APPENDIX A

Air Quality Impact Assessment

31 January 2012

Melissa Walker
Hansen Bailey Pty Ltd
Via email: mwalker@hansenbailey.com.au

Re: Drayton Industrial Dam Modification - Air Quality Assessment

Dear Mel

It is understood that Drayton is preparing a minor Modification to extend its operations into three small areas collectively known as the Modification Areas. This letter provides an assessment of the potential for air quality impacts due to the proposed Modification.

1 INTRODUCTION

The specific details of the Modification are as follows:

- The Modification to Drayton's existing Project Approval 06_0202 will be sought under Section 75W of the *Environmental Planning and Assessment Act 1979*.
- The proposed Modification is 36.5 ha additional disturbance than that approved (as shown on **Figure 1**). This is comprised of:
    - 8.8 ha additional disturbance for the Northern Modification Area
    - 7.4 ha additional disturbance for the Southern Modification Area Pit; and
    - 20.3 ha additional disturbance for the Eastern Modification Area.

  All Modification areas have been previously disturbed due to mining operations and rehabilitated.
- The proposed Modification represents an additional 7.7% disturbance to that approved.
- Active mining will not be closer to private residences than that approved.
- No increase in production levels, employee numbers or extension of mine life are proposed.
- The Modification areas were surveyed in the 2007 Drayton Extension EA.
- Drayton has approval for 14 X 280t trucks and 11 x180t trucks. They do not have any 280t trucks and need approval for use of 30 x180t trucks.

The air quality effects of the Drayton Extension were considered in detail in a report prepared in 2007 (**Holmes Air Sciences, 2007**). In 2009, a review of the potential air quality impacts was completed for a Modification to increase the approved mining disturbance footprint by 8 ha (**Hansen Bailey, 2009**). The approach taken is this assessment follows the same process as the 2009 Modification, as detailed in **Section 2**.

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2 ASSESSMENT

2.1 Introduction

The Drayton EA air quality assessment analysed Drayton's operations for three years - Years 1, 5 and 10. Model predictions of the maximum 24-hour PM_{10}, annual average PM_{10}, annual average TSP and annual average dust (insoluble solids) deposition levels were provided for each of these years for both Drayton considered in isolation and Drayton considered with other sources of dust, i.e. a cumulative assessment.

The air quality assessment completed for the Drayton EA identified the area of land that would experience particulate matter concentration and deposition levels above the impact assessment criteria defined by Office of Environment and Heritage (OEH) for PM_{10}, TSP and dust (insoluble solids) deposition.

This assessment makes use of information provided in the Drayton EA air quality assessment and the 2009 Modification to show that the area of land affected by the Modification (with respect to air quality) does not expand beyond the area already identified in the Drayton EA.

In order to ascertain this, a number of steps were completed:

(1) A review of the meteorological conditions in the area;
(2) A comparison of the locations of dust generating activities required to increase the disturbance areas compared with the locations of equivalent dust sources in Years 1, 5 and 10 considered in the Drayton EA; and
(3) A reviewing of the areas identified to be impacted during Years 1, 5 and 10 in the Drayton EA.

Presented in **Section 2.2**, is a review of the location of the dust generating activities in relation to the dust sensitive areas (residences located generally to the north of the mine), and consideration of the prevailing wind directions.

2.2 Meteorology

Figure 2 shows annual and seasonal wind roses for the area prepared from the hourly meteorological data used in the Drayton EA (**Holmes Air Sciences, 2007**). Over the year, winds are predominantly aligned along a northwest-southeast direction, with winds in summer and autumn being mostly from the southeast. In winter and spring winds are more frequently from the northwest although southeast winds are still a significant feature in the wind roses.

If **Figure 1** is inspected, it can be seen that for dust to be transported from the proposed Modification areas towards any of the residences to the north it would require the wind to be from the following sectors:

- Northern Modification Area (marked red on **Figure 1**):
  - in the 60°-wide sector from 195° clockwise to 255°. Thus winds in the sectors SSW, SW and WSW are required to transport dust from the Northern Modification Area to the residences.
- Eastern and Southern Modification Areas (marked red on **Figure 1**):
  - in the 50°-wide sector from 160° clockwise to 210°. Thus winds in the sectors SSE, S, and SSW are required to transport dust from the Eastern and Southern Modification Areas to the residences.

Table 1 shows an analysis of the 1996 meteorological data set as used in the Drayton EA assessment. The relevant directions are shown in bold print. The table shows that over the year approximately 5.9% of winds lie in the three sectors (SSW, SW and WSW) relevant to the Northern Modification Area and approximately 7.7% of winds lie in the three sectors (SSE, S and SSW) relevant to the Eastern and Southern Modification Areas.

A more detailed analysis of the data confined to the precise sectors for the Northern Modification Area (defined by "195° clockwise to 255°") and for the Eastern and Southern Modification Areas (defined by "160° clockwise to 210°") show only 381 and 262 hours, respectively, of the 7080 hours of valid data in the 1996 dataset were in the direction that would carry dust from the new mining area to the residences. This is 5.4% (Northern Modification Area) and 3.7% (Eastern and Southern Modification Areas) of hours in the year.

This analysis indicates that, given the prevailing winds, the Modification Areas are very favourably located in relation to the nearby residences and very little of the dust liberated while working in this area would be transported towards the residential area of Antiene.

Table 1: Analysis of winds for Drayton area showing fractional occurrence of winds in indicated wind direction and wind speed classes

ALL PASQUILL STABILITY CLASSES

Wind Speed Class (m/s)

WIND SECTOR	0.50 TO 1.50	1.50 TO 3.00	3.00 TO 4.50	4.50 TO 6.00	6.00 TO 7.50	7.50 TO 9.00	9.00 TO 10.50	GREATER THAN 10.50	TOTAL
NNE	0.036864	0.026554	0.001977	0.000424	0.000282	0.000141	0.000000	0.000000	0.066243
NE	0.024294	0.009040	0.000565	0.000141	0.000000	0.000000	0.000000	0.000000	0.034040
ENE	0.012712	0.002966	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.015678
E	0.008757	0.007203	0.001554	0.000424	0.000282	0.000000	0.000000	0.000000	0.018220
ESE	0.010734	0.026695	0.019915	0.015819	0.008192	0.002825	0.000565	0.000141	0.084887
SE	0.010734	0.025424	0.064831	0.073305	0.051977	0.021186	0.004520	0.000847	0.252825
SSE	**0.008475**	**0.007486**	**0.011158**	**0.011582**	**0.006921**	**0.003107**	**0.000424**	**0.000000**	**0.049153**
S	**0.007910**	**0.004661**	**0.000847**	**0.000000**	**0.000424**	**0.000000**	**0.000000**	**0.000000**	**0.013842**
SSW	**0.009887**	**0.002825**	**0.000424**	**0.000282**	**0.000141**	**0.000000**	**0.000141**	**0.000000**	**0.013701**
SW	**0.011158**	**0.003955**	**0.000424**	**0.000282**	**0.000424**	**0.000141**	**0.000000**	**0.000000**	**0.016384**
WSW	**0.014407**	**0.010452**	**0.002260**	**0.000989**	**0.000847**	**0.000141**	**0.000141**	**0.000000**	**0.029237**
W	0.012429	0.015254	0.008051	0.005367	0.004237	0.002684	0.003107	0.001412	0.052542
WNW	0.013701	0.015960	0.016243	0.021751	0.015395	0.011299	0.005367	0.002401	0.102119
NW	0.019915	0.018927	0.021610	0.013701	0.007345	0.002542	0.001130	0.000706	0.085876
NNW	0.022175	0.024153	0.013701	0.006356	0.005367	0.001554	0.000706	0.000424	0.074435
N	0.032627	0.036582	0.013842	0.004944	0.001836	0.000847	0.000141	0.000000	0.090819
CALM									0.000000
TOTAL	0.256780	0.238136	0.177401	0.155367	0.103672	0.046469	0.016243	0.005932	1.000000

MEAN WIND SPEED (m/s) = 3.59
NUMBER OF OBSERVATIONS = 7080

2.3 Comparison of proposed mining in the Modification area with areas covered in previous modelling work

When the original Drayton EA air quality impact report is reviewed, it is easy to see that of the three years modelled, it is Year 10 that is the most relevant year for assessing the effects of mining in the Modification areas.

Figure 3 shows the locations of mining equipment as envisaged in Year 10 (see **Holmes Air Sciences (2007)**) and the predicted annual average PM_{10} concentrations for the same year and

equipment deployment. The numbered dots on the figure denote the locations of dust generating equipment over Year 10.

With respect to the Northern Modification area, the dots numbered 17 to 21 show working positions for the shovel/excavator in the northern pit.

With respect to the Eastern Modification area, the dots numbered 26 to 27 show working positions for the haulage of ROM coal and rejects, and the handling of ROM coal at stockpiles.

In the Drayton EA assessment this scenario (Year 10) showed no exceedences of any of the OEH's impact assessment criteria at the privately owned residences to the north. This approved scenario envisages mining equipment located closer to the residences than will be required when the Northern and Eastern Modifications are undertaken.

Assuming mining takes place at the same rate (i.e. coal and overburden are generated at the same rate) then a good indication as to the likely effects of dust emissions from the Modification Areas can be obtained by sliding the contours and numbered source location markers to the southeast. To represent the effects when activity is taking place in the Northern Modification Area, the dot marked 17 should be located slightly south west in the Northern Modification Area. To represent the effects when activity is taking place in the Eastern Modification Area, the dots marked 26 and 27 should be located in the Eastern Modification Area. . To represent the effects when activity is taking place in the Southern Modification Area, the dot marked 2 would be located slightly south. The other dots would retain their same relative position as should the contours. If this is done it can be seen that no residences would experience higher predicted annual average PM_{10} levels than would arise in Year 10. If this is the case for annual average PM_{10} concentrations then it can be concluded that this will also apply to the contours for the other assessment criteria.

2.4 Change to overburden truck capacity

In the Drayton EA assessment, it was assumed that overburden trucks would have a carrying capacity of 280 tonnes per load (t/load). The actual capacity of the overburden trucks in use is 180 t/load.

The use of 180 t trucks increases the total emissions from year 10 operations by approximately 11%. However it is our experience that the change in impacts is not directly proportional to the increase in emissions. Further, even if it were, an 11% increase in impacts would still not result in any exceedence of the OEH's impact assessment criteria.

3 CONCLUSIONS

This report has assessed the effects on air quality of additional disturbance at Drayton Mine and the use of 180t trucks for overburden transport. Previous air quality impact assessment work undertaken as part of the Drayton EA examined the effects of mining for three scenarios in Years 1, 5 and 10. A review of meteorological conditions indicates that, given the prevailing winds, the Modification Areas are favourably located relative to the nearby Antiene residential area. A review of the modelling results for Year 10 shows that there would be no predicted exceedances of the OEH's assessment criteria at the nearby privately owned residences as a result of the Modification. This conclusion of course assumes that mining methods, other mining equipment (excluding the assessed change in the change to overburden trucks) and the rate of coal and overburden production in the Modification Area are similar to the levels assumed for Year 10.

4 REFERENCES

Hansen Bailey (2009)

"Appendix B. Air Quality Impact Assessment. Drayton Mine. Project Approval Modification Environmental Assessment" prepared for Anglo Coal (Drayton Management) Pty Limited. July 2009.

Holmes Air Sciences (2007)
"Air Quality Impact Assessment: Extension of Drayton Open Cut Mine" Prepared for Hansen Bailey by Holmes Air Sciences, Suite 2B, 14 Glen Street, Eastwood, NSW 2122 (also published as Appendix E to the EA).

Please do not hesitate to contact me should you require any further information.

Kind regards

Judith Cox
Senior Air Quality Engineer

FIGURES

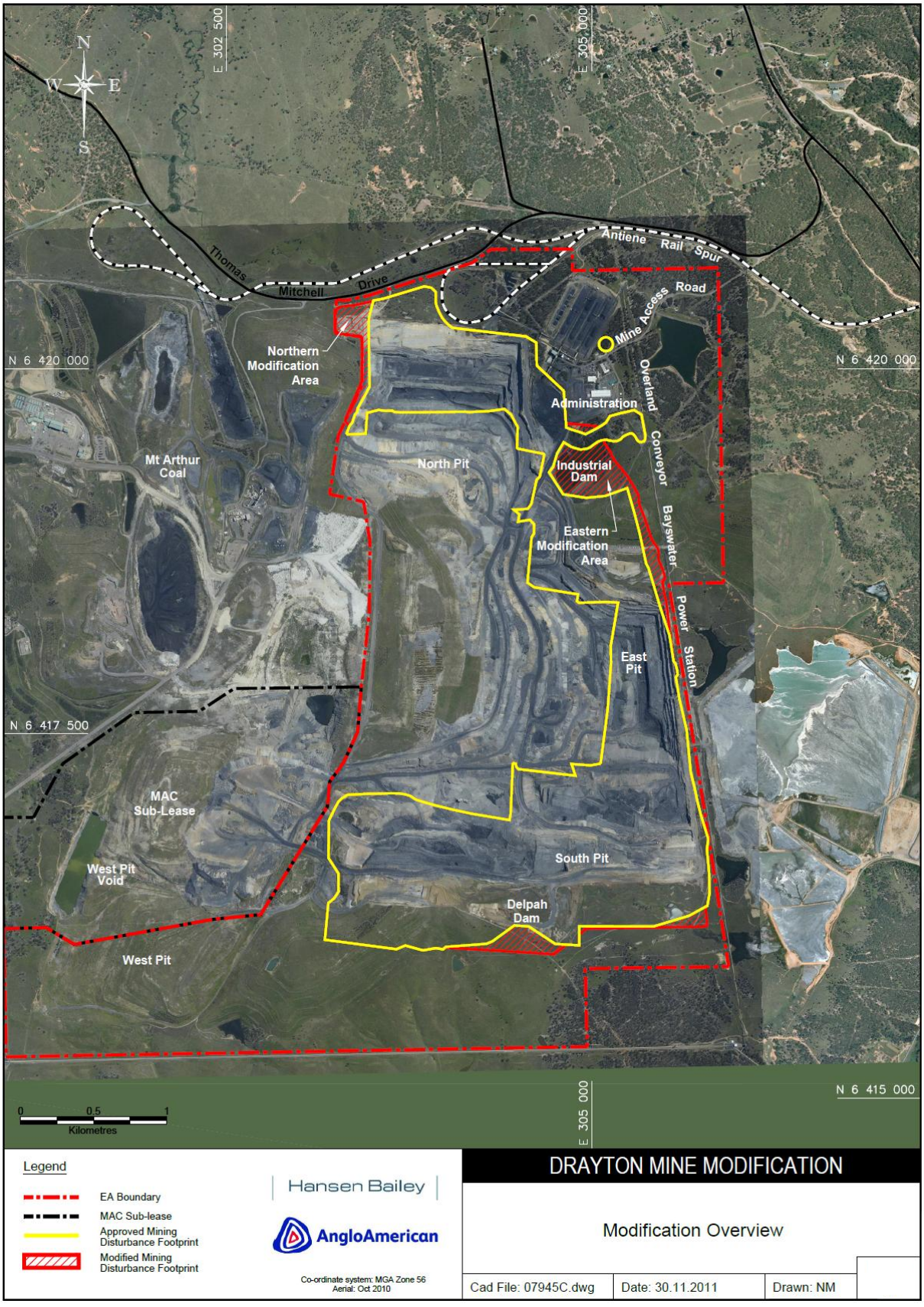

Figure 1: Modification overview

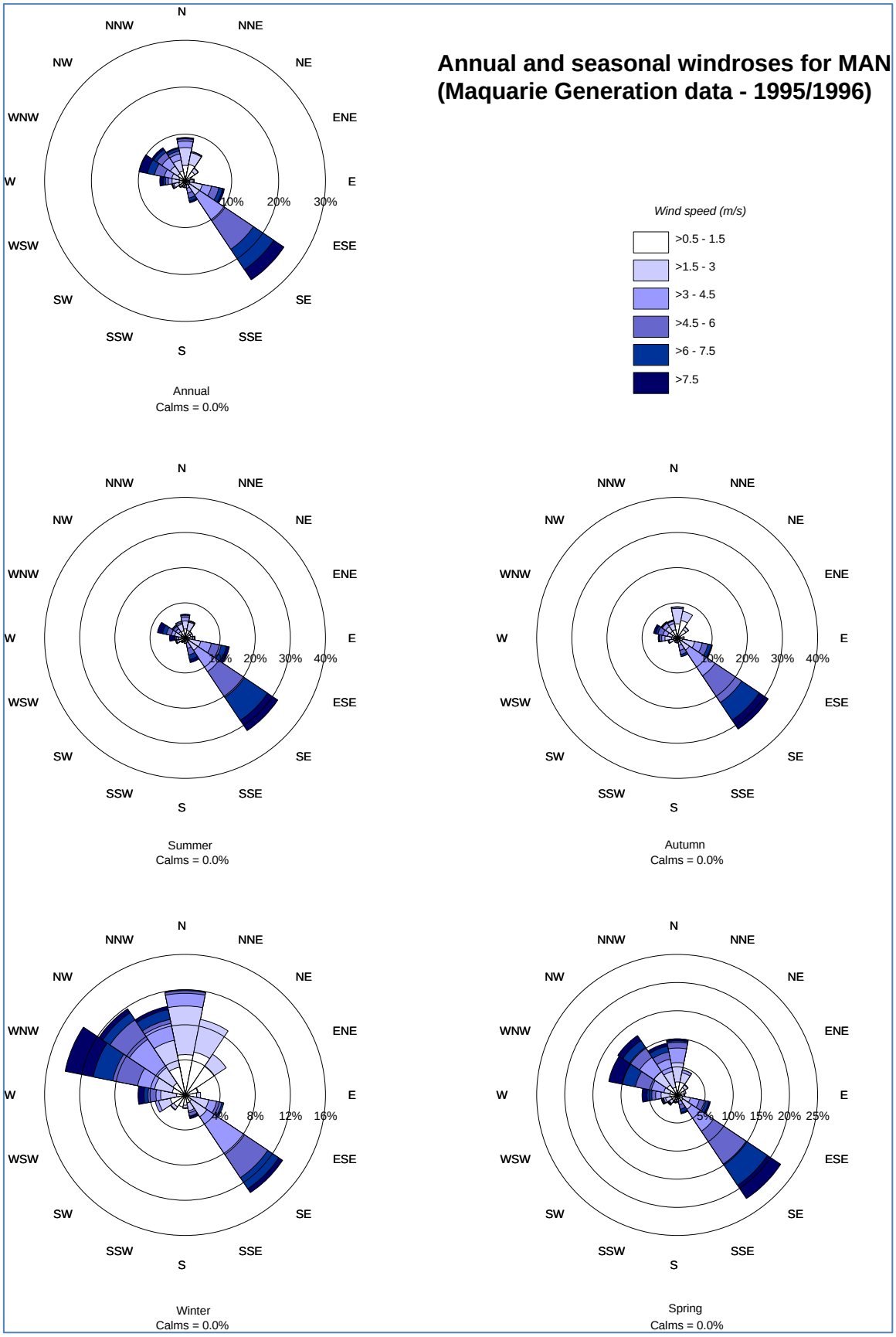

Figure 2: Annual and seasonal windroses of meteorological data used in EA

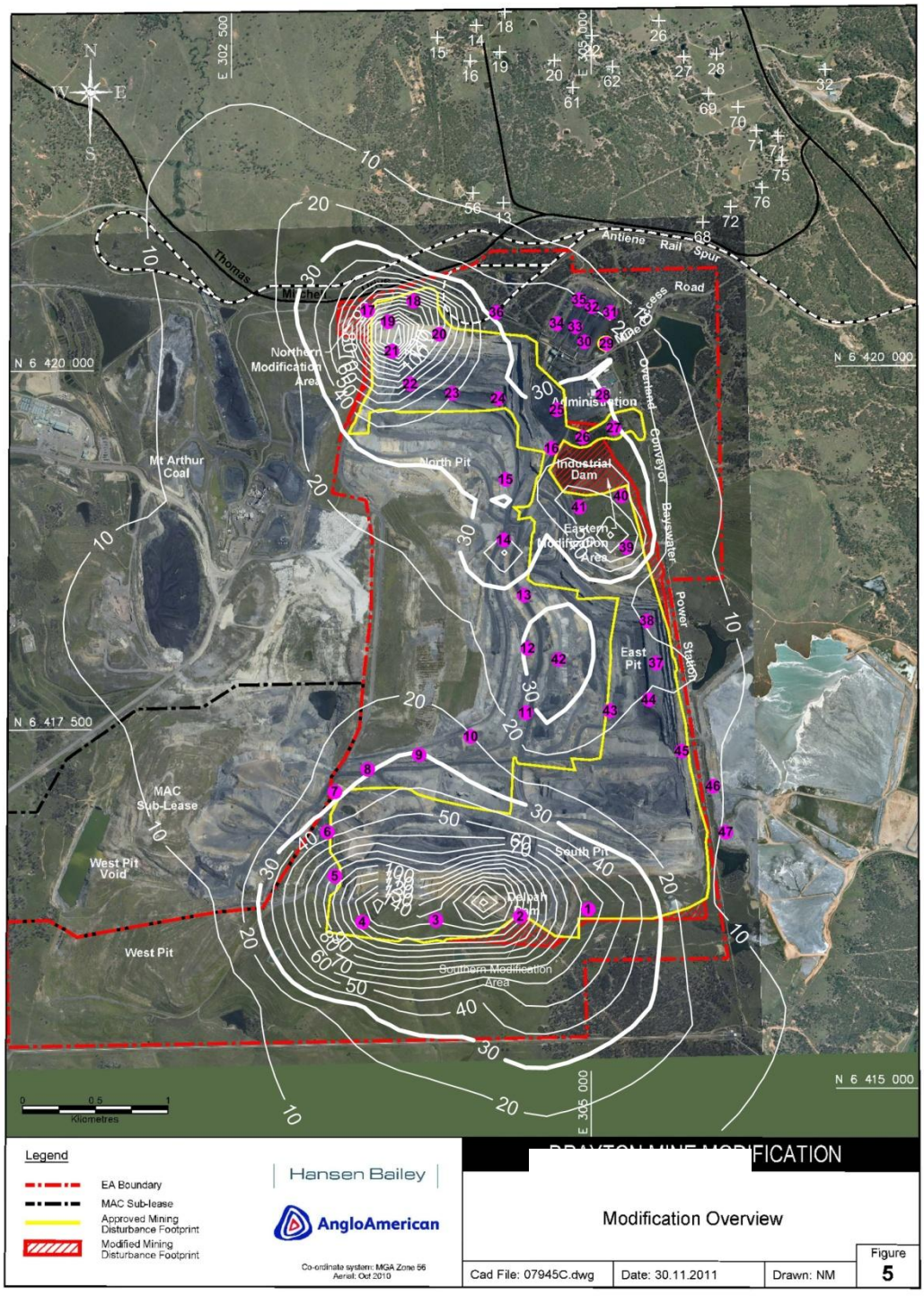

Figure 3: Location of dust sources in Year 10, resulting annual average PM_{10} concentration ($\mu g/m^3$) and the location of new disturbance areas