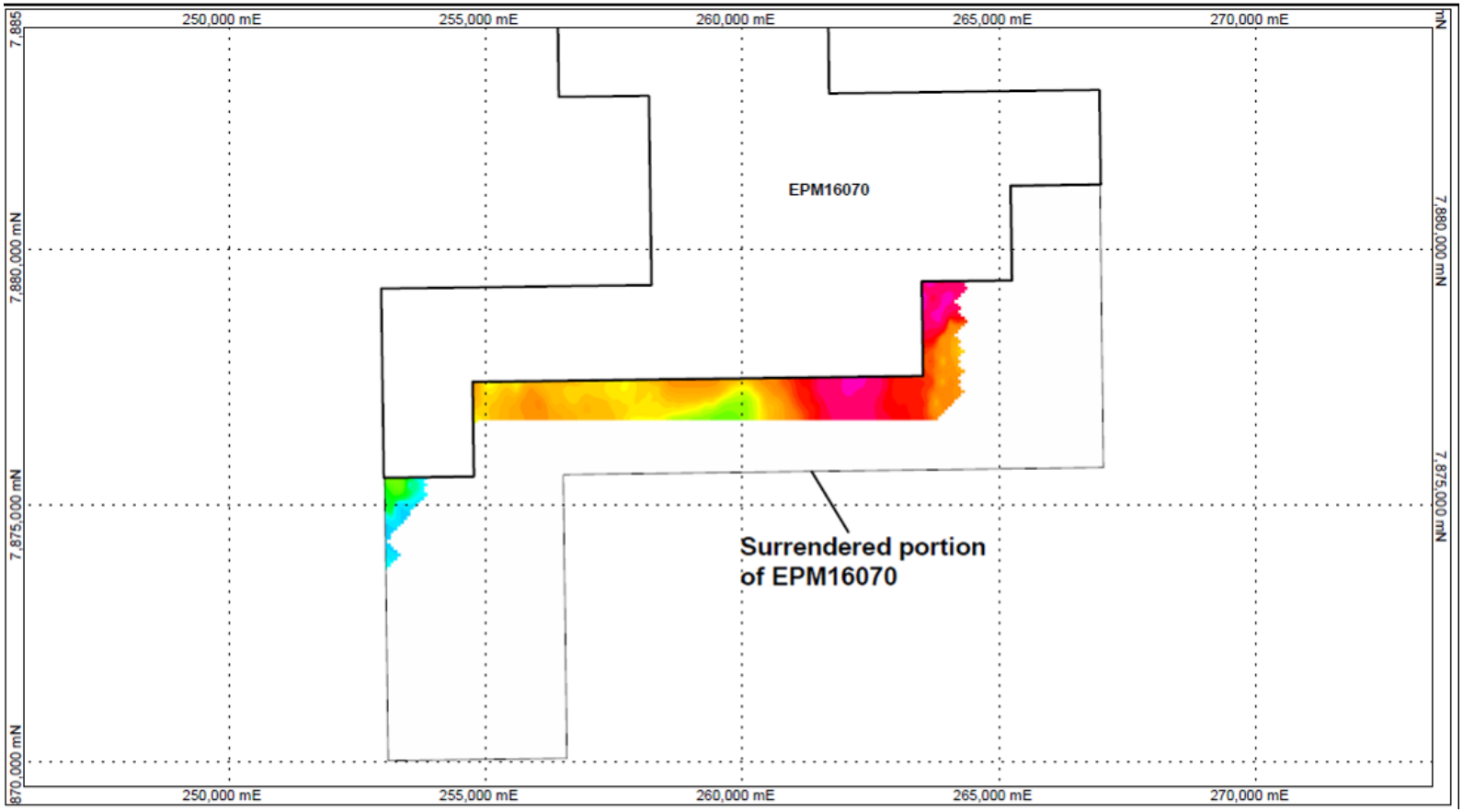



Figure 2 (amended) - An image of the EM Tau Z (LYND - Block 1) within EPM16070

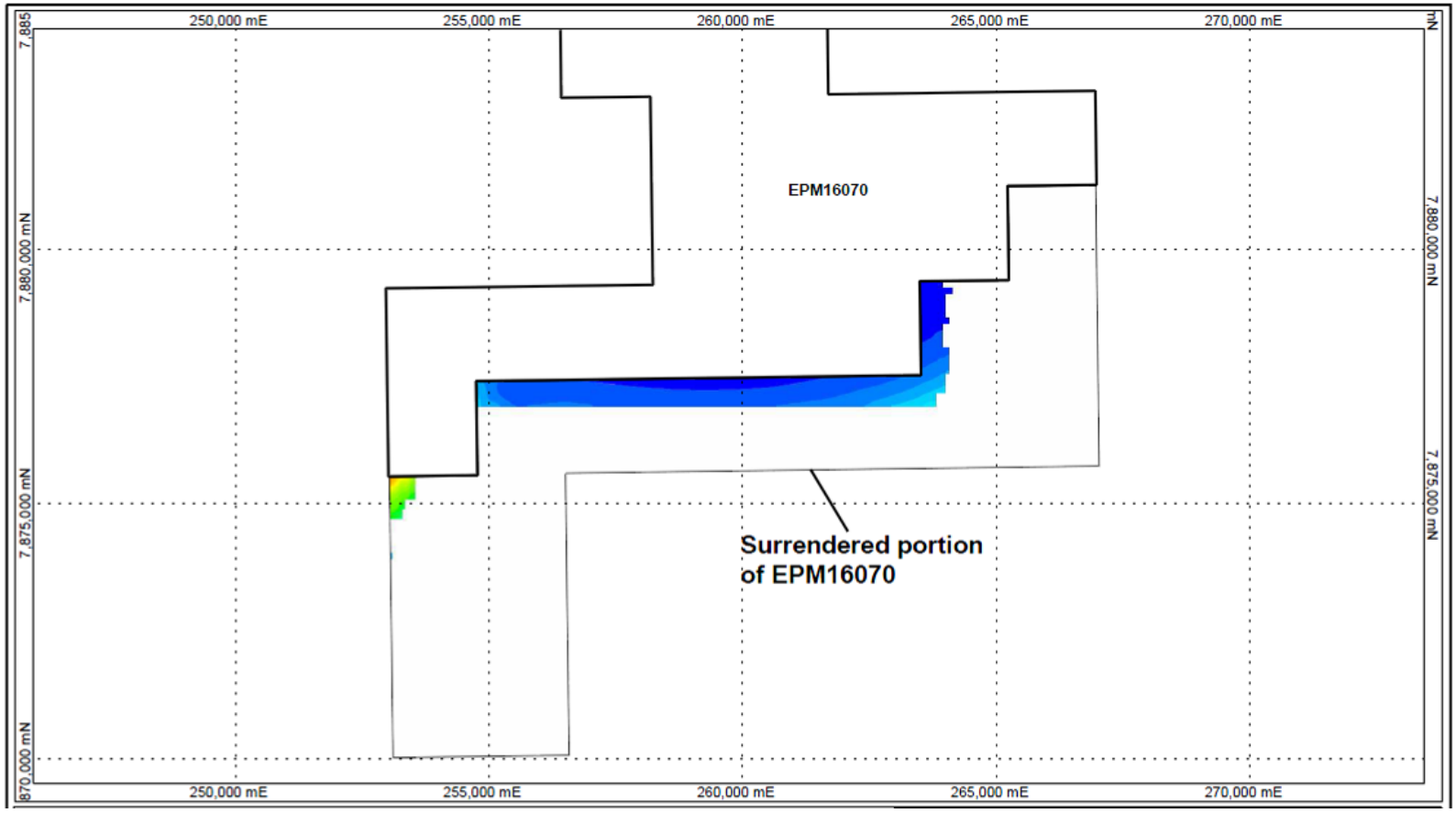



Figure 3 (amended) - An image of the Total Filed Magnetic Intensity (LYND - Block 1) within EPM16070

# 2 APPENDIX 1: SURVEY DETAILS WITHIN SURRENDERED BLOCKS OF EPM16070

### 2.1.1 Logistics

The specific details of the survey were as follows:

| | |
|---|---|
| Base of operations | Ingam - Australia |
| Flying Dates | 25 September to 06 November 2009 |
| Survey type | Electromagnetic, magnetic, radiometric, terrain |
| Aircraft type | DC3 – TP67 |
| EM Base Frequency | 25 Hz |
| Nominal aircraft altitude | 90 m |
| Nominal aircraft speed | 60 m/s |
| Acceptable Kilometres flown:<br>LYND - Block 1 | 5 070 line kilometres |
| **Kilometres flown within EPM16070 surrendered Area** | **32.54 Line kilometres** |
| Nominal flight-line spacing<br>LYND - Block 1 | 200 m |
| Nominal flight-line direction:<br>LYND - Block 1 | 90 degrees |
| Nominal tie-line spacing:<br>LYND - Block 1 | 2 000 m |
| Nominal tie-line direction:<br>LYND - Block 1 | 00 degrees |

### 2.1.2 Datum

All coordinates provided in this report, in maps and in processed digital data-sets have the following datum parameters.

| | |
|---|---|
| Datum | WGS84 |
| Projection | UTM 55 S |
| Type | Transverse Mercator |

### 2.1.3 Survey Area Coordinates

The corner coordinates of the survey within the surrendered portion of EPM16070 were:

| LYND - Block 1<br>within EPM16070<br>Surrendered Area | **Easting (m)** | **Northing (m)** |
|---|---|---|
| | 264051 | 7879203 |
| | 263959 | 7877227 |
| | 263770 | 7877017 |
| | 254753 | 7877005 |
| | 254748 | 7877409 |
| | 263515 | 7877530 |
| | 263509 | 7879207 |
| | 253660 | 7875406 |
| | 253029 | 7874795 |
| | 253021 | 7875409 |

# 3 APPENDIX 2: SYSTEM SPECIFICATIONS

SPECTREM simultaneously takes electromagnetic, total field magnetic and radiometric measurements. Both the electromagnetic and magnetic sensors are towed behind the aircraft in "birds" while the radiometric crystals are installed inside the cabin. The geometry of the system is shown below in Figure 2. Other system specifications are listed below.

### 3.1.1 EM system

| | |
|---|---|
| Transmitter height above ground | 107 m |
| Tx – Rx vertical separation | 37.1 m |
| Tx – Rx horizontal separation | 122.9 m |
| Transmitter coil axis | Vertical |
| Receiver coil axes | X : horizontal, parallel to flight direction<br>Y : horizontal, perpendicular to flight<br>Z : vertical, perpendicular to flight direction |
| Current waveform | Square wave |
| Base frequencies for this survey | 25 Hz |
| Transmitter loop area | 420 $m^2$ |
| RMS current | 920 to 960 amperes |
| RMS dipole moment | 386 400 to 403 200 $A.m^2$ |
| Recording Rate | 5 Hz |
| Window distribution | Pseudo-binary |
| Digitising rate | 38 400 Hz /component |

Window Times for 25 Hz

| Frequency | Window | Window Center | Window Width (µs) |
|---|---|---|---|
| 25 | 1 | 26.0 | 26.0 |
| 25 | 2 | 65.1 | 52.1 |
| 25 | 3 | 143.2 | 104.2 |
| 25 | 4 | 299.5 | 208.3 |
| 25 | 5 | 612.0 | 416.7 |
| 25 | 6 | 1237.0 | 833.3 |
| 25 | 7 | 2487.0 | 1666.7 |
| 25 | 8 | 4987.0 | 3333.3 |
| 25 | 9 | 9987.0 | 6666.7 |
| 25 | 10 | 16653.6 | 6666.7 |

### 3.1.2 Magnetic system

| | |
|---|---|
| Bird height above ground | 71 m |
| Bird location | 19 m below and 41 m behind centre of |
| Sensor | Scintrex CS-2 Sensor with SPECTREM Counter/Sync System |
| Recording Rate | 5 Hz |
| Sensitivity | 0.01 nT |
| Resolution | 0.1 nT |

### 3.1.3 Positioning system

| | |
|---|---|
| Sensor | Novatel OEMV-3 GPS receiver with Fugro Omnistar differential corrections |
| Recording Rate | 5 Hz |

### 3.1.4 Other sensors

| | |
|---|---|
| Radar Altitude | Collins with 5 Hz sampling with 0.3 m |
| Laser Altitude | Riegl with 5 Hz sampling with 0.03 m |
| Barometric Pressure | Rose Mount with 1 Hz sampling |
| Temperature (OAT) | PT-100 RTD with 1 Hz sampling |
| Analogue Chart Recorder | RMS GR-33 |

# 4 APPENDIX 3: DATA PROCESSING

The EM data were processed in Johannesburg using Oasis Montaj and proprietary software.

## 4.1 Electromagnetic Processing

### 4.1.1 Aircraft Processing

Some of the most important EM data processing was carried out on the aircraft as it acquired the data. The first processing stage was stacking the data to 512 samples. The data was then deconvolved to remove system response and transformed to a square wave. A square transmitter waveform was chosen as a periodic approximation of the step response.

In the next stage of processing the data was binned into 8 channels or windows. As the SPECTREM system makes its measurement while the transmitter is switched on, it is necessary to separate the primary (transmitted) field from the (induced) secondary field. The assumption is made that the induced field will have decayed to a minimal amount at the time the last channel is sampled. As the last channel only measured the primary field, it can be subtracted from the other channels to separate the secondary field. Hence there are actually 8 channels with geological information in the final data.

### 4.1.2 Profile data

The spikes in the line data have been removed using a 3 point Naudy filter. The line data have also been drift corrected and micro-levelled. The drift is particularly noticeable on the later time channels and has been applied to channels 4 to 8. This is an iterative process, with the assumption that there is a constant drift on a single line. This is reasonable if the lines are short. The processing steps are:

- The channel data are clipped retaining the data in the resistive areas where the response should be close to zero.
- The average of the clipped data is then calculated and subtracted from the channel data.

The steps are then repeated, refining the correction.

Decorrugation and micro-levelling has been applied to all the channels to reduce small residual errors that have not been corrected through the drift correction method.

### 4.1.3 Apparent Conductivity

The apparent conductivity was calculated from its channel amplitudes and the aircraft height. An apparent conductivity is the conductivity of a half space that would produce an amplitude equivalent to the measured response. It is useful in providing a physically sensible unit and partially compensates for aircraft ground clearance variations. The unit for apparent conductivity is milliSiemens/meter.

### 4.1.4 Grids

The data were gridded using an Akima spline. System lag was corrected before gridding.

A decorrugation filter was applied to reduce the herringbone effects created by geometrical asymmetry inherent in AEM systems

## 4.2 Magnetic Processing

The leveling processing included:

- Tie-line levelling
- Decorrugation
- Micro-levelling

### 4.2.1 Tie-line Levelling

Tie line levelling is used to remove the diurnal variation and errors due to instrument drift, both are assumed to vary slowly over time.

Tie-line levelling is an iterative process:

- Calculate the mis-closures at the crossover points of the tie and traverse lines. The mis-closure is the difference between the magnetic value on the tie line and the traverse line. The mis-closures are weighted by the gradient of the total field at the crossover point.

$$Weight = 1 / e^{(0.1 \times gradient)}$$

- The error is approximated by a piecewise polynomial as a function of time along a flight and then along a tie line.

These steps are repeated until a good fit has been obtained.

### 4.2.2 Decorrugation

This is a grid based operation designed to reduce the residual errors that the tie-line leveling does not remove. These are due to inaccuracies in the crossovers, localised diurnal activity, and local altitude variations.

Elongated anomalies with the following characteristics are removed:

- 2 times the line spacing perpendicular to the line direction
- 2 times the tie line spacing parallel to the line direction
- small dynamic range

### 4.2.3 Micro-levelling

Applies the corrections made to the grid to the profile data and thereby enhances the line data by removing the final residual errors. The micro-levelled data are then gridded. The lag correction is 40m.

## 4.3 DEM processing

Initially, the GPS height and the radar altimeter channels are visually inspected and any spikes or discontinuities are removed. A Low Pass or Naudy Filter is then applied to both channels. The GPS height channel is then gridded and the resultant grid is checked. Due to the nature of the GPS data, it is normally necessary at this stage to perform some degree of decorrugation on the grid with the corrections then written back to the database.

The radar altimeter channel is then subtracted from the corrected GPS height channel in the database and the resultant channel is gridded and verified.

## 4.4 Radiometric Processing

The processing of the radiometric data uses the full 256 channel spectra for most of the corrections. This processing allows us to use the information from the full spectrum to enhance the regions of interest in the spectrum, namely, potassium, uranium and thorium.

# 5 APPENDIX 4: DELIVERABLES

## 5.1 Digital Products

### 5.1.1 Grids / Profile / Map Data

(Grids supplied in Geosoft format)

| | Grids | Line Data | Maps |
|---|---|---|---|
| **EM Data** | | | |
| EMX1 to EMX8 / EMZ1 to EMZ8 | Y | Y | - |
| Tau X or Tau Z | Y | - | Y |
| Anomaly Map | N/A | N/A | N/A |
| Conductivity Grids at Various Depths | - | - | - |
| **TF Magnetic Data** | | | |
| TFMI | Y | Y | Y |
| **Terrain** | | | |
| DEM | Y | Y | - |
| **Radiometric Data** | | | |
| TC, K, U, Th | Y | Y | - |
| **CDI Data** | | | |
| CDI Data - Individual Lines (All lines & Tie Lines) | - | Y | - |
| Conductivity 3D Voxel Model | - | - | - |
| **Interpretation** | | | |
| Preliminary Geological Interpretation | - | - | - |

### 5.1.2 Report

- Logistics report.

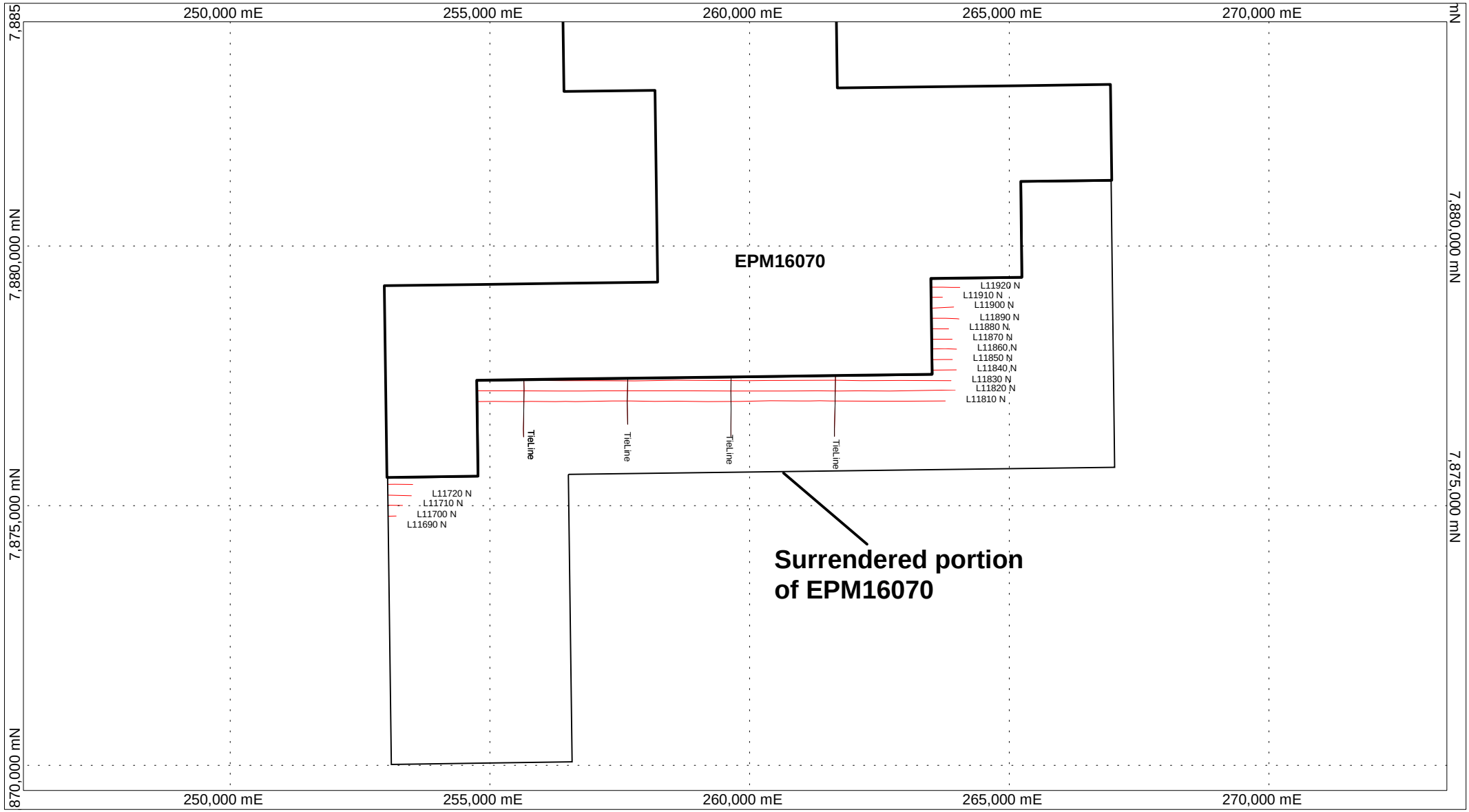
# 6 APPENDIX 6: SOFTWARE VERSIONS

| | |
|---|---|
| SpecDAS acquisition | 1.16 |
| Spectrem processing - SDALOG | 1.06 |
| Spectrem processing - SDASPEC | 4.01 |
| Spectrem processing - LEVEL | 1.03 |
| Autopick | EMPICK 1.03 |
| Geosoft | 6.3 (30) HF2 |
| CDI | 1.00 |

# AAEA Lynd Ni-Cu-PGE project
# North Queensland

**First Pass Spectrem Survey Results: Lynd Block 1**
**EPM16070 Surrendered Area**

## LIST OF IMAGES

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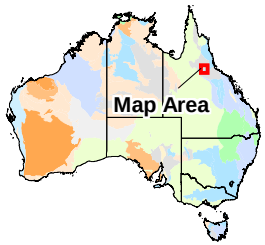


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070
# (SURRENDER AREA)
# SPECTREM AERIAL GEOPHYSICS SURVEY
## Flight Lines

AUTHOR: K Dixon

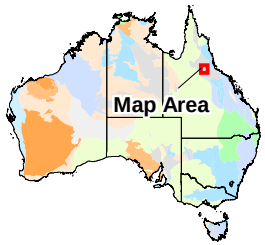
COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000


**LOCATION MAP**

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kilometres

Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY

## Cover

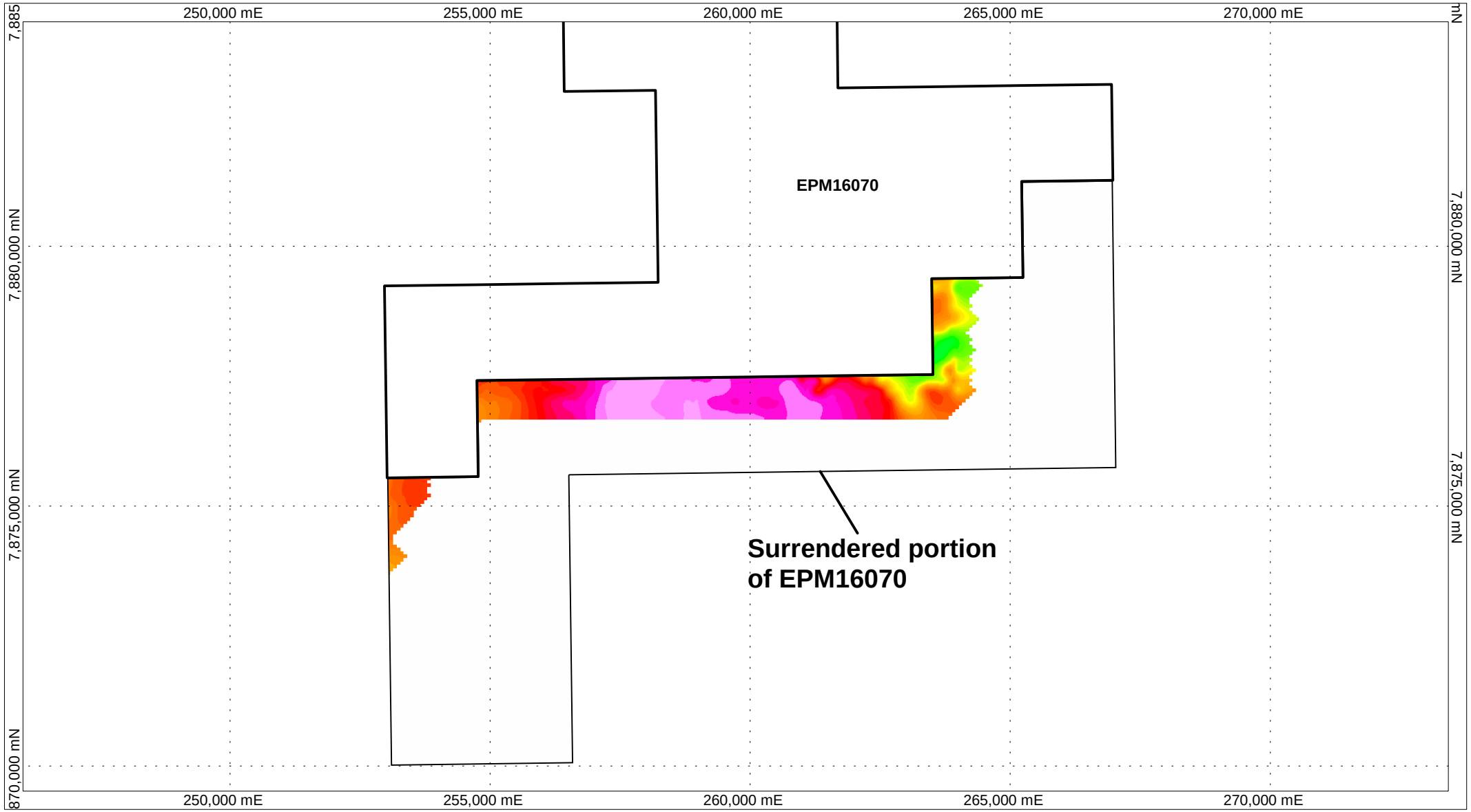
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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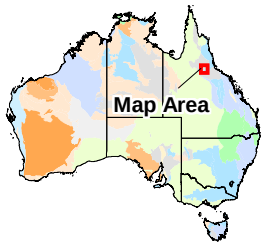


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY DTM

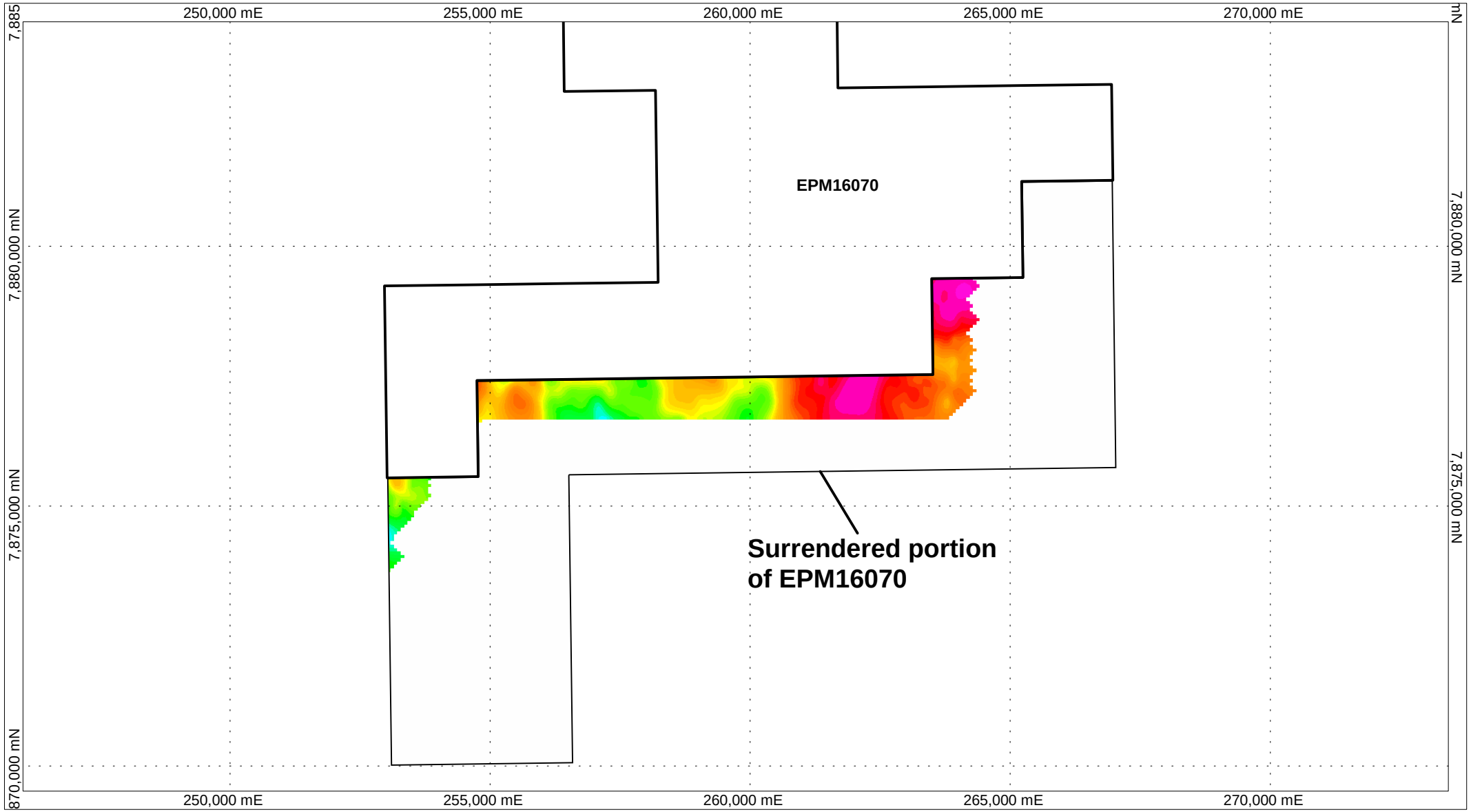
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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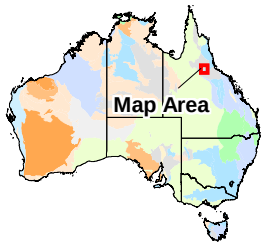


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REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070
# (SURRENDER AREA)
# SPECTREM AERIAL GEOPHYSICS SURVEY
# Time Constant (Tau) in X

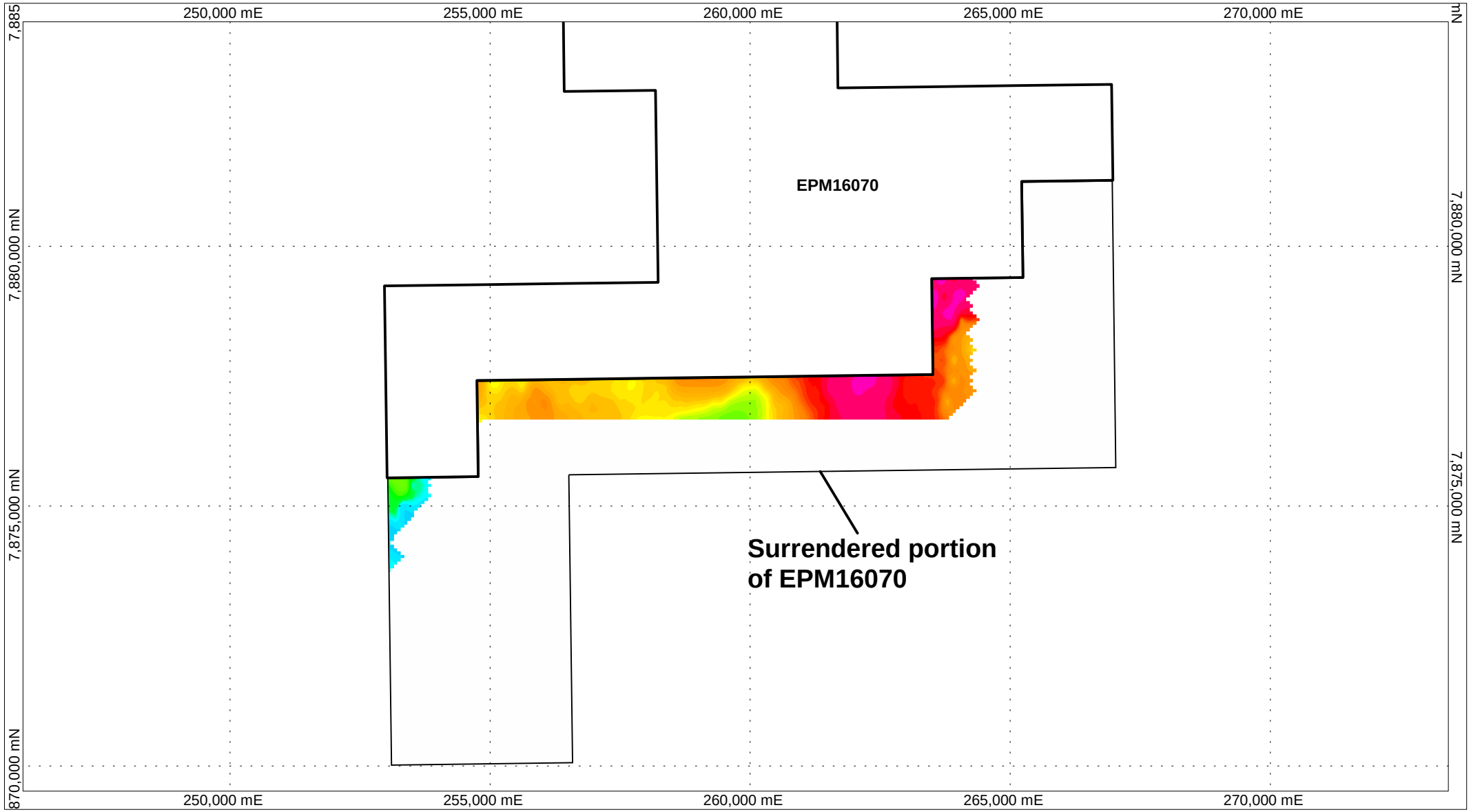
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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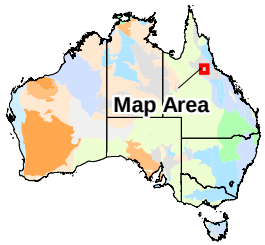


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# LYND BLOCK 1 - EPM16070
# (SURRENDER AREA)
# SPECTREM AERIAL GEOPHYSICS SURVEY
## Time Constant (Tau) in Z

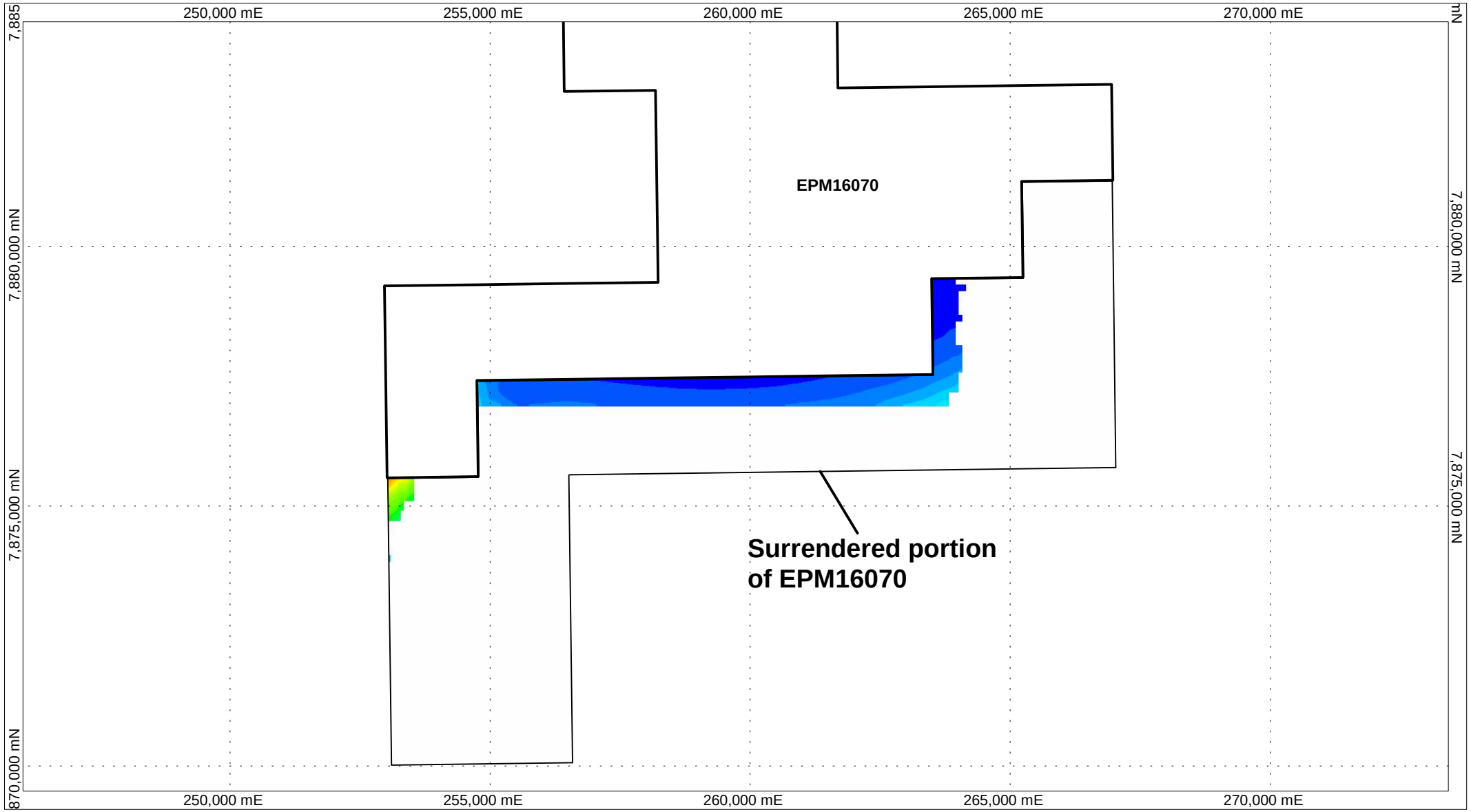
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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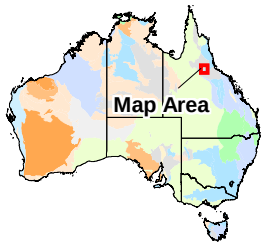


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# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY

## TMI

AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

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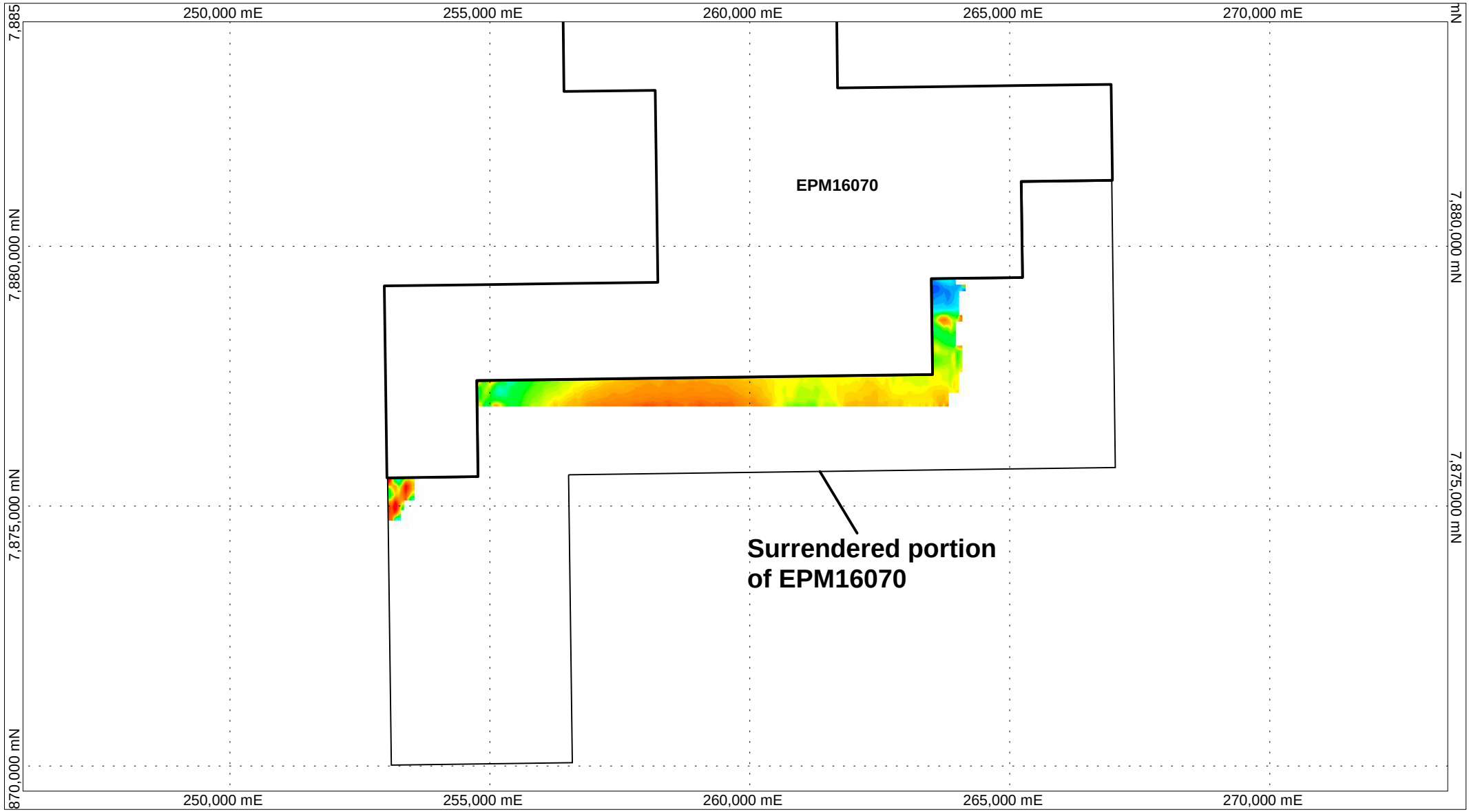


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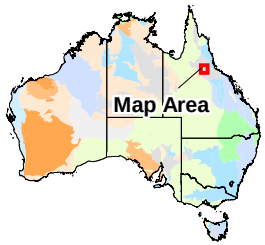


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY TMI 1VD

AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

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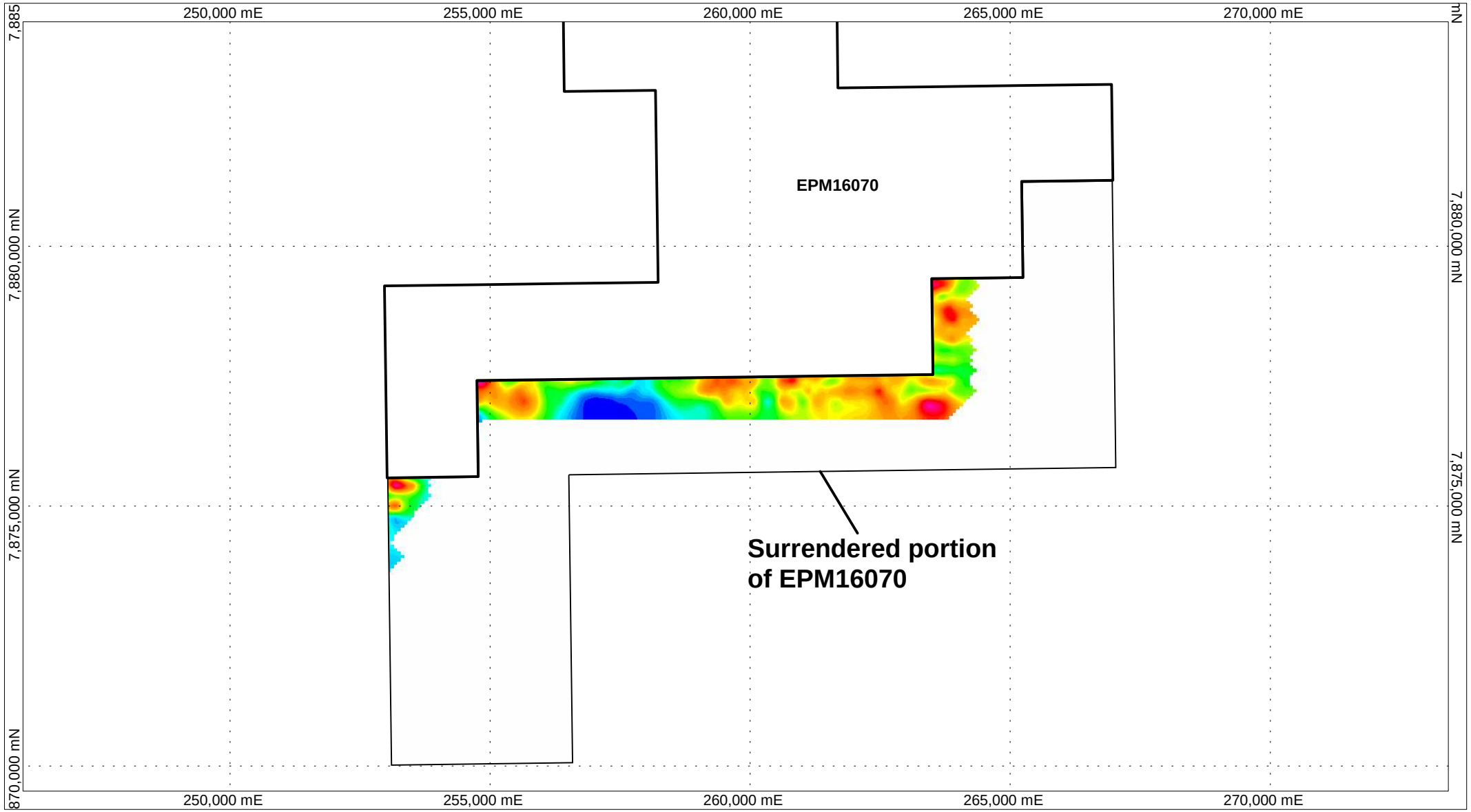


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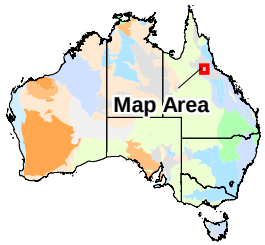


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# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 01 - X

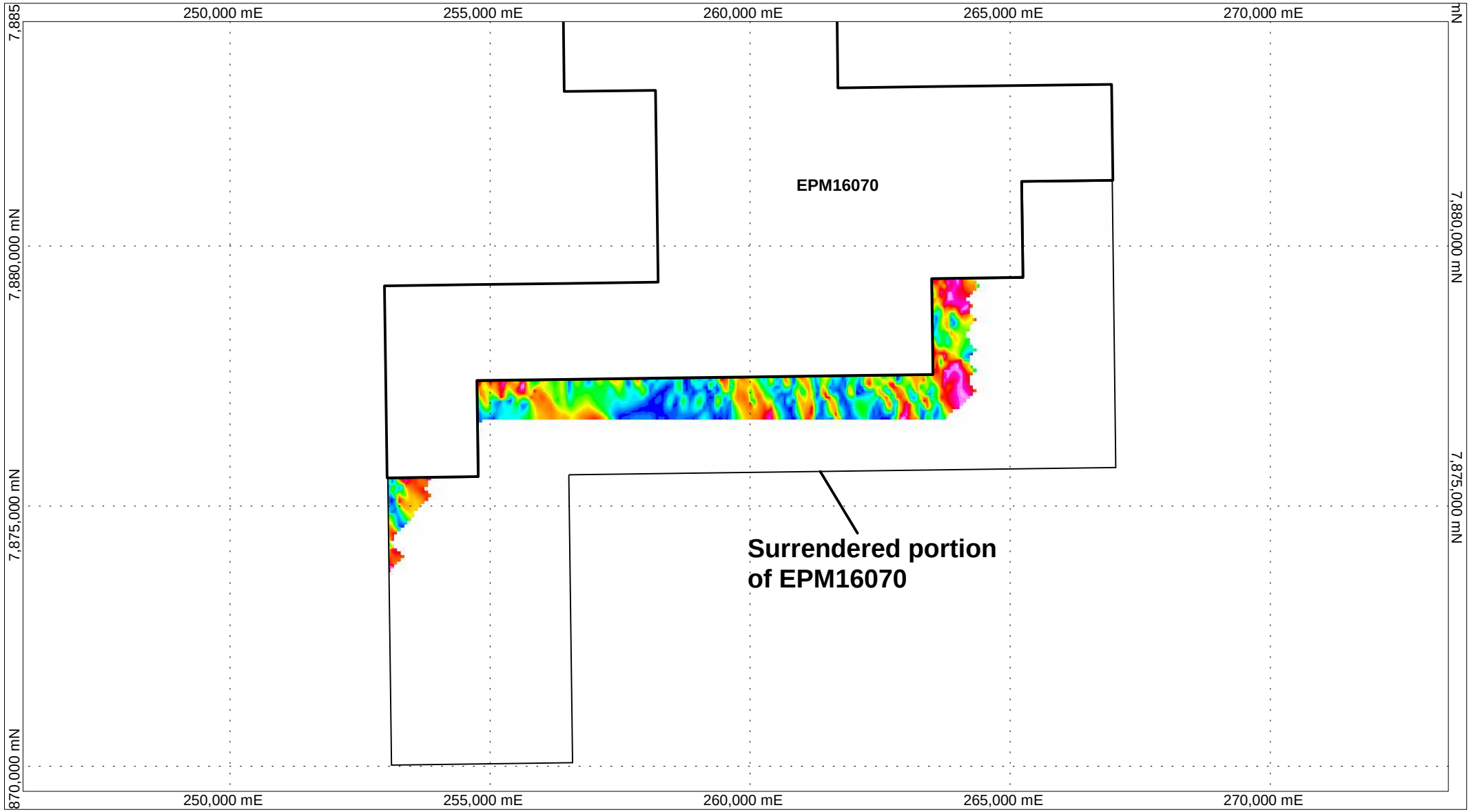
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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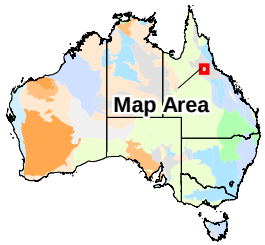


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# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 01 - Z

AUTHOR: K Dixon

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DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

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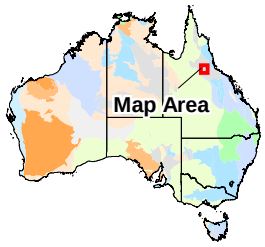


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# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 02 - X

AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

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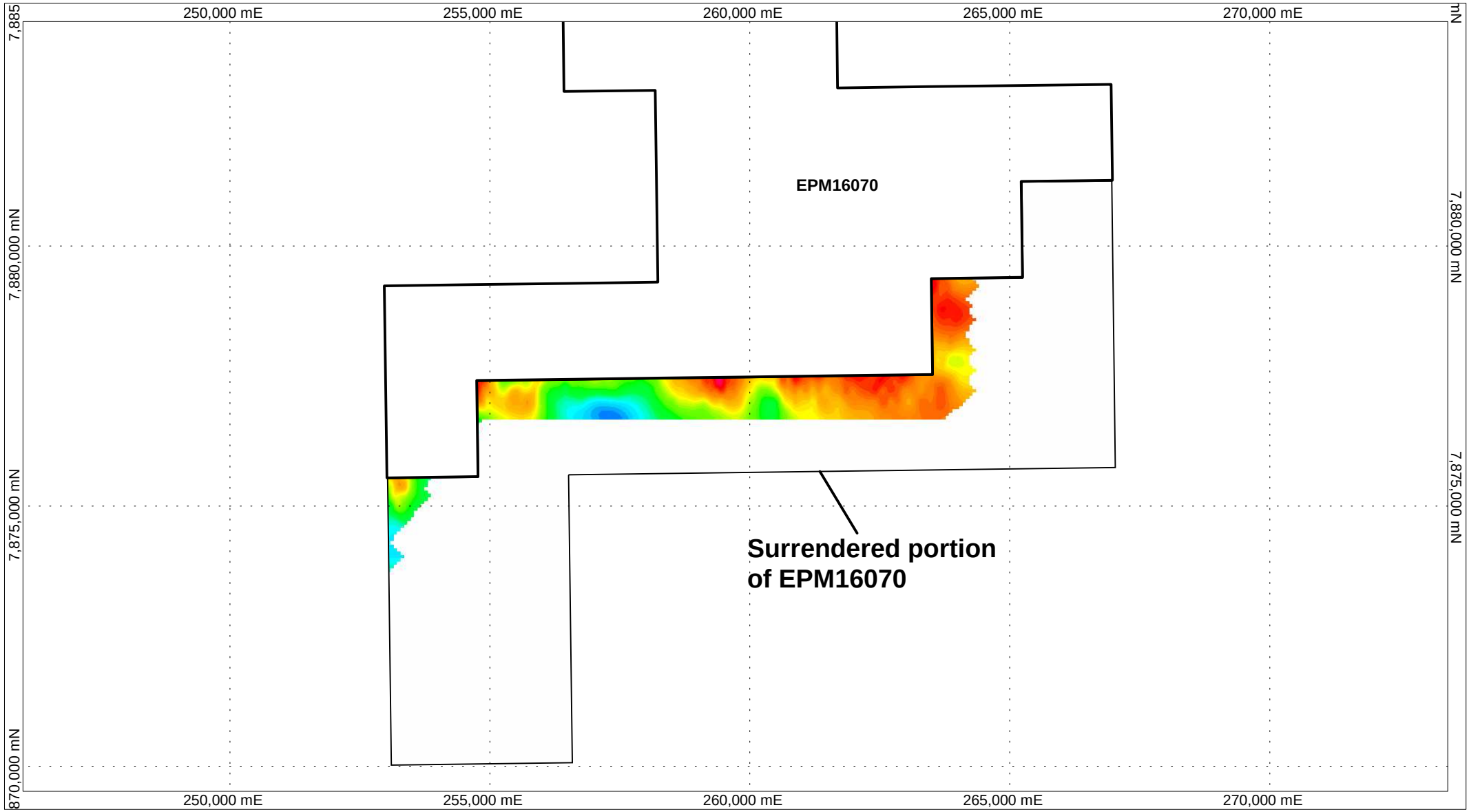


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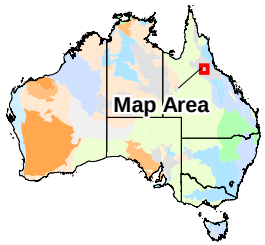


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 02 - Z

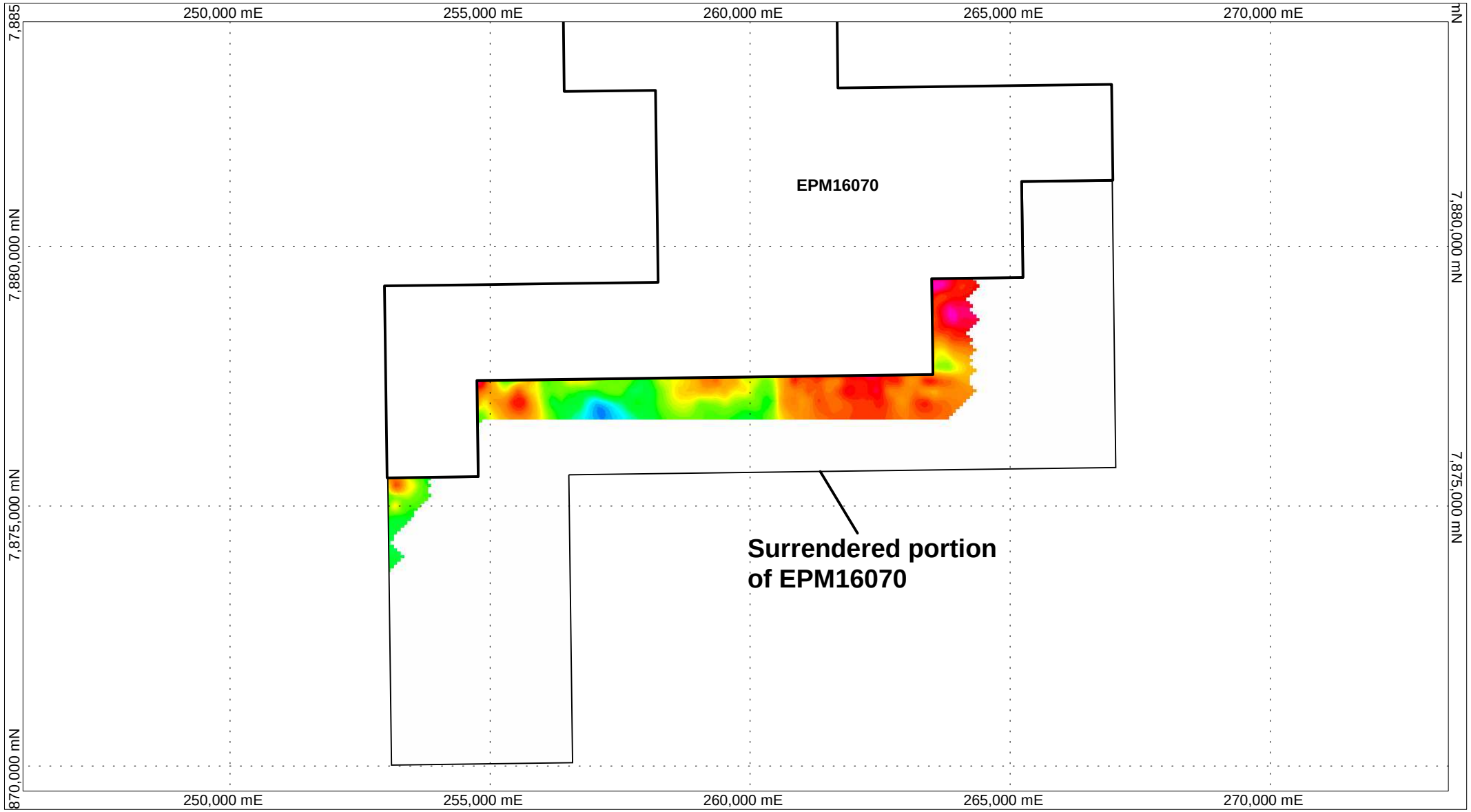
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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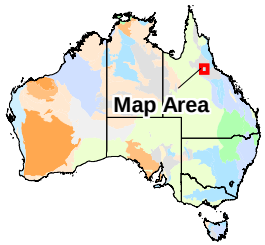


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ANGLO AMERICAN

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PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 03 - X

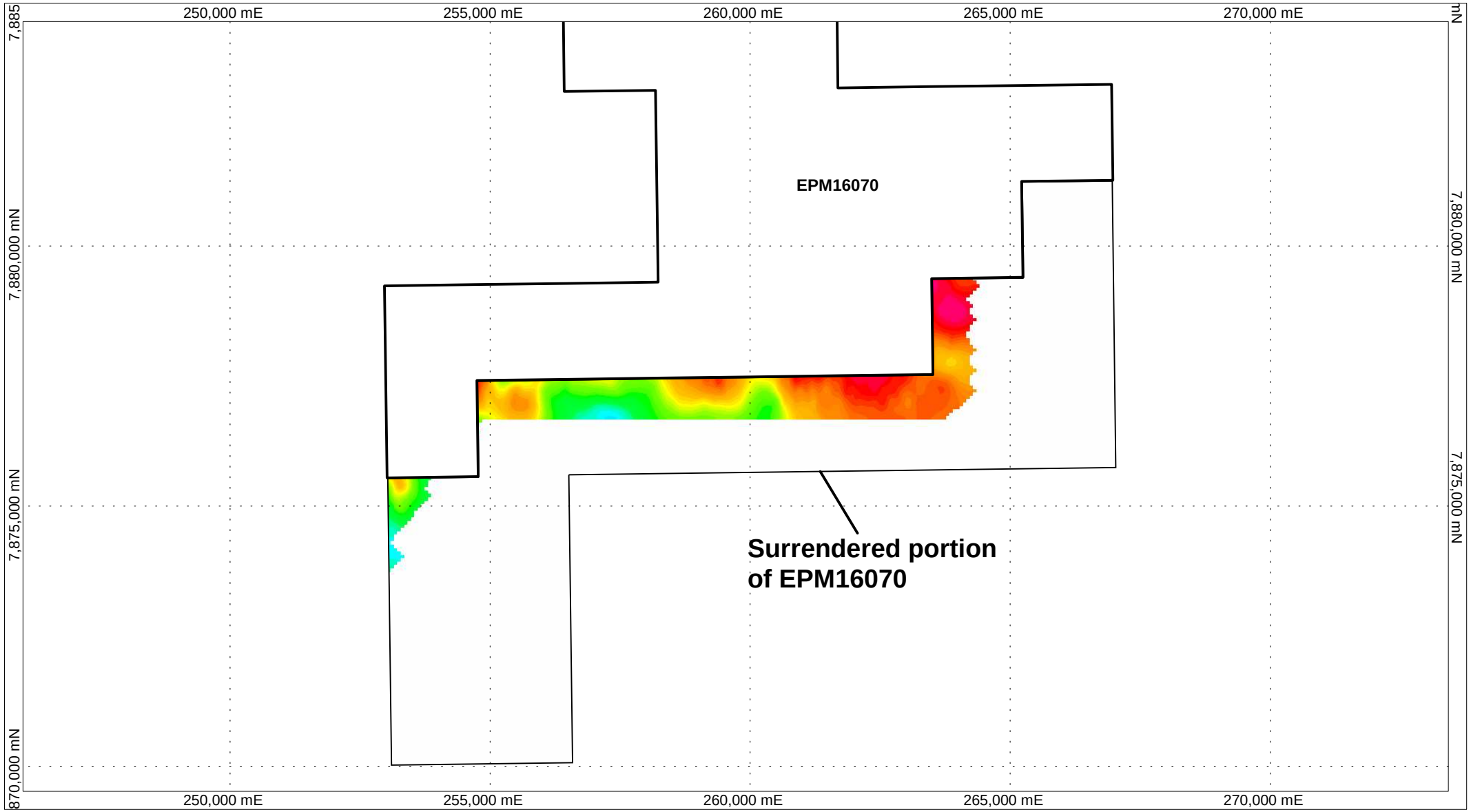
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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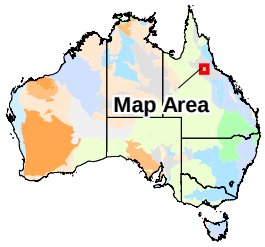


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070
# (SURRENDER AREA)
# SPECTREM AERIAL GEOPHYSICS SURVEY
# EM: Channel 03 - Z

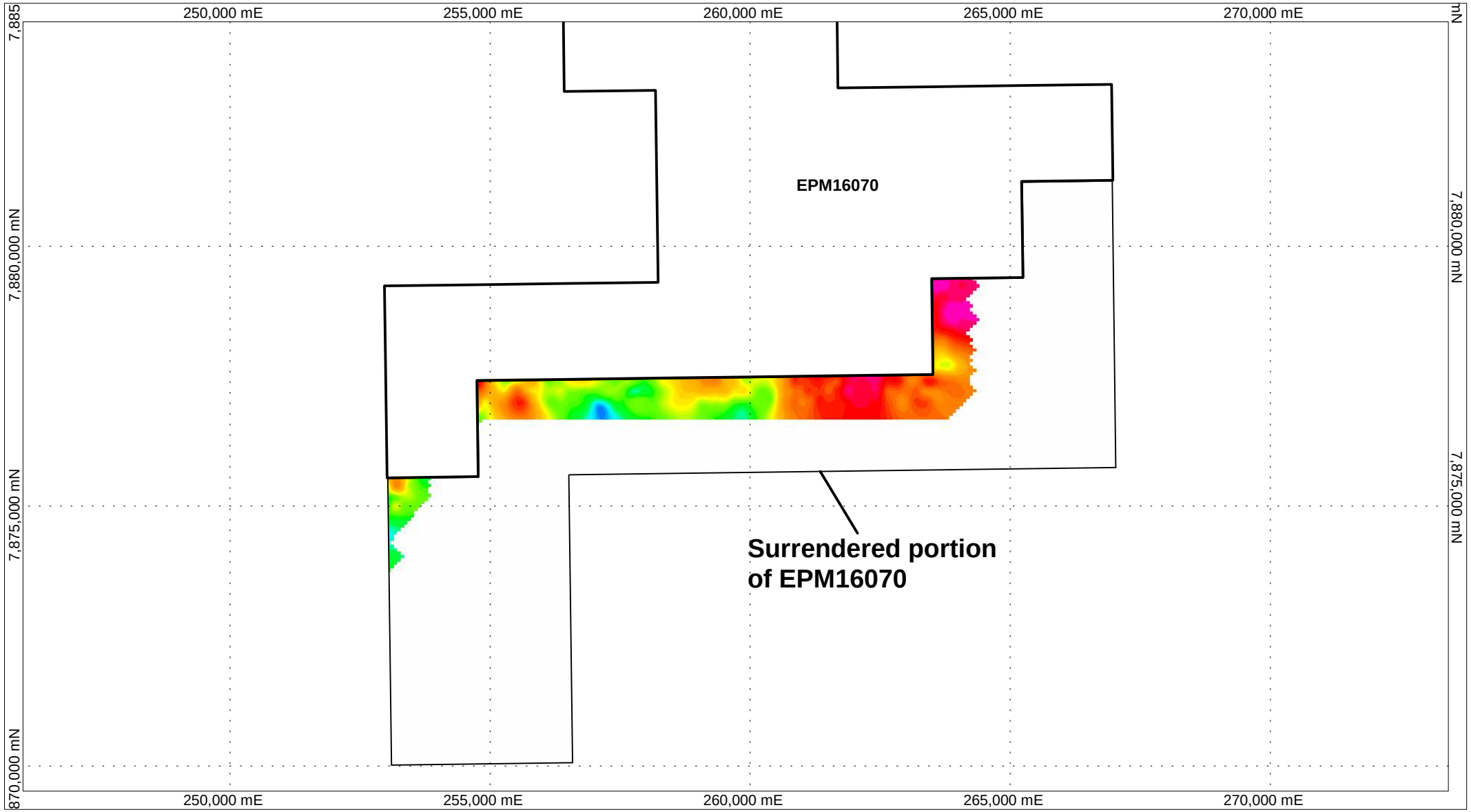
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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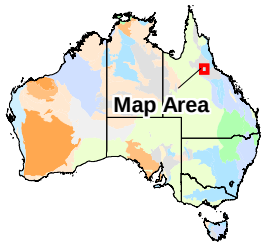


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REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 04 - X

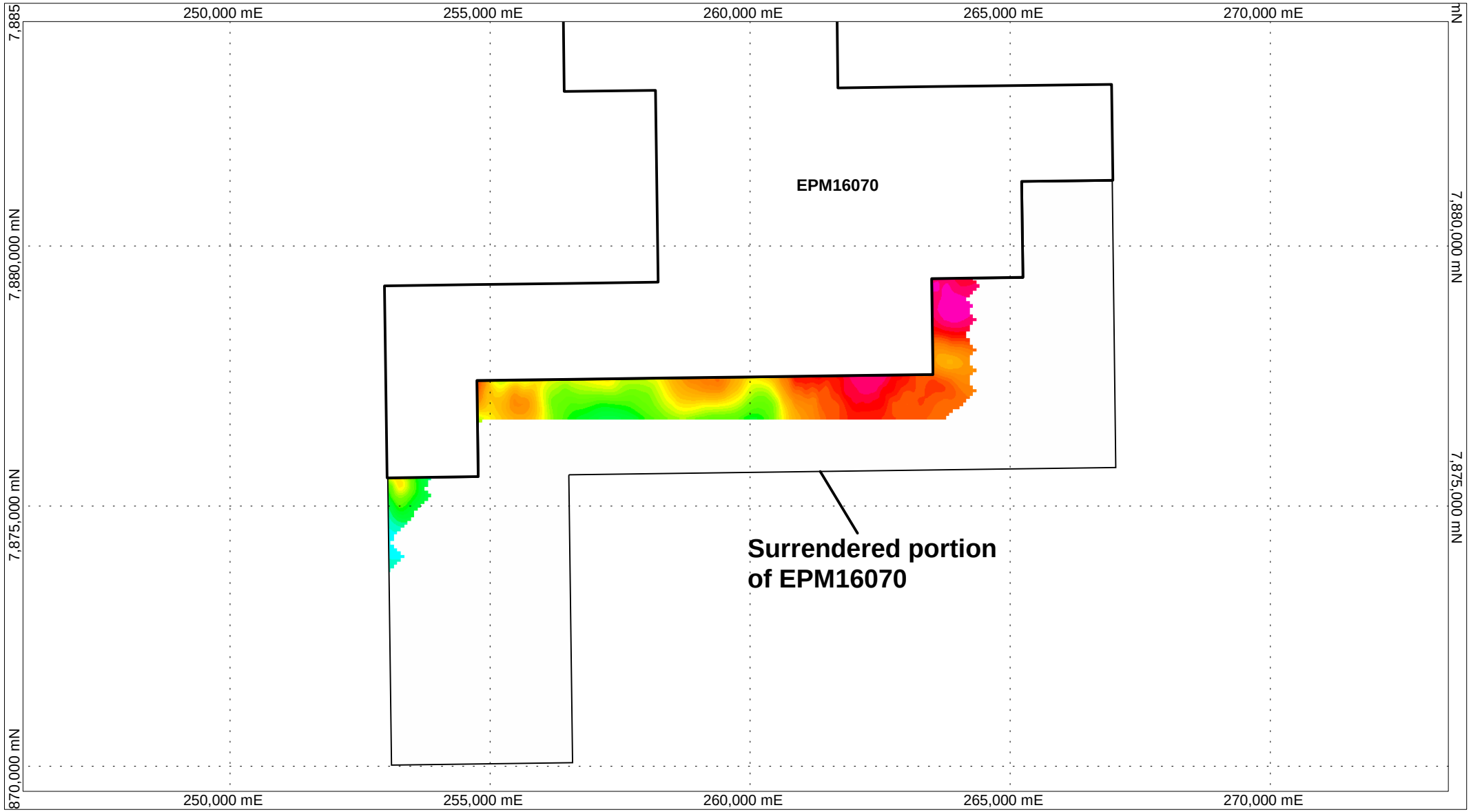
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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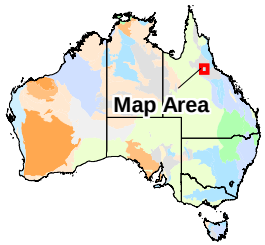


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DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070
# (SURRENDER AREA)
# SPECTREM AERIAL GEOPHYSICS SURVEY
# EM: Channel 04 - Z

AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

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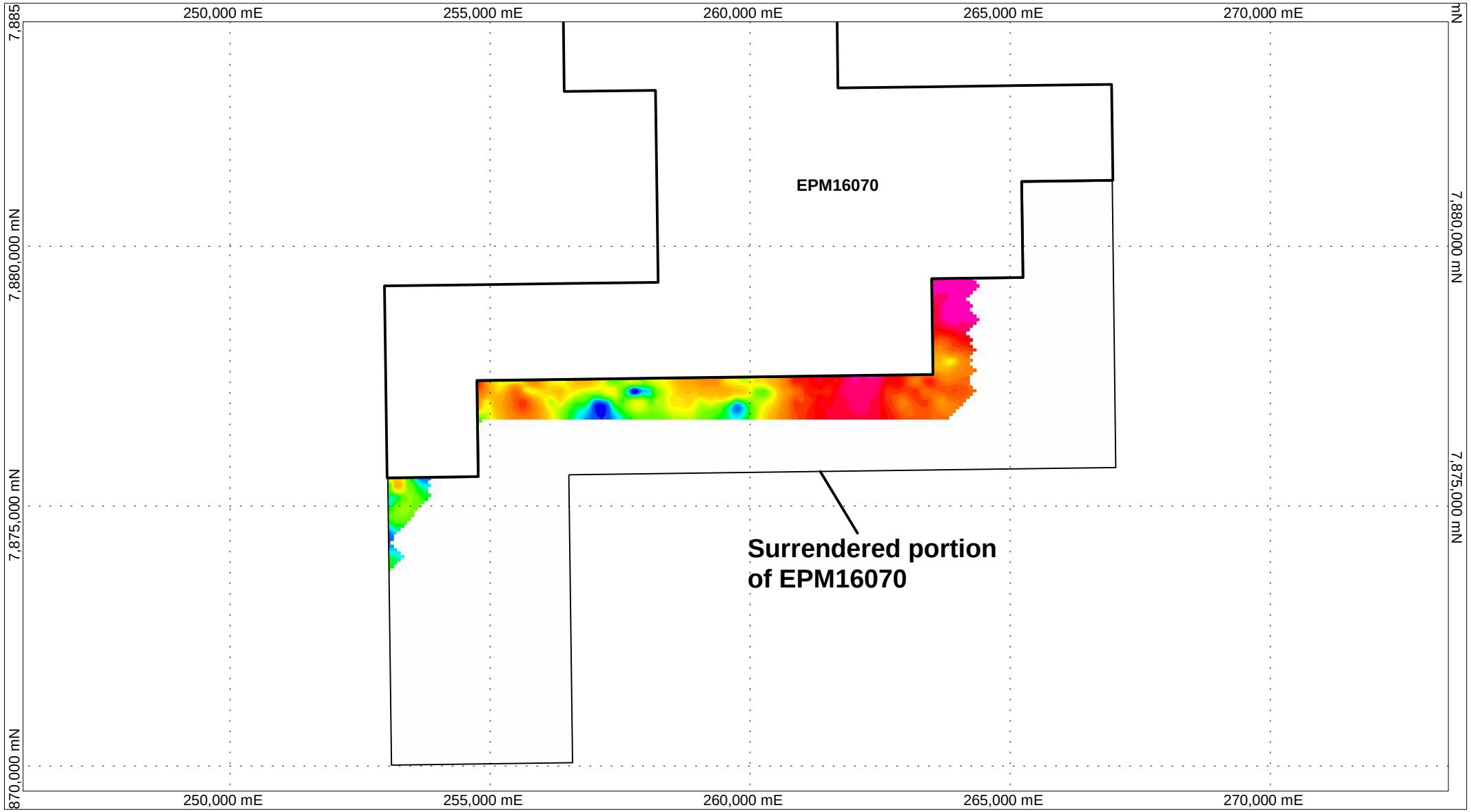


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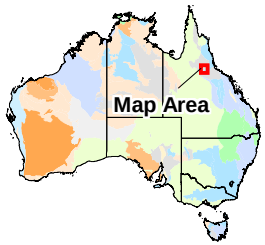


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 05 - X

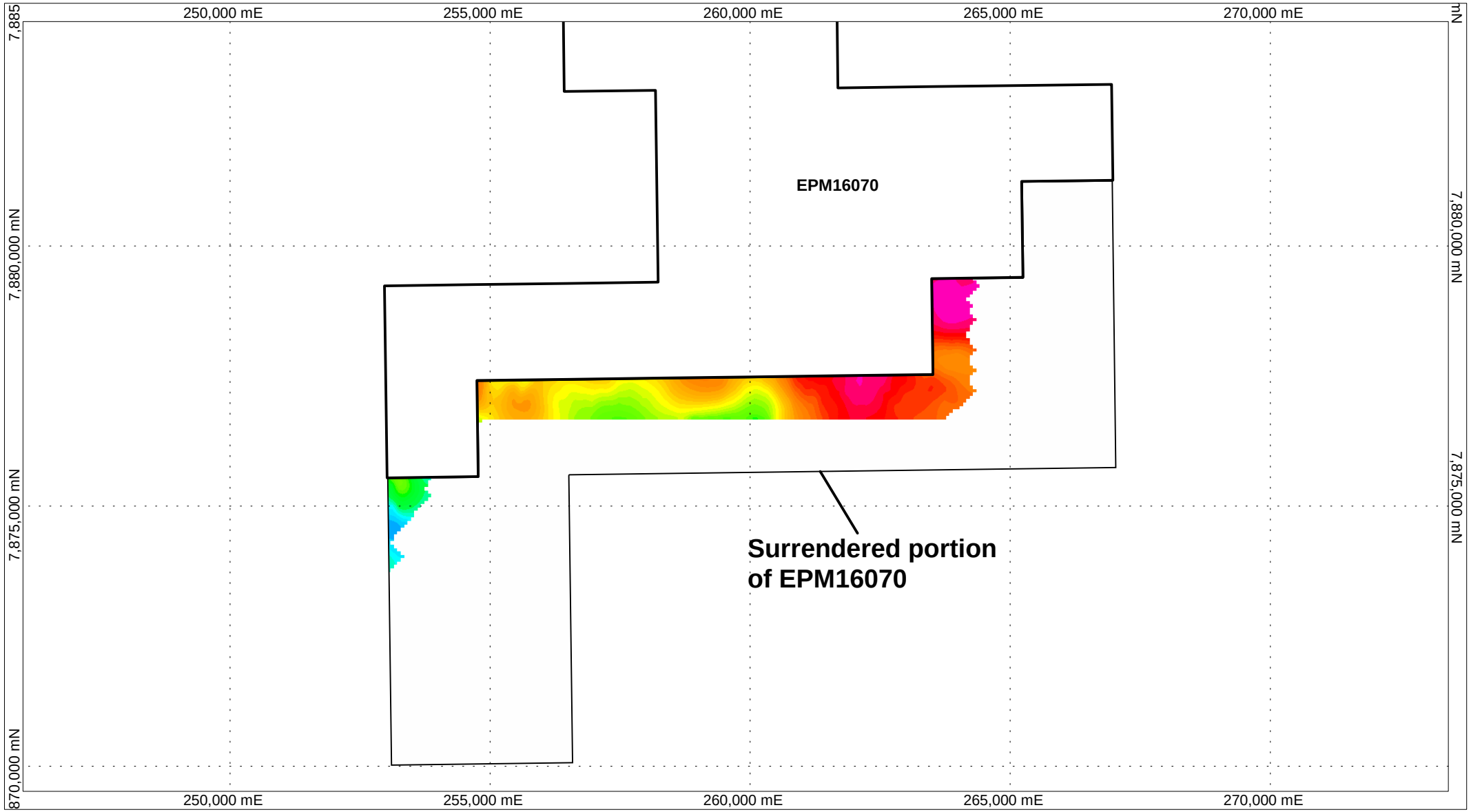
AUTHOR: K Dixon

COMPILED BY: K Dixon

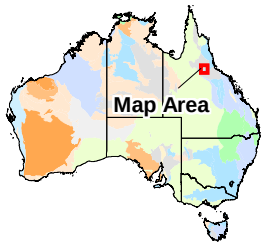
DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000




**LOCATION MAP**

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kilometres

Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 05 - Z

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DATE: 02/04/2009

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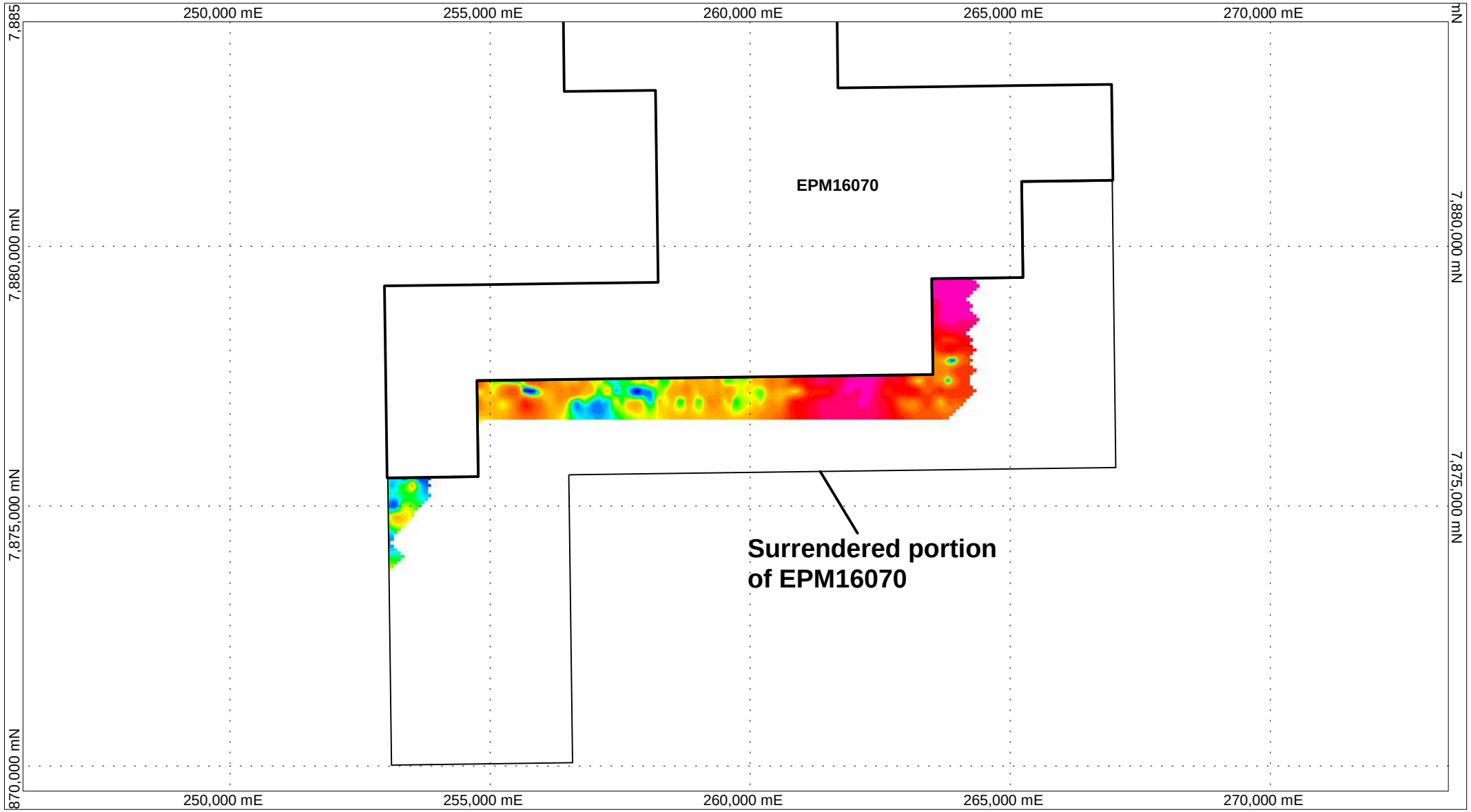


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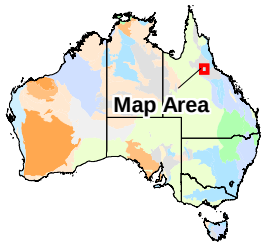


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kilometres

Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 06 - X

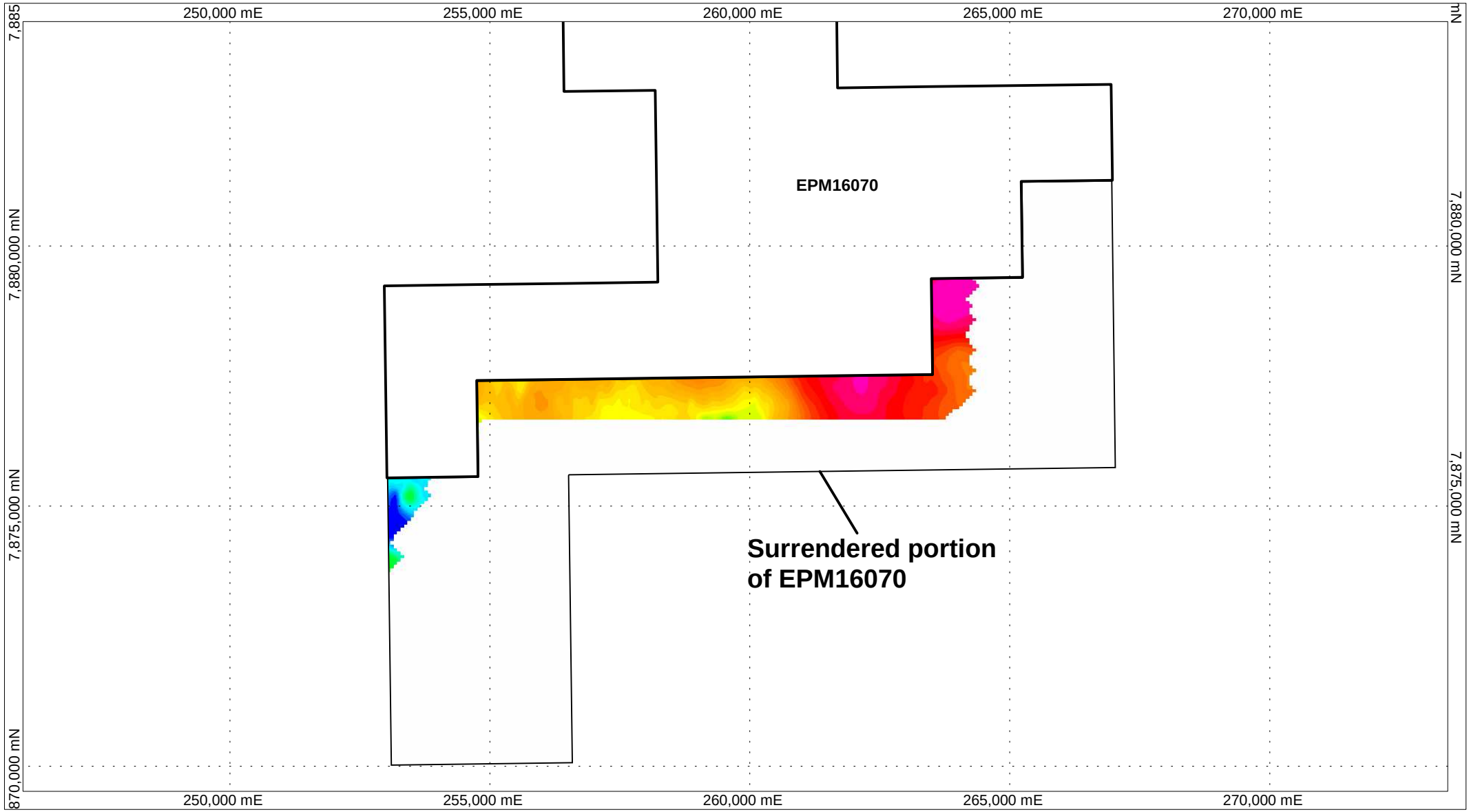
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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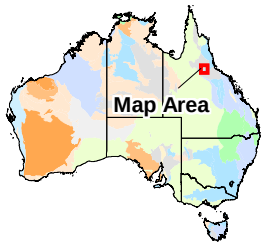


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kilometres

Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 06 - Z

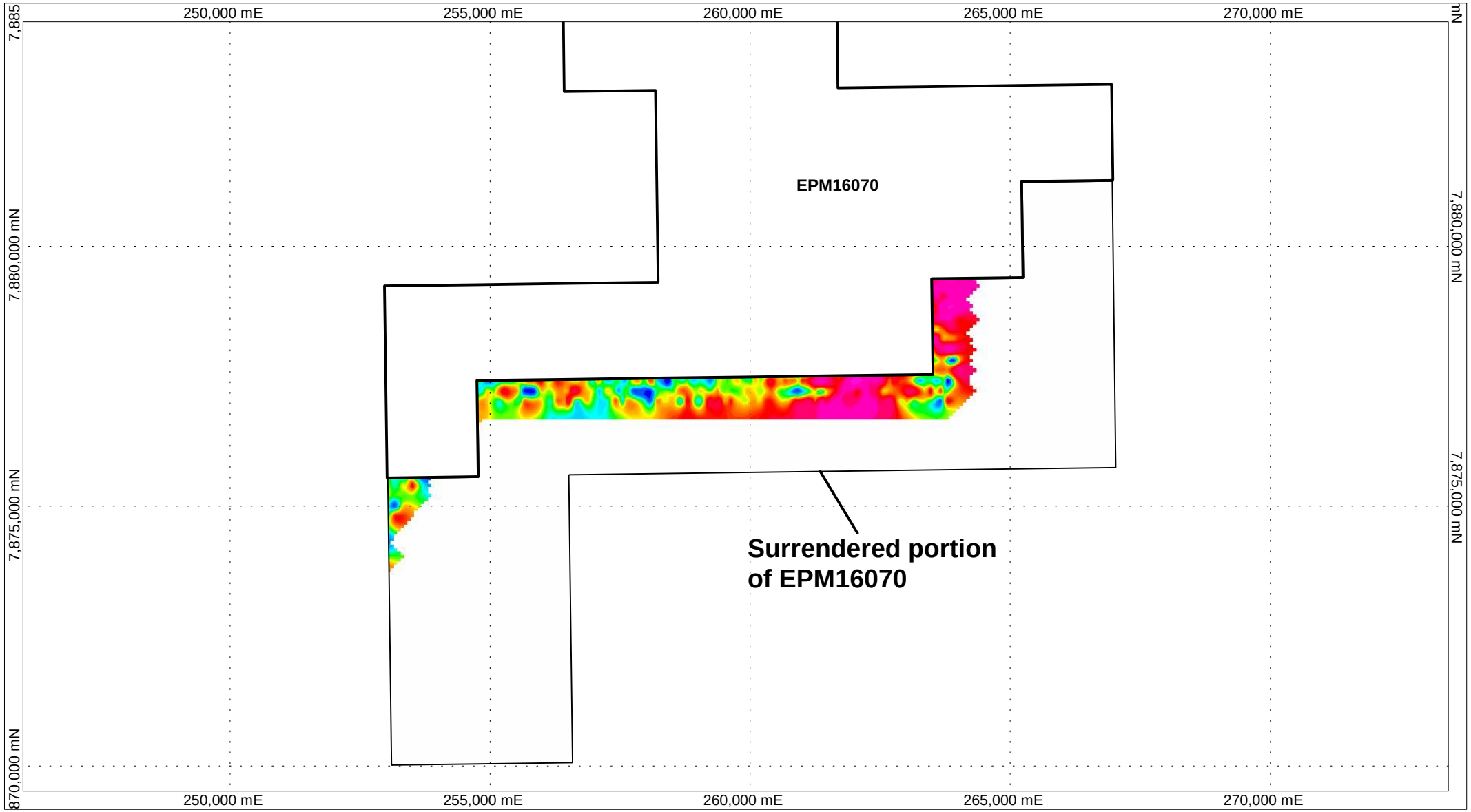
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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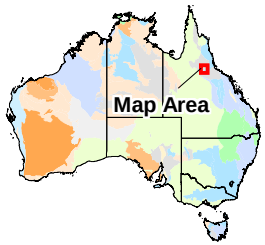


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 07 - X

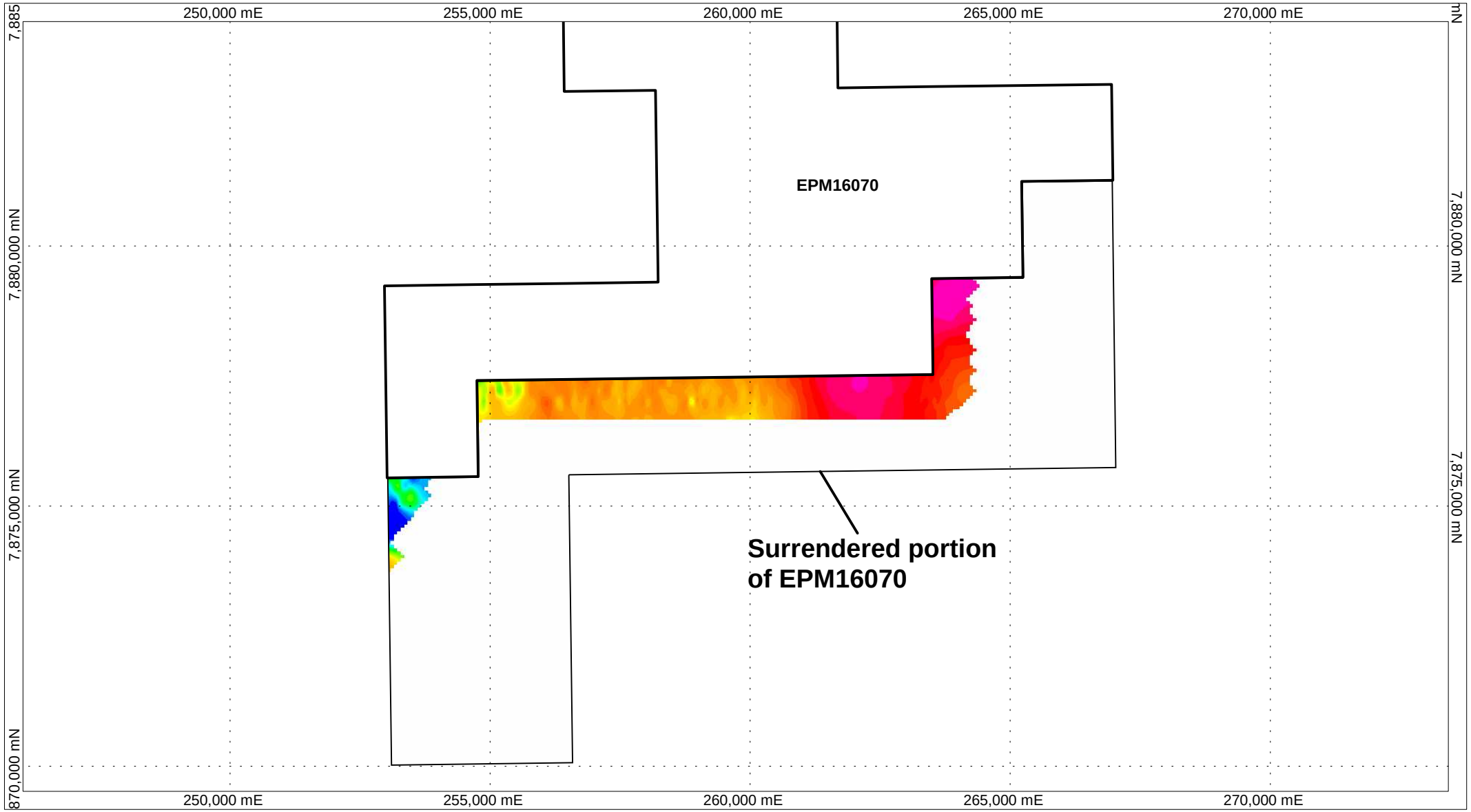
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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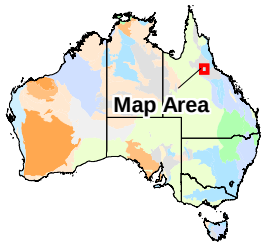


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 07 - Z

AUTHOR: K Dixon

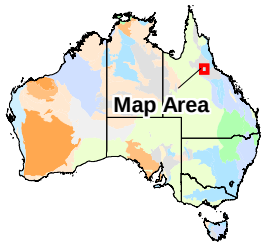
COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000


**LOCATION MAP**

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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 08 - X

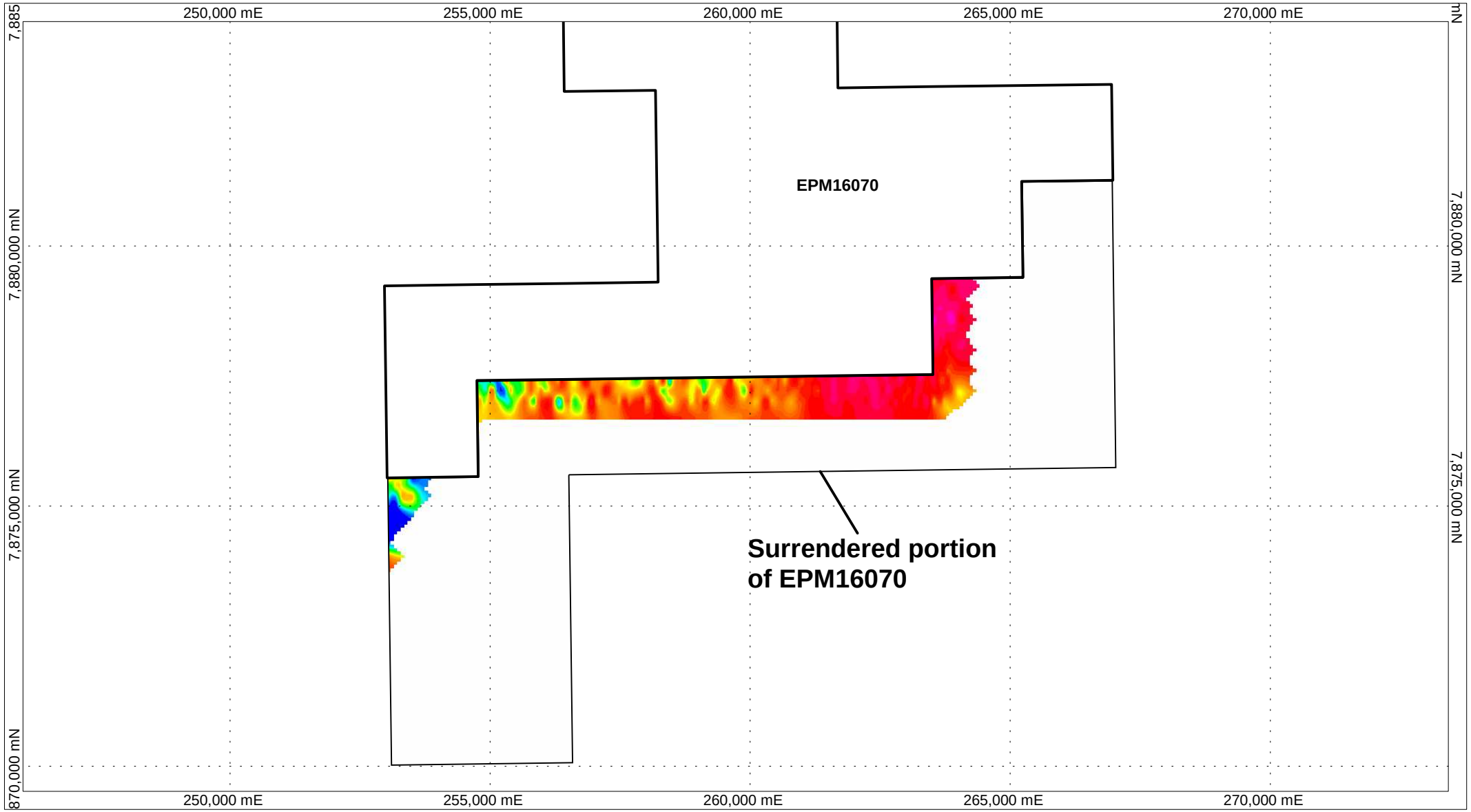
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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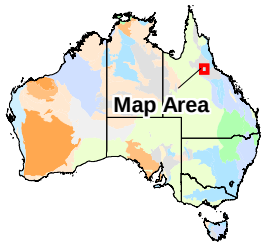


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 08 - Z

AUTHOR: K Dixon

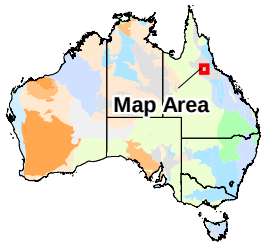
COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000


**LOCATION MAP**

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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 09 - X

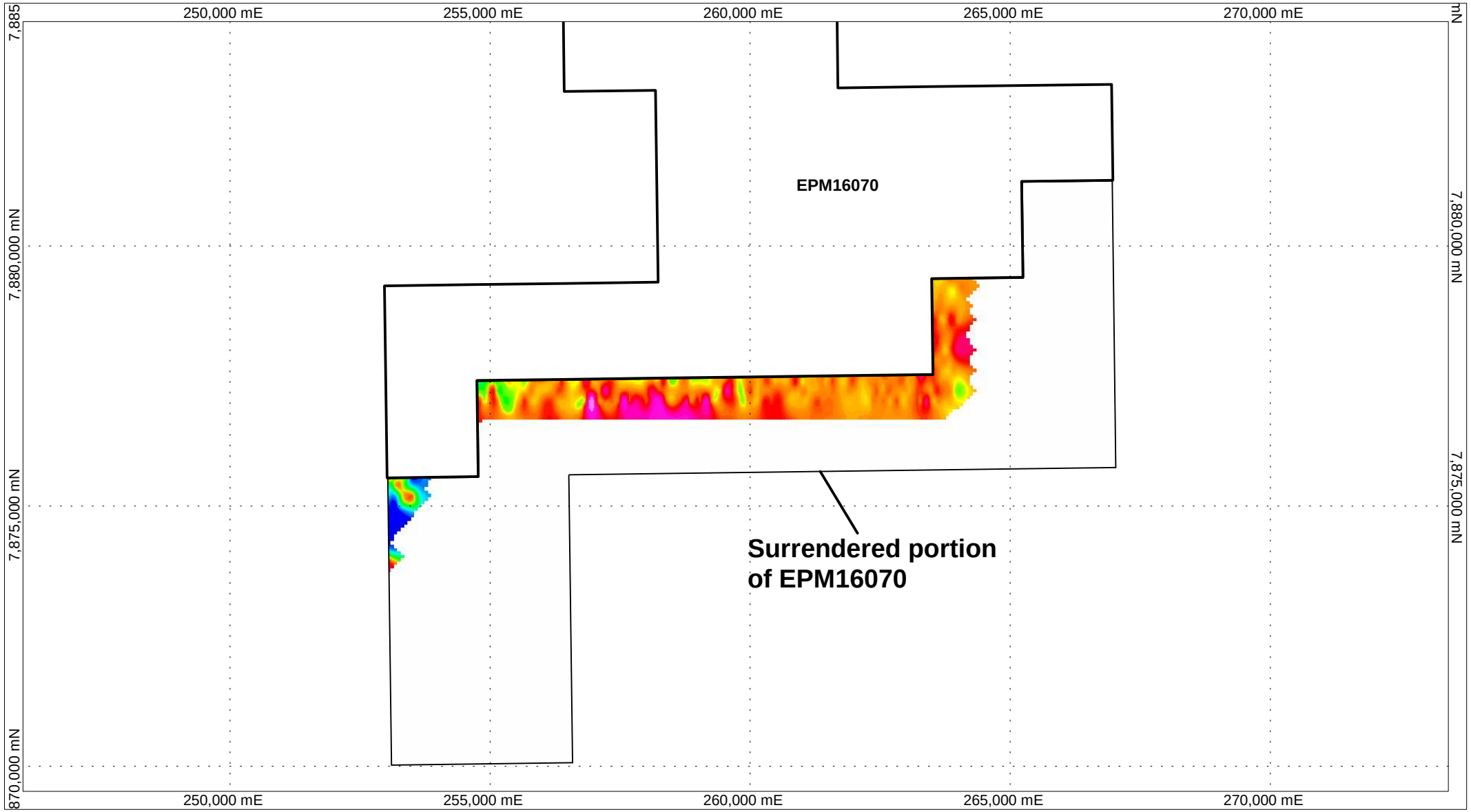
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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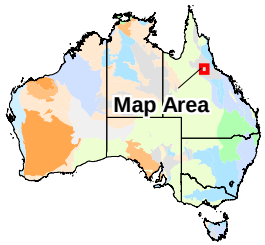


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kilometres

Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY EM: Channel 09 - Z

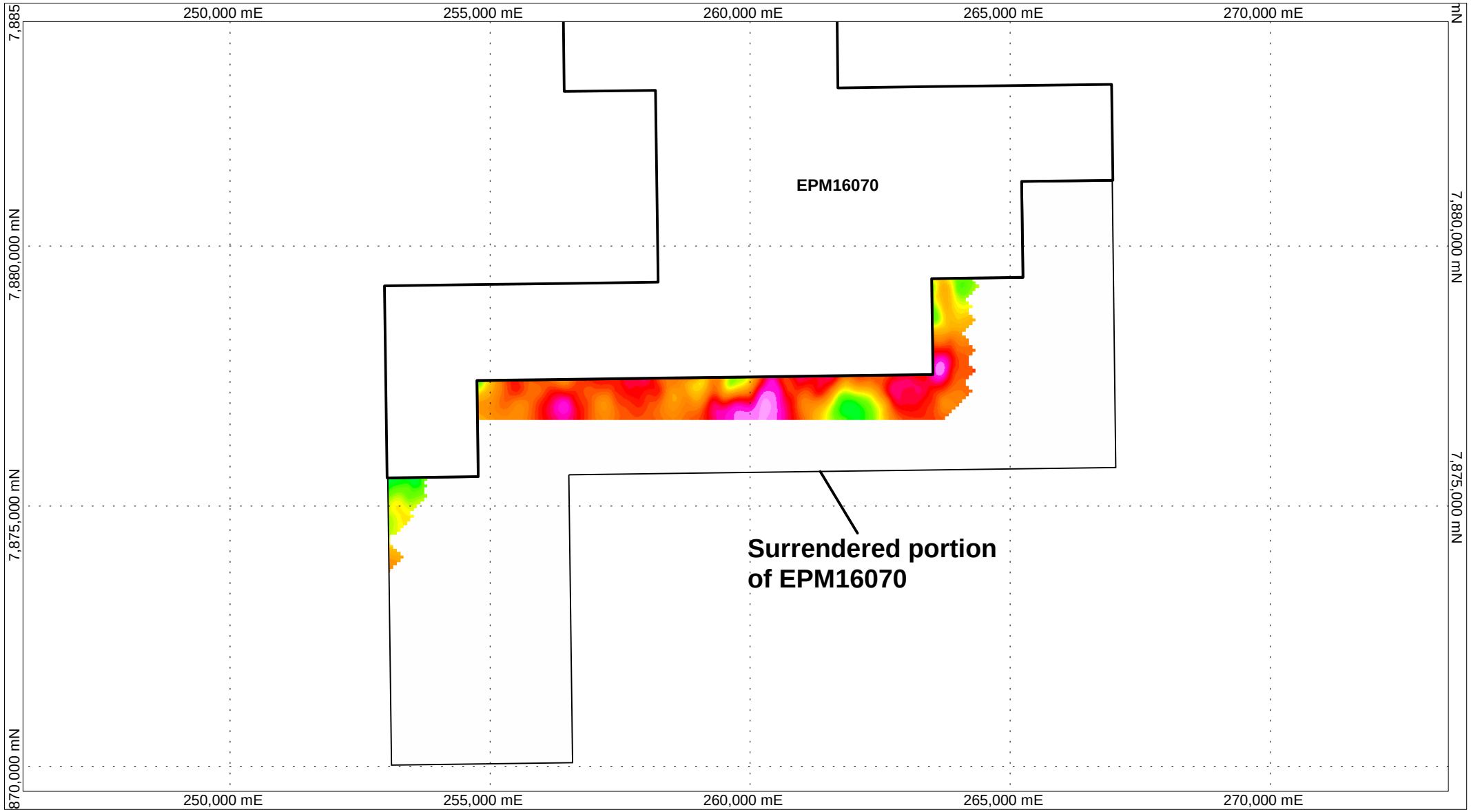
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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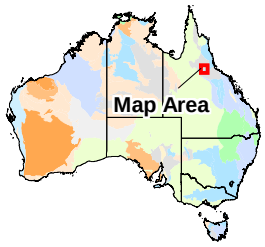


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ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY

## Radiometrics: Total Count (TC)

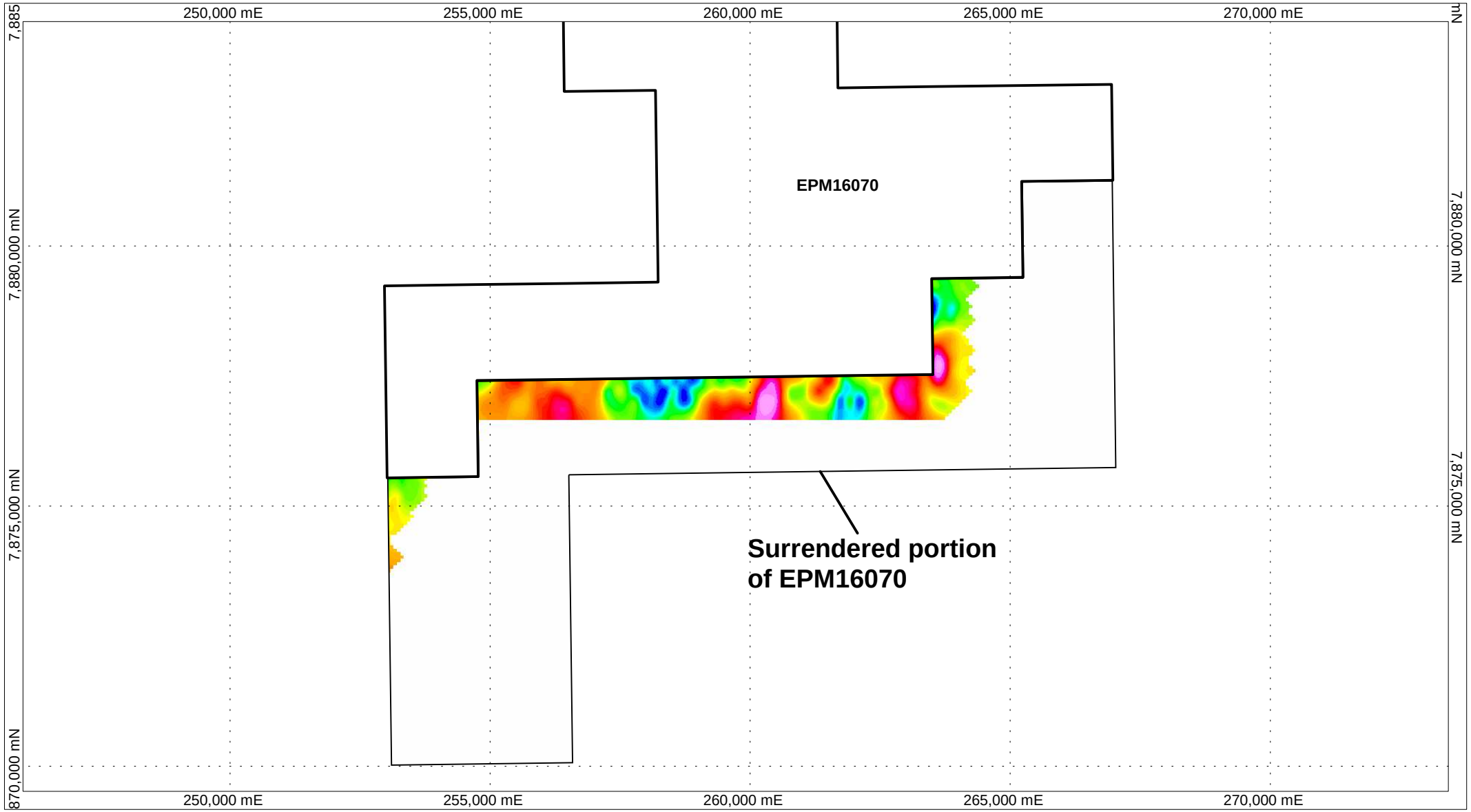
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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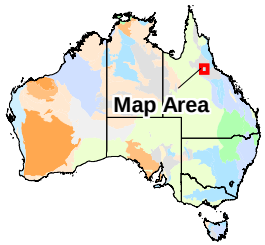


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Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY

## Radiometrics: K

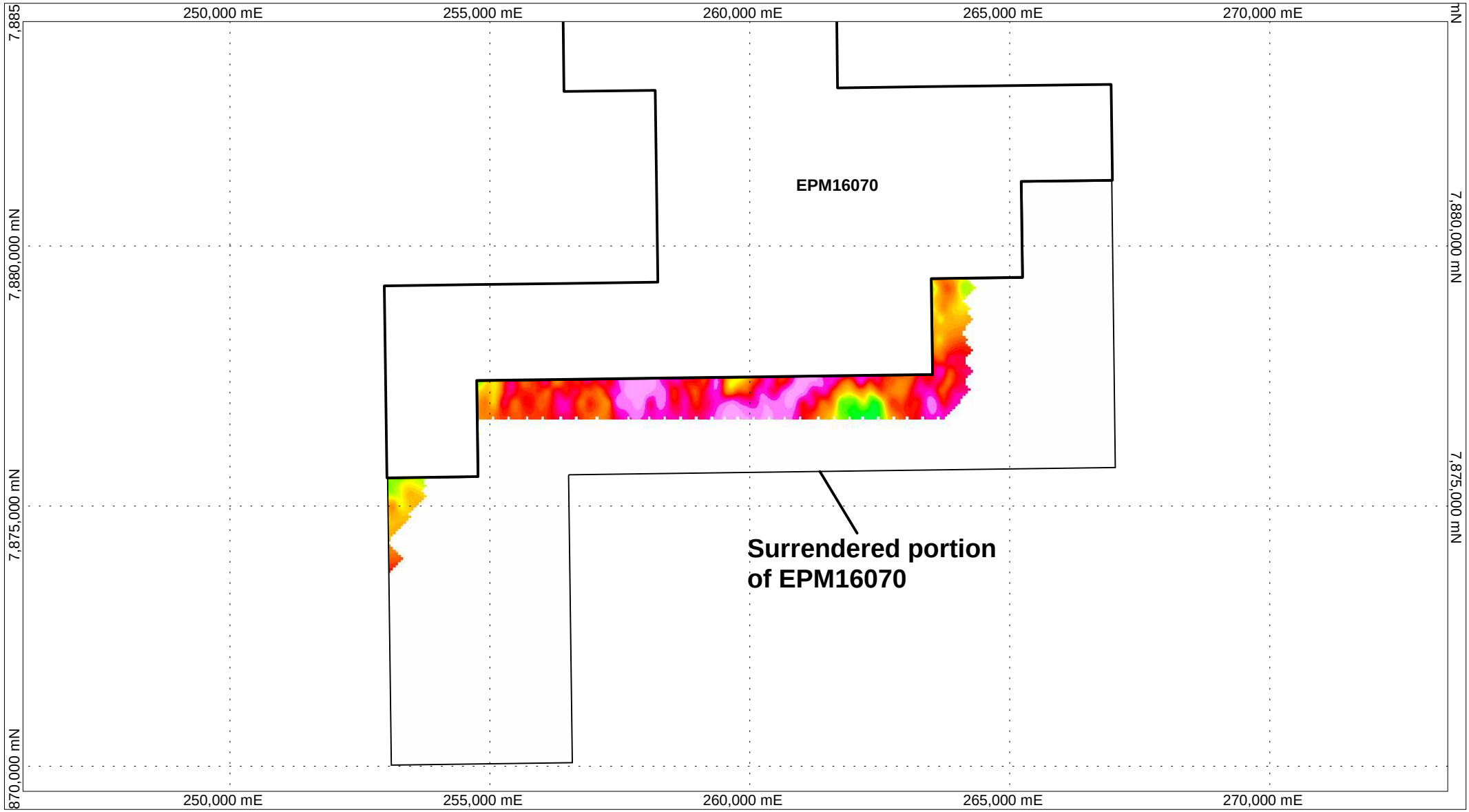
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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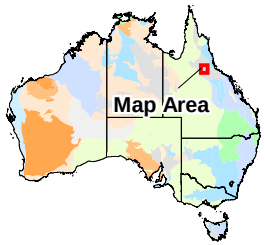


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Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY Radiometrics: Th

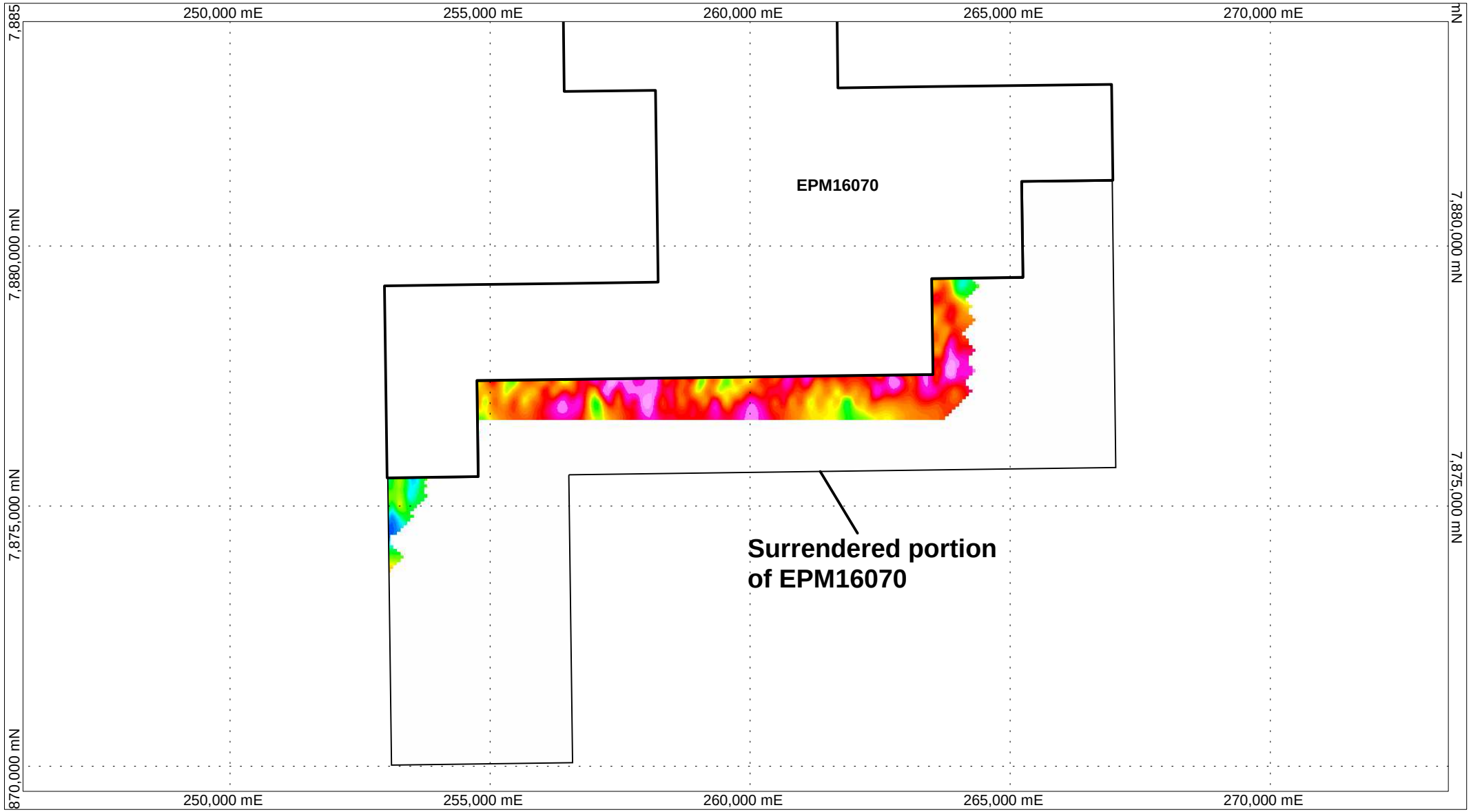
AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000

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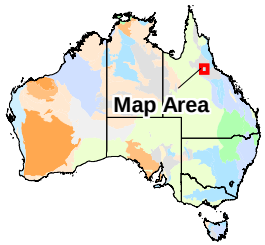


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Scale 1:100,000

ANGLO AMERICAN

REGION: GEORGETOWN

PROJECT: LYND

DRAWING No: AUS_QLD_LYN_GP_13073a.wor

# LYND BLOCK 1 - EPM16070 (SURRENDER AREA) SPECTREM AERIAL GEOPHYSICS SURVEY

## Radiometrics: U

AUTHOR: K Dixon

COMPILED BY: K Dixon

DATE: 02/04/2009

PROJECTION: MGA (Zone 55)

SCALE: 1:100,000