Report

TSF EM34 Geophysical Surveillance Survey

McArthur River Mine

4 APRIL 2012

Prepared for

McArthur River Mining Pty Ltd

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42213980

URS

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Abbreviations

Abbreviation	Description
EM	Electromagnetic
km	Kilometres
m	Metres
m E	Metres Easting
MMP	Mine Management Plan
m N	Metres Northing
MRM	McArthur River Mining
mS/m	Milli Siemens per meter
TSF	Tailings Storage Facility
URS	URS Australia Pty Ltd

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Introduction

This report forms the fourth periodic determination of subsurface electrical conductivity surrounding the McArthur River Mine Tailings Storage Facility (TSF) using geophysical data. This type of survey is currently required as part of the McArthur River Mine (MRM) Mine Management Plan (MMP).

The electromagnetic (EM) method described is a relatively quick means of measuring subsurface electrical conductivity. The method provides a means of detecting any subsurface loss of conductive liquid stored within the TSF via a change in measured ground conductivity when compared to baseline conditions. The method is also useful in determining areas that may warrant the installation of additional groundwater monitoring facilities.

The survey was undertaken in November 2011 when groundwater levels are low, near the end of the dry season.

Scope of Work and Methodology

2.1 Scope of Work

From our understanding of the project, the scope of work comprised the following:

- Field acquisition of electromagnetic data surrounding the TSF,
- Processing of the electromagnetic data, and
- Reporting of the results.

2.2 Methodology

2.2.1 Instrumentation

The Geonics EM 34-3 frequency domain electromagnetic instrument is a robust and relatively easy to use tool for the measurement of subsurface electrical conductivity. The instrument operates with a transmitter coil energized by an alternating electrical current, inducing a time-varying primary magnetic field into the ground. Electrical currents then flow within the sub-surface, generating a secondary magnetic field. A receiver coil placed 20 metres (m) from the transmitter senses this magnetic field and provides a direct readout of the electrical conductivity of the ground. The effective depth of exploration is 30 m with both antennas flat on the ground (vertical dipole orientation) and 15 m when they are upright (horizontal dipole orientation). Thus, average values of earth conductivity are recorded at each station and are compared in profile and with depth. A minimum of two people is required for efficient surveying.

2.2.2 Survey Details

One primary survey line was conducted around the entire perimeter of the TSF. A second survey line was conducted approximately 100 m from the TSF perimeter wall. Two additional survey lines (SE3 and SW3) were undertaken where additional data coverage was desirable (second survey line was within 100 m of the primary survey line or historical area of preferential seepage). The total length of the line surrounding TSF is approximately 10 kilometres (km). Survey line locations are illustrated in Figure 1.

Both horizontal and vertical dipole conductivity measurements were recorded at 20 m station intervals along the lines. Dipole separation was maintained at 20 m.

2.2.3 Data Processing and Report

The conductivity data from the base-line survey (2007) was processed and presented as figures showing profiles and as a plan showing a colour strip, indicative of conductivity value, along each line. Each subsequent survey will provide data that can also be shown as conductivity change with time.

The report describes and discusses the survey and results and contains all data in both hard copy and digital form.

Results

Results of November 2011 ground conductivity measurements are presented as profile plots in Figures 2 to 13 and in plan view, in Figures 14 and 15. Changes in ground conductivity between 2010 and 2011 and between 2007 and 2011 are presented in Figures 16 to 21. The raw data for the current survey is tabulated in Appendix A.

3.1 Conductivity Profiles

3.1.1 Line NE1

Ground conductivity ranged from 30 to >300 mS/m for the vertical dipole configuration and 32 to 132 mS/m for the horizontal dipole configuration (Figure 2). It is noted that a reading of >300 mS/m indicates a reading that is greater than the maximum range of the instrument.

The vertical dipole data (deep) shows local maxima at 613,650 m E, 613,773 m E, 613,938 m E, 614,198 m E, 614,314 m E and 614,421 m E.

The horizontal dipole (shallow) data shows local maxima at 613,773 m E and 614,368 m E.

Compared to the 2010 survey, ground conductivity has increased in the horizontal dipole by 9 mS/m for the minimum value and by 12 mS/m for the maximum value. For the vertical dipole, the minimum value has increased by 2 mS/m and the maximum, by 180 mS/m.

3.1.2 Line SE1

Ground conductivity ranged from 0 to 156 mS/m for the vertical dipole configuration and 26 to 129 mS/m for the horizontal dipole configuration (Figure 3).

The vertical dipole (deep) shows local maxima at 8,183,867 m N.

The horizontal dipole data (shallow) data shows local maxima at 8,183,421 m N, 8,183,710 m N, 8,183,769 m N, 8,183,823 m N and 8,184,410 m N.

The vertical dipole (deep) data shows similar conductivity peaks and troughs at similar intervals to the horizontal dipole (shallow) data. Compared to the 2010 survey, ground conductivity has decreased in the vertical dipole by 16 mS/m for the minimum value and increased by 56 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 4 mS/m and the maximum by 14 mS/m.

3.1.3 Line SW1

Ground conductivity ranged from 10 to >300 mS/m for the vertical dipole configuration and 20 to 108 mS/m for the horizontal dipole configuration (Figure 4). It is noted that a reading of >300 mS/m indicates a reading that is greater than the maximum range of the instrument.

The vertical dipole (deep) shows local maxima at 612,160 m E.

The horizontal dipole data (shallow) data shows local maxima at 612,141 m E.

Both the horizontal and vertical dipole configuration data indicates an increasing trend towards the west.

The vertical dipole (deep) data show similar conductivity peaks and troughs to the 2010 survey however with a general increase in conductivity. Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 4 mS/m for the minimum value and increased by 246 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 6 mS/m and the maximum by 31 mS/m.

3.1.4 Line NW1

Ground conductivity ranged from 15 to 60 mS/m for the vertical dipole configuration and 18 to 68 mS/m for the horizontal dipole configuration (Figure 5).

The vertical dipole data (deep) shows local maxima at 8,184,590 m N.

The horizontal dipole (shallow) data shows local maxima at 8,184,608 m N.

Both the horizontal and vertical dipole configuration data indicates a general increasing trend towards the north.

Compared to the 2010 survey, ground conductivity has decreased in the horizontal dipole by 4 mS/m for the minimum value and no change was reported for the maximum value. For the vertical dipole, the minimum value has shown no change and the maximum value has decreased by 39 mS/m.

3.1.5 Line NE2

Ground conductivity ranged from 16 to 114 mS/m for the vertical dipole configuration and 14 to 75 mS/m for the horizontal dipole configuration (Figure 6).

The vertical dipole (deep) shows local maxima at 614,187 m E and 614326 m E.

The horizontal dipole data (shallow) data shows local maxima at 614,266 m E.

Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 1 mS/m for the minimum value and by 56 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 2 mS/m and the maximum value has increased by 18 mS/m.

3.1.6 Line SE2

Ground conductivity ranged from 6 to >300 mS/m for the vertical dipole configuration and 20 to 252 mS/m for the horizontal dipole configuration (Figure 7). It is noted that a reading of >300 mS/m indicates a reading that is greater than the maximum range of the instrument.

The vertical dipole data (deep) shows local maxima at 8,184,031 m N, 8,184,134 m N, 8,184,358 m N, 8,184,539 m N, and 8,184,716 m N.

The horizontal dipole data (shallow) shows local maxima at 8,184,018m N.

The horizontal and vertical dipole data show similar conductivity peaks and troughs to the 2010 survey. Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 4 mS/m for the minimum value and 30 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 8 mS/m and by 152 mS/m for the maximum value.

3.1.7 Line NE3

Ground conductivity ranged from 16 to 24 mS/m for the vertical dipole configuration and 20 to 24 mS/m for the horizontal dipole configuration (Figure 8).

3 Results

The vertical dipole (deep) shows local maxima at 8,185,107 m N.

The horizontal dipole data (shallow) data shows local maxima at 8,185,107 m N.

Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 1 mS/m for the minimum value and by 2 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 3 mS/m and by 4 mS/m for the maximum value.

3.1.8 Line SW2

Ground conductivity ranged from 56 to 138 mS/m for the vertical dipole configuration and 24 to 84 mS/m for the horizontal dipole configuration (Figure 9).

The vertical dipole (deep) shows local maxima at 612,814 m E, and 612,873 m E.

The horizontal dipole data (shallow) data shows local maxima at 612,775 m E.

Both the horizontal and vertical dipole configuration data indicates a general decreasing trend towards the east.

The vertical dipole (deep) data shows similar conductivity peaks and troughs at similar intervals to the horizontal dipole (shallow) data. Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 22 mS/m for the minimum value and by 72 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 5 mS/m and by 42 mS/m for the maximum value.

3.1.9 Line NW2

Ground conductivity ranged from 12 to 23 mS/m for the vertical dipole configuration and 12 to 38 mS/m for the horizontal dipole configuration (Figure 10).

The vertical dipole (deep) shows local maxima at 8,183,741 m N, and 8,185,263 m N.

The horizontal dipole data (shallow) data shows local maxima at 8,183,880 m N.

Compared to the 2010 survey, ground conductivity has increased in the horizontal dipole by 6 mS/m for the minimum value and by 6 mS/m for the maximum value. For the vertical dipole, the minimum value has increased by 4 mS/m and by 17 mS/m for the maximum value.

3.1.10 Line NW3

Ground conductivity ranged from 6 to 98 mS/m for the vertical dipole configuration and 20 to 72 mS/m for the horizontal dipole configuration (Figure 11).

The vertical dipole (deep) shows local maxima at 8,184,936 m N.

The horizontal dipole data (shallow) data shows local maxima at 8,184,922 m N.

Compared to the 2010 survey, ground conductivity has decreased in the vertical dipole by 4 mS/m for the minimum value and increased by 43 mS/m for the maximum value. For the horizontal dipole, the minimum value has decreased by 2 mS/m and increased by 15 mS/m for the maximum value.

3 Results

3.1.11 Line SW3

Ground conductivity ranged from 12 to 41 mS/m for the vertical dipole configuration and 18 to 80 mS/m for the horizontal dipole configuration (Figure 12).

The vertical dipole (deep) shows local maxima at 612,253 m E.

The horizontal dipole data (shallow) data shows local maxima at 612,289 m E.

Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 10 mS/m for the minimum value and by 3 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 9 mS/m and by 28 mS/m for the maximum value.

3.1.12 Line SE3

Ground conductivity ranged from 16 to >300 mS/m for the vertical dipole configuration and 22 to 90 mS/m for the horizontal dipole configuration (Figure 13). It is noted that a reading of >300 mS/m indicates a reading that is greater than the maximum range of the instrument.

The vertical dipole (deep) shows local maxima at 8,183,754 m N.

The horizontal dipole data (shallow) data shows local maxima at 8,183,790 m N and 8,183,922 m N.

Both the horizontal and vertical dipole configuration data indicates a general decreasing trend towards the north.

Compared to the 2010 survey, ground conductivity has increased in the vertical dipole by 11 mS/m for the minimum value and by 252 mS/m for the maximum value. For the horizontal dipole, the minimum value has increased by 8 mS/m and by 18 mS/m for the maximum value.

Discussion

The current survey was undertaken at similar time of year compared to the 2010 survey and therefore groundwater conditions are considered to be similar and potential changes in conductivity are comparable.

The northern cell of the TSF is no longer in operation and is in the process of being capped. The central cells of the TSF are currently receiving tailings material from the ore processing facility. The southern cell is used as a water storage facility through the wet season (waters derived from surface water run-off and groundwater infiltrating open cut mine operations) which acts as a local groundwater recharge area.

Seepages surrounding the TSF and into Surprise Creek are likely to be a combination of;

- Tailings deposition (historical and current),
- Water storages, and
- Rainfall infiltration into tailings.

4.1 Vertical Dipole

Changes in vertical dipole conductivity between 2011 and 2010 (Figure 16) have generally shown similar conditions, however some areas have notable changes, which can be attributed to groundwater salinity or groundwater levels (Section 4.3). This are noted on Line NE1; centred at 613,700 m E, 613,940 m E and 614,410 m E; Line SW1, centred at 612,160 m E and Line SW2, between 612,500 and 612,900 m E.

Compared to the 2007 data (Figure 18), ground conductivity has increased, remained the same or reduced. South and west of the TSF (Line NW1), there have been both slight reductions in conductivity and areas of increased conductivity (Lines SW1, SW2, NE1 and SE2). Increases in ground conductivity suggest higher salinity groundwater at these locations, particularly within the deeper strata.

4.2 Horizontal Dipole

Changes in horizontal dipole conductivity between 2011 and 2010 (Figure 17) show little or no change in ground conductivity conditions. Line NE1, centred at 613,712 m E and Line SE2 located at 8,184,018 m N show increases in ground conductivity.

Compared to the 2007 data (Figure 19), the horizontal dipole data has reduced to the south east of the TSF (Lines SE1, NE1, SE2 and SE3) indicating a reduction in groundwater salinity. Line NE1 centred at 613,712 m E shows an increase in ground conductivity. The remainder of the TSF has little to no change in ground conductivity.

4.3 Correlation to Groundwater Monitoring

Correlation between 2010 and 2011 groundwater sampling results and ground conductivity measurements were made to determine the relative effectiveness of the current geophysical survey methodology. Factors that can change ground conductivity with time include:

- Changes in groundwater levels,
- Changes in groundwater salinity, and
- Man-made infrastructure changes between surveys.

Factors that need consideration for the correlation include:

- Bore construction and individual screened intervals,
- Bore locations relative to the geophysical survey lines,
- Groundwater sampling times comparative to the geophysical surveys,
- Relative depth of influence "skin depth" of the survey configurations used (20 m inter-coil spacing for both horizontal and vertical dipoles). The skin depth of the instrumentation is variable, subject to the ground conductivity when measured. This is influence by changes in bedrock type, groundwater levels and groundwater salinity,
- Stratification of the groundwater surrounding the TSF (fresh water overlying more saline),
- Variable nature of the underlying hydrogeology (karst/fractured/weathered bedrock and inter-granular aquifers),
- Variable geology underlying the surrounds of the TSF, and
- Variable porosity of the underlying bedrock.

Table 4-1 presents the measured results and relative changes between the 2010 and 2011 geophysical surveys in comparison to groundwater monitoring data.

Table 4-1 2010-2011 Comparative Changes

Bore	2010 (October 2010)				2011 (September 2011)				2011/2010 Change			
	Conductivity (mS/m)		Groundwater		Conductivity (mS/m)		Groundwater		Conductivity (mS/m)		Groundwater	
			Level	EC			Level	EC			Level	EC
	VD	HD	(m bgl)	μS/cm	VD	HD	(m bgl)	μS/cm	VD	HD	(m bgl)	μS/cm
GW6	27	38	8.40	2,170	30	34	6.86	2,070	3	-4	1.54	-100
GW18	32	58	3.42	11,300	74	58	3.05	12,500	42	0	0.37	1,200
GW19	155	59	3.58	6,580	222	90	3.03	7,030	67	31	0.55	450
GW20A	102	41	5.00	5,130	174	72	4.55	5,360	72	31	0.45	230
GW20B*	102	41	4.99	5,920	174	72	4.79	6,290	72	31	0.20	370
GW22	15	19	5.44	2,250	16	20	5.03	1,490	1	1	0.41	-760
GW42A	32	39	3.87	5,280	30	41	3.74	1,580	-2	2	0.13	-3,700
GW42B	32	39	3.82	7,510	30	41	3.73	6,010	-2	2	0.09	-1,500
GW45B	60	40	4.00	9,930	55	48	3.95	9,050	-5	8	0.05	-880
GW48	60	31	1.65	8,750	37	36	1.55	8,380	-23	5	0.10	-370

* - Groundwater Level Measured in December 2011

4 Discussion

In summary:

- Increases in vertical and horizontal ground conductivity are associated with increased groundwater levels and groundwater electrical conductivity (GW18, GW19, GW20A, GW20B).
- Decreases in vertical dipole (deep) ground conductivity are associated with decreases in groundwater conductivity, however increases in vertical conductivity (shallow) are possibly associated with a rise in groundwater levels (GW42A, GW42B, GW45B, GW48).
- Undetermined changes at GW22 and GW6, possibly attributed to the combined effect of an increase in groundwater level and reduction in groundwater salinity or other factors as noted above.

Conclusions and Recommendations

5.1 Conclusions

The EM34-3 survey was conducted around the perimeter of the McArthur River Mine Tailings Storage Facility in November 2011 to determine changes in ground conductivity data with time. The data were collected using a twenty metre inter-coil separation survey specification with both vertical and horizontal dipole modes.

The current survey was undertaken at a similar time of year (November verses October) compared to the 2010 survey and therefore the changes in conductivity are considered comparable.

Changes in ground conductivity (both vertical and horizontal dipole configurations) between 2010 and 2009 have generally shown either no change or increases in ground conductivity, particularly to the north east and south west of the TSF (Lines SW1, SW2, NE1 and SE2).

Compared to the 2007 data, ground conductivity has generally remained the same or slightly reduced apart from increases observed on Lines SW1, SW2, NE1 and SE2.

5.2 Recommendations

It is recommended that MRM undertake regular electromagnetic surveys over the existing lines surrounding the TSF to determine changes in conductivity attributed to seepage remediation techniques. The next survey should use the same equipment configuration and be undertaken late in the dry season between October and November 2012.

It is further recommended that regular monitoring be continued to determine any changes in groundwater quality.

Based on the current results, increases in conductivity, particularly on Lines SW1, SW2, NE1 and SE2 warrant further investigation as these changes in conductivity have only occurred since the last survey. Additional groundwater monitoring facilities should be investigated in the identified areas and if the investigations identify impacts, remediation measures such as cut-off trenches or recovery bores could be considered.

References

URS 2007, EM Survey – TSF Monitoring Programme McArthur River Mine, Unpublished report to McArthur River Mining Pty Ltd, February 2007. URS Report Number 42213767

URS 2009, EM Survey - EM Survey - TSF Monitoring Programme McArthur River Mine, Unpublished report to McArthur River Mining Pty Ltd, March 2010. URS Report Number 42213902

URS 2010, EM Survey – TSF Monitoring Programme McArthur River Mine, Unpublished report to McArthur River Mining Pty Ltd, February 2011. URS Report Number 42213948

Limitations

URS Australia Pty Ltd (URS) has prepared this report in accordance with the usual care and thoroughness of the consulting profession for the use of McArthur River Mining Pty Ltd and only those third parties who have been authorised in writing by URS to rely on the report.

It is based on generally accepted practices and standards at the time it was prepared. No other warranty, expressed or implied, is made as to the professional advice included in this report. It is prepared in accordance with the scope of work and for the purpose outlined in the Proposal dated 1 September 2011.

The methodology adopted and sources of information used by URS are outlined in this the Report.

Where this report indicates that information has been provided to URS by third parties, URS has made no independent verification of this information unless required as part of the agreed scope of work. URS assumes no liability for any inaccuracies in or omissions to that information.

This Report was prepared between November and December 2011. The information in this report is considered to be accurate at the date of issue and is in accordance with conditions at the site at the dates sampled. Opinions and recommendations presented herein apply to the site existing at the time of our investigation and cannot necessarily apply to site changes of which URS is not aware and has not had the opportunity to evaluate. This document and the information contained herein should only be regarded as validly representing the site conditions at the time of the investigation unless otherwise explicitly stated in a preceding section of this report. URS disclaims responsibility for any changes that may have occurred after this time.

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This report contains information obtained by inspection, sampling, testing or other means of investigation. This information is directly relevant only to the points in the ground where they were obtained at the time of the assessment. The borehole logs indicate the inferred ground conditions only at the specific locations tested. The precision with which conditions are indicated depends largely on the frequency and method of sampling, and the uniformity of conditions as constrained by the project budget limitations. The behaviour of groundwater and some aspects of contaminants in soil and groundwater are complex. Our conclusions are based upon the analytical data presented in this report and our experience. Future advances in regard to the understanding of chemicals and their behaviour, and changes in regulations affecting their management, could impact on our conclusions and recommendations regarding their potential presence on this site.

Where conditions encountered at the site are subsequently found to differ significantly from those anticipated in this report, URS must be notified of any such findings and be provided with an opportunity to review the recommendations of this report.

Whilst to the best of our knowledge information contained in this report is accurate at the date of issue, subsurface conditions, including groundwater levels can change in a limited time. Therefore this document and the information contained herein should only be regarded as valid at the time of the investigation unless otherwise explicitly stated in this report.

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Any estimates of potential costs which have been provided are presented as estimates only as at the date of the Report. Any cost estimates that have been provided may therefore vary from actual costs at the time of expenditure.

McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING PROGRAMME

TSF LOCATION PLAN

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MCARTHUR RIVER MINE

Figure: **1**

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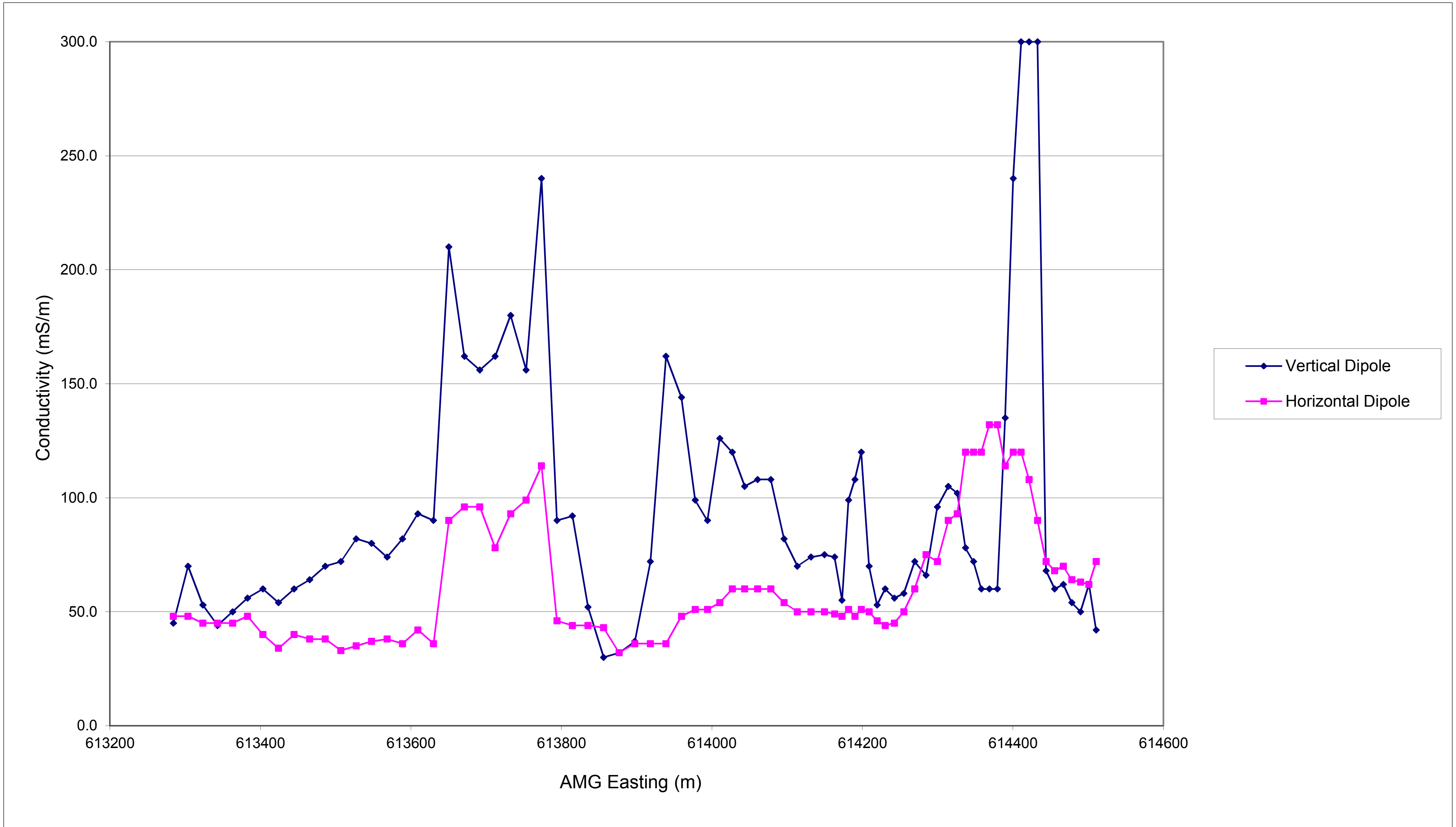

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EM34 SURVEY
TSF MONITORING
PROGRAMME

LINE NE1
CONDUCTIVITY
PROFILE (mS/m)

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Figure: **2**

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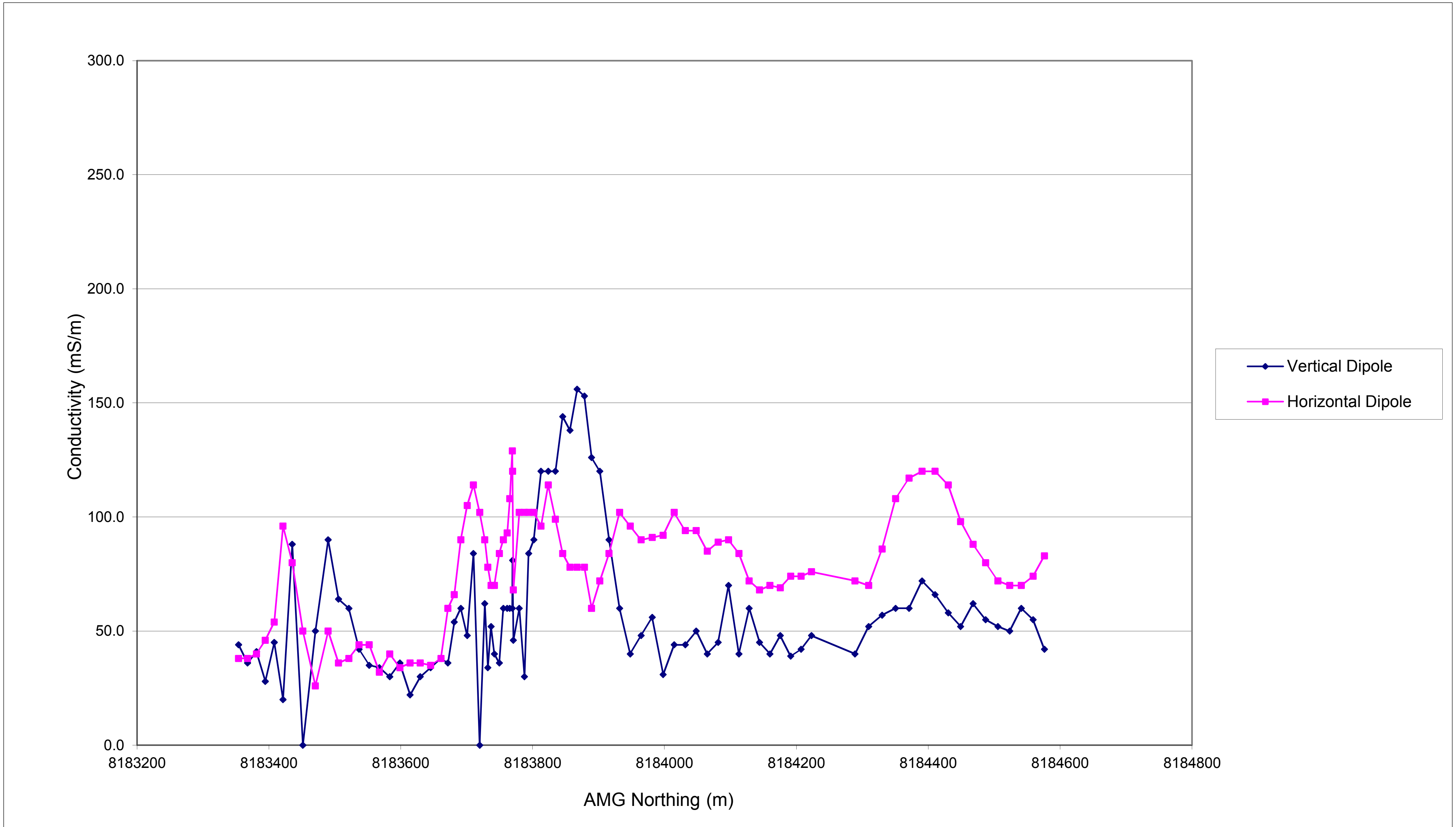

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EM34 SURVEY
TSF MONITORING
PROGRAMME

LINE SE1
CONDUCTIVITY PROFILE (mS/m)

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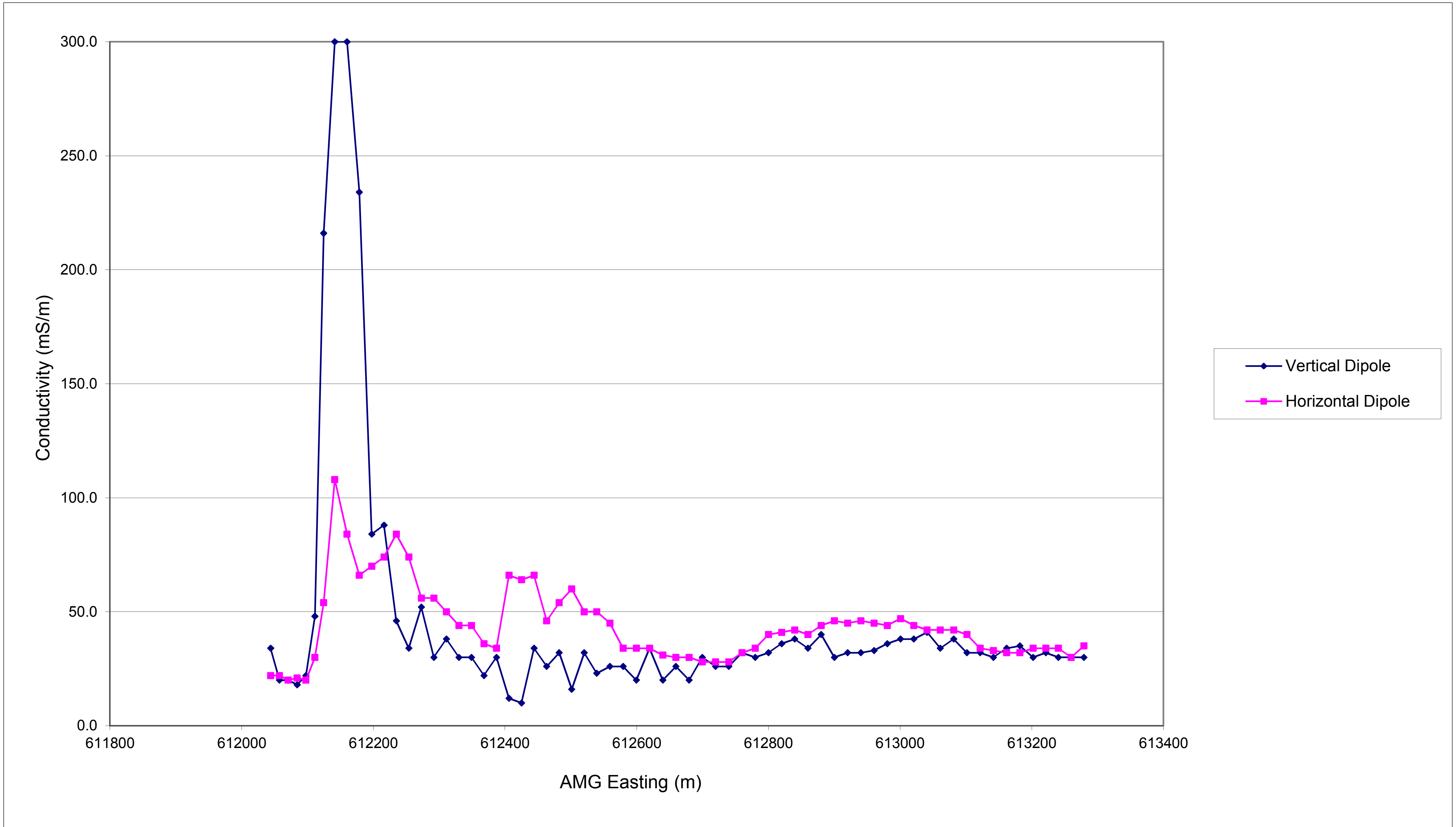

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TSF MONITORING
PROGRAMME

LINE SW1 CONDUCTIVITY PROFILE (mS/m)

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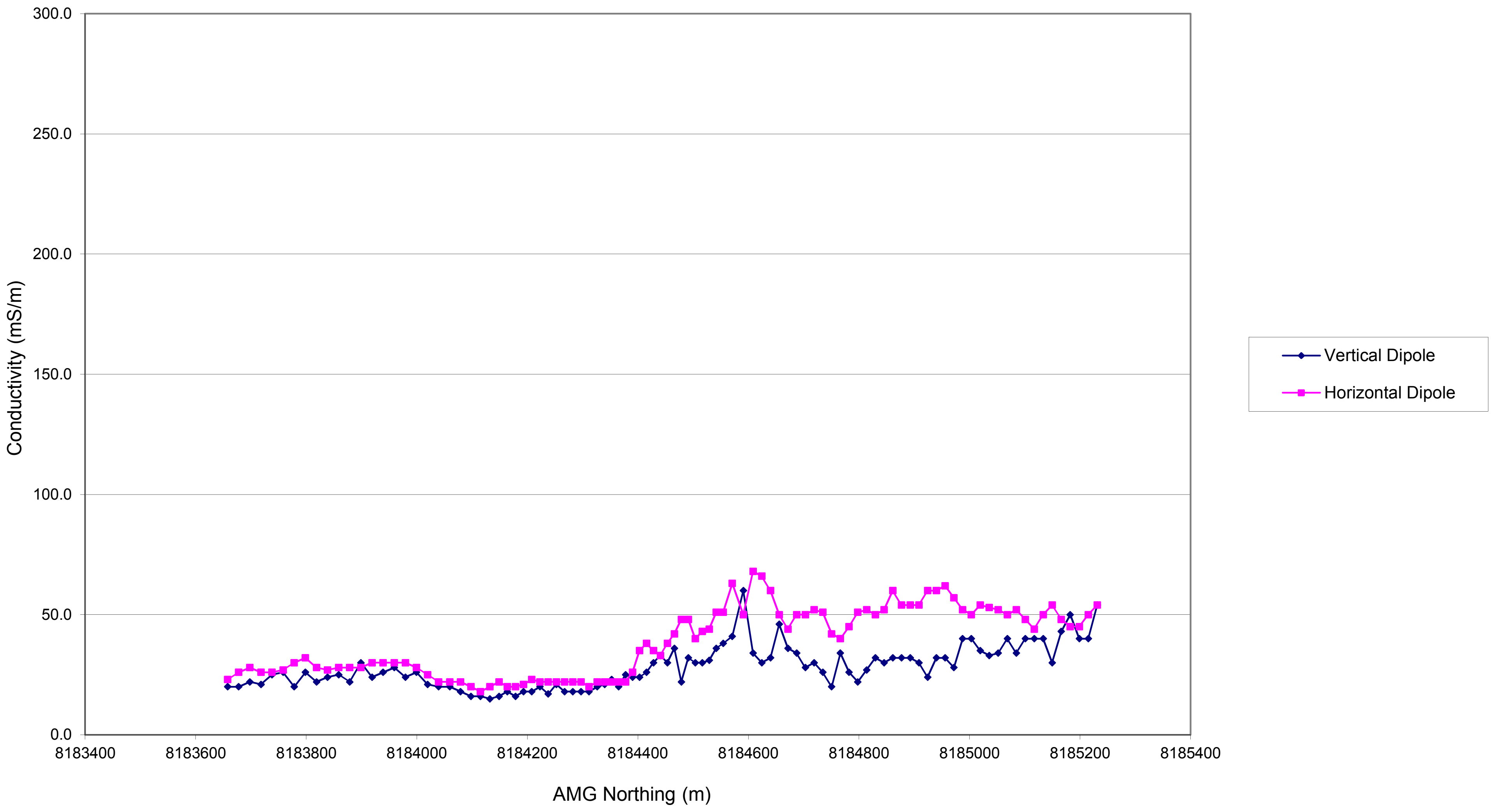

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LINE NW1
CONDUCTIVITY
PROFILE (mS/m)

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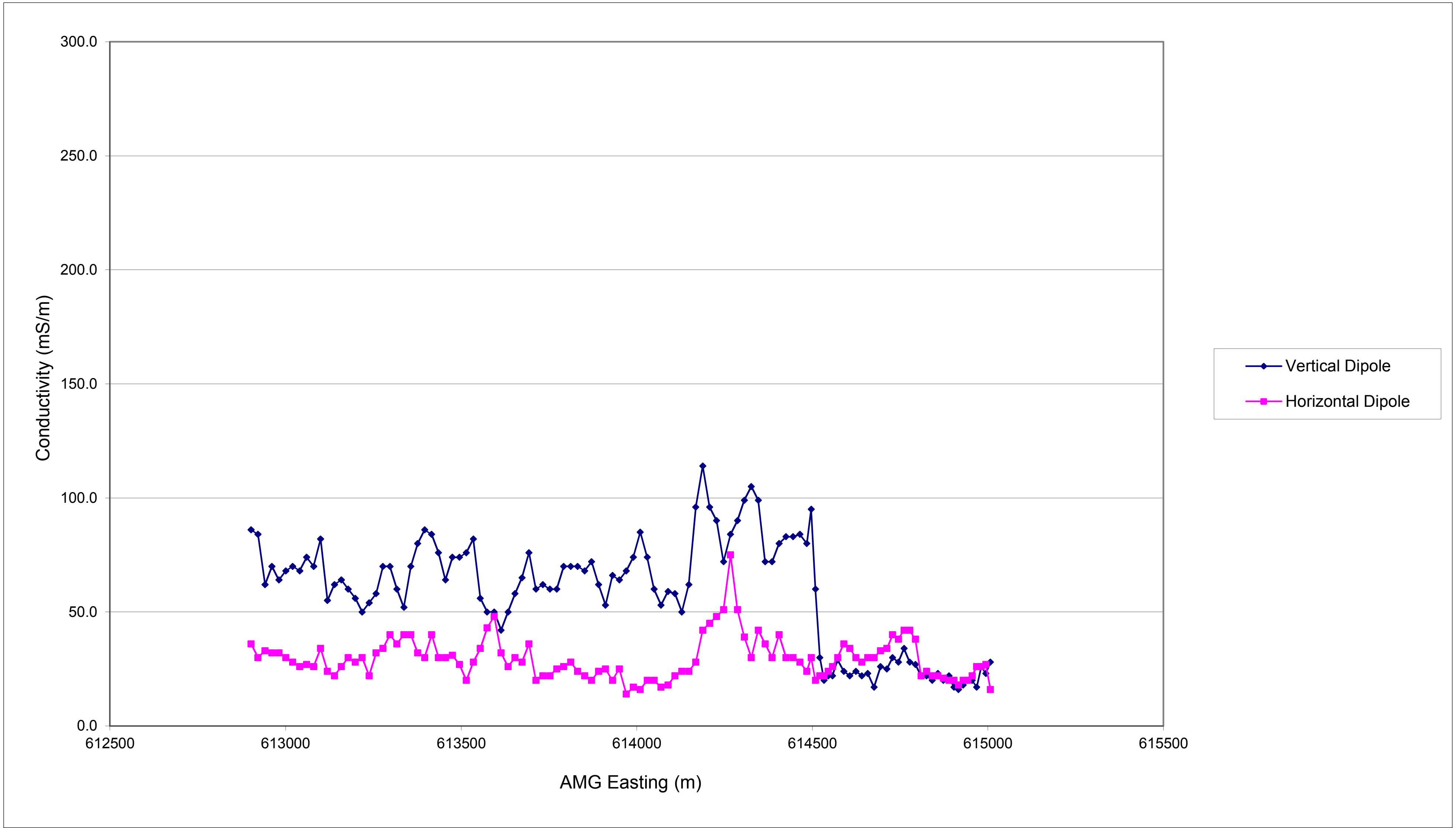

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LINE NE2 CONDUCTIVITY PROFILE (mS/m)

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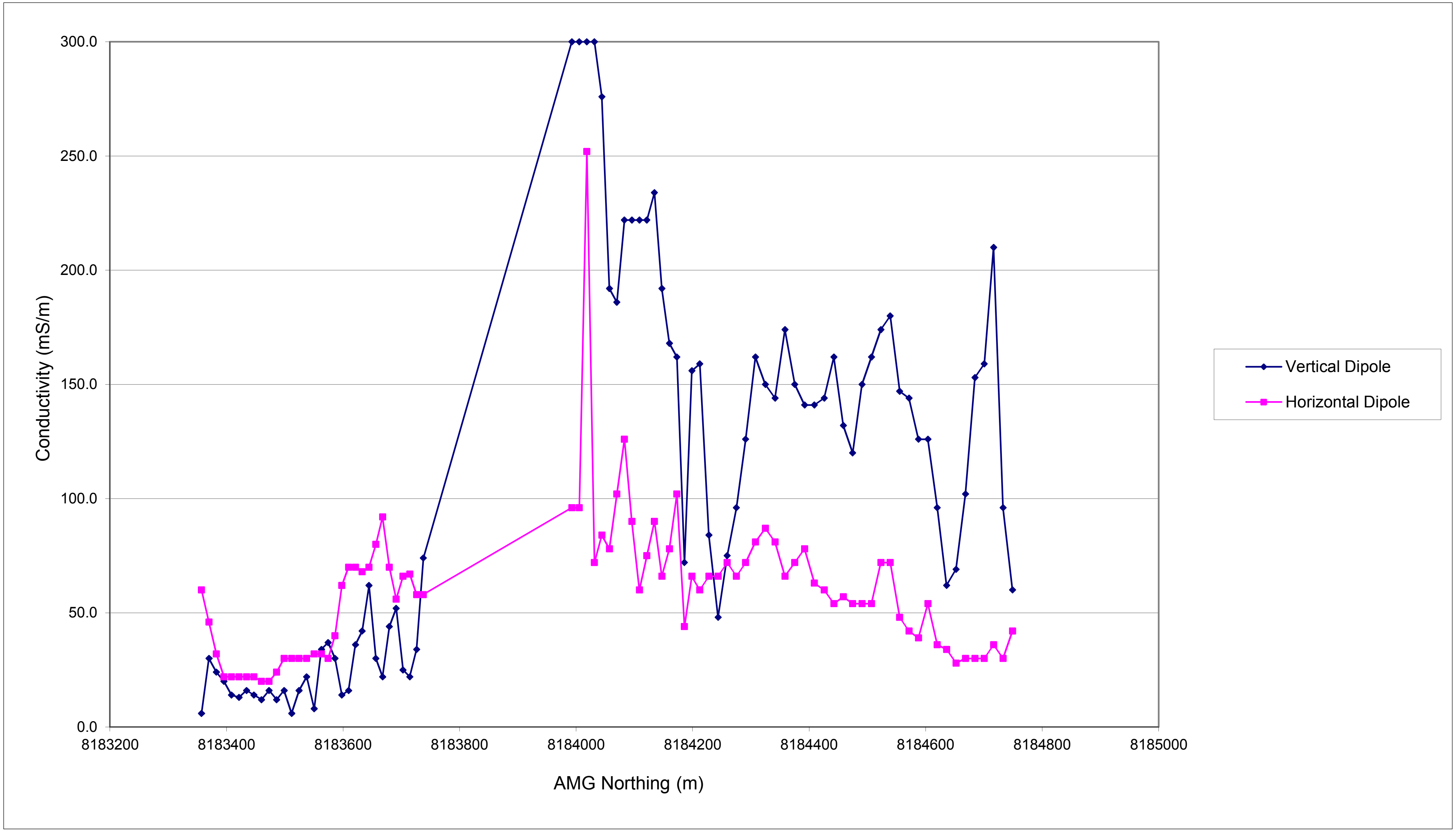

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EM34 SURVEY
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LINE SE1 CONDUCTIVITY PROFILE (mS/m)

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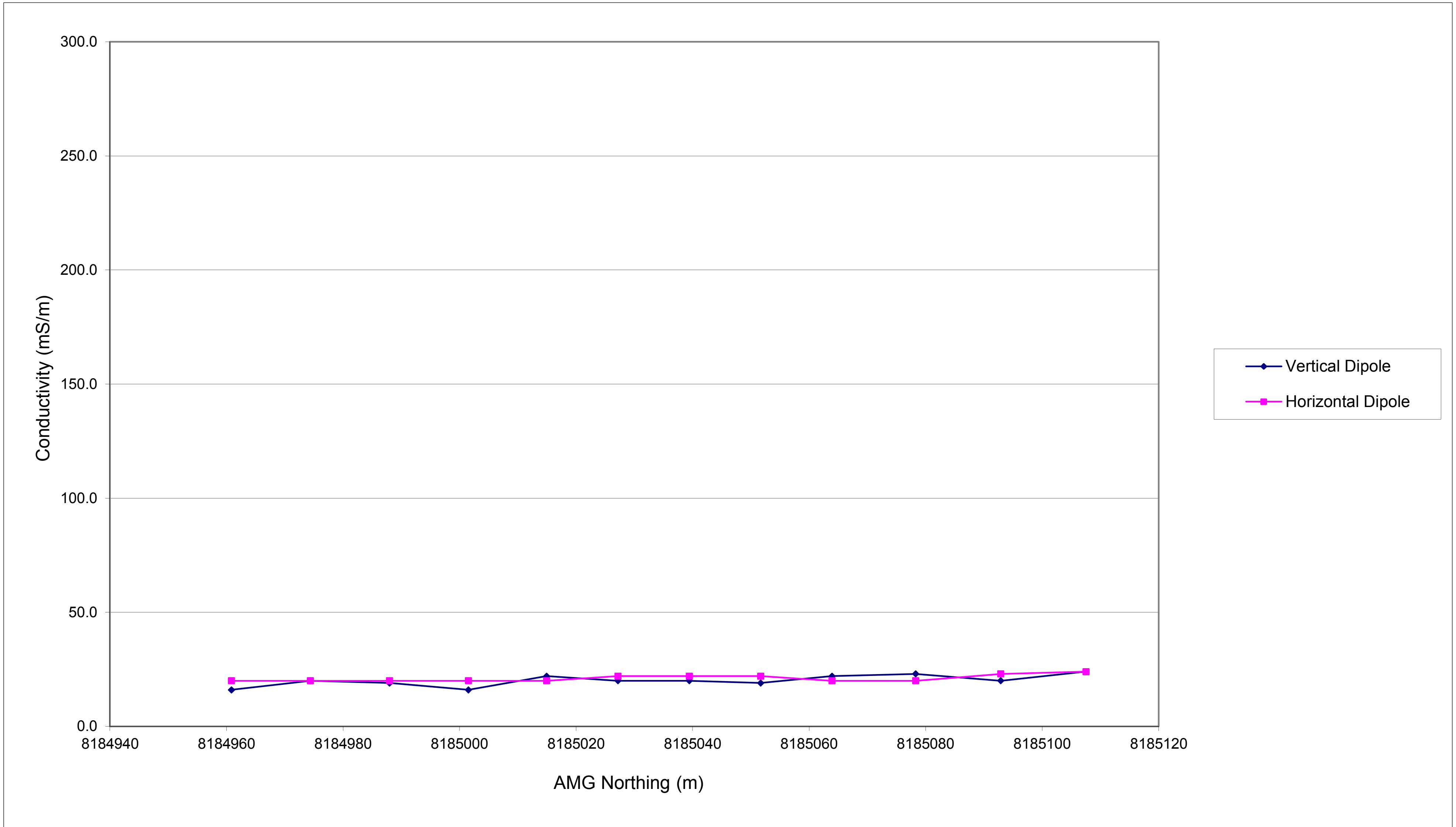

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EM34 SURVEY
TSF MONITORING
PROGRAMME

LINE NE3
CONDUCTIVITY
PROFILE (mS/m)

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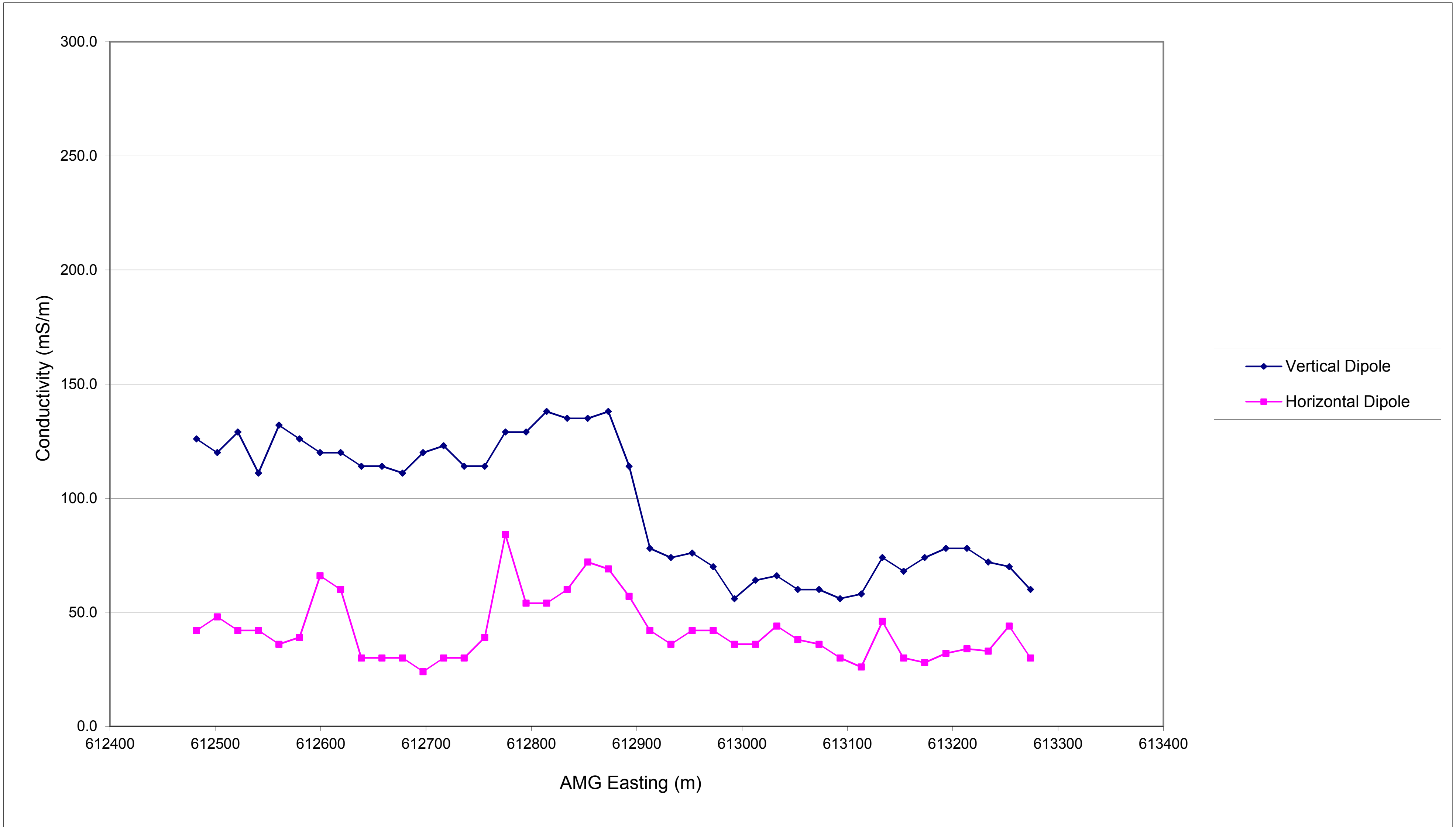

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EM34 SURVEY
TSF MONITORING
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LINE SW2 CONDUCTIVITY PROFILE (mS/m)

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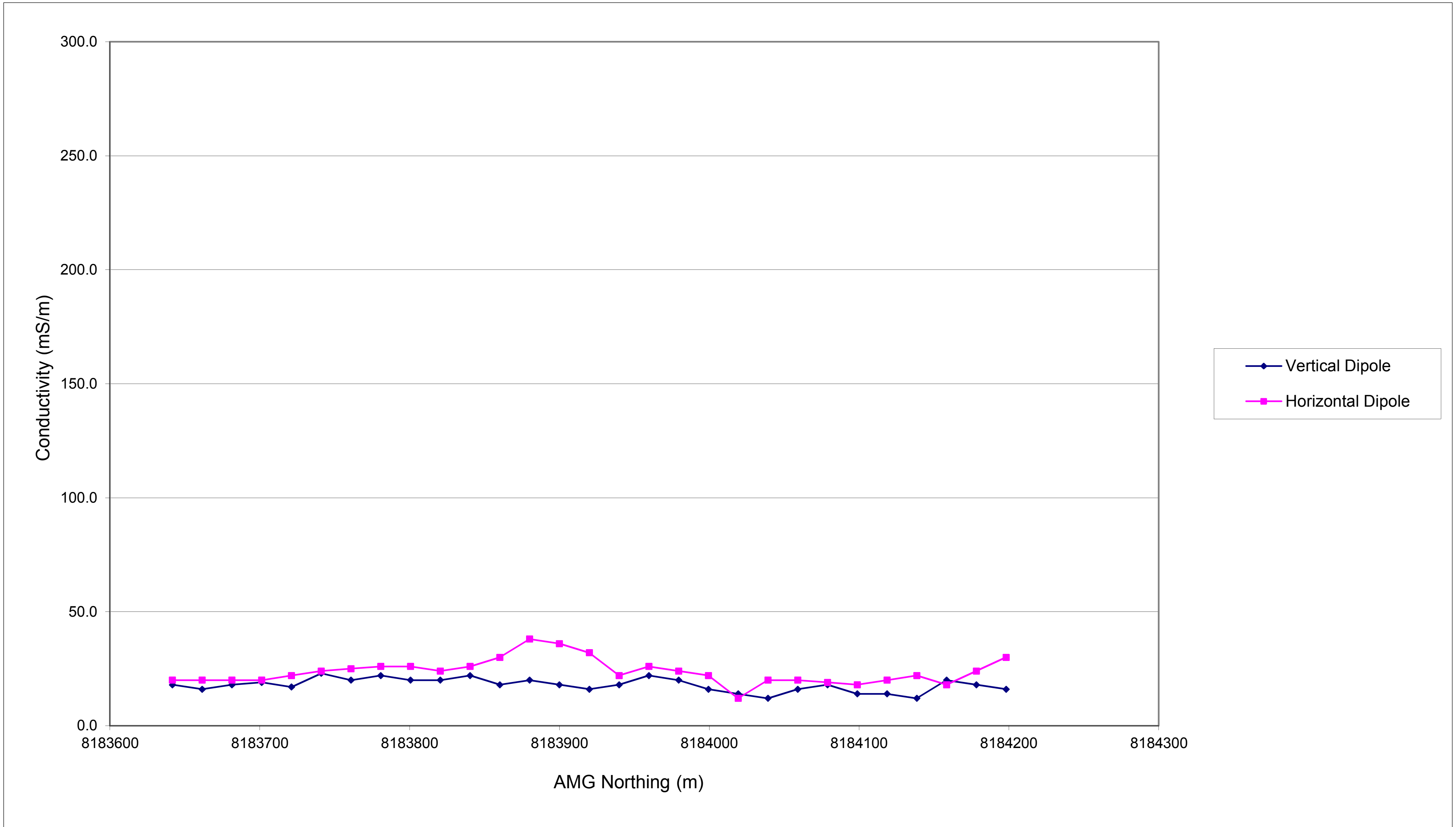
Figure: **9**

File No: 42213980-001.xls | Drawn: JD | Approved: CM | Date: NOV 2011 | Rev. A | A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

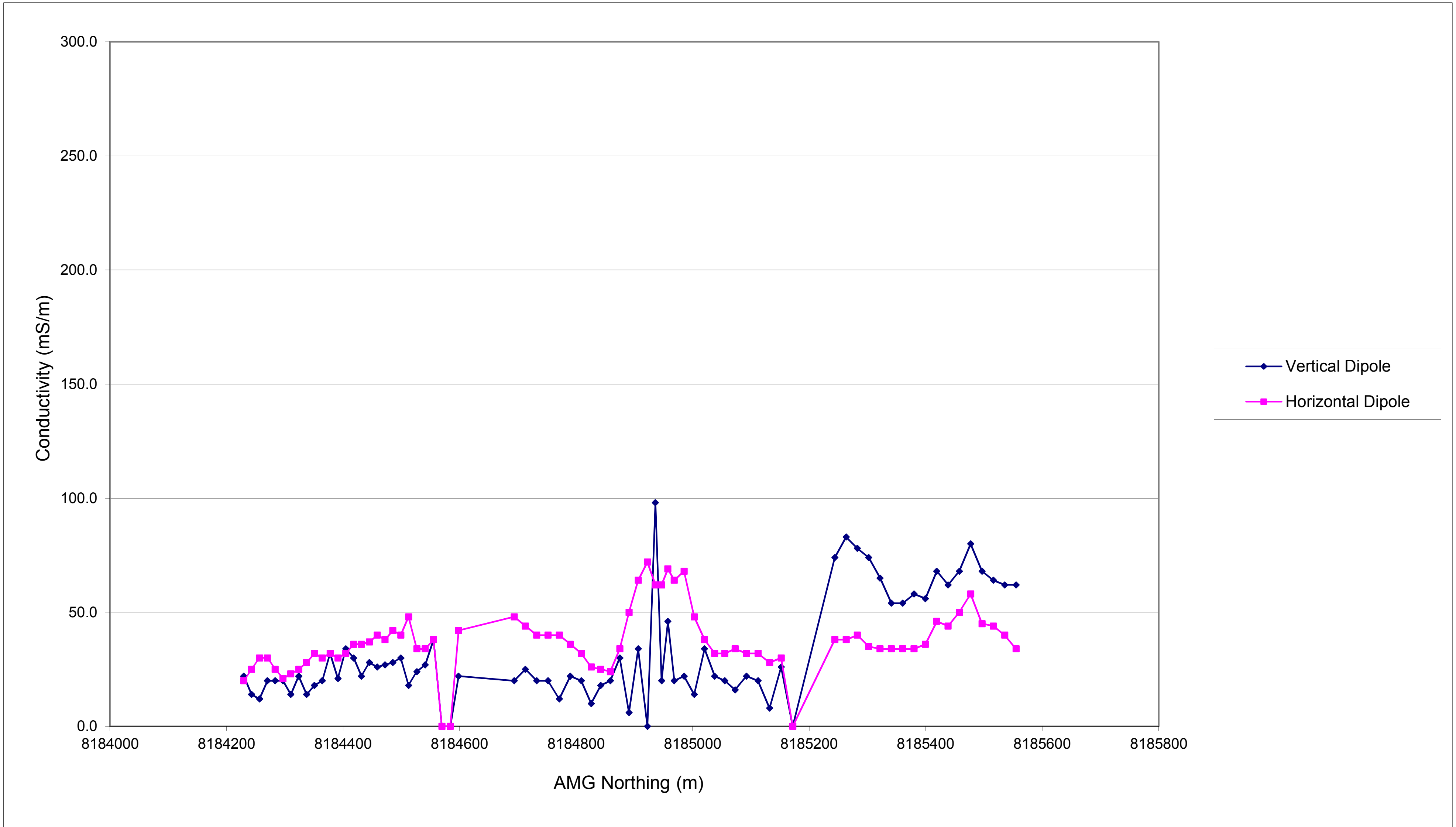
LINE NW2 CONDUCTIVITY PROFILE (mS/m)

URS

MCARTHUR RIVER MINE

Figure: **10**

File No: 42213980-001.xls | Drawn: JD | Approved: CM | Date: NOV 2011 | Rev. A | A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING PROGRAMME

LINE NW3
CONDUCTIVITY PROFILE (mS/m)

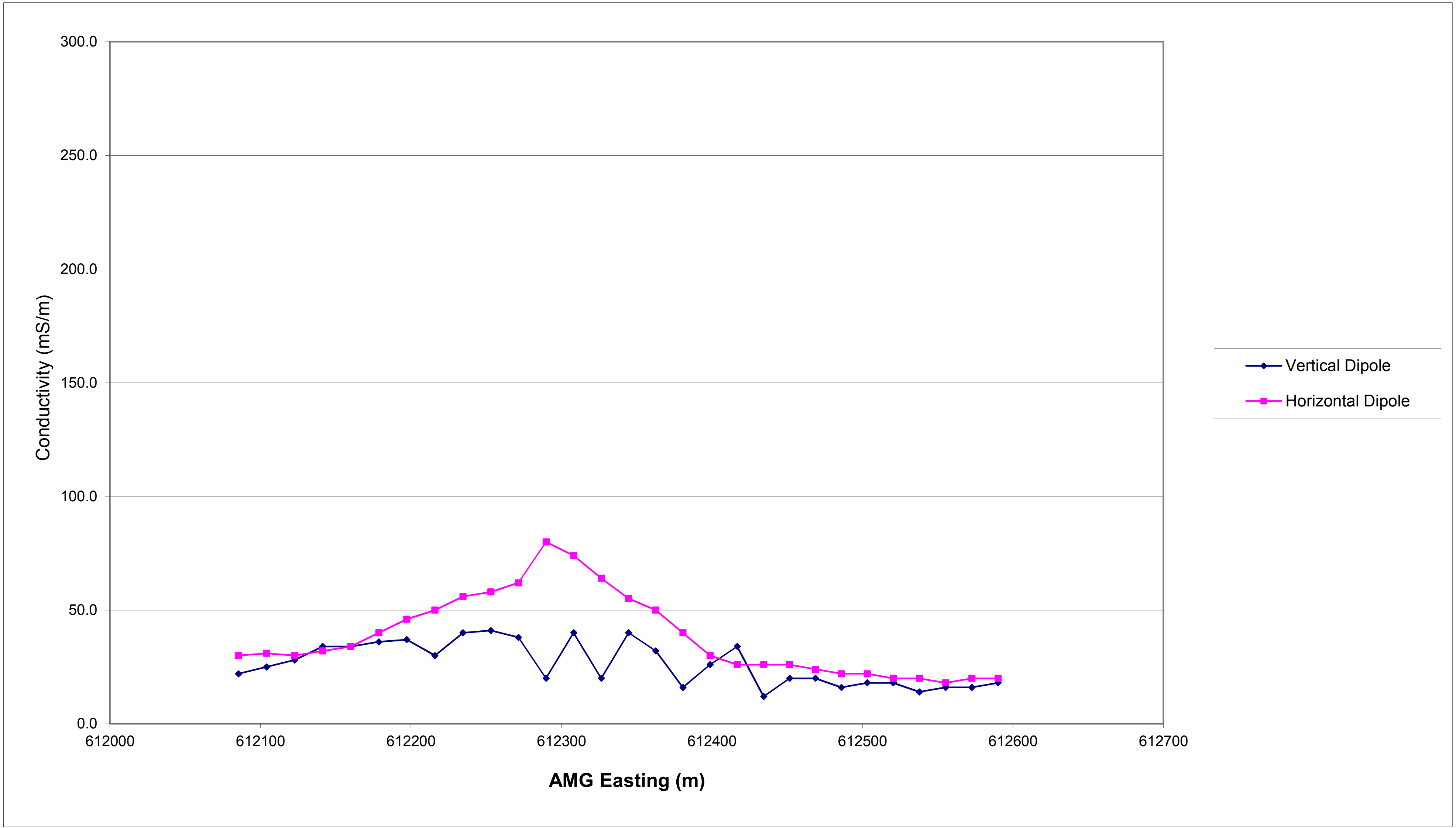
URS

MCARTHUR RIVER MINE

File No: 42213980-001.xls | Drawn: JD | Approved: CM | Date: NOV 2011

Figure: **11**

Rev. A A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

LINE SW3
CONDUCTIVITY PROFILE (mS/m)

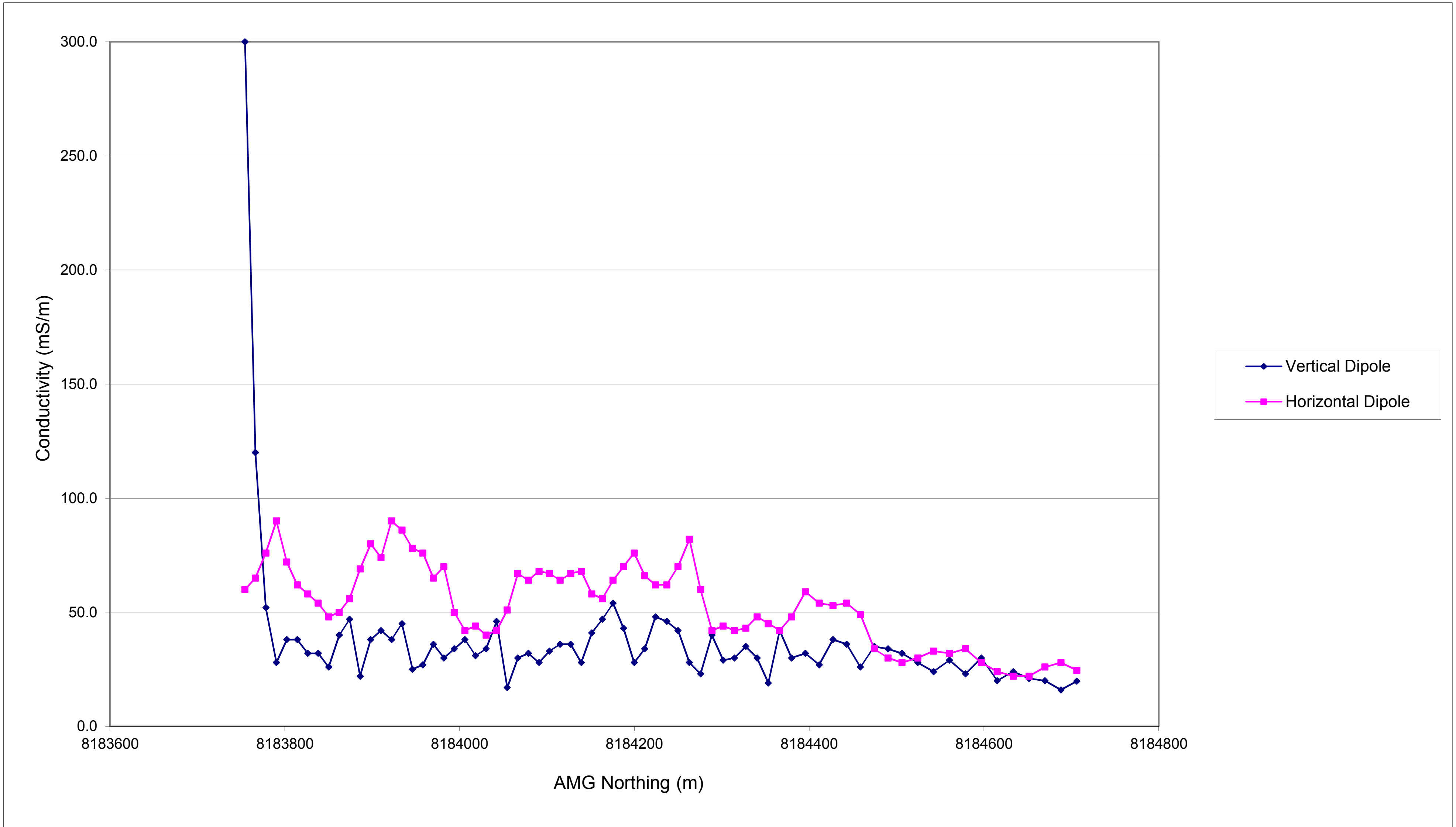
URS

MCARTHUR RIVER MINE

Figure: **12**

File No: 42213980-001.xls Drawn: JD Approved: CM Date: NOV 2011

Rev. A A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

LINE SE3
CONDUCTIVITY
PROFILE (mS/m)

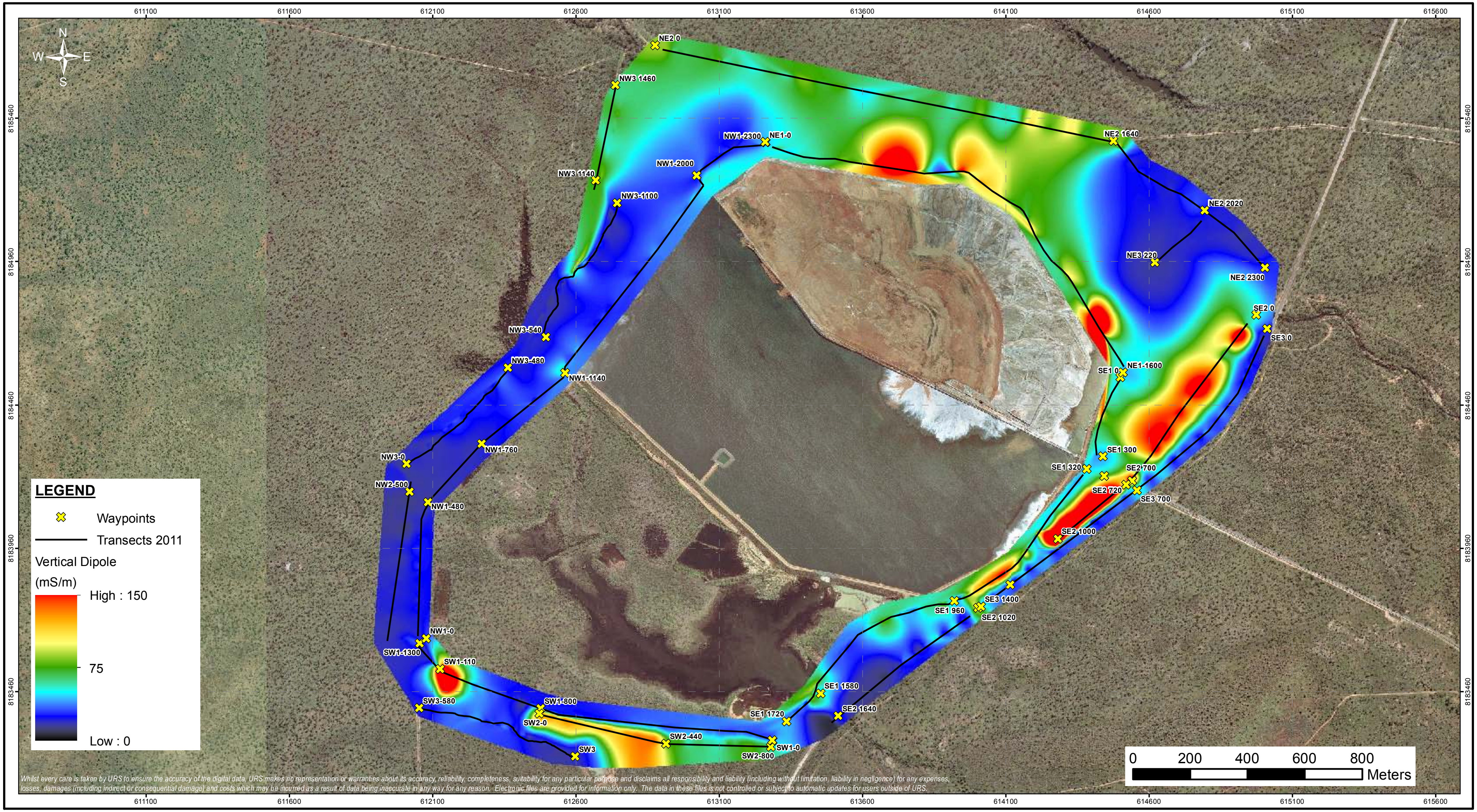
URS

MCARTHUR RIVER MINE

File No: 42213980-001.xls | Drawn: JD | Approved: CM | Date: NOV 2011

Figure: **13**

Rev. A | A4



McARTHUR
RIVER
MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

EM34 SURVEY
VERTICAL DIPOLE
CONDUCTIVITY (mS/m)

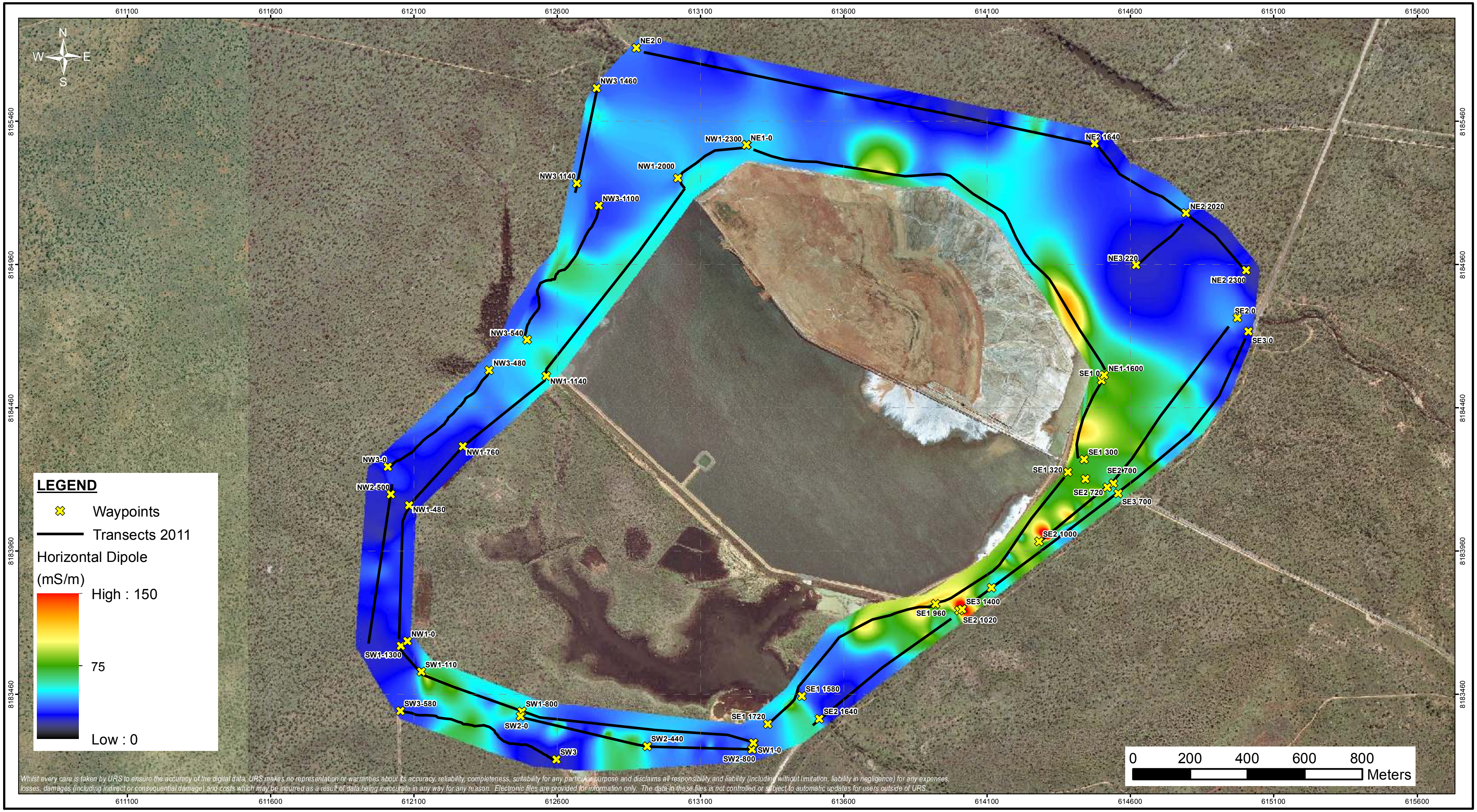
URS

MCARTHUR RIVER MINE

Figure: **14**

File No: **42213980-002..mxd** Drawn: **JD** Approved: **CM** Date: **NOV 2011**

Rev. **A** A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING PROGRAMME

EM34 SURVEY HORIZONTAL DIPOLE CONDUCTIVITY (mS/m)

URS

MCARTHUR RIVER MINE

Figure: **15**

File No: **42213980-003..mxd** Drawn: **JD** Approved: **CM** Date: **NOV 2011** Rev. **A** A4

McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

CHANGE IN VERTICAL DIPOLE CONDUCTIVITY (mS/m) 2010 - 2011

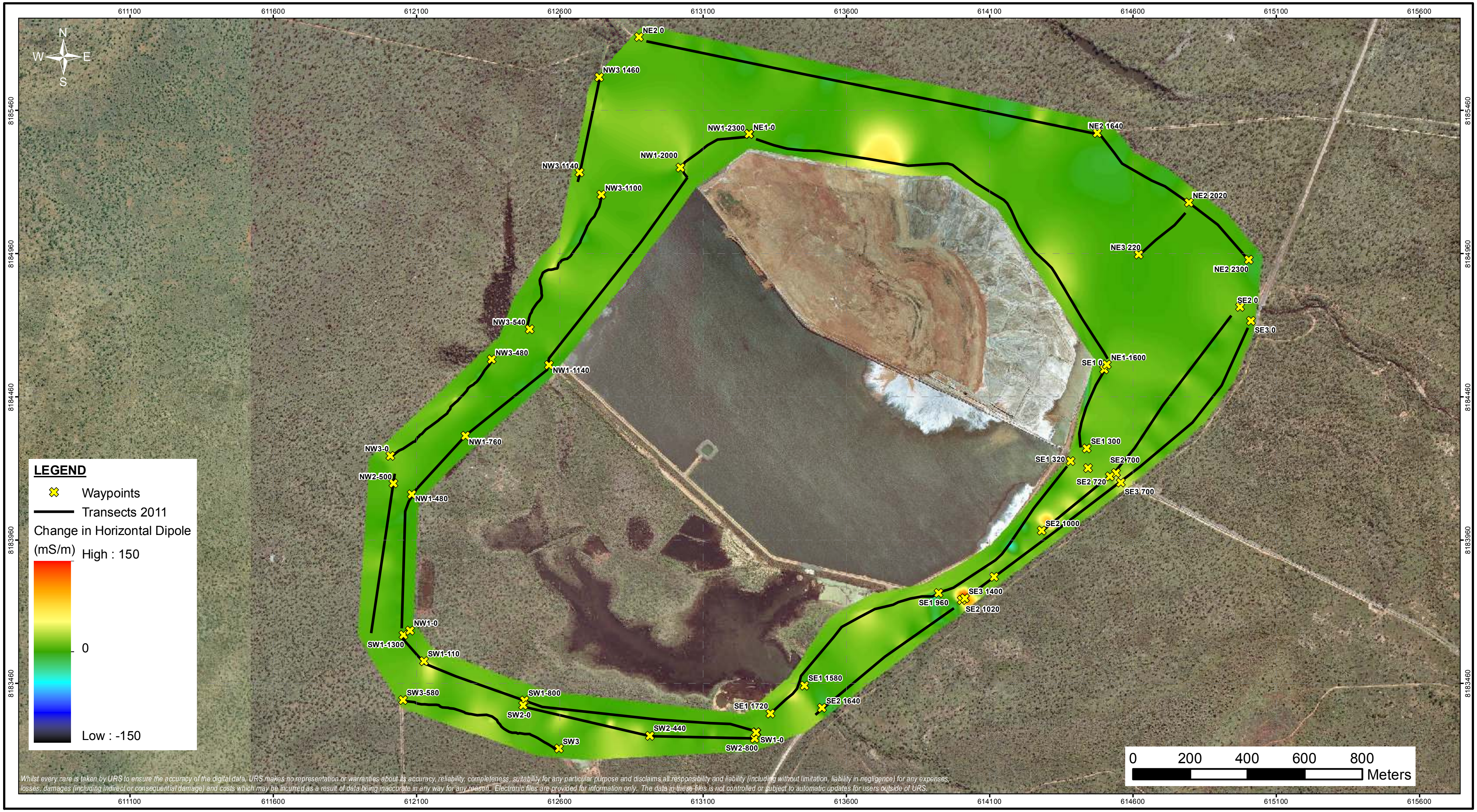
URS

MCARTHUR RIVER MINE

Figure: **16**

File No: **42213980-004..mxd** Drawn: **JD** Approved: **CM** Date: **NOV 2011**

Rev. **A** A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

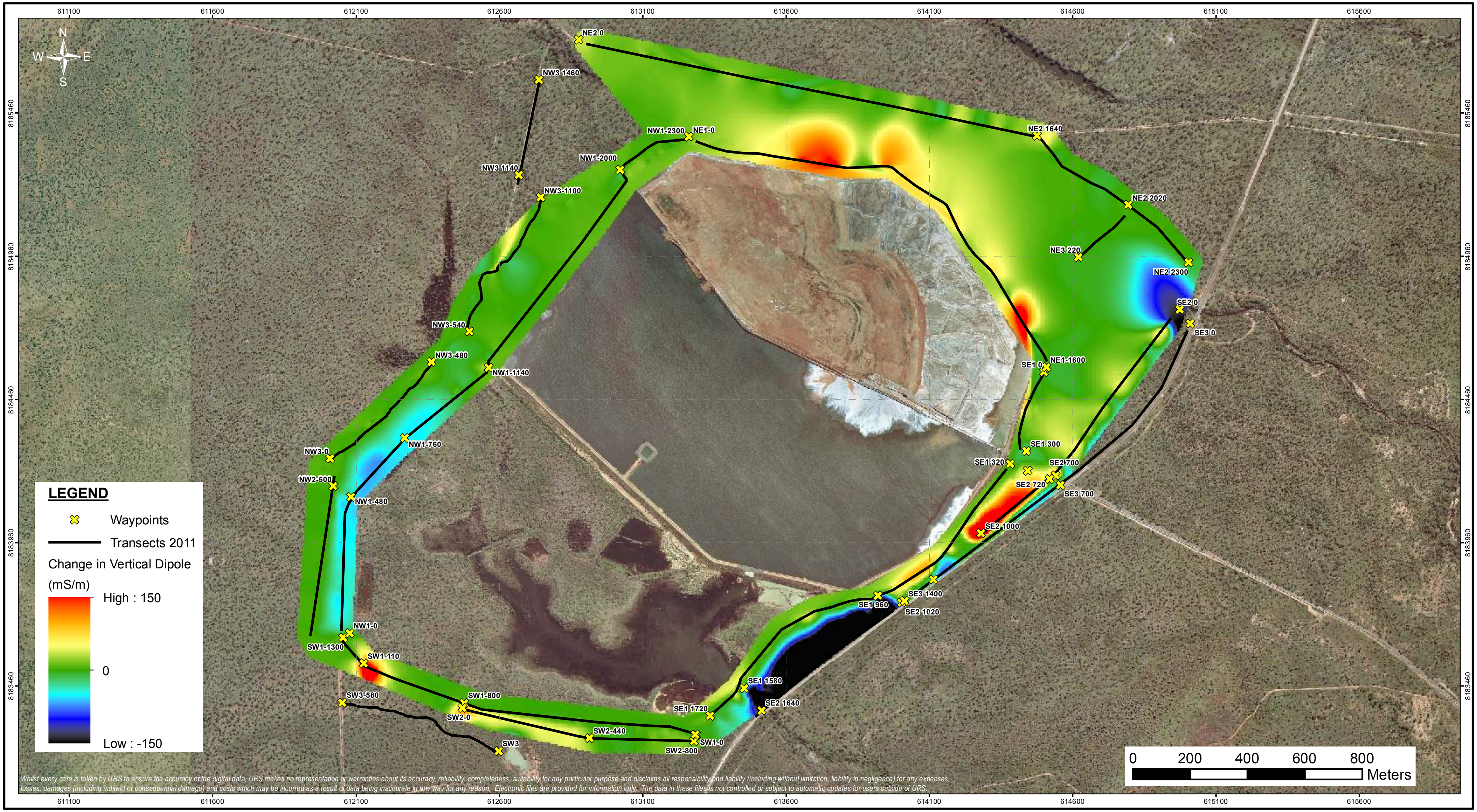
CHANGE IN HORIZONTAL DIPOLE CONDUCTIVITY (mS/m) 2010 - 2011

URS

MCARTHUR RIVER MINE

Figure: **17**

File No: **42213980-005..mxd** | Drawn: **JD** | Approved: **CM** | Date: **NOV 2011** | Rev. **A** | A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

CHANGE IN VERTICAL DIPOLE CONDUCTIVITY (mS/m) 2007 - 2011

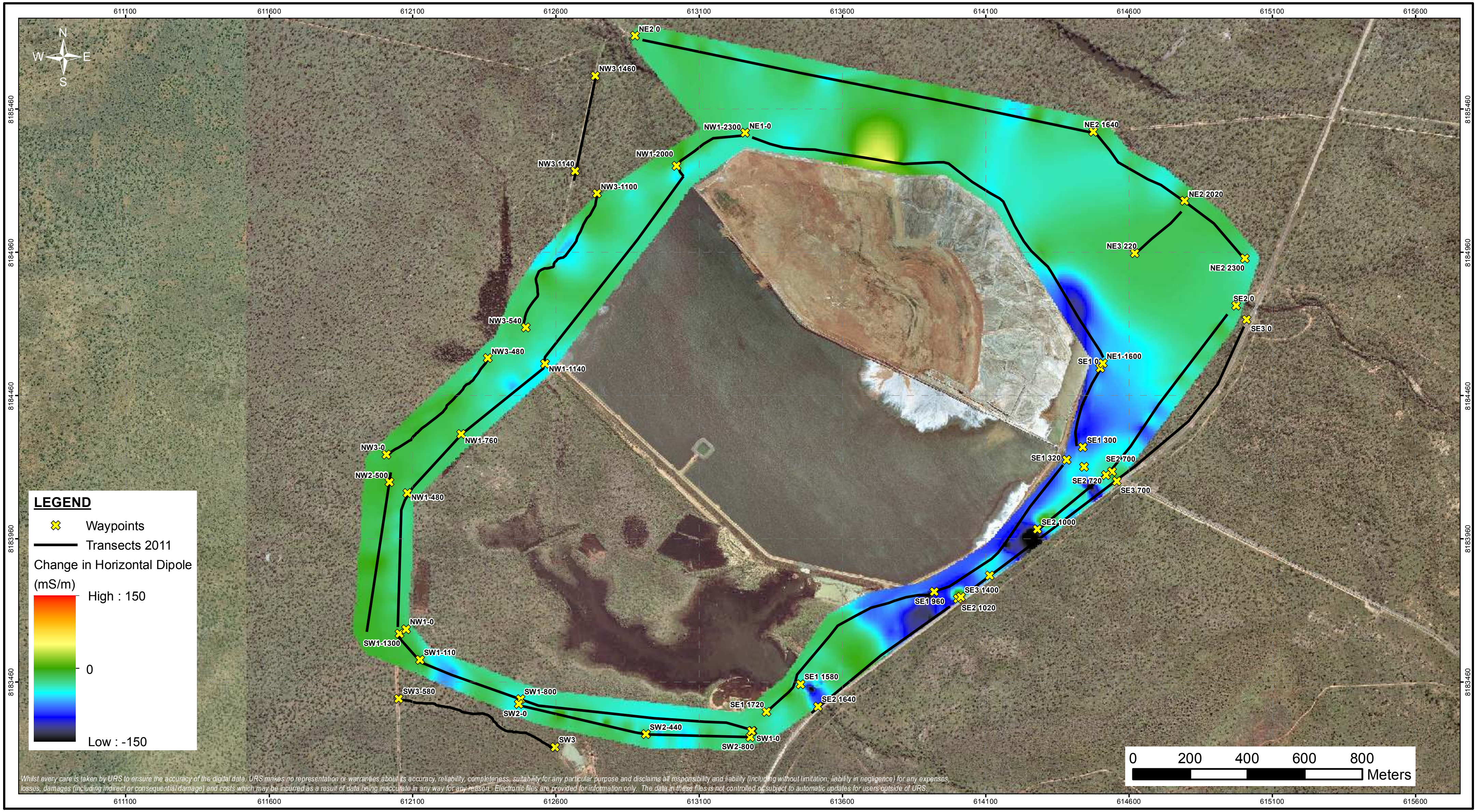
URS

MCARTHUR RIVER MINE

Figure: **18**

File No: **42213980-008..mxd** Drawn: **JD** Approved: **CM** Date: **NOV 2011**

Rev. **A** A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

CHANGE IN HORIZONTAL DIPOLE CONDUCTIVITY (mS/m) 2007-2011

URS

MCARTHUR RIVER MINE

Figure: **19**

File No: **42213980-009..mxd** Drawn: **JD** Approved: **CM** Date: **NOV 2011**

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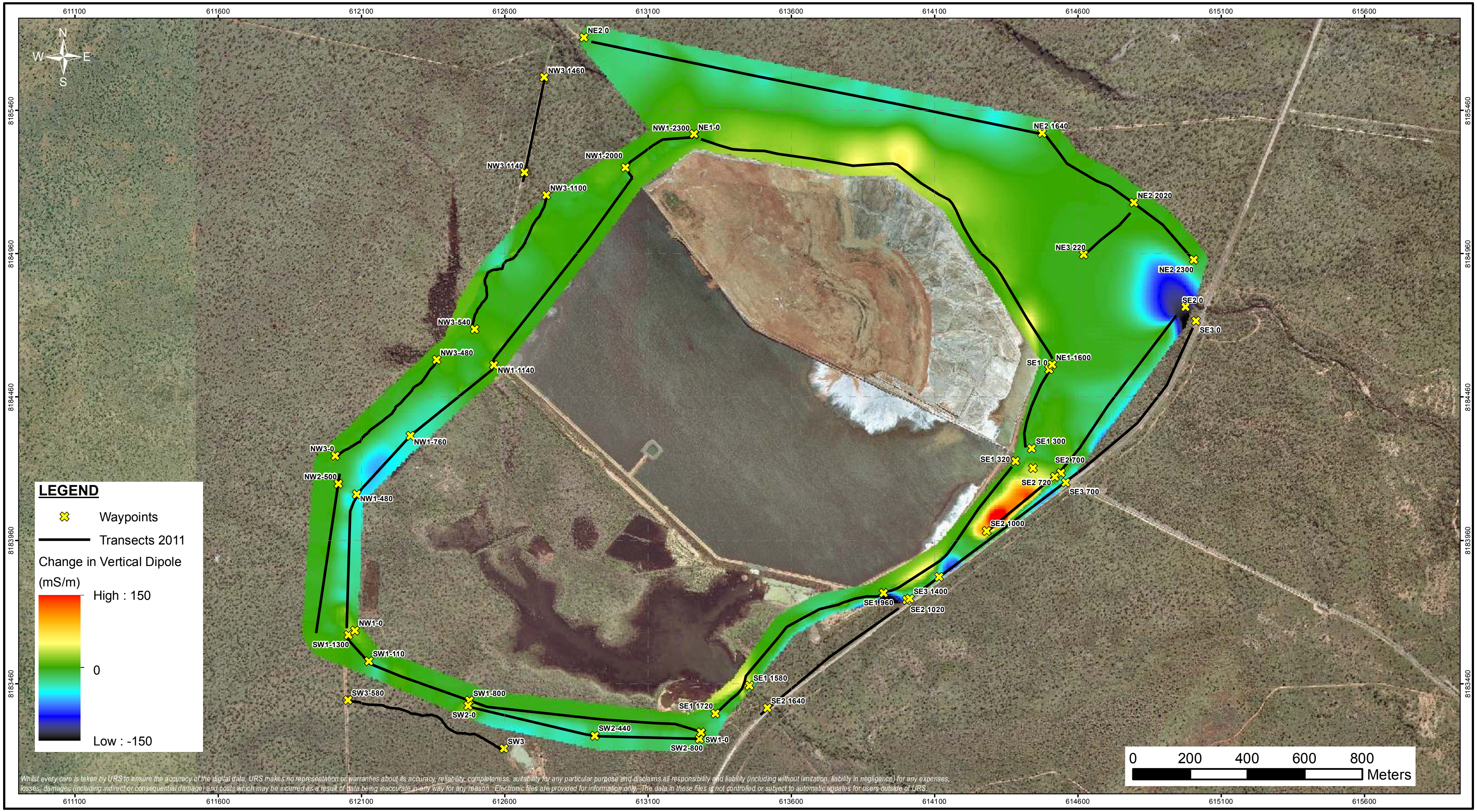


McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING PROGRAMME

CHANGE IN VERTICAL DIPOLE CONDUCTIVITY (mS/m) 2007 - 2010

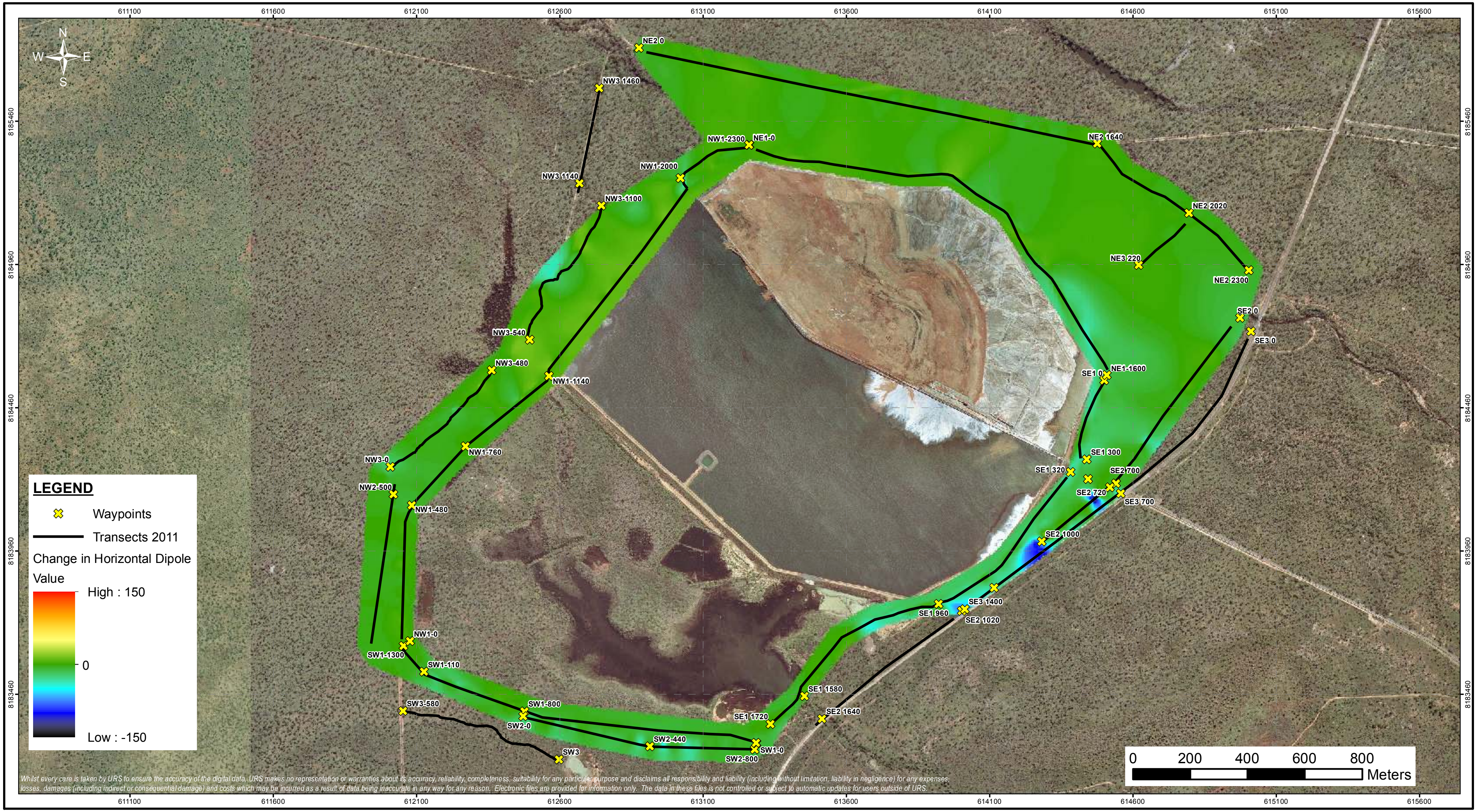
URS

MCARTHUR RIVER MINE

Figure: **20**

File No: **42213980-006..mxd** | Drawn: **JD** | Approved: **CM** | Date: **NOV 2011**

Rev. **A** | A4



McARTHUR RIVER MINING

EM34 SURVEY
TSF MONITORING
PROGRAMME

CHANGE IN HORIZONTAL DIPOLE CONDUCTIVITY (mS/m) 2007 - 2010

URS

MCARTHUR RIVER MINE

Figure: **21**

File No: **42213980-007..mxd** Drawn: **JD** Approved: **CM** Date: **NOV 2011**

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Appendix A Raw Data

Line	Distance	Vertical Dipole	Horizontal Dipole	AMG Easting (m)	AMG Northing (m)	Comment
NE1	0	**45.0**	**48.0**	613284.215	8185365.682	
NE1	20	**70.0**	**48.0**	613303.7994	8185358.733	
NE1	40	**53.0**	**45.0**	613323.3838	8185351.784	
NE1	60	**44.0**	**45.0**	613342.9683	8185344.834	
NE1	80	**50.0**	**45.0**	613362.9406	8185339.126	
NE1	100	**56.0**	**48.0**	613382.9957	8185333.682	
NE1	120	**60.0**	**40.0**	613403.3482	8185329.819	
NE1	140	**54.0**	**34.0**	613424.0108	8185327.606	
NE1	160	**60.0**	**40.0**	613444.6733	8185325.392	
NE1	180	**64.0**	**38.0**	613465.4222	8185324.493	
NE1	200	**70.0**	**38.0**	613486.1969	8185323.987	
NE1	220	**72.0**	**33.0**	613506.9251	8185323.042	
NE1	240	**82.0**	**35.0**	613527.3437	8185319.179	
NE1	260	**80.0**	**37.0**	613547.7623	8185315.316	
NE1	280	**74.0**	**38.0**	613568.2658	8185311.948	
NE1	300	**82.0**	**36.0**	613588.8045	8185308.785	
NE1	320	**93.0**	**42.0**	613609.3433	8185305.622	
NE1	340	**90.0**	**36.0**	613629.882	8185302.46	
NE1	360	**210.0**	**90.0**	613650.4207	8185299.297	
NE1	380	**162.0**	**96.0**	613670.9595	8185296.134	
NE1	400	**156.0**	**96.0**	613691.4619	8185292.745	
NE1	420	**162.0**	**78.0**	613711.9619	8185289.34	
NE1	440	**180.0**	**93.0**	613732.462	8185285.935	
NE1	460	**156.0**	**99.0**	613752.962	8185282.531	
NE1	480	**240.0**	**114.0**	613773.4639	8185279.138	
NE1	500	**90.0**	**46.0**	613793.9878	8185275.88	
NE1	520	**92.0**	**44.0**	613814.5178	8185272.752	
NE1	540	**52.0**	**44.0**	613835.2577	8185274.055	
NE1	560	**30.0**	**43.0**	613855.9976	8185275.359	
NE1	580	**32.0**	**32.0**	613876.7375	8185276.663	

Appendix A - Raw Data

NE1	600	**37.0**	**36.0**	613897.4773	8185277.966	
NE1	620	**72.0**	**36.0**	613918.2172	8185279.27	generator
NE1	640	**162.0**	**36.0**	613938.9694	8185279.835	
NE1	660	**144.0**	**48.0**	613959.4973	8185277.678	
NE1	680	**99.0**	**51.0**	613977.652	8185268.381	
NE1	700	**90.0**	**51.0**	613993.9528	8185255.492	
NE1	720	**126.0**	**54.0**	614010.4167	8185242.813	
NE1	740	**120.0**	**60.0**	614026.9417	8185230.213	
NE1	760	**105.0**	**60.0**	614043.4666	8185217.612	
NE1	780	**108.0**	**60.0**	614060.5341	8185205.797	
NE1	800	**108.0**	**60.0**	614078.1668	8185194.801	
NE1	820	**82.0**	**54.0**	614095.7996	8185183.804	
NE1	840	**70.0**	**50.0**	614113.4323	8185172.807	
NE1	860	**74.0**	**50.0**	614131.5619	8185162.652	
NE1	880	**75.0**	**50.0**	614149.5529	8185152.321	
NE1	900	**74.0**	**49.0**	614162.9381	8185136.651	
NE1	920	**55.0**	**48.0**	614172.8197	8185118.37	
NE1	940	**99.0**	**51.0**	614181.4442	8185099.468	
NE1	960	**108.0**	**48.0**	614189.9568	8185080.511	
NE1	980	**120.0**	**51.0**	614198.4694	8185061.554	
NE1	1000	**70.0**	**50.0**	614208.8185	8185043.552	
NE1	1020	**53.0**	**46.0**	614219.4576	8185025.701	
NE1	1040	**60.0**	**44.0**	614230.0966	8185007.85	
NE1	1060	**56.0**	**45.0**	614242.2747	8184991.041	
NE1	1080	**58.0**	**50.0**	614254.898	8184974.534	
NE1	1100	**72.0**	**60.0**	614269.2781	8184959.609	
NE1	1120	**66.0**	**75.0**	614284.3784	8184945.332	
NE1	1140	**96.0**	**72.0**	614299.3678	8184930.941	
NE1	1160	**105.0**	**90.0**	614314.0621	8184916.247	
NE1	1180	**102.0**	**93.0**	614325.9976	8184899.274	
NE1	1200	**78.0**	**120.0**	614336.8808	8184881.581	
NE1	1220	**72.0**	**120.0**	614347.4373	8184863.681	

Appendix A - Raw Data

NE1	1240	**60.0**	**120.0**	614357.9937	8184845.781
NE1	1260	**60.0**	**132.0**	614368.5502	8184827.881
NE1	1280	**60.0**	**132.0**	614379.1066	8184809.982
NE1	1300	**135.0**	**114.0**	614389.663	8184792.082
NE1	1320	**240.0**	**120.0**	614400.2195	8184774.182
NE1	1340	**300.0**	**120.0**	614410.7759	8184756.282
NE1	1360	**300.0**	**108.0**	614421.3324	8184738.382
NE1	1380	**300.0**	**90.0**	614432.6358	8184720.946
NE1	1400	**68.0**	**72.0**	614444.0048	8184703.551
NE1	1420	**60.0**	**68.0**	614455.3737	8184686.156
NE1	1440	**62.0**	**70.0**	614466.7426	8184668.761
NE1	1460	**54.0**	**64.0**	614478.2302	8184651.444
NE1	1480	**50.0**	**63.0**	614489.7573	8184634.154
NE1	1500	**62.0**	**62.0**	614500.8938	8184616.633
NE1	1520	**42.0**	**72.0**	614510.4381	8184598.173
SE1	0	**42.0**	**83.0**	614512.1006	8184576.037
SE1	20	**55.0**	**74.0**	614500.8041	8184558.762
SE1	40	**60.0**	**70.0**	614490.1898	8184541.06
SE1	60	**50.0**	**70.0**	614479.6041	8184523.34
SE1	80	**52.0**	**72.0**	614469.1337	8184505.561
SE1	100	**55.0**	**80.0**	614460.7048	8184486.719
SE1	120	**62.0**	**88.0**	614452.2758	8184467.878
SE1	140	**52.0**	**98.0**	614443.8468	8184449.037
SE1	160	**58.0**	**114.0**	614435.4354	8184430.189
SE1	180	**66.0**	**120.0**	614429.6374	8184410.379
SE1	200	**72.0**	**120.0**	614423.8395	8184390.57
SE1	220	**60.0**	**117.0**	614418.4908	8184370.651
SE1	240	**60.0**	**108.0**	614414.5797	8184350.384
SE1	260	**57.0**	**86.0**	614412.6994	8184330.011
SE1	280	**52.0**	**70.0**	614414.4759	8184309.447
SE1	300	**40.0**	**72.0**	614416.2523	8184288.883

Appendix A - Raw Data

SE1	320	**48.0**	**76.0**	614369.6286	8184222.746	in drainage line
SE1	340	**42.0**	**74.0**	614357.0118	8184207.03	
SE1	360	**39.0**	**74.0**	614344.395	8184191.314	
SE1	380	**48.0**	**69.0**	614331.7782	8184175.597	wet ground
SE1	400	**40.0**	**70.0**	614319.1613	8184159.881	standing water to W
SE1	420	**45.0**	**68.0**	614306.5445	8184144.165	standing water to W
SE1	440	**60.0**	**72.0**	614293.9277	8184128.448	standing water to W
SE1	460	**40.0**	**84.0**	614281.3109	8184112.732	
SE1	480	**70.0**	**90.0**	614268.694	8184097.015	
SE1	500	**45.0**	**89.0**	614256.0772	8184081.299	
SE1	520	**40.0**	**85.0**	614244.4968	8184064.819	
SE1	540	**50.0**	**94.0**	614233.2257	8184048.111	
SE1	560	**44.0**	**94.0**	614221.9545	8184031.404	
SE1	580	**44.0**	**102.0**	614210.6834	8184014.696	
SE1	600	**31.0**	**92.0**	614199.4122	8183997.988	
SE1	620	**56.0**	**91.0**	614188.1411	8183981.28	
SE1	640	**48.0**	**90.0**	614176.8699	8183964.573	
SE1	660	**40.0**	**96.0**	614165.2916	8183948.083	
SE1	680	**60.0**	**102.0**	614153.1991	8183931.96	
SE1	700	**90.0**	**84.0**	614140.9854	8183915.944	
SE1	720	**120.0**	**72.0**	614126.5168	8183901.913	
SE1	740	**126.0**	**60.0**	614110.7648	8183889.494	
SE1	760	**153.0**	**78.0**	614093.8544	8183878.53	
SE1	780	**156.0**	**78.0**	614076.944	8183867.565	
SE1	800	**138.0**	**78.0**	614060.0336	8183856.6	
SE1	820	**144.0**	**84.0**	614043.1231	8183845.635	
SE1	840	**120.0**	**99.0**	614026.2127	8183834.671	
SE1	860	**120.0**	**114.0**	614009.3023	8183823.706	
SE1	880	**120.0**	**96.0**	613992.3919	8183812.741	
SE1	900	**90.0**	**102.0**	613975.4814	8183801.776	standing water to E
SE1	920	**84.0**	**102.0**	613956.9807	8183793.902	standing water to E
SE1	940	**30.0**	**102.0**	613937.7984	8183787.786	

Appendix A - Raw Data

SE1	960	**60.0**	**102.0**	613919.3726	8183779.787	
SE1	980	**46.0**	**68.0**	613901.3166	8183770.834	
SE1	1000	**81.0**	**120.0**	613881.4128	8183769.645	
SE1	1020	**60.0**	**129.0**	613861.2875	8183769.22	standing water to E
SE1	1040	**60.0**	**108.0**	613841.5006	8183765.39	standing water to E
SE1	1060	**60.0**	**93.0**	613821.7137	8183761.56	
SE1	1080	**60.0**	**90.0**	613802.4615	8183755.606	
SE1	1100	**36.0**	**84.0**	613783.2192	8183749.613	
SE1	1120	**40.0**	**70.0**	613764.5441	8183742.064	
SE1	1140	**52.0**	**70.0**	613745.088	8183736.926	
SE1	1160	**34.0**	**78.0**	613725.4922	8183732.216	
SE1	1180	**62.0**	**90.0**	613705.8963	8183727.505	
SE1	1200	**0.0**	**102.0**	613687.4367	8183719.813	overhead power
SE1	1220	**84.0**	**114.0**	613669.6777	8183710.284	
SE1	1240	**48.0**	**105.0**	613651.9187	8183700.755	
SE1	1260	**60.0**	**90.0**	613634.2346	8183691.089	
SE1	1280	**54.0**	**66.0**	613616.6167	8183681.301	
SE1	1300	**36.0**	**60.0**	613598.9989	8183671.513	
SE1	1320	**38.0**	**38.0**	613581.9408	8183661.059	
SE1	1340	**34.0**	**35.0**	613569.2487	8183645.403	
SE1	1360	**30.0**	**36.0**	613556.5566	8183629.748	
SE1	1380	**22.0**	**36.0**	613543.6868	8183614.238	
SE1	1400	**36.0**	**34.0**	613530.791	8183598.75	
SE1	1420	**30.0**	**40.0**	613517.8952	8183583.261	
SE1	1440	**34.0**	**32.0**	613504.9995	8183567.773	
SE1	1460	**35.0**	**44.0**	613492.1037	8183552.285	
SE1	1480	**42.0**	**44.0**	613479.2079	8183536.796	
SE1	1500	**60.0**	**38.0**	613466.3121	8183521.308	
SE1	1520	**64.0**	**36.0**	613453.4163	8183505.82	
SE1	1540	**90.0**	**50.0**	613441.1314	8183490.009	overhead power
SE1	1560	**50.0**	**26.0**	613435.4278	8183470.684	overhead power and creek/outlet

Appendix A - Raw Data

SE1	1580	**0.0**	**50.0**	613428.4604	8183451.773	outlet
SE1	1600	**88.0**	**80.0**	613416.8175	8183435.586	
SE1	1620	**20.0**	**96.0**	613402.4173	8183421.56	
SE1	1640	**45.0**	**54.0**	613387.2632	8183408.273	
SE1	1660	**28.0**	**46.0**	613372.3173	8183394.753	
SE1	1680	**41.0**	**40.0**	613357.3715	8183381.232	
SE1	1700	**36.0**	**38.0**	613342.4256	8183367.711	
SE1	1720	**44.0**	**38.0**	613327.4798	8183354.19	
SW1	0	**30.0**	**35.0**	613279.1398	8183299.125	
SW1	20	**30.0**	**30.0**	613259.7975	8183304.858	
SW1	40	**30.0**	**34.0**	613240.4551	8183310.591	
SW1	60	**32.0**	**34.0**	613221.1127	8183316.325	
SW1	80	**30.0**	**34.0**	613201.7704	8183322.058	
SW1	100	**35.0**	**32.0**	613181.918	8183324.749	
SW1	120	**34.0**	**32.0**	613161.7634	8183325.638	
SW1	140	**30.0**	**33.0**	613141.6088	8183326.528	
SW1	160	**32.0**	**34.0**	613121.4543	8183327.417	
SW1	180	**32.0**	**40.0**	613101.3258	8183328.771	
SW1	200	**38.0**	**42.0**	613081.1987	8183330.148	
SW1	220	**34.0**	**42.0**	613061.0717	8183331.526	
SW1	240	**41.0**	**42.0**	613040.9446	8183332.904	
SW1	260	**38.0**	**44.0**	613020.8175	8183334.281	
SW1	280	**38.0**	**47.0**	613000.6904	8183335.659	
SW1	300	**36.0**	**44.0**	612980.5633	8183337.037	
SW1	320	**33.0**	**45.0**	612960.4362	8183338.414	
SW1	340	**32.0**	**46.0**	612940.3191	8183339.903	
SW1	360	**32.0**	**45.0**	612920.2664	8183342.114	
SW1	380	**30.0**	**46.0**	612900.2138	8183344.325	
SW1	400	**40.0**	**44.0**	612880.1611	8183346.536	
SW1	420	**34.0**	**40.0**	612860.1085	8183348.747	
SW1	440	**38.0**	**42.0**	612840.0558	8183350.958	

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SW1	460	**36.0**	**41.0**	612820.0032	8183353.17
SW1	480	**32.0**	**40.0**	612799.9505	8183355.381
SW1	500	**30.0**	**34.0**	612779.8979	8183357.592
SW1	520	**32.0**	**32.0**	612759.8452	8183359.803
SW1	540	**26.0**	**28.0**	612739.7926	8183362.014
SW1	560	**26.0**	**28.0**	612719.7399	8183364.225
SW1	580	**30.0**	**28.0**	612699.6873	8183366.436
SW1	600	**20.0**	**30.0**	612679.6346	8183368.647
SW1	620	**26.0**	**30.0**	612659.582	8183370.858
SW1	640	**20.0**	**31.0**	612639.5293	8183373.069
SW1	660	**34.0**	**34.0**	612619.4767	8183375.28
SW1	680	**20.0**	**34.0**	612599.424	8183377.491
SW1	700	**26.0**	**34.0**	612579.3714	8183379.702
SW1	720	**26.0**	**45.0**	612559.3187	8183381.913
SW1	740	**23.0**	**50.0**	612539.2661	8183384.124
SW1	760	**32.0**	**50.0**	612520.2426	8183390.838
SW1	780	**16.0**	**60.0**	612501.2203	8183397.558
SW1	800	**32.0**	**54.0**	612482.1981	8183404.277
SW1	820	**26.0**	**46.0**	612463.1759	8183410.997
SW1	840	**34.0**	**66.0**	612444.1537	8183417.716
SW1	860	**10.0**	**64.0**	612425.1315	8183424.436
SW1	880	**12.0**	**66.0**	612406.1092	8183431.155
SW1	900	**30.0**	**34.0**	612387.087	8183437.875
SW1	920	**22.0**	**36.0**	612368.0648	8183444.595
SW1	940	**30.0**	**44.0**	612349.0426	8183451.314
SW1	960	**30.0**	**44.0**	612330.0204	8183458.034
SW1	980	**38.0**	**50.0**	612310.9981	8183464.753
SW1	1000	**30.0**	**56.0**	612291.9759	8183471.473
SW1	1020	**52.0**	**56.0**	612272.9537	8183478.192
SW1	1040	**34.0**	**74.0**	612253.9315	8183484.912
SW1	1060	**46.0**	**84.0**	612234.9491	8183491.737
SW1	1080	**88.0**	**74.0**	612216.2509	8183499.311

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SW1	1100	**84.0**	**70.0**	612197.5526	8183506.886	
SW1	1120	**234.0**	**66.0**	612178.8544	8183514.46	
SW1	1140	**300.0**	**84.0**	612160.1561	8183522.035	
SW1	1160	**300.0**	**108.0**	612141.4579	8183529.609	
SW1	1180	**216.0**	**54.0**	612124.6172	8183539.823	bend N
SW1	1200	**48.0**	**30.0**	612111.1791	8183554.87	
SW1	1220	**22.0**	**20.0**	612097.741	8183569.917	
SW1	1240	**18.0**	**21.0**	612084.3029	8183584.964	
SW1	1260	**20.0**	**20.0**	612070.8648	8183600.011	
SW1	1280	**20.0**	**22.0**	612057.4267	8183615.058	
SW1	1300	**34.0**	**22.0**	612043.9887	8183630.105	
NW1	0	**20.0**	**23.0**	612047.6914	8183657.746	
NW1	20	**20.0**	**26.0**	612048.3201	8183677.848	
NW1	40	**22.0**	**28.0**	612048.9488	8183697.951	
NW1	60	**21.0**	**26.0**	612049.5775	8183718.053	
NW1	80	**25.0**	**26.0**	612050.2062	8183738.156	
NW1	100	**26.0**	**27.0**	612050.8349	8183758.259	
NW1	120	**20.0**	**30.0**	612051.4636	8183778.361	
NW1	140	**26.0**	**32.0**	612052.0923	8183798.464	
NW1	160	**22.0**	**28.0**	612052.721	8183818.566	
NW1	180	**24.0**	**27.0**	612053.3497	8183838.669	
NW1	200	**25.0**	**28.0**	612053.9785	8183858.772	
NW1	220	**22.0**	**28.0**	612054.6072	8183878.874	
NW1	240	**30.0**	**28.0**	612055.2359	8183898.977	
NW1	260	**24.0**	**30.0**	612055.8646	8183919.08	
NW1	280	**26.0**	**30.0**	612056.4933	8183939.182	
NW1	300	**28.0**	**30.0**	612057.122	8183959.285	
NW1	320	**24.0**	**30.0**	612057.7507	8183979.387	
NW1	340	**26.0**	**28.0**	612058.3794	8183999.49	
NW1	360	**21.0**	**25.0**	612059.0081	8184019.593	
NW1	380	**20.0**	**22.0**	612059.6368	8184039.695	

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NW1	400	**20.0**	**22.0**	612060.2655	8184059.798	
NW1	420	**18.0**	**22.0**	612065.0161	8184079.085	
NW1	440	**16.0**	**20.0**	612072.0883	8184097.913	
NW1	460	**16.0**	**18.0**	612082.2664	8184115.227	
NW1	480	**15.0**	**20.0**	612092.7371	8184132.399	
NW1	500	**16.0**	**22.0**	612104.185	8184148.836	
NW1	520	**18.0**	**20.0**	612117.7874	8184163.651	
NW1	540	**16.0**	**20.0**	612131.3897	8184178.466	
NW1	560	**18.0**	**21.0**	612144.992	8184193.281	
NW1	580	**18.0**	**23.0**	612158.5943	8184208.096	
NW1	600	**20.0**	**22.0**	612172.1966	8184222.911	
NW1	620	**17.0**	**22.0**	612185.7989	8184237.726	
NW1	640	**21.0**	**22.0**	612199.4012	8184252.542	
NW1	660	**18.0**	**22.0**	612213.0035	8184267.357	
NW1	680	**18.0**	**22.0**	612226.6058	8184282.172	
NW1	700	**18.0**	**22.0**	612240.2081	8184296.987	
NW1	720	**18.0**	**20.0**	612253.8104	8184311.802	
NW1	740	**20.0**	**22.0**	612267.4127	8184326.617	
NW1	760	**21.0**	**22.0**	612282.407	8184339.946	bend
NW1	780	**23.0**	**22.0**	612298.0806	8184352.549	
NW1	800	**20.0**	**22.0**	612313.7541	8184365.153	
NW1	820	**25.0**	**22.0**	612329.4276	8184377.757	
NW1	840	**24.0**	**26.0**	612345.1011	8184390.36	
NW1	860	**24.0**	**35.0**	612360.7747	8184402.964	
NW1	880	**26.0**	**38.0**	612376.4482	8184415.567	
NW1	900	**30.0**	**35.0**	612392.1217	8184428.171	
NW1	920	**33.0**	**33.0**	612407.7952	8184440.775	
NW1	940	**30.0**	**38.0**	612423.4688	8184453.378	
NW1	960	**36.0**	**42.0**	612439.1423	8184465.982	
NW1	980	**22.0**	**48.0**	612454.8158	8184478.585	
NW1	1000	**32.0**	**48.0**	612470.4893	8184491.189	
NW1	1020	**30.0**	**40.0**	612486.1629	8184503.792	

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NW1	1040	**30.0**	**43.0**	612501.8364	8184516.396	
NW1	1060	**31.0**	**44.0**	612517.5099	8184529	
NW1	1080	**36.0**	**51.0**	612533.1835	8184541.603	
NW1	1100	**38.0**	**51.0**	612548.857	8184554.207	
NW1	1120	**41.0**	**63.0**	612557.5385	8184570.791	
NW1	1140	**60.0**	**50.0**	612560.377	8184590.702	
NW1	1160	**34.0**	**68.0**	612568.7267	8184608.255	
NW1	1180	**30.0**	**66.0**	612581.17	8184624.056	
NW1	1200	**32.0**	**60.0**	612593.6132	8184639.857	
NW1	1220	**46.0**	**50.0**	612606.0565	8184655.659	
NW1	1240	**36.0**	**44.0**	612618.4998	8184671.46	standing water in drain
NW1	1260	**34.0**	**50.0**	612630.943	8184687.261	
NW1	1280	**28.0**	**50.0**	612643.3863	8184703.062	
NW1	1300	**30.0**	**52.0**	612655.8295	8184718.863	
NW1	1320	**26.0**	**51.0**	612668.2728	8184734.664	
NW1	1340	**20.0**	**42.0**	612680.716	8184750.465	
NW1	1360	**34.0**	**40.0**	612693.1593	8184766.266	
NW1	1380	**26.0**	**45.0**	612705.6025	8184782.068	
NW1	1400	**22.0**	**51.0**	612718.0458	8184797.869	
NW1	1420	**27.0**	**52.0**	612730.4891	8184813.67	
NW1	1440	**32.0**	**50.0**	612742.9323	8184829.471	
NW1	1460	**30.0**	**52.0**	612755.3756	8184845.272	
NW1	1480	**32.0**	**60.0**	612767.8188	8184861.073	
NW1	1500	**32.0**	**54.0**	612780.2621	8184876.874	
NW1	1520	**32.0**	**54.0**	612792.7053	8184892.675	
NW1	1540	**30.0**	**54.0**	612805.1486	8184908.476	
NW1	1560	**24.0**	**60.0**	612817.5918	8184924.278	
NW1	1580	**32.0**	**60.0**	612830.0351	8184940.079	
NW1	1600	**32.0**	**62.0**	612842.4784	8184955.88	
NW1	1620	**28.0**	**57.0**	612854.9216	8184971.681	
NW1	1640	**40.0**	**52.0**	612867.3649	8184987.482	
NW1	1660	**40.0**	**50.0**	612879.8081	8185003.283	

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NW1	1680	**35.0**	**54.0**	612891.8388	8185019.396	
NW1	1700	**33.0**	**53.0**	612903.6534	8185035.673	
NW1	1720	**34.0**	**52.0**	612915.468	8185051.949	
NW1	1740	**40.0**	**50.0**	612927.2826	8185068.226	
NW1	1760	**34.0**	**52.0**	612939.0972	8185084.502	
NW1	1780	**40.0**	**48.0**	612950.9118	8185100.779	
NW1	1800	**40.0**	**44.0**	612962.7265	8185117.055	
NW1	1820	**40.0**	**50.0**	612974.5411	8185133.332	
NW1	1840	**30.0**	**54.0**	612986.3557	8185149.608	
NW1	1860	**43.0**	**48.0**	612998.1703	8185165.885	
NW1	1880	**50.0**	**45.0**	613009.9849	8185182.161	
NW1	1900	**40.0**	**45.0**	613021.7995	8185198.438	
NW1	1920	**40.0**	**50.0**	613033.6142	8185214.714	
NW1	1940	**54.0**	**54.0**	613045.4288	8185230.991	
NW1	1960	**30.0**	**39.0**	613032.8148	8185246.481	
NW1	1980	**25.0**	**36.0**	613026.2828	8185265.408	bend at toe of ramp
NW1	2000	**40.0**	**47.0**	613034.4961	8185283.43	
NW1	2020	**26.0**	**43.0**	613050.4717	8185295.257	
NW1	2040	**28.0**	**44.0**	613066.9109	8185306.686	
NW1	2060	**28.0**	**45.0**	613083.3501	8185318.115	
NW1	2080	**22.0**	**44.0**	613099.1786	8185330.371	
NW1	2100	**30.0**	**38.0**	613114.9369	8185342.722	
NW1	2120	**28.0**	**39.0**	613132.1148	8185352.998	
NW1	2140	**20.0**	**40.0**	613149.3385	8185363.206	
NW1	2160	**30.0**	**40.0**	613169.2827	8185364.952	
NW1	2180	**28.0**	**41.0**	613189.2288	8185366.692	
NW1	2200	**33.0**	**43.0**	613209.1748	8185368.432	
NW1	2220	**30.0**	**41.0**	613229.1209	8185370.172	
NW1	2240	**45.0**	**43.0**	613249.067	8185371.912	
NW1	2260	**42.0**	**34.0**			
NE2	0	**86.0**	**36.0**	612901.9606	8185705.641	

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NE2	20	**84.0**	**30.0**	612921.7285	8185701.515
NE2	40	**62.0**	**33.0**	612941.4964	8185697.389
NE2	60	**70.0**	**32.0**	612961.2643	8185693.263
NE2	80	**64.0**	**32.0**	612981.0322	8185689.137
NE2	100	**68.0**	**30.0**	613000.8001	8185685.011
NE2	120	**70.0**	**28.0**	613020.568	8185680.885
NE2	140	**68.0**	**26.0**	613040.3359	8185676.759
NE2	160	**74.0**	**27.0**	613060.1038	8185672.633
NE2	180	**70.0**	**26.0**	613079.8717	8185668.507
NE2	200	**82.0**	**34.0**	613099.6397	8185664.381
NE2	220	**55.0**	**24.0**	613119.4076	8185660.255
NE2	240	**62.0**	**22.0**	613139.1755	8185656.129
NE2	260	**64.0**	**26.0**	613158.9434	8185652.003
NE2	280	**60.0**	**30.0**	613178.7113	8185647.877
NE2	300	**56.0**	**28.0**	613198.4792	8185643.751
NE2	320	**50.0**	**30.0**	613218.2471	8185639.625
NE2	340	**54.0**	**22.0**	613238.015	8185635.499
NE2	360	**58.0**	**32.0**	613257.7829	8185631.373
NE2	380	**70.0**	**34.0**	613277.5508	8185627.247
NE2	400	**70.0**	**40.0**	613297.3187	8185623.12
NE2	420	**60.0**	**36.0**	613317.0866	8185618.994
NE2	440	**52.0**	**40.0**	613336.8545	8185614.868
NE2	460	**70.0**	**40.0**	613356.6224	8185610.742
NE2	480	**80.0**	**32.0**	613376.3903	8185606.616
NE2	500	**86.0**	**30.0**	613396.1582	8185602.49
NE2	520	**84.0**	**40.0**	613415.9261	8185598.364
NE2	540	**76.0**	**30.0**	613435.694	8185594.238
NE2	560	**64.0**	**30.0**	613455.4619	8185590.112
NE2	580	**74.0**	**31.0**	613475.253	8185586.1
NE2	600	**74.0**	**27.0**	613495.0609	8185582.171
NE2	620	**76.0**	**20.0**	613514.8689	8185578.241
NE2	640	**82.0**	**28.0**	613534.6768	8185574.312

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NE2	660	**56.0**	**34.0**	613554.4847	8185570.382
NE2	680	**50.0**	**43.0**	613574.2927	8185566.453
NE2	700	**50.0**	**48.0**	613594.1006	8185562.524
NE2	720	**42.0**	**32.0**	613613.9085	8185558.594
NE2	740	**50.0**	**26.0**	613633.7165	8185554.665
NE2	760	**58.0**	**30.0**	613653.5244	8185550.736
NE2	780	**65.0**	**28.0**	613673.3323	8185546.806
NE2	800	**76.0**	**36.0**	613693.1403	8185542.877
NE2	820	**60.0**	**20.0**	613712.9482	8185538.947
NE2	840	**62.0**	**22.0**	613732.7562	8185535.018
NE2	860	**60.0**	**22.0**	613752.5641	8185531.089
NE2	880	**60.0**	**25.0**	613772.372	8185527.159
NE2	900	**70.0**	**26.0**	613792.18	8185523.23
NE2	920	**70.0**	**28.0**	613811.9879	8185519.301
NE2	940	**70.0**	**24.0**	613831.7958	8185515.371
NE2	960	**68.0**	**22.0**	613851.6038	8185511.442
NE2	980	**72.0**	**20.0**	613871.4117	8185507.512
NE2	1000	**62.0**	**24.0**	613891.2196	8185503.583
NE2	1020	**53.0**	**25.0**	613911.0276	8185499.654
NE2	1040	**66.0**	**20.0**	613930.8355	8185495.724
NE2	1060	**64.0**	**25.0**	613950.6434	8185491.795
NE2	1080	**68.0**	**14.0**	613970.4514	8185487.866
NE2	1100	**74.0**	**17.0**	613990.235	8185483.817
NE2	1120	**85.0**	**16.0**	614009.9987	8185479.671
NE2	1140	**74.0**	**20.0**	614029.7623	8185475.525
NE2	1160	**60.0**	**20.0**	614049.526	8185471.378
NE2	1180	**53.0**	**17.0**	614069.2897	8185467.232
NE2	1200	**59.0**	**18.0**	614089.0533	8185463.086
NE2	1220	**58.0**	**22.0**	614108.817	8185458.939
NE2	1240	**50.0**	**24.0**	614128.5806	8185454.793
NE2	1260	**62.0**	**24.0**	614148.3443	8185450.647
NE2	1280	**96.0**	**28.0**	614168.108	8185446.5

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NE2	1300	**114.0**	**42.0**	614187.8716	8185442.354	
NE2	1320	**96.0**	**45.0**	614207.6353	8185438.208	
NE2	1340	**90.0**	**48.0**	614227.3989	8185434.061	
NE2	1360	**72.0**	**51.0**	614247.1626	8185429.915	
NE2	1380	**84.0**	**75.0**	614266.9263	8185425.769	
NE2	1400	**90.0**	**51.0**	614286.6899	8185421.622	
NE2	1420	**99.0**	**39.0**	614306.4536	8185417.476	
NE2	1440	**105.0**	**30.0**	614326.2172	8185413.33	
NE2	1460	**99.0**	**42.0**	614345.9809	8185409.183	
NE2	1480	**72.0**	**36.0**	614365.7445	8185405.037	
NE2	1500	**72.0**	**30.0**	614385.5082	8185400.891	
NE2	1520	**80.0**	**40.0**	614405.2719	8185396.744	
NE2	1540	**83.0**	**30.0**	614425.0355	8185392.598	
NE2	1560	**83.0**	**30.0**	614444.7992	8185388.452	
NE2	1580	**84.0**	**28.0**	614464.5628	8185384.305	
NE2	1600	**80.0**	**24.0**	614484.3248	8185380.156	
NE2	1620	**95.0**	**30.0**	614496.6223	8185364.557	
NE2	1640	**60.0**	**20.0**	614508.9199	8185348.957	
NE2	1660	**30.0**	**22.0**	614521.2174	8185333.357	junction moving away from fence
NE2	1680	**20.0**	**22.0**	614533.4564	8185317.712	
NE2	1700	**22.0**	**24.0**	614545.3206	8185301.78	
NE2	1720	**22.0**	**26.0**	614557.1848	8185285.848	
NE2	1740	**29.0**	**30.0**	614572.3371	8185273.586	
NE2	1760	**24.0**	**36.0**	614589.4695	8185263.533	
NE2	1780	**22.0**	**34.0**	614606.602	8185253.48	
NE2	1800	**24.0**	**30.0**	614623.7345	8185243.427	
NE2	1820	**22.0**	**28.0**	614640.867	8185233.374	
NE2	1840	**23.0**	**30.0**	614657.9995	8185223.321	
NE2	1860	**17.0**	**30.0**	614675.9064	8185214.836	
NE2	1880	**26.0**	**33.0**	614694.3025	8185207.341	
NE2	1900	**25.0**	**34.0**	614712.4441	8185199.385	

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NE2	1920	**30.0**	**40.0**	614728.6189	8185187.854
NE2	1940	**28.0**	**38.0**	614744.7937	8185176.323
NE2	1960	**34.0**	**42.0**	614760.9685	8185164.792
NE2	1980	**28.0**	**42.0**	614777.1432	8185153.261
NE2	2000	**27.0**	**38.0**	614793.318	8185141.73
NE2	2020	**22.0**	**22.0**	614809.4928	8185130.2
NE2	2040	**22.0**	**24.0**	614825.4298	8185118.343
NE2	2060	**20.0**	**22.0**	614841.3514	8185106.465
NE2	2080	**23.0**	**22.0**	614857.2729	8185094.587
NE2	2100	**20.0**	**21.0**	614873.1944	8185082.708
NE2	2120	**22.0**	**20.0**	614889.1159	8185070.83
NE2	2140	**17.0**	**20.0**	614903.2319	8185057.014
NE2	2160	**16.0**	**18.0**	614916.2053	8185041.972
NE2	2180	**18.0**	**20.0**	614929.1787	8185026.929
NE2	2200	**20.0**	**20.0**	614942.152	8185011.887
NE2	2220	**20.0**	**22.0**	614955.1254	8184996.844
NE2	2240	**17.0**	**26.0**	614968.0988	8184981.802
NE2	2260	**26.0**	**26.0**	614981.0721	8184966.76
NE2	2280	**23.0**	**27.0**	614994.0455	8184951.717
NE2	2300	**28.0**	**16.0**	615007.0189	8184936.675
SE2	0	**60.0**	**42.0**	614941.9475	8184748.934
SE2	20	**96.0**	**30.0**	614929.6749	8184732.8
SE2	40	**210.0**	**36.0**	614917.4023	8184716.666
SE2	60	**159.0**	**30.0**	614905.1297	8184700.532
SE2	80	**153.0**	**30.0**	614892.8571	8184684.398
SE2	100	**102.0**	**30.0**	614880.5845	8184668.264
SE2	120	**69.0**	**28.0**	614868.3119	8184652.13
SE2	140	**62.0**	**34.0**	614856.0393	8184635.996
SE2	160	**96.0**	**36.0**	614843.7667	8184619.862
SE2	180	**126.0**	**54.0**	614831.4941	8184603.728
SE2	200	**126.0**	**39.0**	614819.2215	8184587.594

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SE2	220	**144.0**	**42.0**	614806.9489	8184571.46
SE2	240	**147.0**	**48.0**	614794.6763	8184555.326
SE2	260	**180.0**	**72.0**	614782.4037	8184539.192
SE2	280	**174.0**	**72.0**	614770.1311	8184523.059
SE2	300	**162.0**	**54.0**	614757.8585	8184506.925
SE2	320	**150.0**	**54.0**	614745.5859	8184490.791
SE2	340	**120.0**	**54.0**	614733.3133	8184474.657
SE2	360	**132.0**	**57.0**	614721.0407	8184458.523
SE2	380	**162.0**	**54.0**	614708.7681	8184442.389
SE2	400	**144.0**	**60.0**	614697.0201	8184425.88
SE2	420	**141.0**	**63.0**	614685.7655	8184409.021
SE2	440	**141.0**	**78.0**	614674.5108	8184392.161
SE2	460	**150.0**	**72.0**	614663.2562	8184375.301
SE2	480	**174.0**	**66.0**	614652.0015	8184358.441
SE2	500	**144.0**	**81.0**	614640.7468	8184341.581
SE2	520	**150.0**	**87.0**	614629.4922	8184324.721
SE2	540	**162.0**	**81.0**	614618.2375	8184307.862
SE2	560	**126.0**	**72.0**	614606.9828	8184291.002
SE2	580	**96.0**	**66.0**	614594.4491	8184275.088
SE2	600	**75.0**	**72.0**	614581.6252	8184259.388
SE2	620	**48.0**	**66.0**	614568.8012	8184243.689
SE2	640	**84.0**	**66.0**	614555.9773	8184227.99
SE2	660	**159.0**	**60.0**	614543.1533	8184212.291
SE2	680	**156.0**	**66.0**	614528.1046	8184198.808
SE2	700	**72.0**	**44.0**	614512.4509	8184185.929
SE2	720	**162.0**	**102.0**	614496.7972	8184173.049
SE2	740	**168.0**	**78.0**	614481.1434	8184160.169
SE2	760	**192.0**	**66.0**	614465.4897	8184147.29
SE2	780	**234.0**	**90.0**	614449.836	8184134.41
SE2	800	**222.0**	**75.0**	614434.1823	8184121.531
SE2	820	**222.0**	**60.0**	614418.5286	8184108.651
SE2	840	**222.0**	**90.0**	614402.8749	8184095.772

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SE2	860	**222.0**	**126.0**	614387.2211	8184082.892
SE2	880	**186.0**	**102.0**	614371.5674	8184070.012
SE2	900	**192.0**	**78.0**	614355.9137	8184057.133
SE2	920	**276.0**	**84.0**	614340.26	8184044.253
SE2	940	**300.0**	**72.0**	614324.6063	8184031.374
SE2	960	**300.0**	**252.0**	614308.9525	8184018.494
SE2	980	**300.0**	**96.0**	614293.2988	8184005.615
SE2	1000	**300.0**	**96.0**	614277.6451	8183992.735
SE2	1020	**74.0**	**58.0**	613987.9846	8183737.952
SE2	1040	**34.0**	**58.0**	613971.4846	8183726.284
SE2	1060	**22.0**	**67.0**	613954.9846	8183714.616
SE2	1080	**25.0**	**66.0**	613938.4846	8183702.948
SE2	1100	**52.0**	**56.0**	613921.9846	8183691.281
SE2	1120	**44.0**	**70.0**	613905.4846	8183679.613
SE2	1140	**22.0**	**92.0**	613888.9846	8183667.945
SE2	1160	**30.0**	**80.0**	613872.4847	8183656.278
SE2	1180	**62.0**	**70.0**	613855.9847	8183644.61
SE2	1200	**42.0**	**68.0**	613839.4847	8183632.942
SE2	1220	**36.0**	**70.0**	613822.9847	8183621.275
SE2	1240	**16.0**	**70.0**	613806.4847	8183609.607
SE2	1260	**14.0**	**62.0**	613789.9847	8183597.939
SE2	1280	**30.0**	**40.0**	613773.4847	8183586.272
SE2	1300	**37.0**	**30.0**	613756.9847	8183574.604
SE2	1320	**34.0**	**32.0**	613740.4847	8183562.936
SE2	1340	**8.0**	**32.0**	613724.5756	8183550.497
SE2	1360	**22.0**	**30.0**	613709.0189	8183537.599
SE2	1380	**16.0**	**30.0**	613693.4622	8183524.7
SE2	1400	**6.0**	**30.0**	613677.9054	8183511.802
SE2	1420	**16.0**	**30.0**	613662.3487	8183498.903
SE2	1440	**12.0**	**24.0**	613646.792	8183486.005
SE2	1460	**16.0**	**20.0**	613631.2353	8183473.106
SE2	1480	**12.0**	**20.0**	613615.6785	8183460.207

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SE2	1500	**14.0**	**22.0**	613600.1218	8183447.309	
SE2	1520	**16.0**	**22.0**	613584.5651	8183434.41	
SE2	1540	**13.0**	**22.0**	613569.0083	8183421.512	
SE2	1560	**14.0**	**22.0**	613553.4516	8183408.613	
SE2	1580	**20.0**	**22.0**	613537.8949	8183395.715	
SE2	1600	**24.0**	**32.0**	613522.3382	8183382.816	
SE2	1620	**30.0**	**46.0**	613506.7814	8183369.917	
SE2	1640	**6.0**	**60.0**	613491.2247	8183357.019	
NE3	-60	**28.0**	**34.0**			from NE2-2020 to start of NE3 transect
NE3	-40	**28.0**	**28.0**			
NE3	-20	**25.0**	**24.0**			
NE3	0	**24.0**	**24.0**	614781.8894	8185107.517	
NE3	20	**20.0**	**23.0**	614768.6631	8185092.889	
NE3	40	**23.0**	**20.0**	614755.4368	8185078.261	
NE3	60	**22.0**	**20.0**	614741.9447	8185063.917	
NE3	80	**19.0**	**22.0**	614726.4868	8185051.671	
NE3	100	**20.0**	**22.0**	614711.0288	8185039.425	
NE3	120	**20.0**	**22.0**	614695.5708	8185027.179	
NE3	140	**22.0**	**20.0**	614680.1128	8185014.934	
NE3	160	**16.0**	**20.0**	614665.6583	8185001.53	
NE3	180	**19.0**	**20.0**	614651.3413	8184987.968	
NE3	200	**20.0**	**20.0**	614637.0243	8184974.405	
NE3	220	**16.0**	**20.0**	614622.7074	8184960.843	
SW2	0	**126.0**	**42.0**	612482.2835	8183382.58	
SW2	20	**120.0**	**48.0**	612501.8239	8183377.983	
SW2	40	**129.0**	**42.0**	612521.3642	8183373.387	
SW2	60	**111.0**	**42.0**	612540.9046	8183368.79	
SW2	80	**132.0**	**36.0**	612560.445	8183364.194	
SW2	100	**126.0**	**39.0**	612579.9853	8183359.597	

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SW2	120	**120.0**	**66.0**	612599.5257	8183355.001
SW2	140	**120.0**	**60.0**	612619.0661	8183350.404
SW2	160	**114.0**	**30.0**	612638.6064	8183345.808
SW2	180	**114.0**	**30.0**	612658.1468	8183341.211
SW2	200	**111.0**	**30.0**	612677.6872	8183336.615
SW2	220	**120.0**	**24.0**	612697.2275	8183332.018
SW2	240	**123.0**	**30.0**	612716.7679	8183327.422
SW2	260	**114.0**	**30.0**	612736.3083	8183322.826
SW2	280	**114.0**	**39.0**	612755.8486	8183318.229
SW2	300	**129.0**	**84.0**	612775.389	8183313.633
SW2	320	**129.0**	**54.0**	612794.9294	8183309.036
SW2	340	**138.0**	**54.0**	612814.4697	8183304.44
SW2	360	**135.0**	**60.0**	612834.0101	8183299.843
SW2	380	**135.0**	**72.0**	612853.5505	8183295.247
SW2	400	**138.0**	**69.0**	612873.0908	8183290.65
SW2	420	**114.0**	**57.0**	612892.7985	8183286.844
SW2	440	**78.0**	**42.0**	612912.5254	8183283.129
SW2	460	**74.0**	**36.0**	612932.5214	8183281.95
SW2	480	**76.0**	**42.0**	612952.5887	8183281.444
SW2	500	**70.0**	**42.0**	612972.656	8183280.937
SW2	520	**56.0**	**36.0**	612992.7233	8183280.43
SW2	540	**64.0**	**36.0**	613012.7906	8183279.924
SW2	560	**66.0**	**44.0**	613032.8579	8183279.417
SW2	580	**60.0**	**38.0**	613052.9252	8183278.911
SW2	600	**60.0**	**36.0**	613072.9925	8183278.404
SW2	620	**56.0**	**30.0**	613093.0599	8183277.897
SW2	640	**58.0**	**26.0**	613113.1272	8183277.391
SW2	660	**74.0**	**46.0**	613133.1945	8183276.884
SW2	680	**68.0**	**30.0**	613153.2618	8183276.377
SW2	700	**74.0**	**28.0**	613173.3291	8183275.871
SW2	720	**78.0**	**32.0**	613193.3964	8183275.364
SW2	740	**78.0**	**34.0**	613213.4637	8183274.858

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SW2	760	**72.0**	**33.0**	613233.531	8183274.351
SW2	780	**70.0**	**44.0**	613253.5983	8183273.844
SW2	800	**60.0**	**30.0**	613273.6656	8183273.338
NW2	0	**18.0**	**20.0**	611940.8268	8183641.704
NW2	20	**16.0**	**20.0**	611943.79	8183661.577
NW2	40	**18.0**	**20.0**	611946.7532	8183681.45
NW2	60	**19.0**	**20.0**	611949.7165	8183701.323
NW2	80	**17.0**	**22.0**	611952.6797	8183721.197
NW2	100	**23.0**	**24.0**	611955.643	8183741.07
NW2	120	**20.0**	**25.0**	611958.6062	8183760.943
NW2	140	**22.0**	**26.0**	611961.5694	8183780.816
NW2	160	**20.0**	**26.0**	611964.5327	8183800.689
NW2	180	**20.0**	**24.0**	611967.4959	8183820.562
NW2	200	**22.0**	**26.0**	611970.4592	8183840.436
NW2	220	**18.0**	**30.0**	611973.4224	8183860.309
NW2	240	**20.0**	**38.0**	611976.3856	8183880.182
NW2	260	**18.0**	**36.0**	611979.3489	8183900.055
NW2	280	**16.0**	**32.0**	611982.3121	8183919.928
NW2	300	**18.0**	**22.0**	611985.2753	8183939.801
NW2	320	**22.0**	**26.0**	611988.2386	8183959.675
NW2	340	**20.0**	**24.0**	611991.2018	8183979.548
NW2	360	**16.0**	**22.0**	611994.1651	8183999.421
NW2	380	**14.0**	**12.0**	611997.1283	8184019.294
NW2	400	**12.0**	**20.0**	612000.0915	8184039.167
NW2	420	**16.0**	**20.0**	612003.0548	8184059.041
NW2	440	**18.0**	**19.0**	612006.018	8184078.914
NW2	460	**14.0**	**18.0**	612008.9812	8184098.787
NW2	480	**14.0**	**20.0**	612011.9445	8184118.66
NW2	500	**12.0**	**22.0**	612014.9077	8184138.533
NW2	520	**20.0**	**18.0**	612017.871	8184158.406
NW2	540	**18.0**	**24.0**	612020.8342	8184178.28

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NW2	560	**16.0**	**30.0**	612023.7974	8184198.153	
NW3	0	**22.0**	**20.0**	611981.2473	8184229.721	
NW3	20	**14.0**	**25.0**	611995.9952	8184243.191	
NW3	40	**12.0**	**30.0**	612010.7431	8184256.662	
NW3	60	**20.0**	**30.0**	612025.491	8184270.132	
NW3	80	**20.0**	**25.0**	612040.2389	8184283.603	
NW3	100	**20.0**	**21.0**	612054.9868	8184297.073	
NW3	120	**14.0**	**23.0**	612069.7347	8184310.544	
NW3	140	**22.0**	**25.0**	612084.4826	8184324.014	
NW3	160	**14.0**	**28.0**	612099.2305	8184337.485	
NW3	180	**18.0**	**32.0**	612113.9784	8184350.955	
NW3	200	**20.0**	**30.0**	612128.7263	8184364.426	
NW3	220	**32.0**	**32.0**	612143.4742	8184377.897	
NW3	240	**21.0**	**30.0**	612158.2221	8184391.367	
NW3	260	**34.0**	**32.0**	612172.97	8184404.838	
NW3	280	**30.0**	**36.0**	612187.7179	8184418.308	
NW3	300	**22.0**	**36.0**	612202.4658	8184431.779	
NW3	320	**28.0**	**37.0**	612217.2137	8184445.249	
NW3	340	**26.0**	**40.0**	612231.9616	8184458.72	
NW3	360	**27.0**	**38.0**	612246.7095	8184472.19	
NW3	380	**28.0**	**42.0**	612261.4574	8184485.661	
NW3	400	**30.0**	**40.0**	612276.2053	8184499.131	
NW3	420	**18.0**	**48.0**	612290.9532	8184512.602	
NW3	440	**24.0**	**34.0**	612304.9775	8184526.82	
NW3	460	**27.0**	**34.0**	612318.9233	8184541.119	
NW3	480	**38.0**	**38.0**	612332.869	8184555.419	
NW3	500	**0.0**	**0.0**	612346.8148	8184569.718	at water
NW3	520	**0.0**	**0.0**	612360.7605	8184584.017	at water
NW3	540	**22.0**	**42.0**	612374.7062	8184598.317	
NW3	560	**20.0**	**48.0**	612457.0723	8184693.775	
NW3	580	**25.0**	**44.0**	612462.839	8184713.18	

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NW3	600	**20.0**	**40.0**	612468.6058	8184732.585	
NW3	620	**20.0**	**40.0**	612474.3726	8184751.989	
NW3	640	**12.0**	**40.0**	612480.3944	8184771.307	
NW3	660	**22.0**	**36.0**	612487.7712	8184790.158	
NW3	680	**20.0**	**32.0**	612495.1479	8184809.01	
NW3	700	**10.0**	**26.0**	612506.1313	8184825.907	
NW3	720	**18.0**	**25.0**	612517.8976	8184842.38	
NW3	740	**20.0**	**24.0**	612529.664	8184858.853	
NW3	760	**30.0**	**34.0**	612541.896	8184874.975	
NW3	780	**6.0**	**50.0**	612554.4851	8184890.828	
NW3	800	**34.0**	**64.0**	612567.0742	8184906.681	
NW3	820	**0.0**	**72.0**	612579.6633	8184922.534	
NW3	840	**98.0**	**62.0**	612594.3302	8184936.07	fence crossing
NW3	860	**20.0**	**62.0**	612611.4544	8184946.866	
NW3	880	**46.0**	**69.0**	612628.5786	8184957.663	
NW3	900	**20.0**	**64.0**	612645.7028	8184968.459	
NW3	920	**22.0**	**68.0**	612656.4865	8184985.379	
NW3	940	**14.0**	**48.0**	612666.6783	8185002.869	
NW3	960	**34.0**	**38.0**	612676.8701	8185020.36	
NW3	980	**22.0**	**32.0**	612687.0619	8185037.851	
NW3	1000	**20.0**	**32.0**	612697.2537	8185055.342	
NW3	1020	**16.0**	**34.0**	612707.4455	8185072.833	
NW3	1040	**22.0**	**32.0**	612711.9923	8185092.482	
NW3	1060	**20.0**	**32.0**	612716.072	8185112.311	
NW3	1080	**8.0**	**28.0**	612720.1517	8185132.139	
NW3	1100	**26.0**	**30.0**	612724.2315	8185151.967	
NW3	1120	**0.0**	**0.0**	612728.3112	8185171.795	standing puddle
NW3	1140	**74.0**	**38.0**	612684.1916	8185243.94	
NW3	1160	**83.0**	**38.0**	612689.2988	8185263.39	
NW3	1180	**78.0**	**40.0**	612694.406	8185282.841	
NW3	1200	**74.0**	**35.0**	612699.5131	8185302.291	
NW3	1220	**65.0**	**34.0**	612704.6203	8185321.741	

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NW3	1240	**54.0**	**34.0**	612709.7275	8185341.192
NW3	1260	**54.0**	**34.0**	612714.8346	8185360.642
NW3	1280	**58.0**	**34.0**	612719.9418	8185380.092
NW3	1300	**56.0**	**36.0**	612725.049	8185399.543
NW3	1320	**68.0**	**46.0**	612730.1561	8185418.993
NW3	1340	**62.0**	**44.0**	612735.2633	8185438.443
NW3	1360	**68.0**	**50.0**	612740.3705	8185457.894
NW3	1380	**80.0**	**58.0**	612745.4777	8185477.344
NW3	1400	**68.0**	**45.0**	612750.5848	8185496.794
NW3	1420	**64.0**	**44.0**	612755.692	8185516.245
NW3	1440	**62.0**	**40.0**	612760.7992	8185535.695
NW3	1460	**62.0**	**34.0**	612765.9063	8185555.145
SE3	0	**19.8**	**24.6**	615000.4536	8184706.211
SE3	20	**16.0**	**28.0**	614992.1194	8184688.015
SE3	40	**20.0**	**26.0**	614983.7851	8184669.819
SE3	60	**21.0**	**22.0**	614975.4509	8184651.622
SE3	80	**24.0**	**22.0**	614967.1166	8184633.426
SE3	100	**20.0**	**24.0**	614958.7824	8184615.23
SE3	120	**30.0**	**28.0**	614950.4481	8184597.033
SE3	140	**23.0**	**34.0**	614942.1138	8184578.837
SE3	160	**29.0**	**32.0**	614933.7796	8184560.64
SE3	180	**24.0**	**33.0**	614925.4453	8184542.444
SE3	200	**28.0**	**30.0**	614917.1111	8184524.248
SE3	220	**32.0**	**28.0**	614908.7768	8184506.051
SE3	240	**34.0**	**30.0**	614896.5104	8184490.25
SE3	260	**35.0**	**34.0**	614884.1678	8184474.494
SE3	280	**26.0**	**49.0**	614871.8252	8184458.739
SE3	300	**36.0**	**54.0**	614859.4825	8184442.984
SE3	320	**38.0**	**53.0**	614847.1399	8184427.229
SE3	340	**27.0**	**54.0**	614834.7973	8184411.474
SE3	360	**32.0**	**59.0**	614822.4546	8184395.718

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SE3	380	**30.0**	**48.0**	614810.112	8184379.963	
SE3	400	**42.0**	**42.0**	614795.6869	8184366.216	
SE3	420	**19.0**	**45.0**	614780.393	8184353.306	
SE3	440	**30.0**	**48.0**	614765.0991	8184340.396	
SE3	460	**35.0**	**43.0**	614749.8052	8184327.486	
SE3	480	**30.0**	**42.0**	614734.5113	8184314.576	
SE3	500	**29.0**	**44.0**	614719.2174	8184301.666	
SE3	520	**40.0**	**42.0**	614703.9235	8184288.757	
SE3	540	**23.0**	**60.0**	614688.6296	8184275.847	
SE3	560	**28.0**	**82.0**	614673.3357	8184262.937	
SE3	580	**42.0**	**70.0**	614658.0418	8184250.027	
SE3	600	**46.0**	**62.0**	614642.7479	8184237.117	
SE3	620	**48.0**	**62.0**	614627.454	8184224.207	
SE3	640	**34.0**	**66.0**	614611.6548	8184211.928	
SE3	660	**28.0**	**76.0**	614595.7151	8184199.825	
SE3	680	**43.0**	**70.0**	614579.7754	8184187.722	
SE3	700	**54.0**	**64.0**	614563.8356	8184175.618	road cut, sign and pipes
SE3	720	**47.0**	**56.0**	614547.8959	8184163.515	short - road cut and pipes
SE3	740	**41.0**	**58.0**	614531.9562	8184151.411	
SE3	760	**28.0**	**68.0**	614516.0165	8184139.308	
SE3	780	**36.0**	**67.0**	614500.0768	8184127.204	
SE3	800	**36.0**	**64.0**	614484.137	8184115.101	
SE3	820	**33.0**	**67.0**	614468.1973	8184102.998	
SE3	840	**28.0**	**68.0**	614452.2576	8184090.894	
SE3	860	**32.0**	**64.0**	614436.3179	8184078.791	
SE3	880	**30.0**	**67.0**	614420.3781	8184066.687	
SE3	900	**17.0**	**51.0**	614404.4384	8184054.584	
SE3	920	**46.0**	**42.0**	614388.4987	8184042.48	
SE3	940	**34.0**	**40.0**	614372.559	8184030.377	
SE3	960	**31.0**	**44.0**	614356.6193	8184018.274	
SE3	980	**38.0**	**42.0**	614340.6795	8184006.17	
SE3	1000	**34.0**	**50.0**	614324.7239	8183994.088	

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SE3	1020	**30.0**	**70.0**	614308.6922	8183982.107	
SE3	1040	**36.0**	**65.0**	614292.6604	8183970.125	
SE3	1060	**27.0**	**76.0**	614276.6287	8183958.144	
SE3	1080	**25.0**	**78.0**	614260.5969	8183946.163	
SE3	1100	**45.0**	**86.0**	614244.5652	8183934.182	
SE3	1120	**38.0**	**90.0**	614228.5335	8183922.2	
SE3	1140	**42.0**	**74.0**	614212.5017	8183910.219	
SE3	1160	**38.0**	**80.0**	614196.47	8183898.238	
SE3	1180	**22.0**	**69.0**	614180.4383	8183886.256	
SE3	1200	**47.0**	**56.0**	614164.4065	8183874.275	
SE3	1220	**40.0**	**50.0**	614148.3748	8183862.294	
SE3	1240	**26.0**	**48.0**	614132.343	8183850.313	
SE3	1260	**32.0**	**54.0**	614116.3113	8183838.331	
SE3	1280	**32.0**	**58.0**	614100.2796	8183826.35	
SE3	1300	**38.0**	**62.0**	614084.2478	8183814.369	
SE3	1320	**38.0**	**72.0**	614068.2161	8183802.387	
SE3	1340	**28.0**	**90.0**	614052.1843	8183790.406	
SE3	1360	**52.0**	**76.0**	614036.1526	8183778.425	
SE3	1380	**120.0**	**65.0**	614020.1209	8183766.444	
SE3	1400	**300.0**	**60.0**	614004.0891	8183754.462	entrance - sign post
SW3	0	**18.0**	**20.0**	612590.0429	8183228.968	
SW3	20	**16.0**	**20.0**	612572.6303	8183236.999	
SW3	40	**16.0**	**18.0**	612555.2178	8183245.029	
SW3	60	**14.0**	**20.0**	612537.8052	8183253.06	
SW3	80	**18.0**	**20.0**	612520.3927	8183261.091	
SW3	100	**18.0**	**22.0**	612503.1613	8183269.501	
SW3	120	**16.0**	**22.0**	612485.9699	8183277.994	
SW3	140	**20.0**	**24.0**	612468.7784	8183286.488	
SW3	160	**20.0**	**26.0**	612451.5869	8183294.981	
SW3	180	**12.0**	**26.0**	612434.3955	8183303.475	
SW3	200	**34.0**	**26.0**	612416.7478	8183310.902	

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SW3	220	**26.0**	**30.0**	612398.7324	8183317.469
SW3	240	**16.0**	**40.0**	612380.717	8183324.037
SW3	260	**32.0**	**50.0**	612362.7016	8183330.604
SW3	280	**40.0**	**55.0**	612344.6861	8183337.171
SW3	300	**20.0**	**64.0**	612326.5186	8183343.28
SW3	320	**40.0**	**74.0**	612308.1466	8183348.771
SW3	340	**20.0**	**80.0**	612289.7746	8183354.263
SW3	360	**38.0**	**62.0**	612271.4025	8183359.754
SW3	380	**41.0**	**58.0**	612253.0305	8183365.245
SW3	400	**40.0**	**56.0**	612234.5764	8183370.432
SW3	420	**30.0**	**50.0**	612215.9311	8183374.908
SW3	440	**37.0**	**46.0**	612197.2857	8183379.385
SW3	460	**36.0**	**40.0**	612178.6404	8183383.861
SW3	480	**34.0**	**34.0**	612159.9951	8183388.338
SW3	500	**34.0**	**32.0**	612141.3596	8183392.854
SW3	520	**28.0**	**30.0**	612122.7539	8183397.492
SW3	540	**25.0**	**31.0**	612104.1482	8183402.131
SW3	560	**22.0**	**30.0**	612085.5425	8183406.769

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