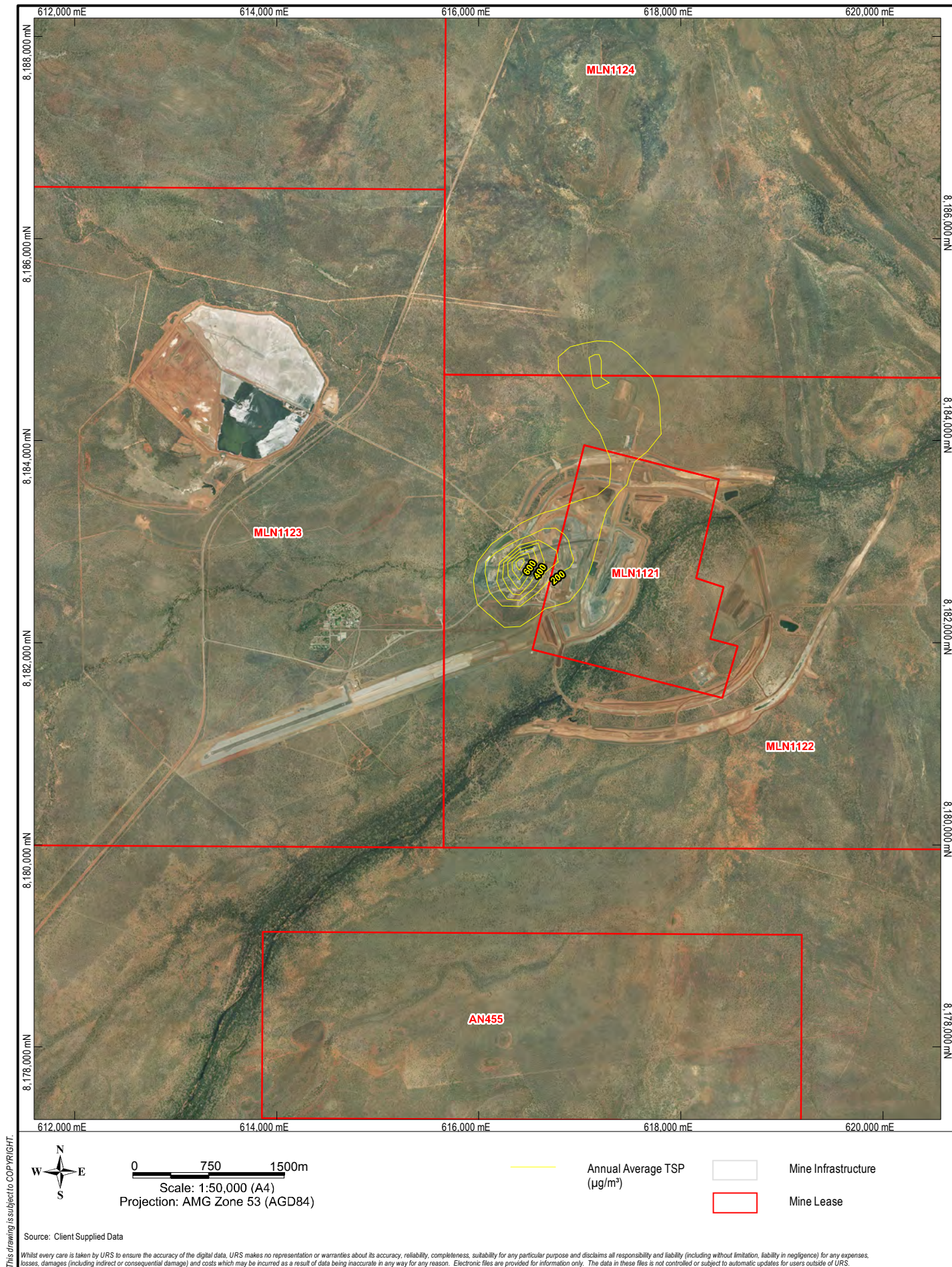


Appendix E Modelling Results



MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE TSP
2011 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-001.wor

Drawn: RG

Approved: CP

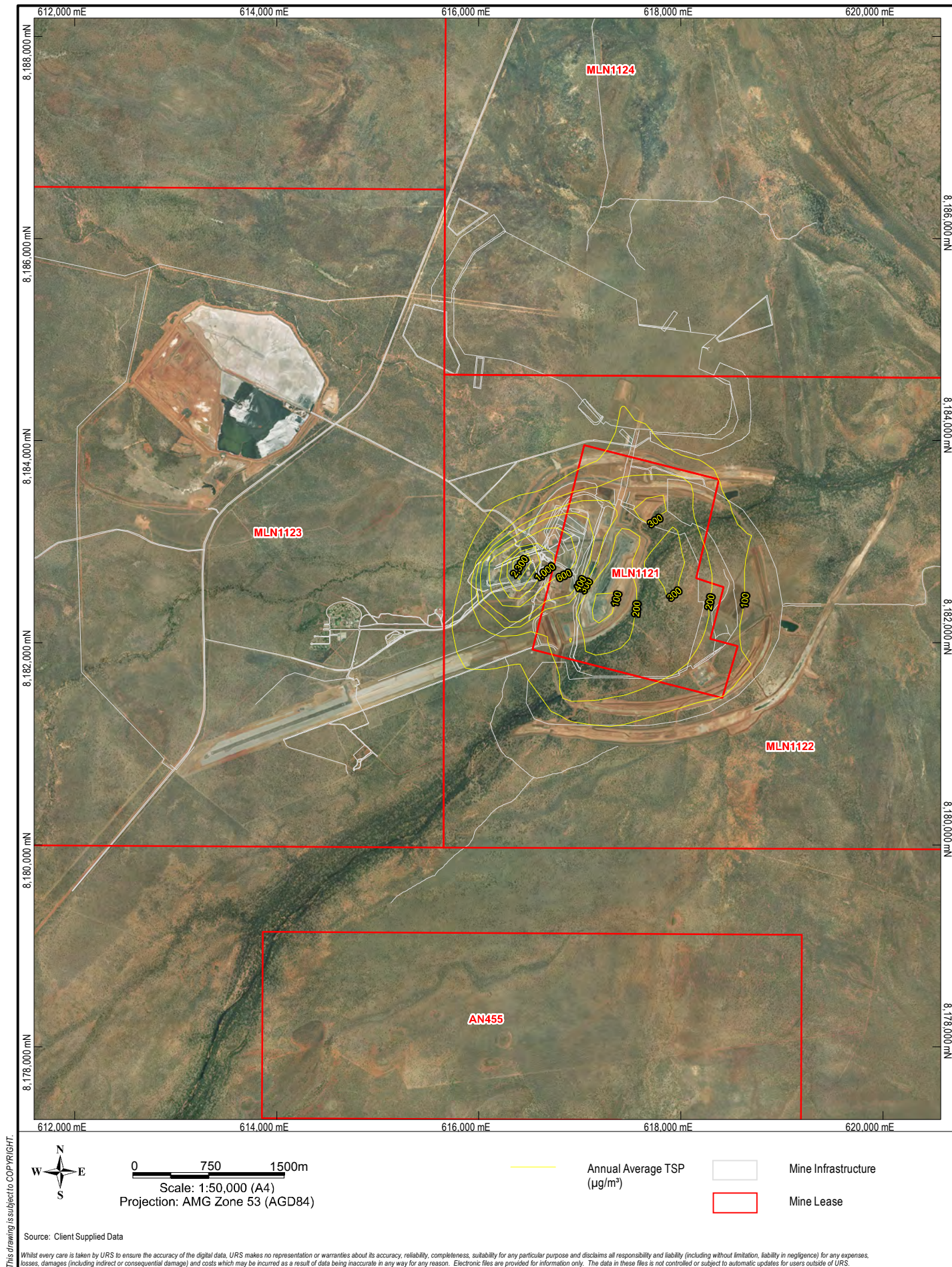
Date: 08-09-2011

Figure: **E-1**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

ANNUAL AVERAGE TSP
2015 ($\mu\text{g}/\text{m}^3$)

URS

AIR QUALITY

File No: 42626795-g-002.wor

Drawn: RG

Approved: CP

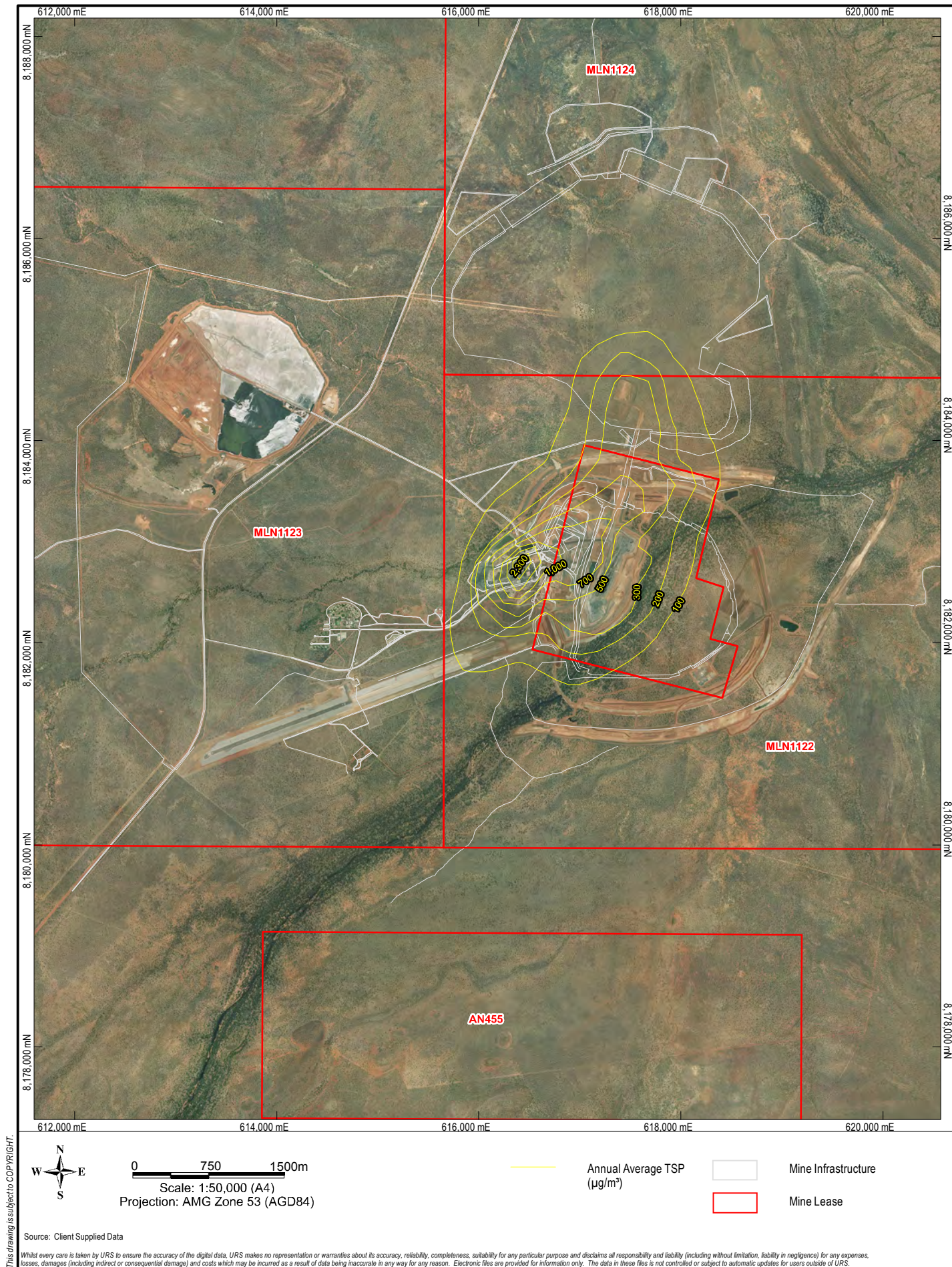
Date: 08-09-2011

Figure: **E-2**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE TSP
2025 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-003.wor

Drawn: RG

Approved: CP

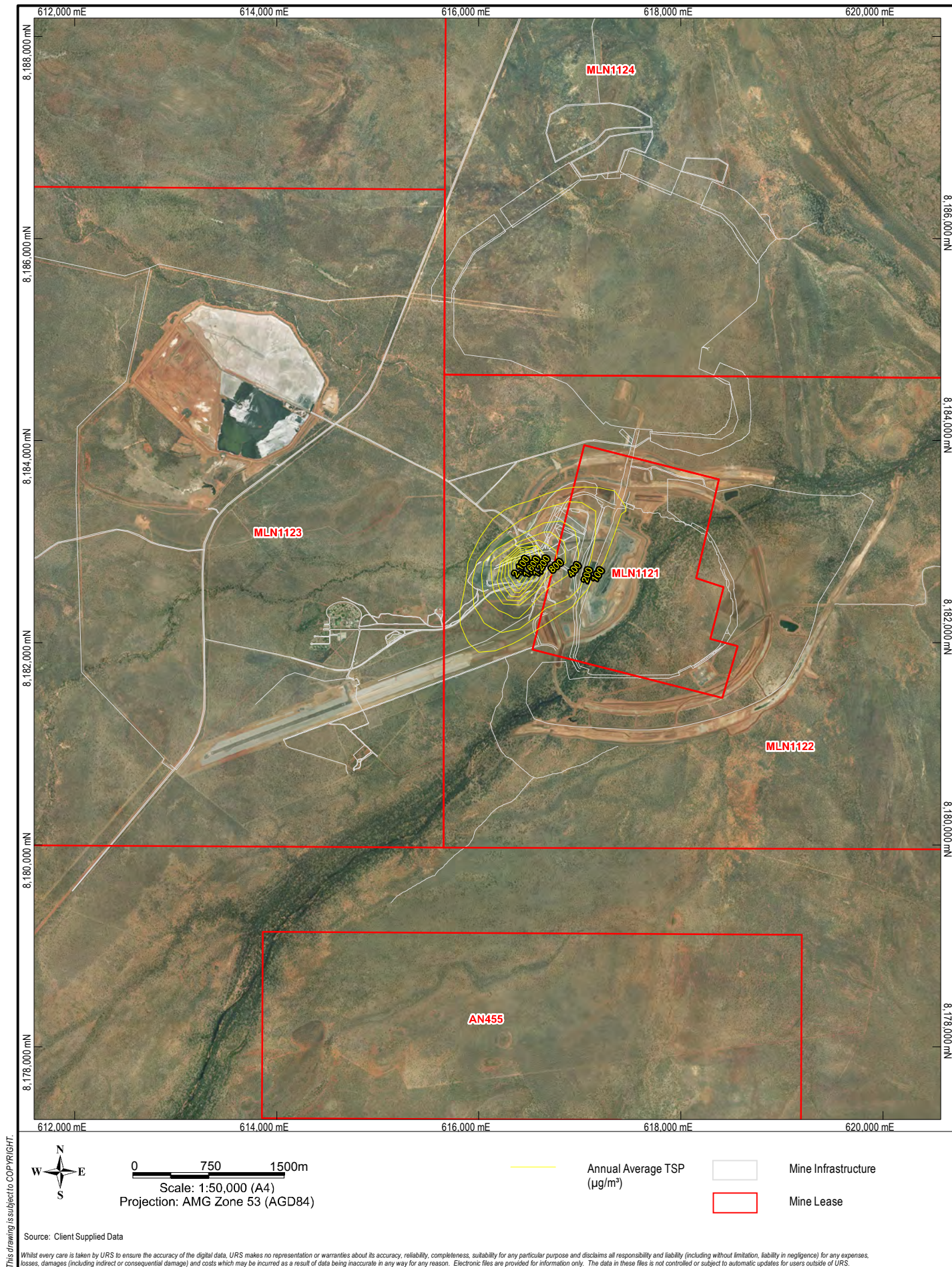
Date: 08-09-2011

Figure: **E-3**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE TSP
2030 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-004.wor

Drawn: RG

Approved: CP

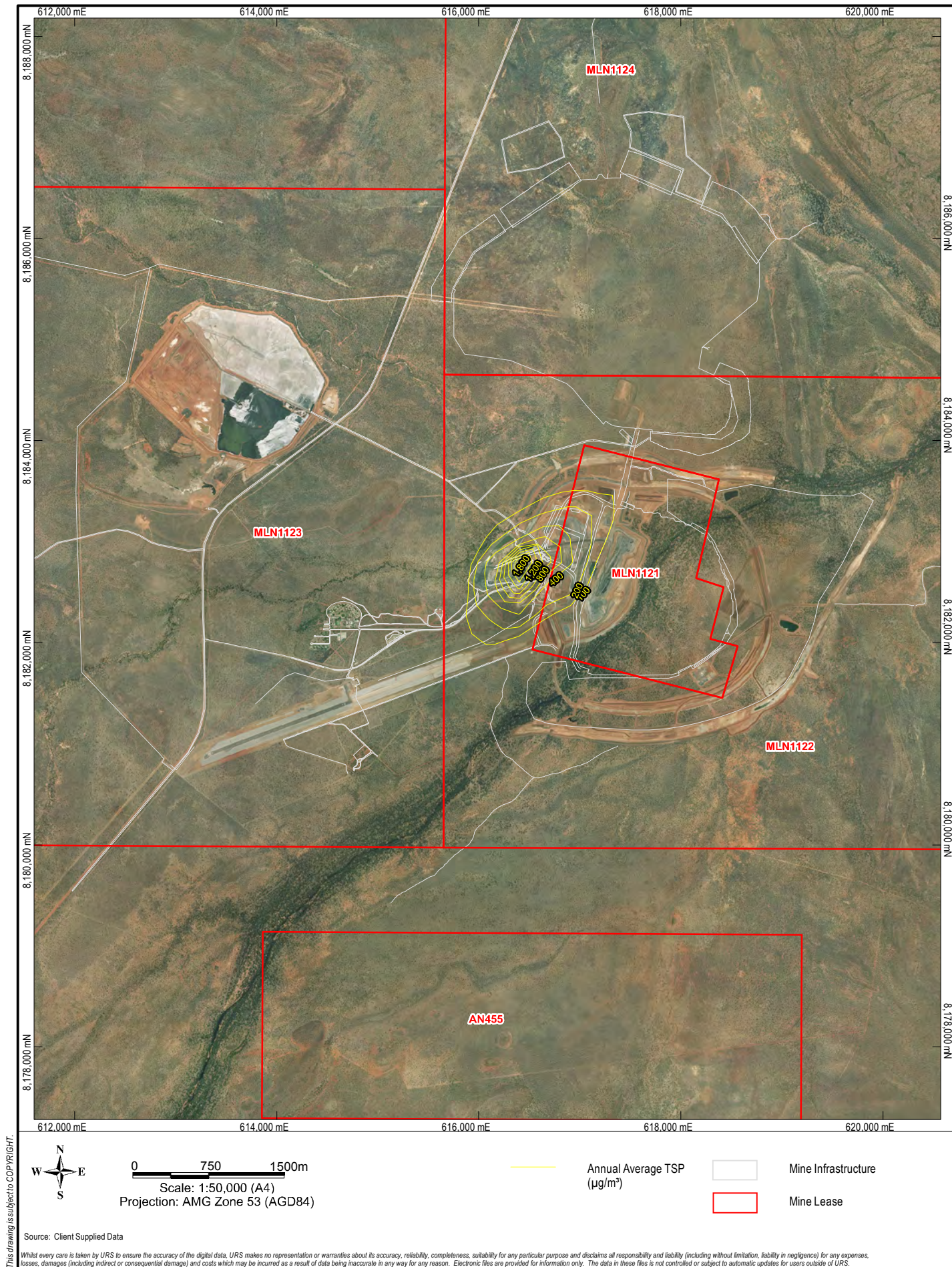
Date: 08-09-2011

Figure: **E-4**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE TSP
2035 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-005.wor

Drawn: RG

Approved: CP

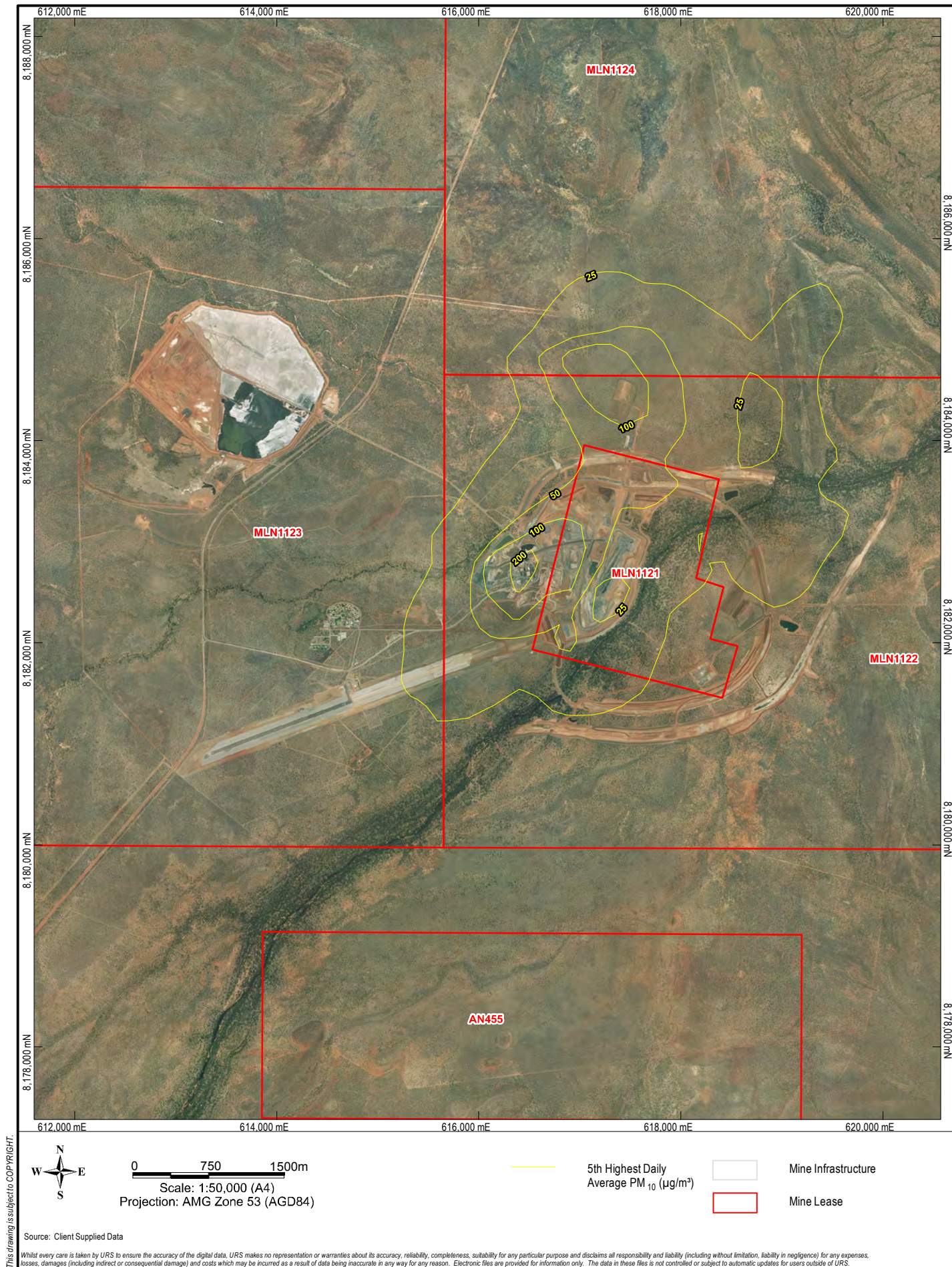
Date: 08-09-2011

Figure: **E-5**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**5th HIGHEST DAILY
AVERAGE PM_{10}
2011 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-006.wor

Drawn: RG

Approved: CP

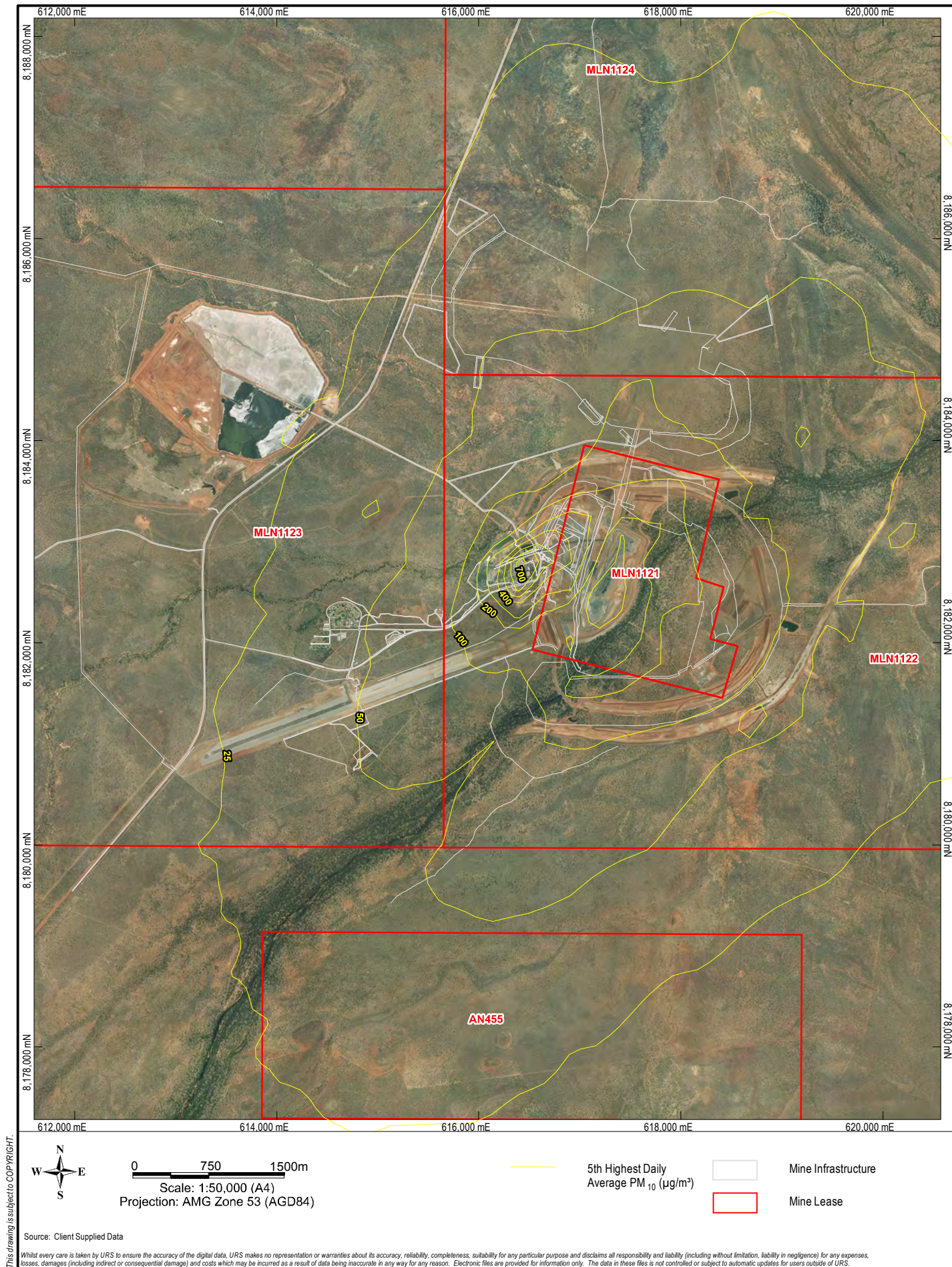
Date: 08-09-2011

Figure: **E-6**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**5th HIGHEST DAILY
AVERAGE PM_{10}
2015 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-007.wor

Drawn: RG

Approved: CP

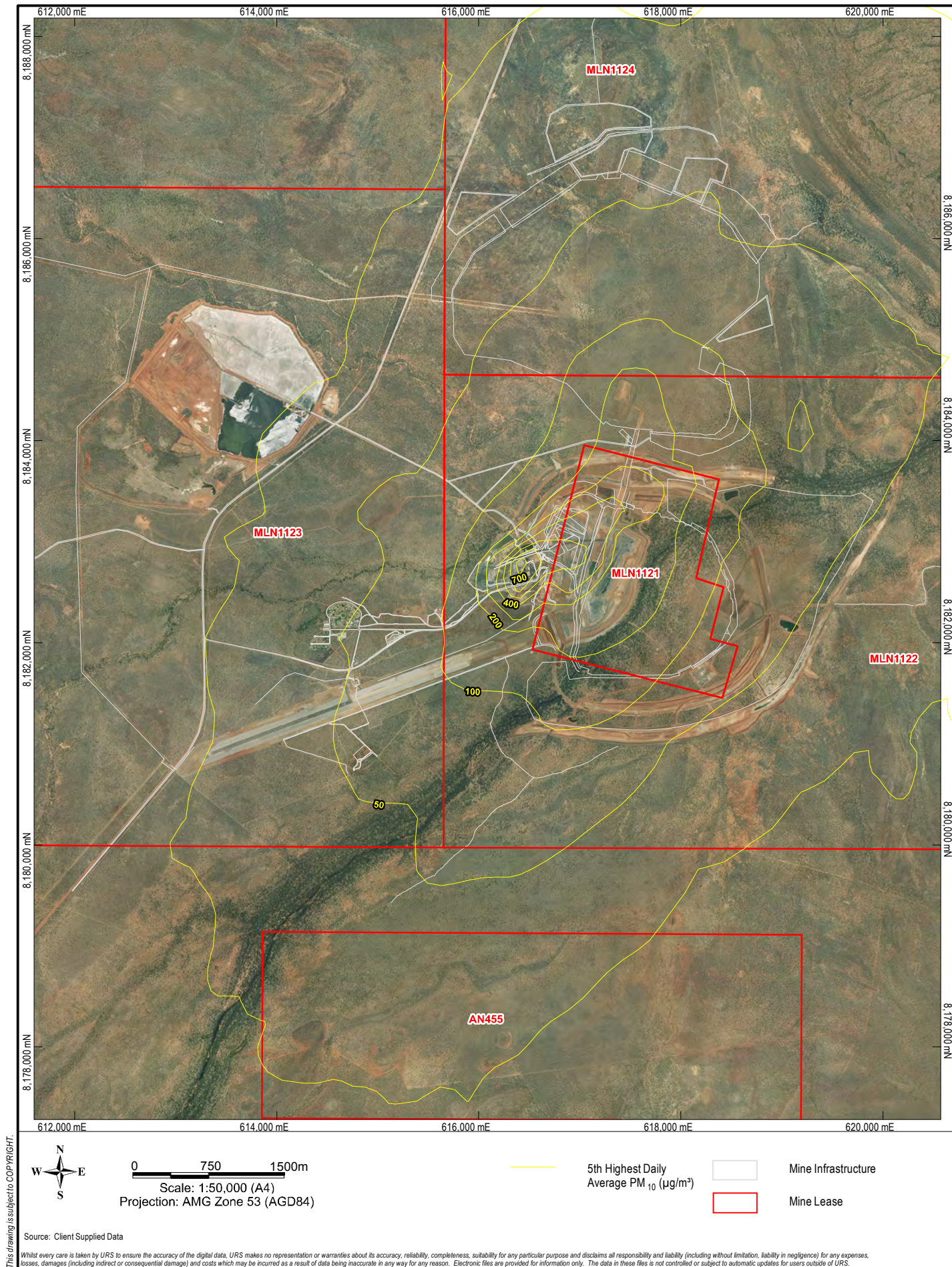
Date: 08-09-2011

Figure: **E-7**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**5th HIGHEST DAILY
AVERAGE PM_{10}
2025 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-008.wor

Drawn: RG

Approved: CP

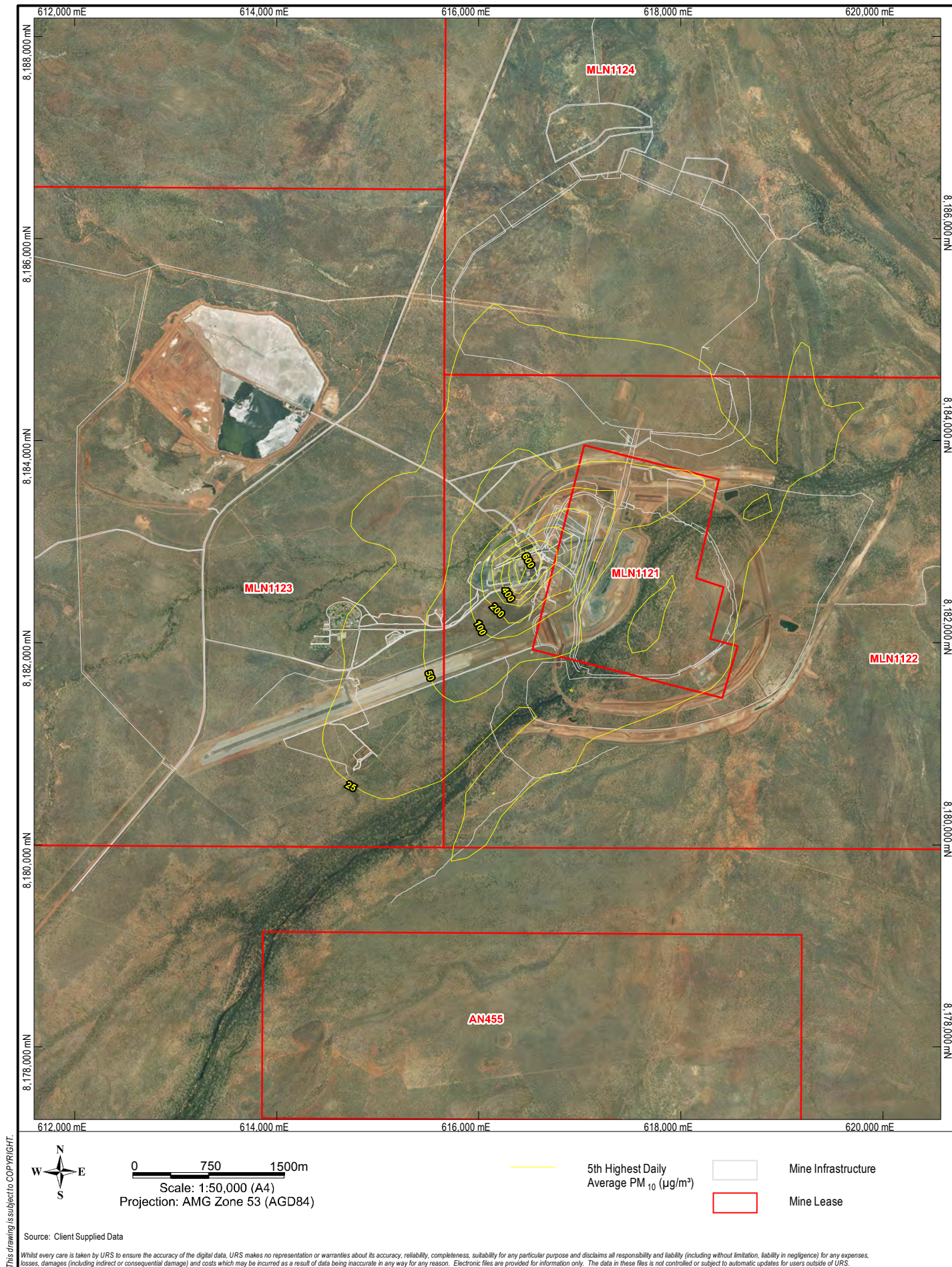
Date: 08-09-2011

Figure: **E-8**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**5th HIGHEST DAILY
AVERAGE PM_{10}
2030 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-009.wor

Drawn: RG

Approved: CP

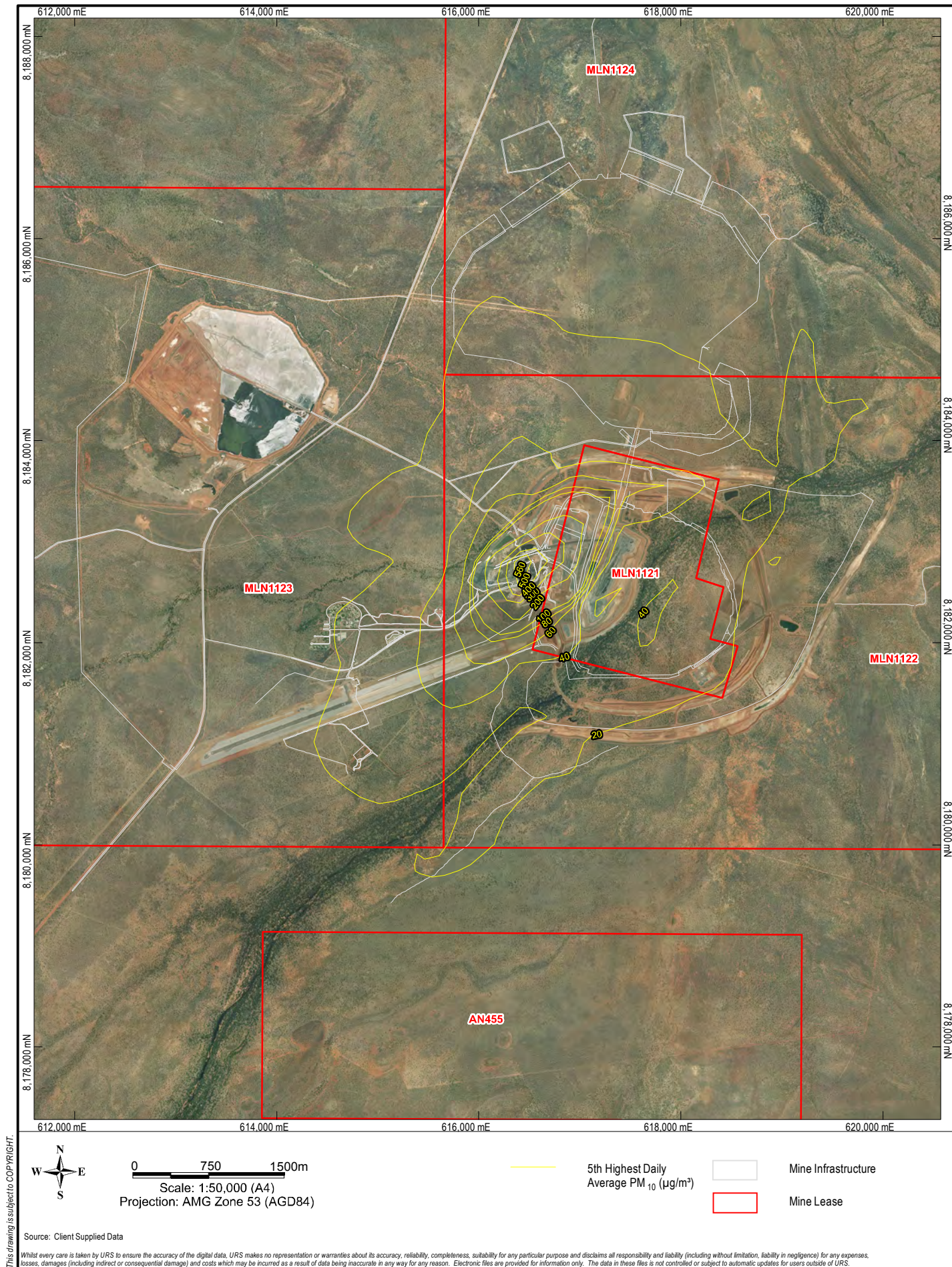
Date: 08-09-2011

Figure: **E-9**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**5th HIGHEST DAILY
AVERAGE PM_{10}
2035 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-032.wor

Drawn: RG

Approved: CP

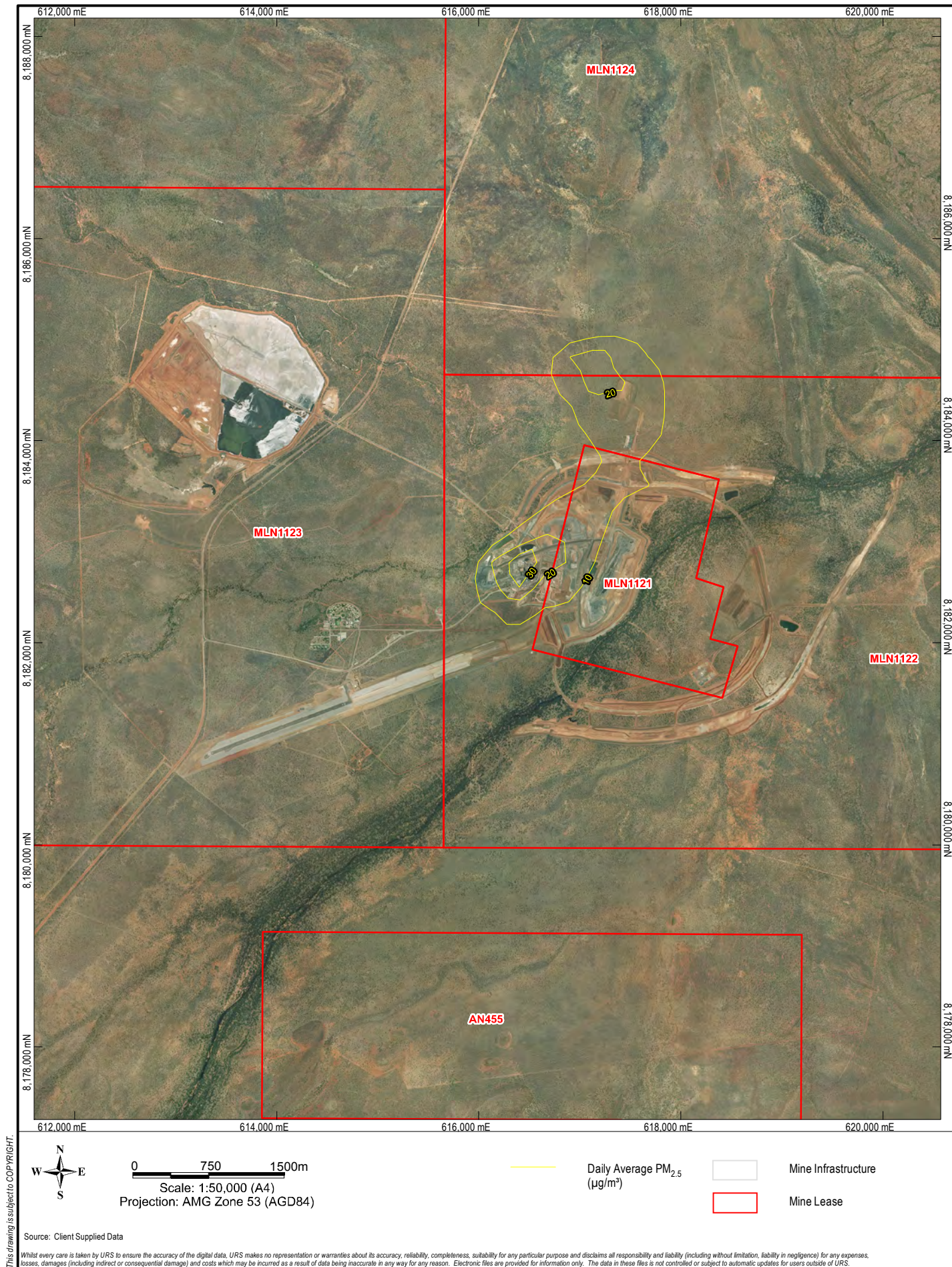
Date: 13-09-2011

Figure: **E-10**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
 $PM_{2.5}$ 2011 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-011.wor

Drawn: RG

Approved: CP

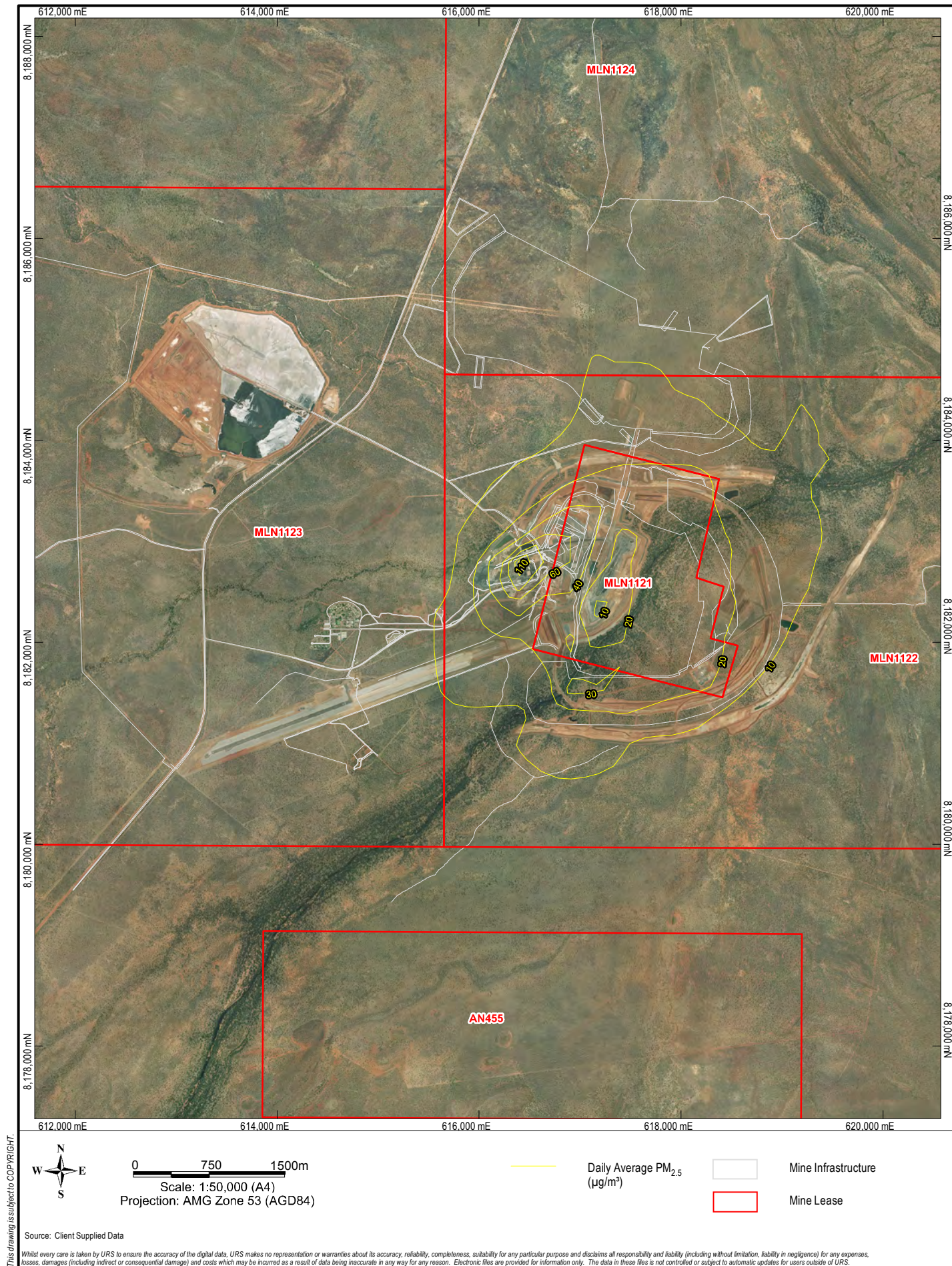
Date: 12-09-2011

Figure: **E-11**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
PM_{2.5} 2015 (µg/m³)**

URS

AIR QUALITY

File No: 42626795-g-011.wor

Drawn: RG

Approved: CP

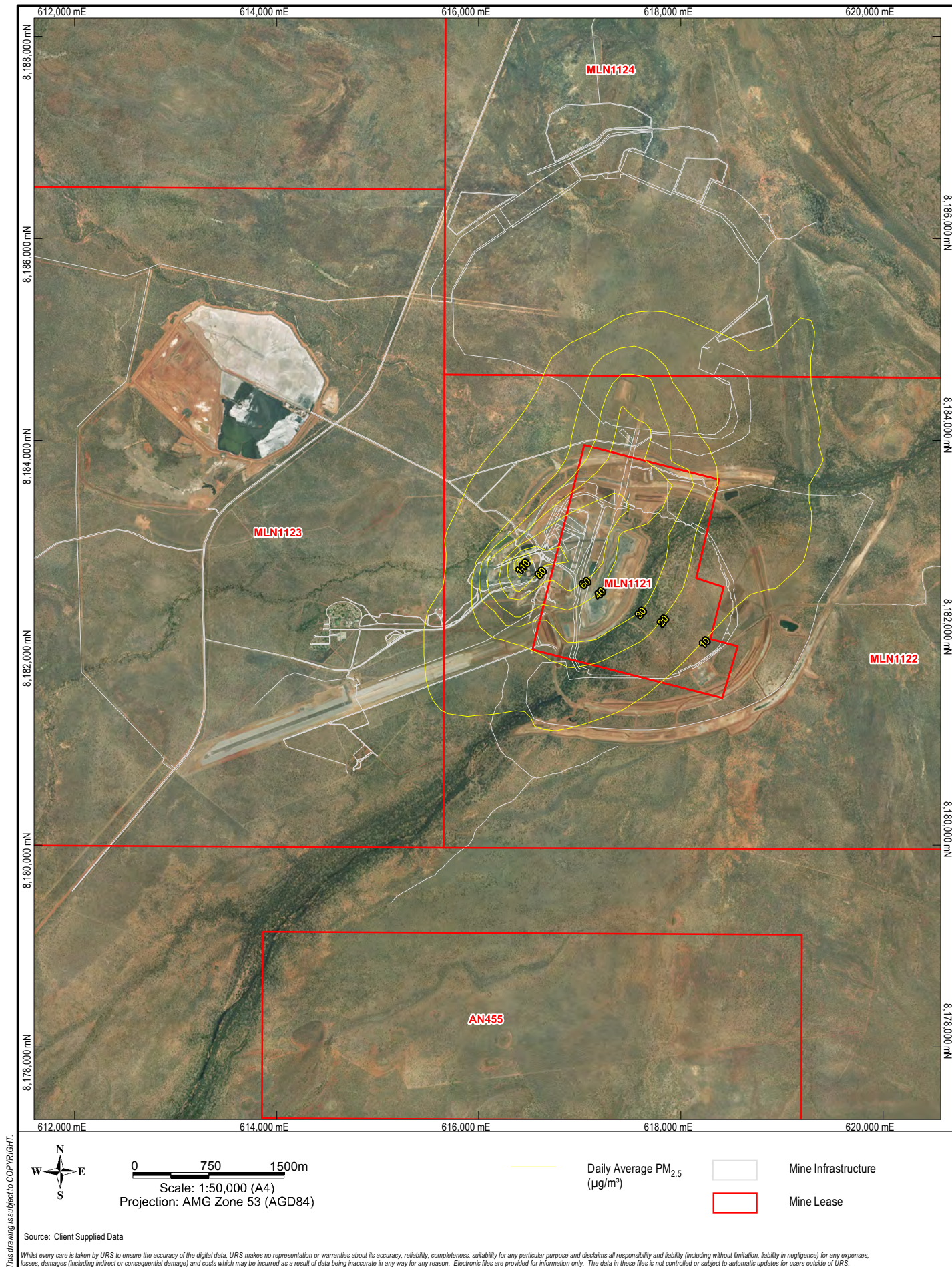
Date: 08-09-2011

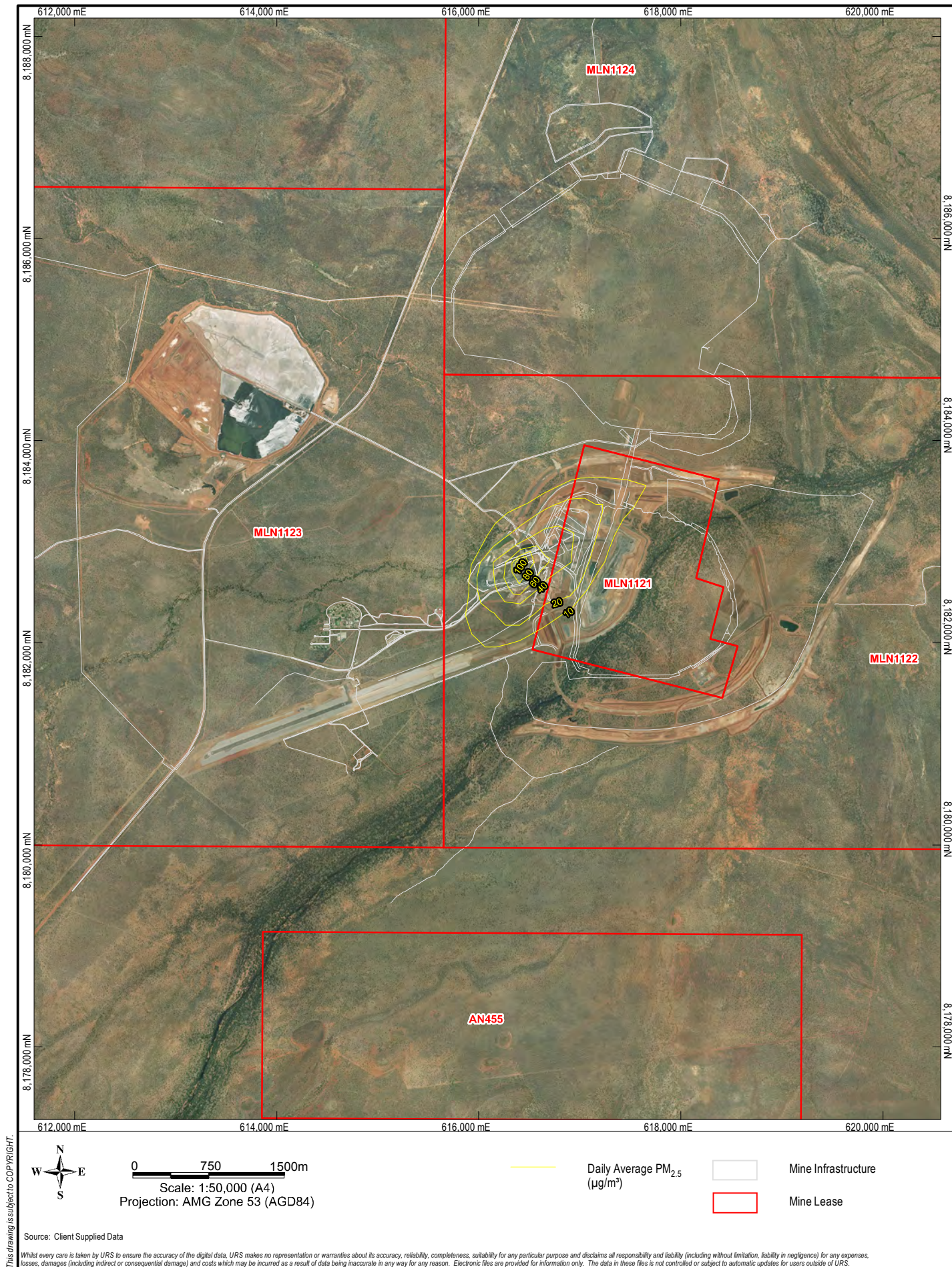
Figure: **E-12**

Rev. A

A4







MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
PM_{2.5} 2030 (µg/m³)**

URS

AIR QUALITY

File No: 42626795-g-013.wor

Drawn: RG

Approved: CP

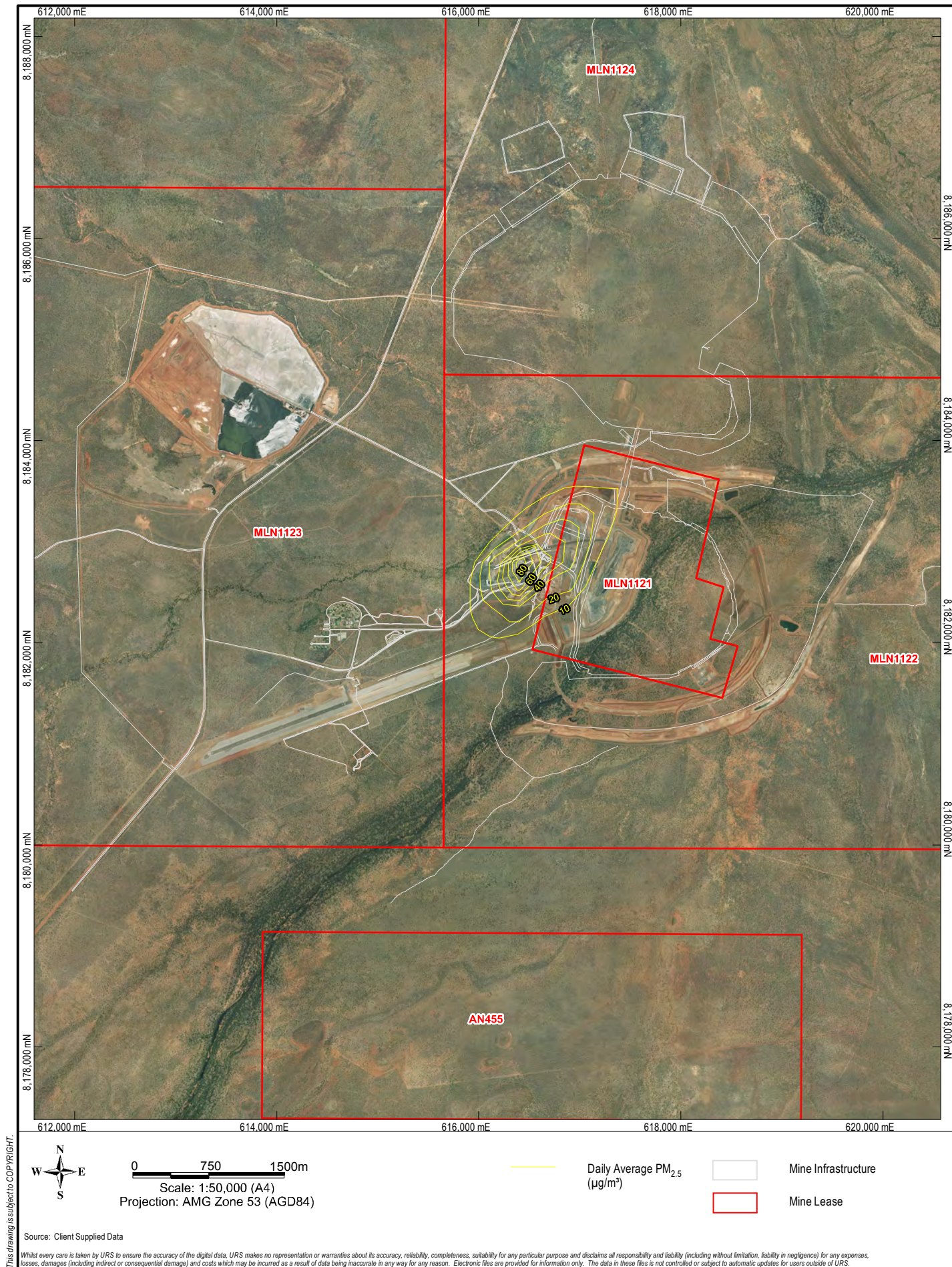
Date: 08-09-2011

Figure: **E-14**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
PM_{2.5} 2035 (µg/m³)**

URS

AIR QUALITY

File No: 42626795-g-014.wor

Drawn: RG

Approved: CP

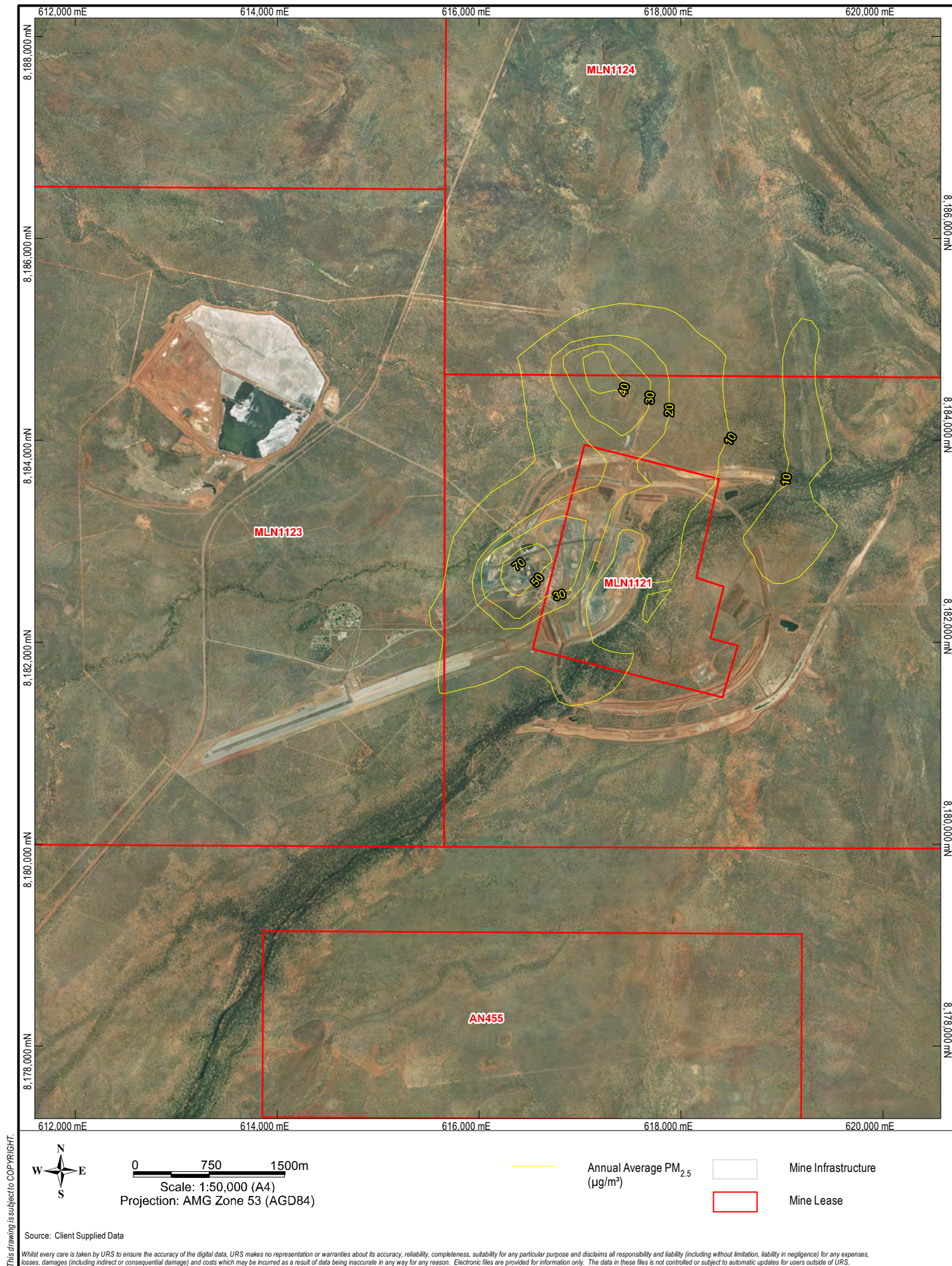
Date: 08-09-2011

Figure: **E-15**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE $PM_{2.5}$
2011 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-033.wor

Drawn: RG

Approved: CP

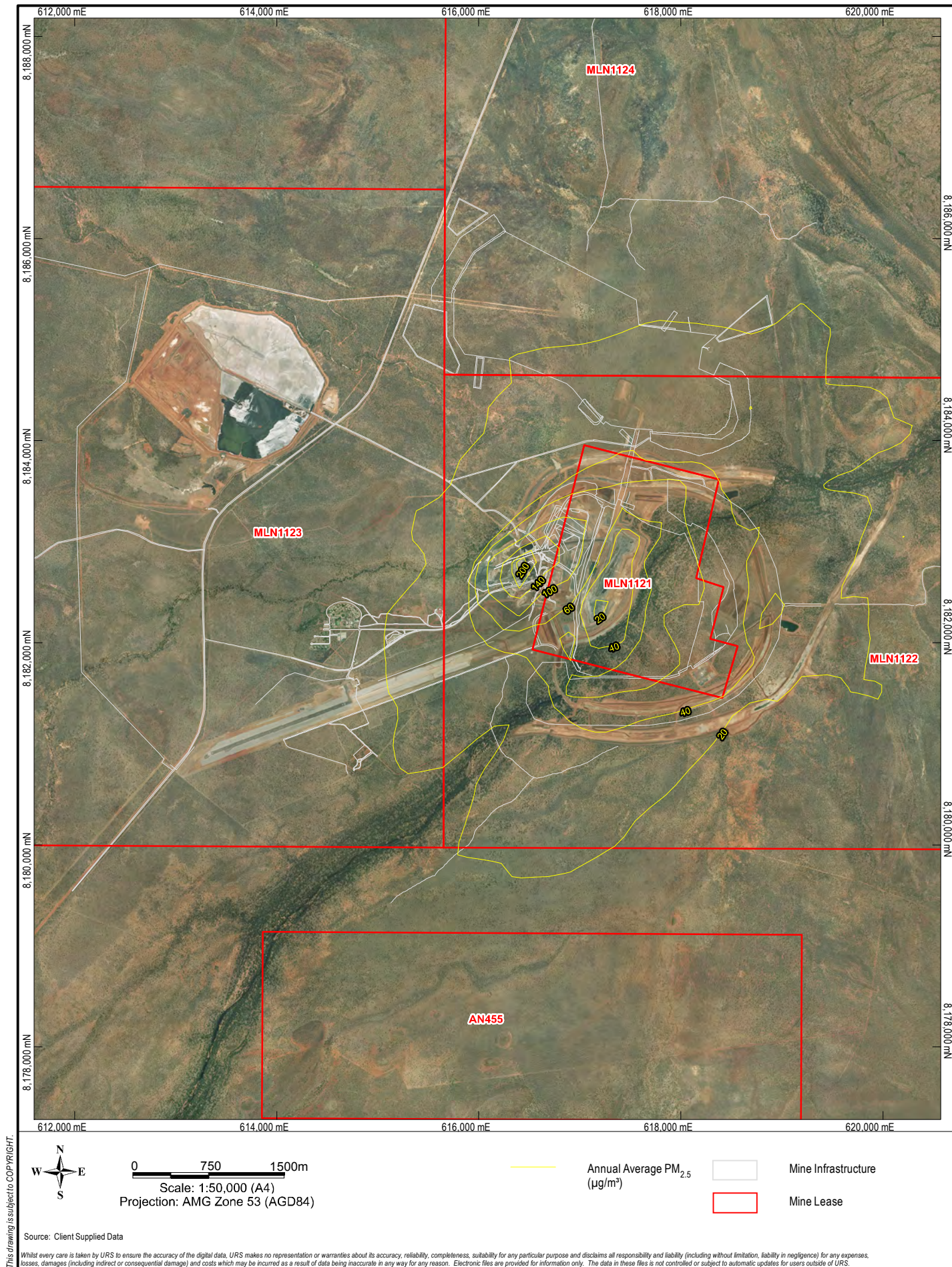
Date: 12-09-2011

Figure: **E-16**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

ANNUAL AVERAGE PM_{2.5}
2015 (µg/m³)

URS

AIR QUALITY

File No: 42626795-g-015.wor

Drawn: RG

Approved: CP

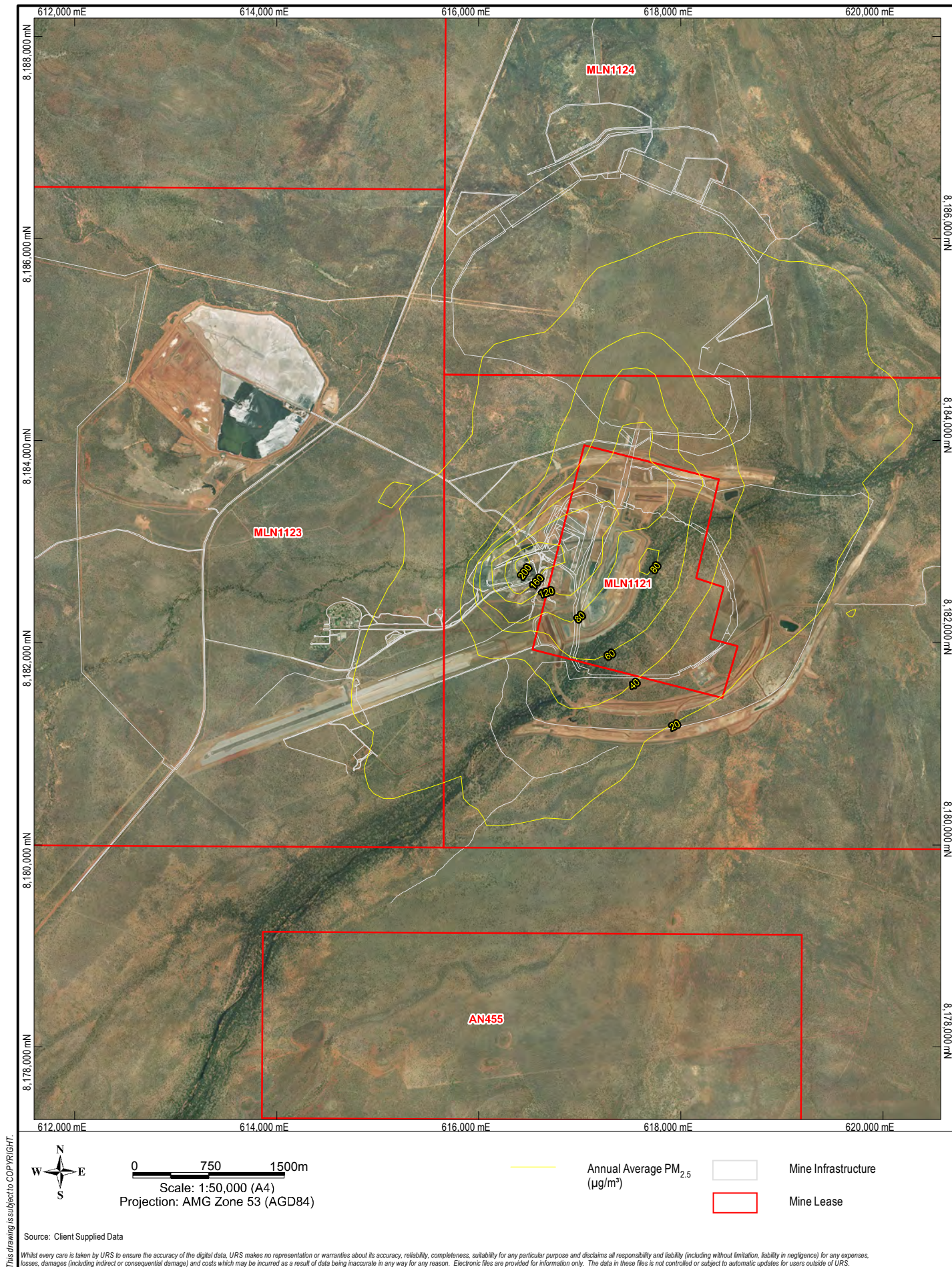
Date: 08-09-2011

Figure: **E-17**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE PM_{2.5}
2025 (µg/m³)**

URS

AIR QUALITY

File No: 42626795-g-016.wor

Drawn: RG

Approved: CP

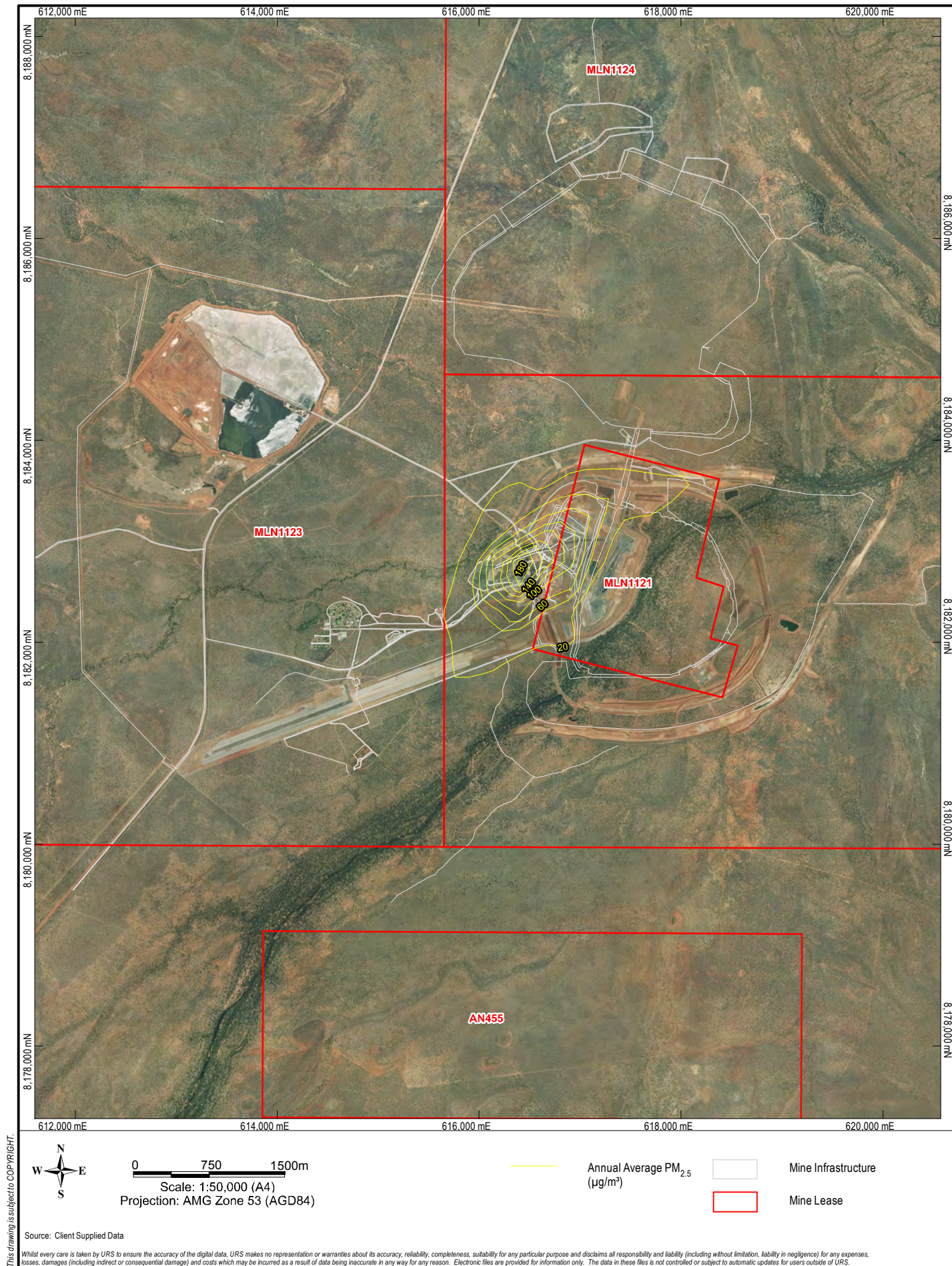
Date: 08-09-2011

Figure: **E-18**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE $PM_{2.5}$
2030 ($\mu g/m^3$)**

URS

AIR QUALITY

File No: 42626795-g-017.wor

Drawn: RG

Approved: CP

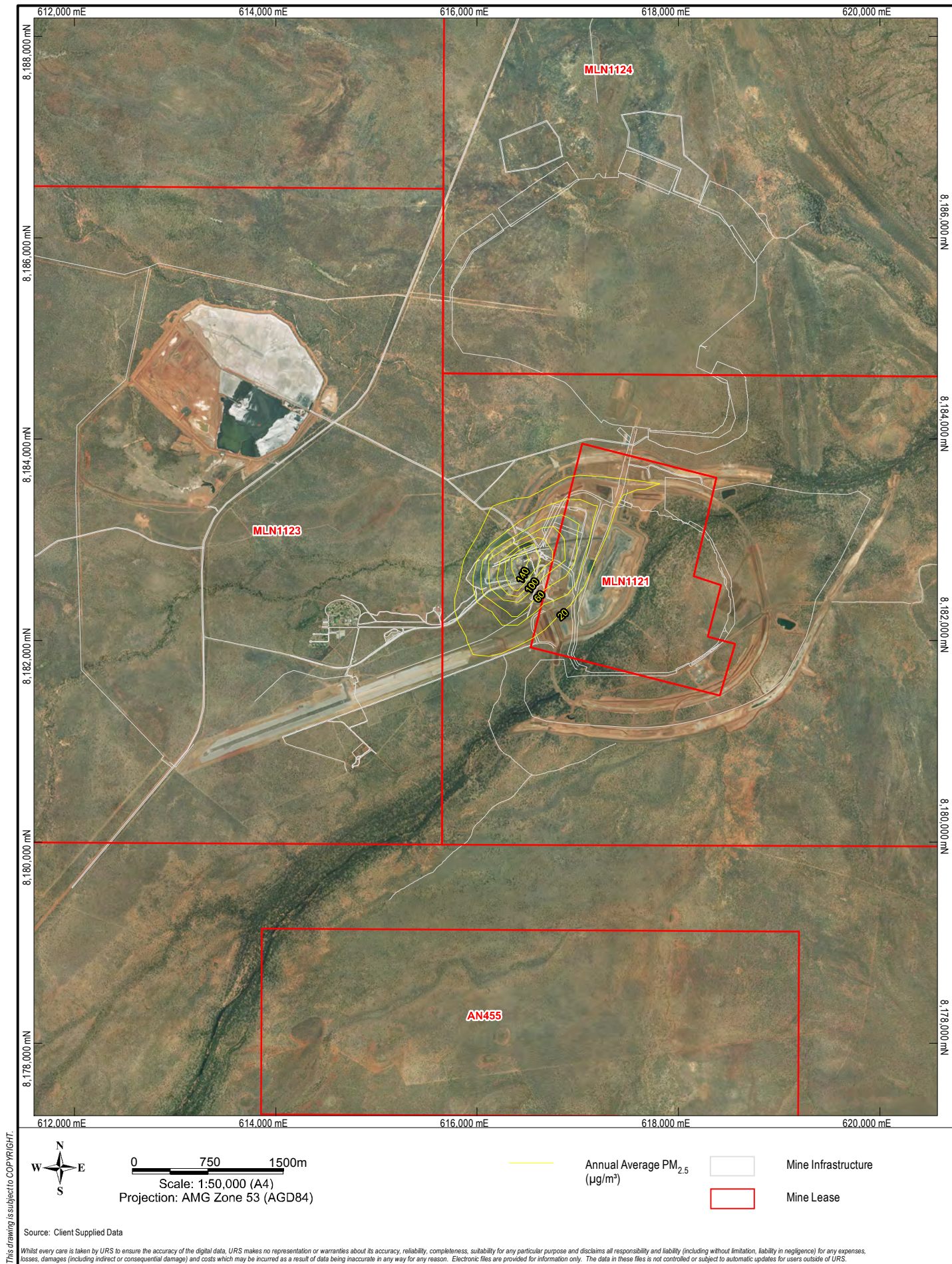
Date: 08-09-2011

Figure: **E-19**

Rev. A

A4





MCARTHUR RIVER MINE
PHASE 3 DEVELOPMENT PROJECT

Draft
ANNUAL AVERAGE PM_{2.5}
2035 (µg/m³)



AIR QUALITY

File No: 42626795-g-018.wor

Drawn: RG

Approved: CP

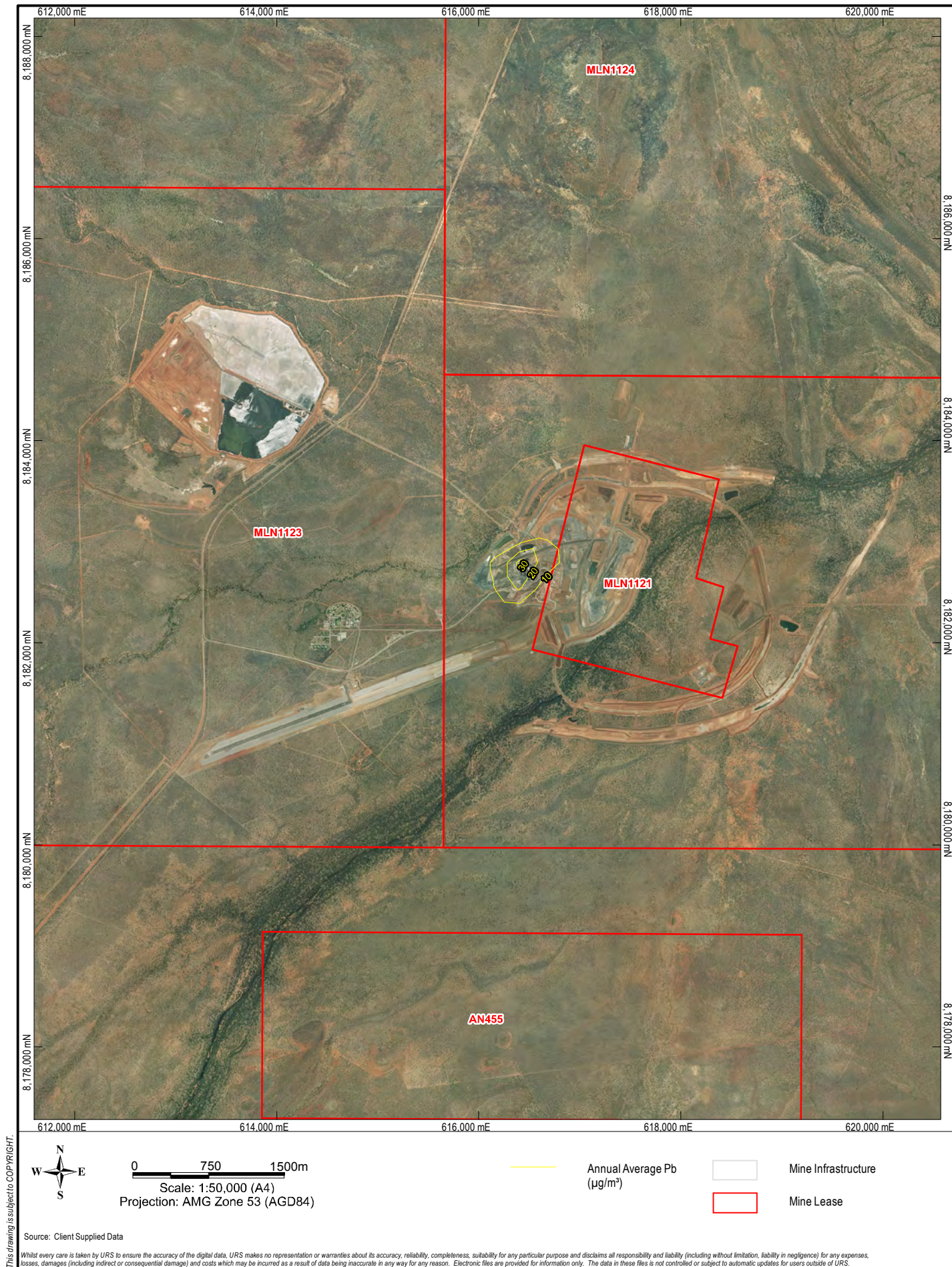
Date: 08-09-2011

Figure: E-20

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

ANNUAL AVERAGE Pb
2011 ($\mu\text{g}/\text{m}^3$)

URS

AIR QUALITY

File No: 42626795-g-019.wor

Drawn: RG

Approved: CP

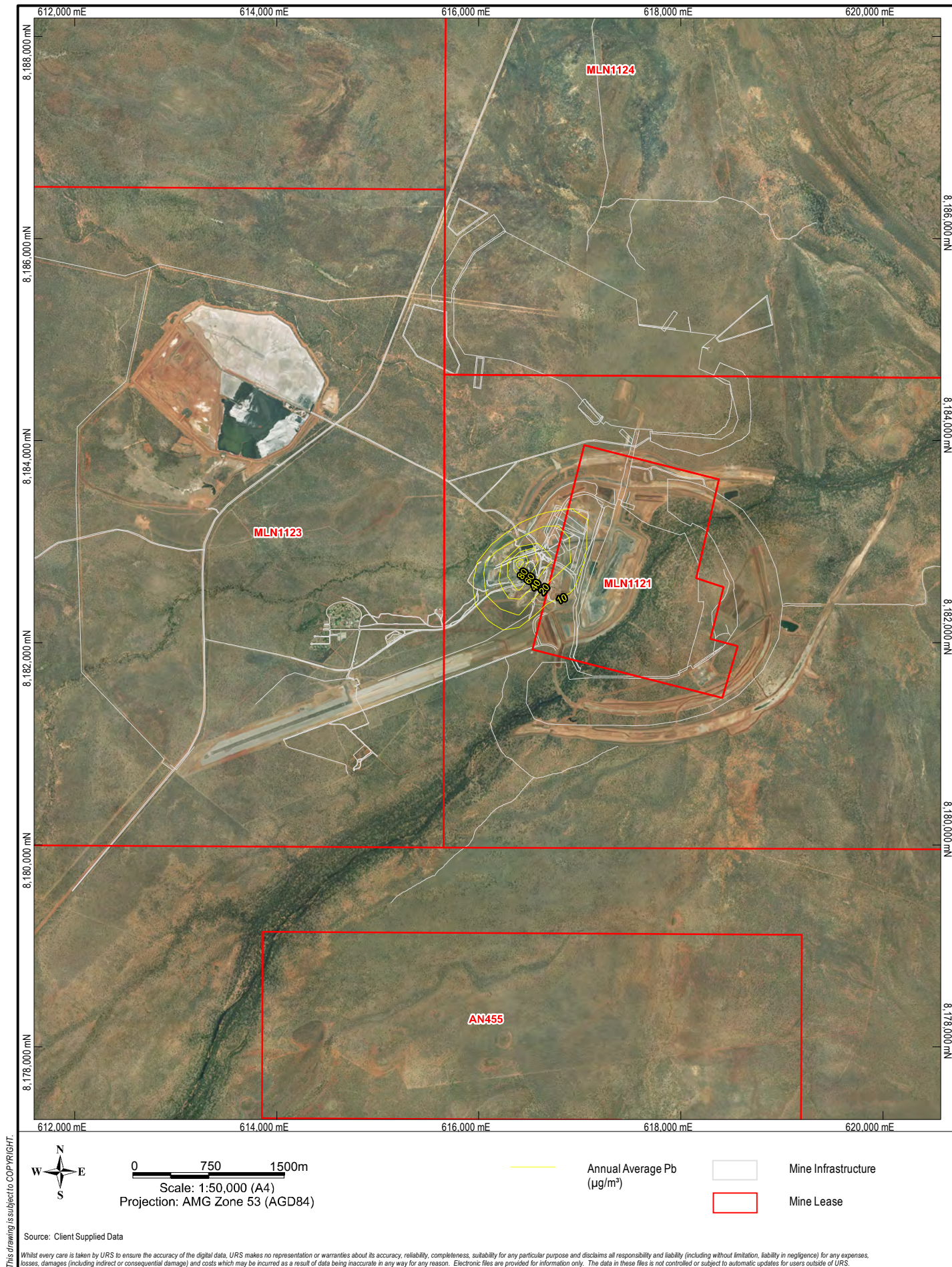
Date: 08-09-2011

Figure: **E-21**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE Pb
2015 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

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Drawn: RG

Approved: CP

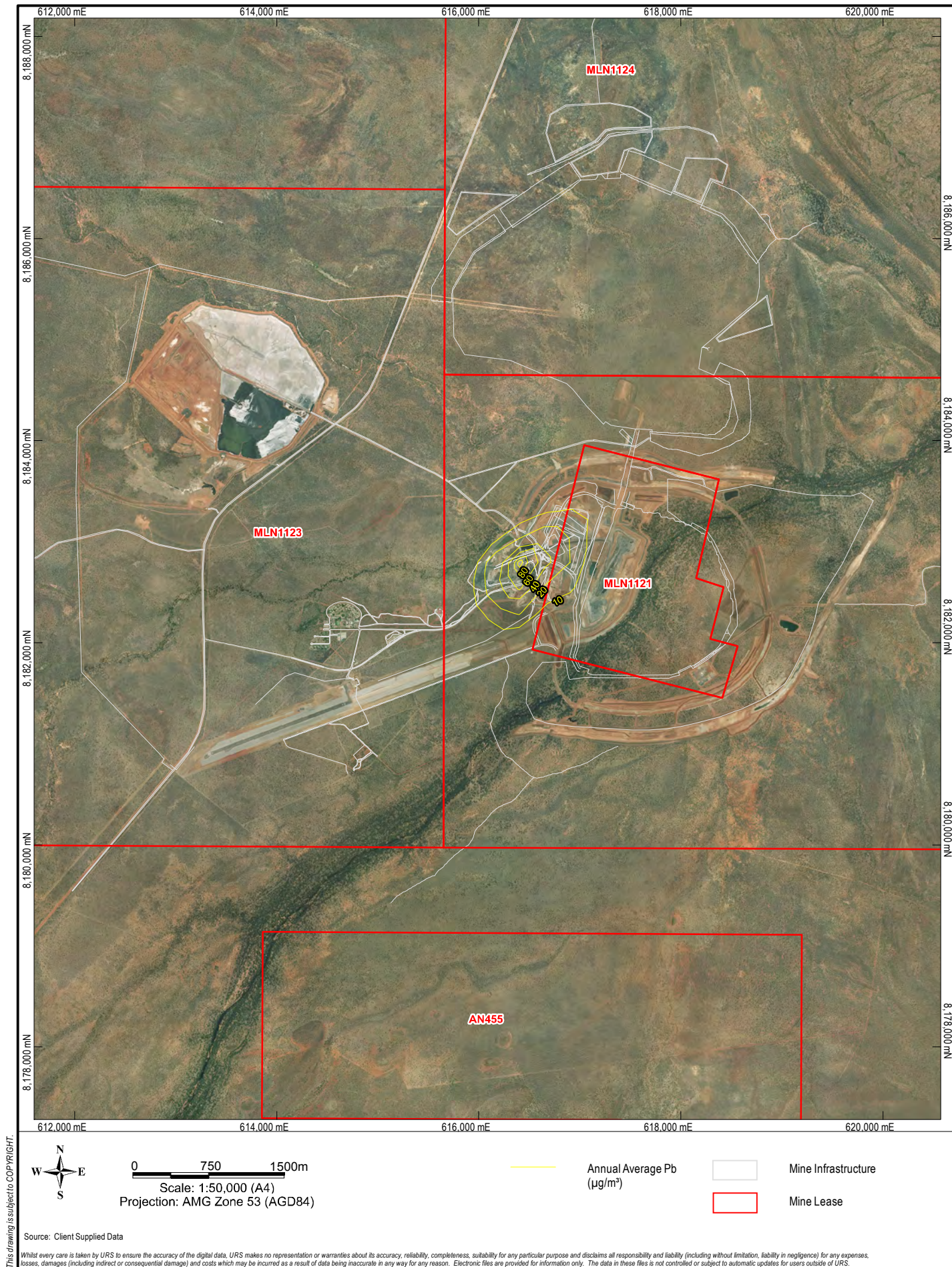
Date: 08-09-2011

Figure: **E-22**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE Pb
2025 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-021.wor

Drawn: RG

Approved: CP

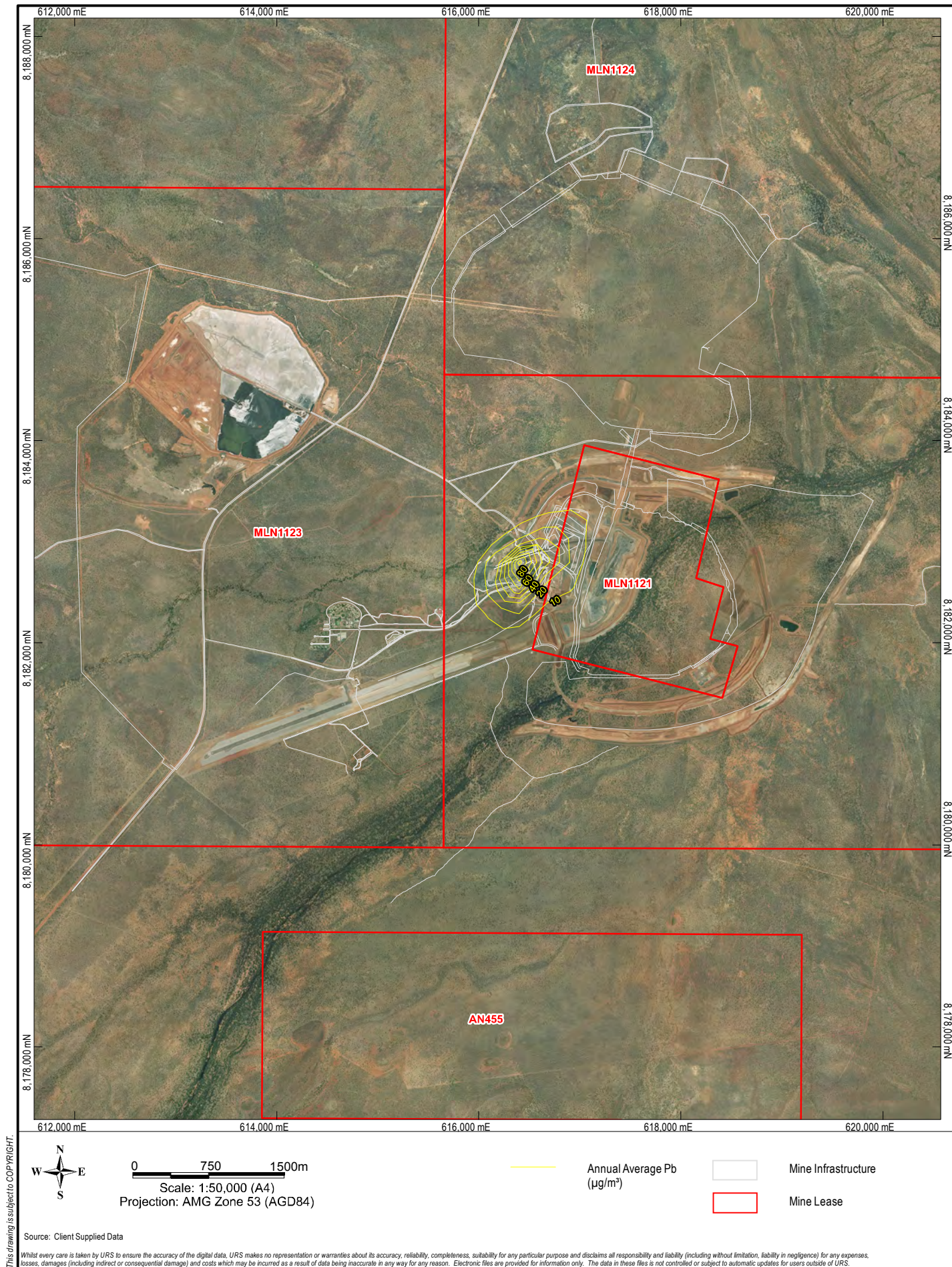
Date: 08-09-2011

Figure: **E-23**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE Pb
2030 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-022.wor

Drawn: RG

Approved: CP

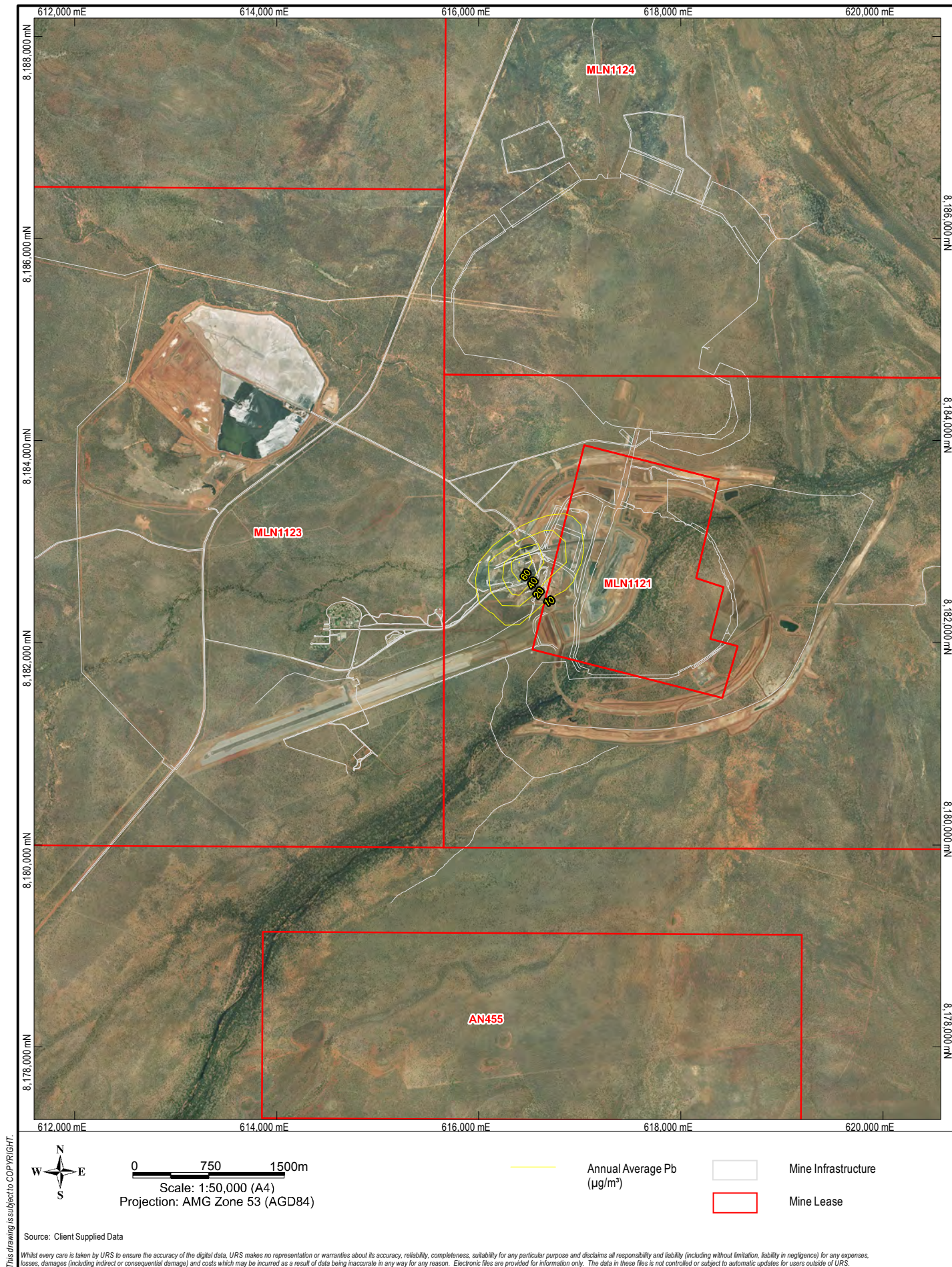
Date: 08-09-2011

Figure: **E-24**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE Pb
2035 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-023.wor

Drawn: RG

Approved: CP

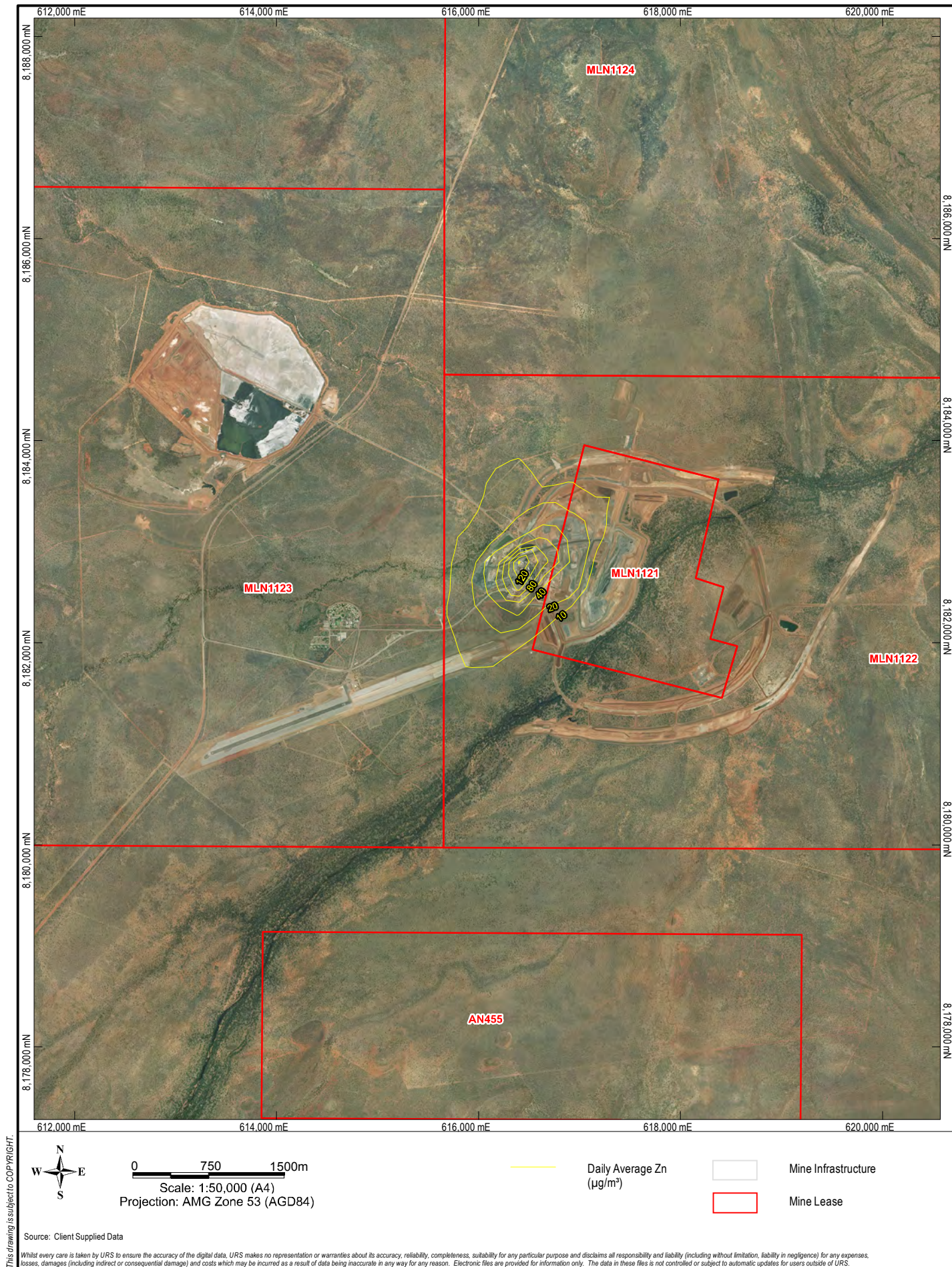
Date: 08-09-2011

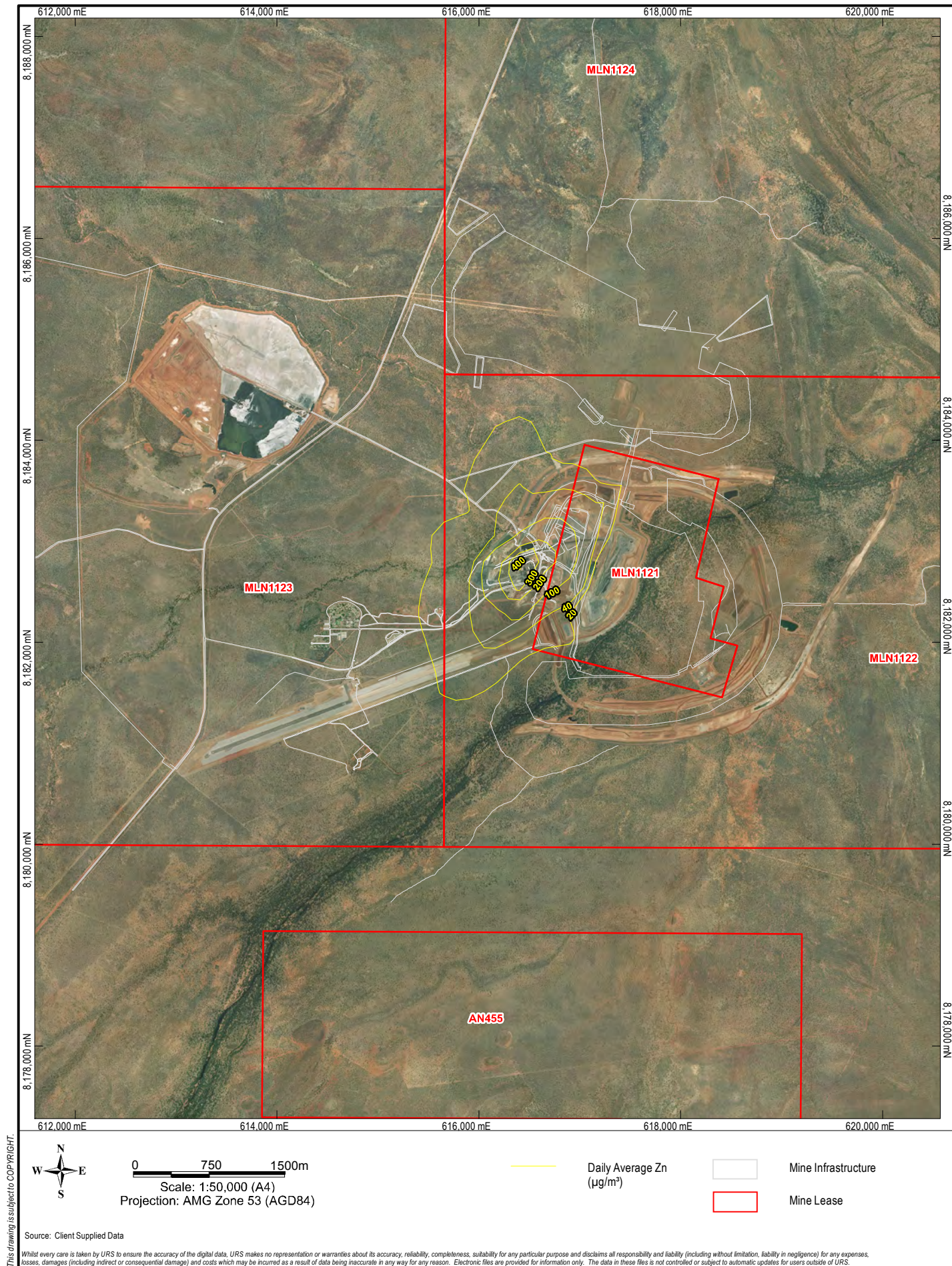
Figure: **E-25**

Rev. A

A4







MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
Zn 2015 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-024.wor

Drawn: RG

Approved: CP

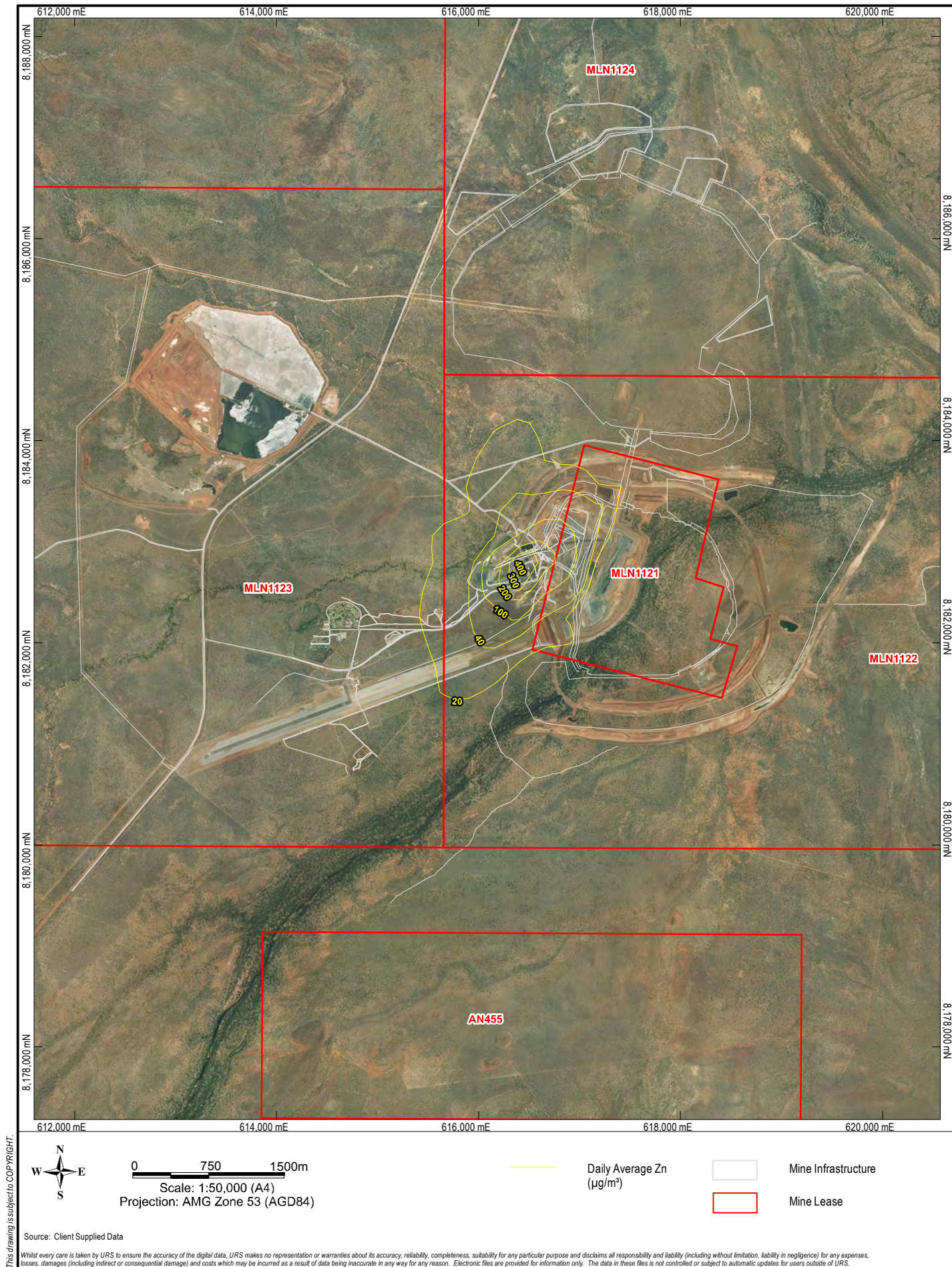
Date: 08-09-2011

Figure: **E-27**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
Zn 2025 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-025.wor

Drawn: RG

Approved: CP

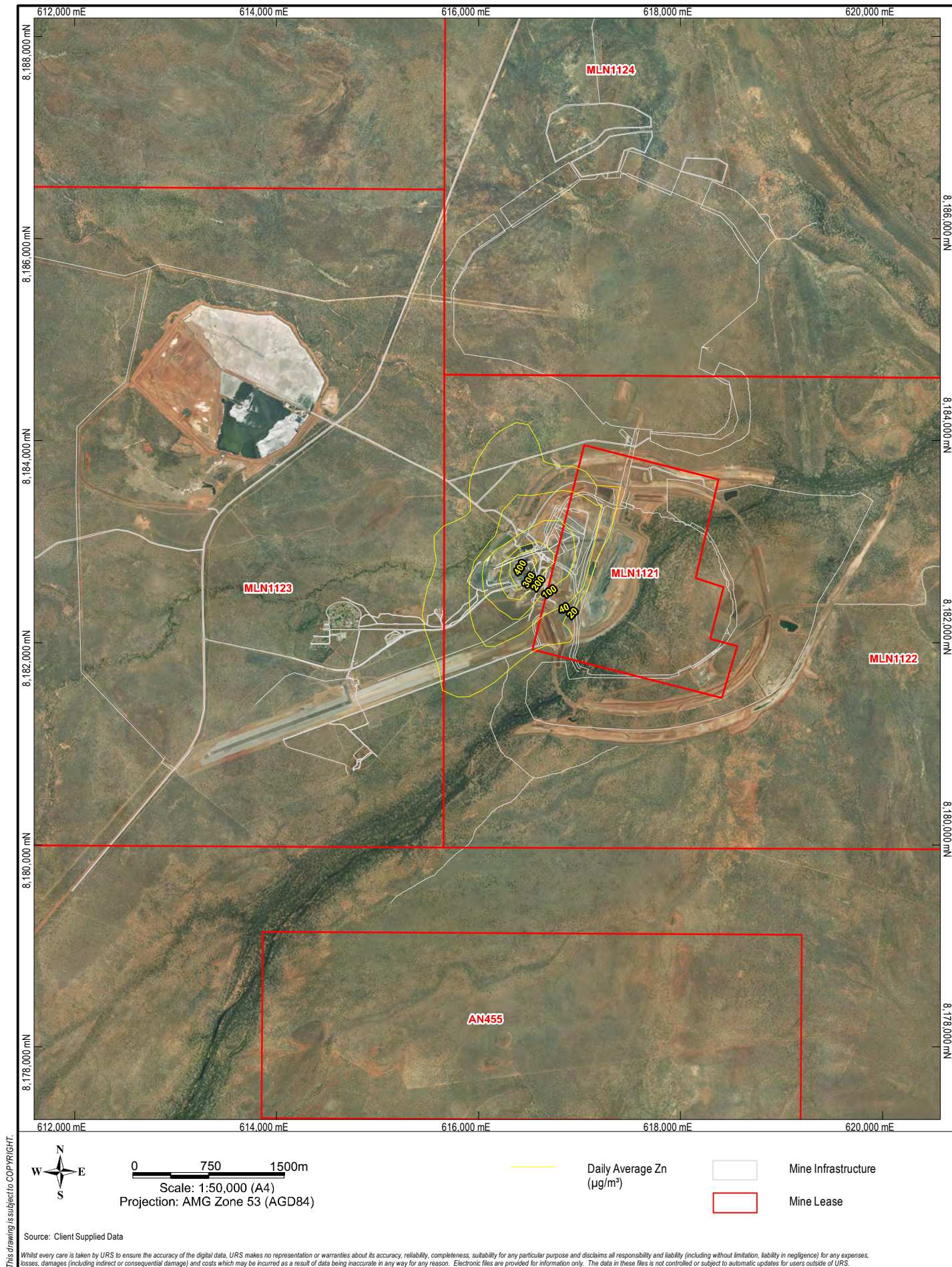
Date: 08-09-2011

Figure: **E-28**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
Zn 2030 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-026.wor

Drawn: RG

Approved: CP

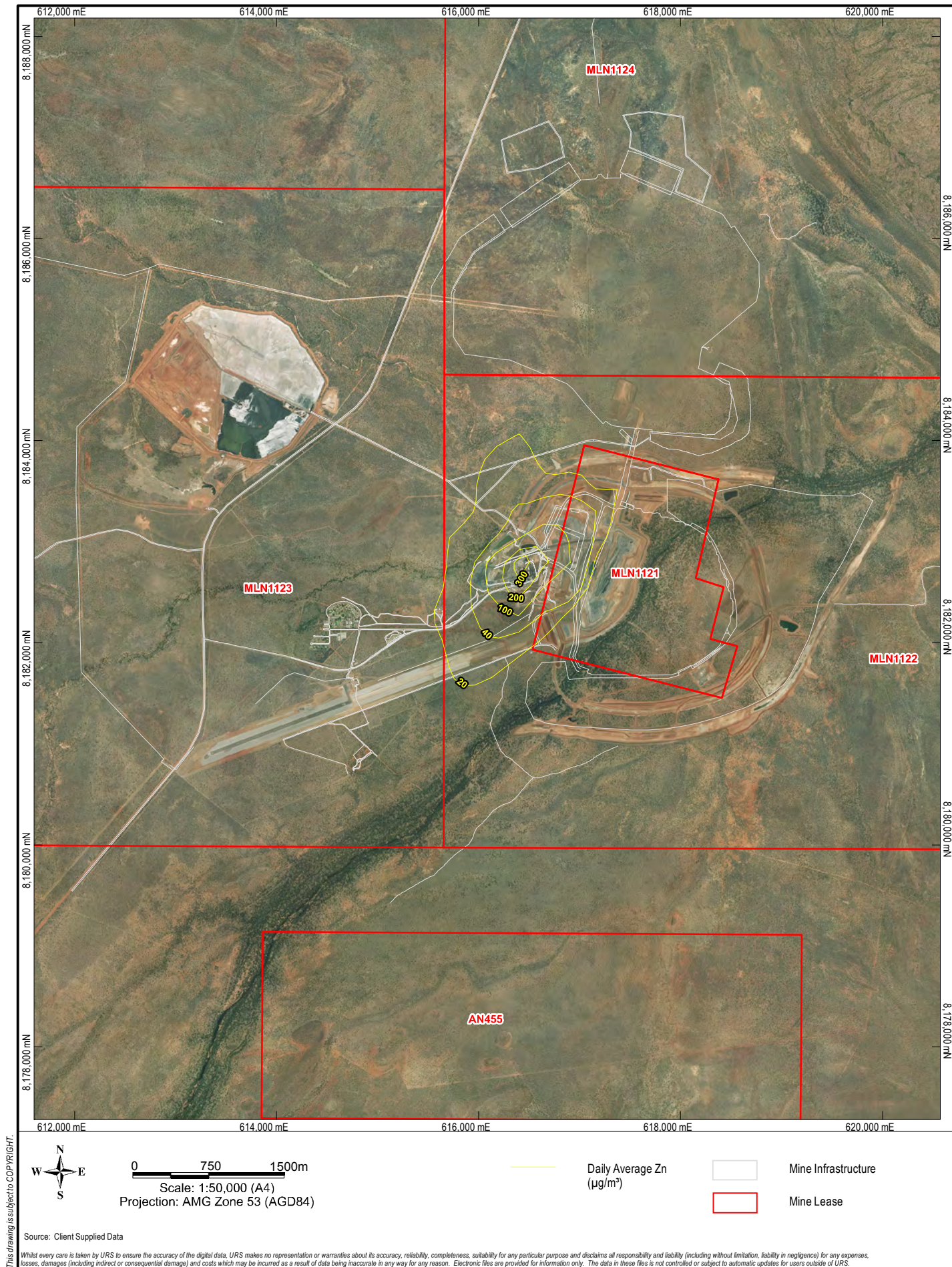
Date: 08-09-2011

Figure: **E-29**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**MAXIMUM DAILY AVERAGE
Zn 2035 ($\mu\text{g}/\text{m}^3$)**

URS

AIR QUALITY

File No: 42626795-g-027.wor

Drawn: RG

Approved: CP

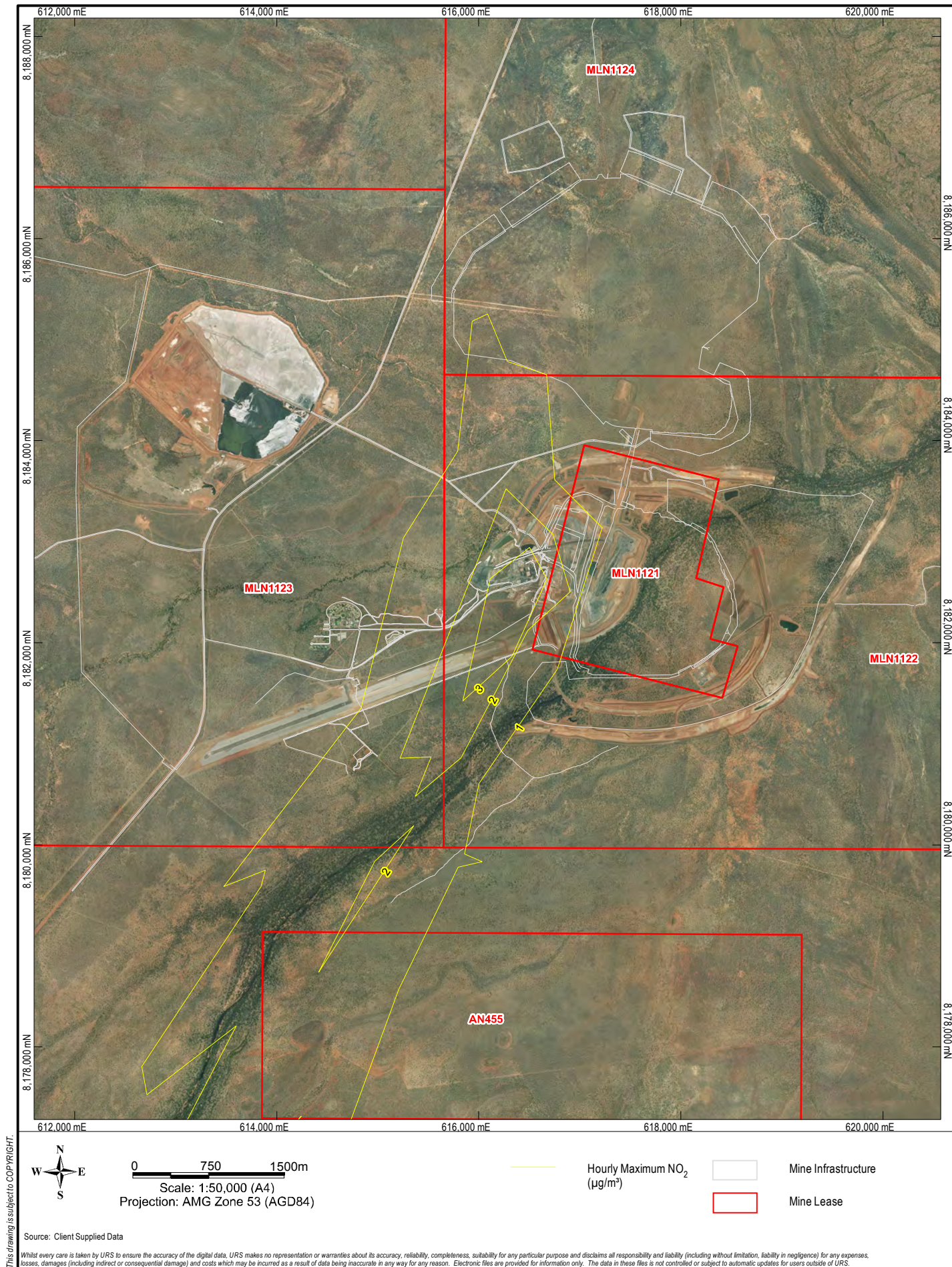
Date: 08-09-2011

Figure: **E-30**

Rev. A

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**ANNUAL AVERAGE
NO₂ (µg/m³)
AVERAGE LOAD**

URS

AIR QUALITY

Figure: **E-31**

File No: 42626795-g-028.wor

Drawn: **RG**

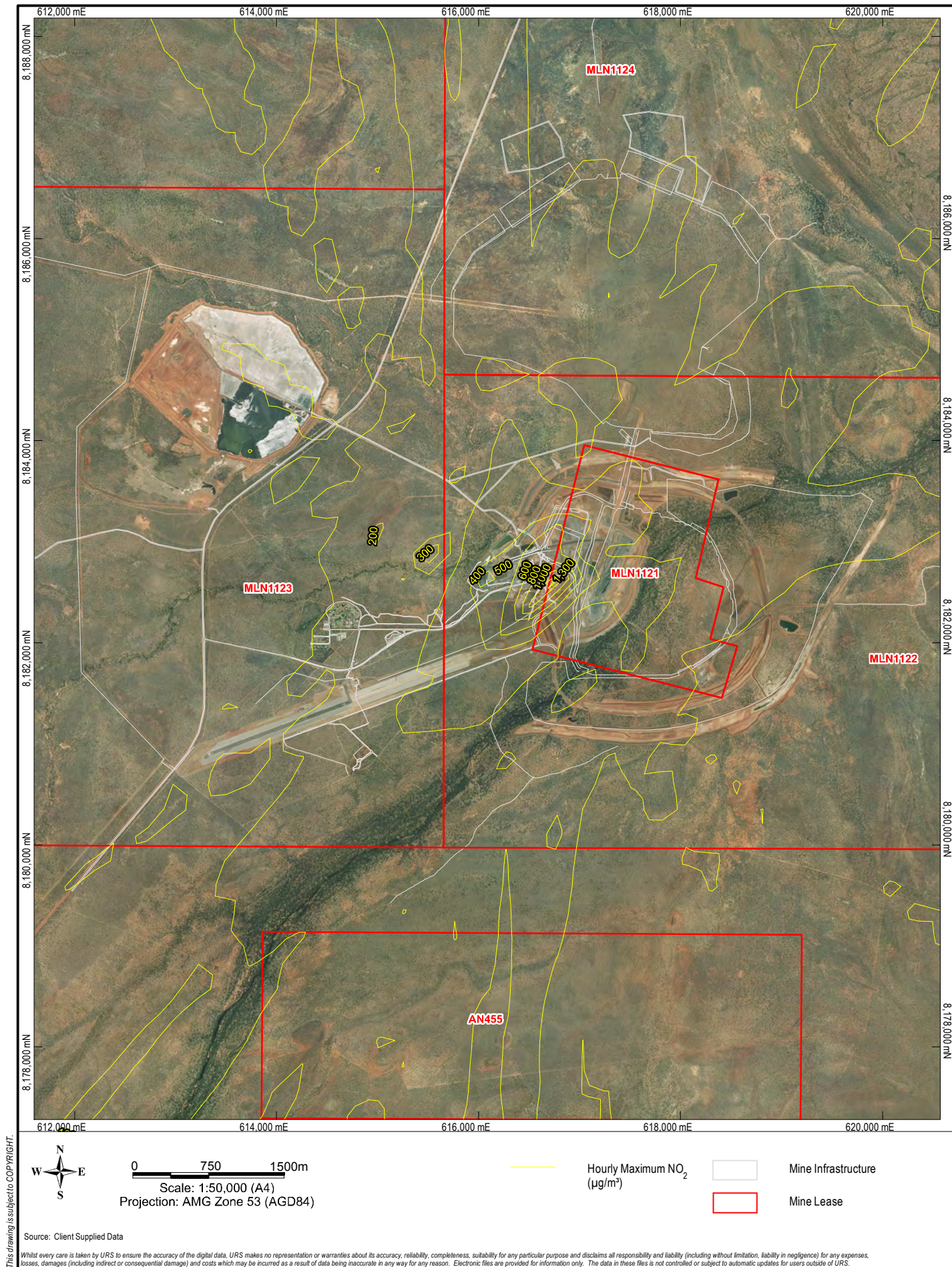
Approved: **CP**

Date: 13-09-2011

Rev. **A**

A4





MCARTHUR RIVER MINE PHASE 3 DEVELOPMENT PROJECT

**HOURLY MAXIMUM
NO₂ (µg/m³)
PEAK LOAD**

URS

AIR QUALITY

File No: 42626795-g-030.wor

Drawn: RG

Approved: CP

Date: 13-09-2011

Figure: **E-32**

Rev. A

A4



Appendix F FullCAM

The National Carbon Accounting System (NCAS) tracks Australia's greenhouse gas sources and sinks from the land. It was developed through extensive collaboration with scientists, policy makers and industry professionals, and combines satellite imagery with models and data to provide a 30-year dynamic account across the continent.

The National Carbon Accounting Toolbox allows users to access the NCAS models and data in order to generate project-level greenhouse gas accounts that are consistent with Australia's national greenhouse accounts. FullCAM Version 3.0 released with the National Carbon Accounting Toolbox Version 1.0 accounts for carbon stock changes associated with land use and management.

F.1 FullCAM Setup

The Plot mode was used, where a 'plot' is a piece of land with uniform characteristics, such as a forest stand or a paddock. It had no area specified thereby acting as a point model and its output masses were in tonnes per hectare. The plot simulation tracks all the carbon (and nitrogen if specified) associated with the plot.

The parameters specified by the user included:

Table F-10 FullCAM User Inputs

Parameter	Input
Configuration	
Plot type	Multilayer mixed including soil and minerals
Simulate	Carbon
Timing	
Simulation steps	Monthly
Duration	January 1980 to December 2010
Output Steps	12 monthly
Data Builder	
Data Builder on	Yes
Spatial Data	Lat -16.42783 deg N, Long 136.10292 deg E
Tree-species Groups	Local Species
Tree-species/Regimes	Local Species

F.2 FullCAM Results

Following table provide the results from FullCAM.

Table F-11 FullCAM Results

Year	Onsite C mass (t C/ha)	C mass of soil (t C/ha)	C mass of debris (t C/ha)	C mass of trees (t C/ha)
1979	49.33	13.6	14.4	21.33
1980	43.68	13.12	9.23	21.33
1981	41.42	12.4	7.69	21.33
1982	39.71	11.8	6.58	21.33

Appendix F

Year	Onsite C mass (t C/ha)	C mass of soil (t C/ha)	C mass of debris (t C/ha)	C mass of trees (t C/ha)
1983	38.42	11.34	5.75	21.33
1984	37.13	10.7	5.09	21.33
1985	36.26	10.35	4.57	21.33
1986	35.58	10.11	4.14	21.33
1987	34.8	9.7	3.77	21.33
1988	34.28	9.49	3.45	21.33
1989	33.75	9.23	3.18	21.33
1990	33.32	9.06	2.93	21.33
1991	32.82	8.76	2.73	21.33
1992	32.48	8.61	2.53	21.33
1993	32.06	8.36	2.37	21.33
1994	31.79	8.24	2.22	21.33
1995	31.47	8.04	2.09	21.33
1996	31.1	7.8	1.97	21.33
1997	30.83	7.64	1.86	21.33
1998	30.65	7.55	1.77	21.33
1999	30.36	7.34	1.69	21.33
2000	30.11	7.15	1.62	21.33
2001	29.88	6.99	1.55	21.33
2002	29.73	6.91	1.48	21.33
2003	29.54	6.78	1.42	21.33
2004	29.37	6.67	1.37	21.33
2005	29.24	6.58	1.32	21.33
2006	29.11	6.49	1.28	21.33
2007	28.99	6.41	1.24	21.33
2008	28.88	6.34	1.21	21.33
2009	28.78	6.27	1.18	21.33
2010	28.69	6.2	1.15	21.33
Min	28.69	6.2	1.15	28.69
Max	49.33	13.6	14.4	49.33

In order to convert the tonnes of carbon to tonnes of carbon dioxide, the data was multiplied by 3.67 (the ratio of molecular mass of carbon dioxide to carbon), giving a conservative maximum 181 tonnes CO₂-e per hectare of land cleared.



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