

## Nimrodel Resources Limited Takatokwane Project Resource Estimation



## J\_1265

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## 1. INTRODUCTION

Nimrodel has recently completed an initial programme drilling comprising 14 drillholes on the Takatokwane project area (PL035/2007) located 195 km west of Gaborone in Botswana. Optiro was requested to compile a geological model and resource assessment based on this drilling and other drilling previously carried out on the area.

Dr Blayden, a Competent Person for coal resources, has prepared this report and resource estimate on behalf of Optiro with the assistance of Amanda Clements, who undertook the computer modelling and resource estimation using Datamine mining software.

## 2. LOCATION AND ACCESS

The Takatokwane project is contained within PL035/2007, a square shaped area approximately 400 km<sup>2</sup> in area. The permit is located 195 km west of Gaborone and is accessible by a fully sealed road which passes immediately to the north. The topography is flat and the area is largely covered by open savannah vegetation which has been cleared in part. The area is largely used for grazing and contains a number of settlements. There are few tracks within the area although cross country access is possible.

## 3. GEOLOGY

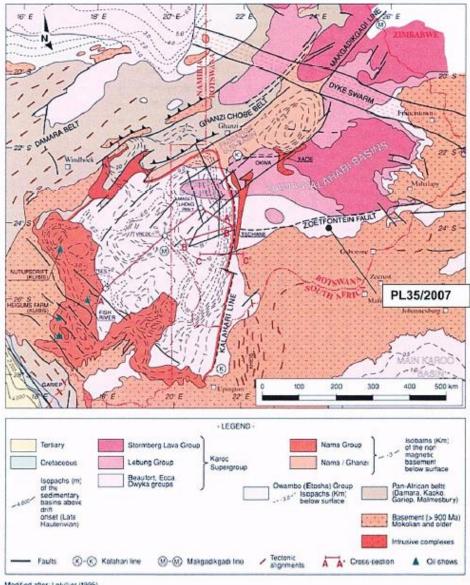
## 3.1. **REGIONAL GEOLOGY**

The Takatokwane exploration area is located in the Kweneng area on the south eastern margin of the Kalahari Basin in central Botswana. The area contains Permian-age coal bearing strata of the Ecca Group, part of the much more widely developed Karoo Supergroup. Coals of equivalent age to the Ecca Group are widely developed in southern Africa (Figure 3.1 and Figure 3.2).

The coal bearing sequence is between 40 m and 60 m thick and is best known to the east, in the Mmamabula area, where the sequence usually contains three seams referred to, from bottom to top as the E, A and K seams (Figure 3.2).



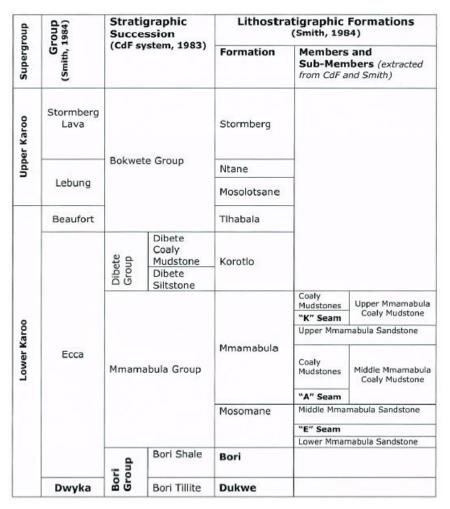
#### Figure 3.1 Location map and geology of Botswana



Modified after: Letuilier (1995)



#### Figure 3.2 Karoo Super-group stratigraphy



## **3.2. PERMIT GEOLOGY**

There is no outcrop on the permit area and assessment of the geology is based entirely on drilling. Up until now exploration has been of a regional nature and how the coal bearing formations and structure in the area relate to the regional geology, particularly to areas further east, has yet to be fully realised. Stratigraphic nomenclature and seam names have thus been adopted on an informal basis largely for the purposes of modelling and resource estimation.

Two key formations of the Ecca Group are recognised; the coal bearing Mmamabula Formation and the overlying Dibete Siltstone. In the Takatokwane area the Mmamabula Formation is at least 75 m thick and may be thicker, as it is not certain yet whether the full sequence has been intersected. The overlying Dibete Siltstone may be at least 100 m thick. Unconformably overlying the whole sequence is a veneer of younger calcrete and/or conglomeratic silcrete (Tertiary?) up to 60 m thick overlain by unconsolidated sand.

## 3.3. COAL GEOLOGY

At this stage four principal seams are recognised in the area, referred to as Seams 1 to 4, although in some drillholes a further two seams (Seam 5 and 6) are also developed.

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The seams are relatively evenly spaced within the sequence and largely separated by sandstone intervals although there is usually some shale or siltstone directly associated with the coal. Seam 1 defines the upper boundary of the Mmamabula Group as it is in most cases directly overlain by the massive finer grained sediments of the Dibete Siltstone.

## Seam 1

Seam 1 is recognised in nine drillholes and is largely developed along the eastern boundary of the permit. It is commonly >2 m in thickness with a maximum thickness 4.86 m in drillhole WA5. The average ash value for the seam is 38.1% and the average sulphur is 3.1%.

## Seam 2

Seam 2 is widely developed in the permit area and has maximum thickness of 17.48 m in drillhole WA4 on the eastern central boundary. In the adjacent drillhole to the south (WA5) the seam has a thickness of 14.08 m. The average ash content is 34.3% and sulphur is 3.7%. To the south, west and north the seam splits into Seam 2 Upper and Seam 2 Lower.

The Upper split is consistently developed to the west south and north though it appears to thin out to the north-west. It is commonly >2 m in thickness. The Seam 2 Upper is relatively low in ash and sulphur with average contents of 25.8% ash and 1.8% sulphur.

The Lower split recognised in virtually all drillholes though is variable in thickness, locally down to 0.5 m and up to 5.13 m. The average ash and sulphur contents are 37.6% and 2.6% respectively.

## Seam 3

Seam 3 is also widely developed and reasonably consistent in thickness. The seam is commonly >1.5 m in thickness although the minimum thickness intersected was 1.36 m in drillhole WA21 and the maximum was 3.6 m in drillhole WA4. Seam 3 has a moderate ash content of 30.7% and a sulphur content of 2.8%.

## Seam 4

Seam 4 is recognised in a north-westerly trending belt through the central part of the permit and is best developed in the northern central portion. In this area the seam is between 2.29 m (drillhole WA10) and 4.34 m (drillhole HL01) in thickness. The average ash and sulphur contents are 30.0% and 2.6% respectively.

It should be noted that for all seams at Floats SG 1.6, ash values are reduced to between 14.6% and 18% whilst the sulphur content is only slightly reduced. For Seam 1 the sulphur content actually rises slightly at Floats SG 1.6.

Table 3.1 lists the maximum, minimum and average depth from surface to the top of each seam, and the maximum, minimum and average thickness for each seam. These figures were calculated from drillhole intercepts for each seam. For the purpose of clarity, Seam 2 includes all intercepts for Seam 2, Seam 2 Upper and Seam 2 Lower splits. Table 3.2 lists the maximum, minimum and average depth from surface for each seam, and the maximum, minimum and average thickness for each split of Seam 2. It should be noted that the splits do not cover the same area as illustrated in Figure 6.2 to Figure 6.4.



	Top of se	am depth fro	m surface	Seam thickness			
Seam	Minimum (m)	Maximum (m)	Average (m)	Minimum (m)	Maximum (m)	Average (m)	
1	70.38	127.32	90.38	0.68	4.86	2.22	
2*	69.10	155.50	103.55	0.50	17.48	3.46	
3	89.92	177.20	128.12	1.36	3.60	2.39	
4	123.98	199.92	149.15	0.62	4.34	2.32	

#### Table 3.1 Depth from surface and thickness by seam, as seen in drillhole intercepts

 Table 3.2
 Seam 2 depth from surface and thickness by split, as seen in drillhole intercepts

	Top of se	am depth fro	m surface	Seam thickness			
Seam	Minimum (m)	Maximum (m)	Average (m)	Minimum (m)	Maximum (m)	Average (m)	
2	128.23	148.37	138.30	14.08	17.48	15.78	
2 Upper	71.94	141.66	99.00	0.56	4.26	2.41	
2 Lower	69.10	155.50	102.67	0.50	5.13	2.74	

## 3.4. STRUCTURAL GEOLOGY

A preliminary structural interpretation has been carried out by Nimrodel which indicates the Ecca Group strata in the permit are distributed in the form of a north-easterly trending anticlinal structure and associated syncline to the south east (Figure 3.3). A series of normal (?) faults transect the folds orthogonal to the fold axes.



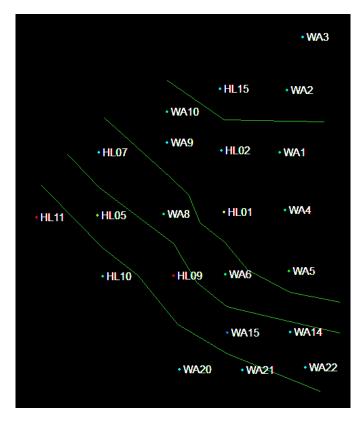


Figure 3.3 Takatokwane structural interpretation. Interpreted faults are shown in green

## 4. **EXPLORATION**

## 4.1. PREVIOUS EXPLORATION

Some water bore drilling has been carried out in the area but this has proved to be of limited use. BP Coal Botswana (BPB) carried out a regional programme of drilling over the area prior to the permit being acquired by Wizard Investments but no report of this drilling is available. A summary of the drilling carried out by BPB in the currently held portion of PL035/2007 is given in Table 4.1 (as extracted from the Wizard Investments 2010 relinquishment report). It is believed the drillholes were fully cored at NQ size (47.6 mm) but there are no data on the logging and sampling procedures or of analyses carried out.

Drillhole	Upper Ec (K Se	ca Seam am?)		a Top Seam am?)	Middle Ecca Main Seam (E Seam?)		
number	Gross interval	Best horizon	Gross	Net	Gross	Net	
BKW1	-	-	1.99	1.74	3.56	2.67	
BKW2	16.03	2.63	2.39	2.39	3.02	1.28	
BKW3	15.31	2.82	3.27	1.55	4.00	4.00	
BKW4	-	-	-	-	1.49	0.80	
BKW8	-	-	-	-	-	-	
BKW9	16.40	2.76	0.20	0.00	2.33	1.56	
BKW27	-	-	2.20	1.65	1.50	0.85	

Table 4.1	Summary of BP Coal Botswana drilling within PL 035/2007
Table 4.1	Summary of bP Coal Bolswana drilling within PL 035/2007



Over the period from October 2008 to January 2009, Homeland Mining acquired an interest in PL035/2007 through the drilling of eleven TNW/HQ (65 mm) cored holes (HL series), all within the currently retained portion of the permit, as summarised in Table 4.2. All seams were sampled and analysed in the Advanced Coal Technologies (ACT) laboratory in Pretoria. The ACT laboratory is a nationally accredited laboratory.

Density logs were run in most drillholes.

Analyses requested included Float/Sink testing of each sample at 0.1 relative density (RD) increments from 1.4 to 1.8 with the yield, proximate, sulphur and calorific value (CV) determined for each fraction. The same sets of analyses were also carried out on each cumulative fraction. Relative density was determined for the whole sample.

Drillhole	Start	Finish	Totaldepth	Commente
number	date	date	(m)	Comments
HL9	14/10/08	22/10/08	318.00	
HL3	23/10/08	25/10/08	84.07	Stopped in first coal at 129.6 m, casing jammed
HL3A	03/11/08	09/11/08	129.60	
HL10	07/11/08	11/11/08	171.00	
HL10A	12/11/08	14/11/08	99.00	Fractured
HL1	19/11/08	24/11/08	249.10	
HL5	02/12/08	05/12/08	215.50	
HL11	06/10.08	10/12/08	300.10	
HL2	06/01/09	08/01/09	150.17	
HL7	09/01/09	12/01/09	150.00	
HL15	16/01/09	17/01/09	150.10	Stopped short of E Seam

#### Table 4.2 Summary of Homeland Mining drilling in PL035/2007

## 4.2. CURRENT EXPLORATION

Nimrodel drilled 14 core holes (TNW/HQ size, 65 mm) for a total of 2,255 m from March to August 2011, as summarised in Table 4.3. Geophysical logs including density gamma and calliper were run in most holes. Seams were logged and sampled at the exploration campsite, sealed in plastic bags and sent to the ACT laboratory for analysis.

#### Table 4.3 Nimrodel drilling summary

Drillhole number	Date started	Date completed	Total depth (m)
WA1	13/04/2011	18/04/2011	165.46
WA2	18/04/2011	5/05/2011	165.69
WA3	6/05/2011	11/05/2011	138.95
WA4	9/05/2011	12/05/2011	172.64



Drillhole	Date	Date	Total depth
number	started	completed	(m)
WA5	13/05/2011	26/05/2011	189.00
WA6	6/07/2011	11/07/2011	172.00
WA8	12/07/2011	15/07/2011	181.00
WA9	19/07/2011	23/07/2011	160.00
WA10	2/08/2011	5/08/2011	181.00
WA14	22/06/2011	25/06/2011	156.60
WA15	18/06/2011	21/06/2011	111.20
WA20	13/06/2011	17/06/2011	160.00
WA21	2/06/2011	6/06/2011	141.95
WA22	18/05/2011	23/05/2011	159.10

## 4.2.1. SAMPLING

The coal in the Takatokwane permit area is characteristically dull and the transition from coal to clastic sediment is often quite gradual. Consequently identifying seam boundaries can be problematic. In general sampling intervals were generally set at a minimum of 0.30 m and a maximum of 1.5 m.

Sampling was carried out as soon as possible after the core was extracted from the drillhole.

## 4.2.2. ANALYSES

The same sets of analyses were requested for the Nimrodel samples as were carried out on the Homeland Mining samples, i.e. Float/Sink testing of each sample at 0.1 RD increments from 1.4 to 1.8 with the yield, proximate, sulphur and CV determined for each fraction. The same sets of analyses were carried out on each cumulative fraction along with the relative density of the whole sample.

## 5. DATABASE

## 5.1. ENCODING

Only the Homeland and Nimrodel drilling data were used for the modelling and resource estimation. All collar, lithology and sampling intervals were encoded into the LogCheck data management system using the Standard Coalfield Logging Dictionary.

## 5.2. VALIDATION

Validation was carried out by comparing the alphanumeric LogCheck output against the field encoding sheets.

## 5.3. SEAM CORRELATIONS

Seam correlations were established by generating a series of east-west and north-south drillhole cross-sections with each drillhole showing lithological and geophysical logging data. Seam 2 had a



characteristic density signal, being a relatively thick interval with associated shale beds. Using this interval as a reference it was possible to recognise the split of the seam and to establish the correlation of the overlying Seam 1, as well as the Seam 3 and Seam 4 which underlie Seam 2.

The drillholes are nominally located on 4 km centres and it is possible that a more complex pattern of seam development in terms of seam splitting and convergence will be identified as infill data is obtained. However there is a reasonable level of confidence with the regard to the overall reliability of the correlations.

## 6. **RESOURCE ESTIMATION**

## 6.1. DATA IMPORTING

Collar, survey, assay and geology fields were imported into Datamine and desurveyed to create 3D drillholes. The cut-off date for the data for the resources is 5 October 2011. The drillholes used for the resource estimate are included in Table 6.1.

Drillhole	Facting	Nouthing	Elevation	Date	Date	Total depth
number	Easting	Northing	(mRL)	started	completed	(m)
HL1	227634.243	7335460.912	1103.179	19/11/2008	24/11/2008	249.10
HL2	227454.459	7339436.112	1098.781	6/01/2009	8/01/2009	150.17
HL3A	227737.315	7331498.823	1105.913	23/10/2008	25/10/2008	84.07
HL3A	227737.315	7331498.823	1105.913	3/11/2008	7/11/2008	129.60
HL5	219528.519	7335249.882	1104.067	2/12/2008	5/12/2008	215.50
HL7	219611.56	7339327.342	1091.769	9/01/2009	12/01/2009	150.00
HL9	224403.746	7331420.249	1107.484	14/10/2008	22/10/2008	318.00
HL10	219854.155	7331369.773	1106.852	7/11/2008	11/11/2008	171.00
HL11	215593.786	7335159.023	1104.613	6/12/2008	10/12/2008	300.10
HL15	227387.165	7343370.103	1080.038	16/01/2009	17/01/2009	150.10
WA1	231196.595	7339286.47	1095.166	13/04/2011	18/04/2011	165.46
WA2	231692.672	7343301.44	1091.315	18/04/2011	5/05/2011	165.69
WA3	232684.939	7346727.683	1088.142	6/05/2011	11/05/2011	138.95
WA4	231546.746	7335621.629	1100.541	9/05/2011	12/05/2011	172.64
WA5	231815.274	7331714.237	1106.307	13/05/2011	26/05/2011	189.00
WA6	227737.315	7331498.823	1105.913	6/07/2011	11/07/2011	172.00
WA8	223767.036	7335369.234	1103.207	12/07/2011	15/07/2011	181.00
WA9	223975.29	7339950.041	1099.873	19/07/2011	23/07/2011	160.00
WA10	223991.876	7341932.272	1098.779	2/08/2011	5/08/2011	181.00
WA14	231897.659	7327786.774	1108.634	22/06/2011	25/06/2011	156.60
WA15	227826.19	7327758.463	1108.628	18/06/2011	21/06/2011	111.20
WA20	224765.035	7325376.335	1111.347	13/06/2011	17/06/2011	160.00
WA21	228803.676	7325337.207	1109.54	2/06/2011	6/06/2011	141.95
WA22	232832.676	7325504.024	1110.61	18/05/2011	23/05/2011	159.10

#### Table 6.1Summary of drillholes in the Takatokwane permit area

## 6.2. MODELLING

Top and bottom surfaces were then created for each seam, using a 2 km extrapolation radius around drillholes. Drillholes with seam intersections that were more than 4 km apart were excluded from

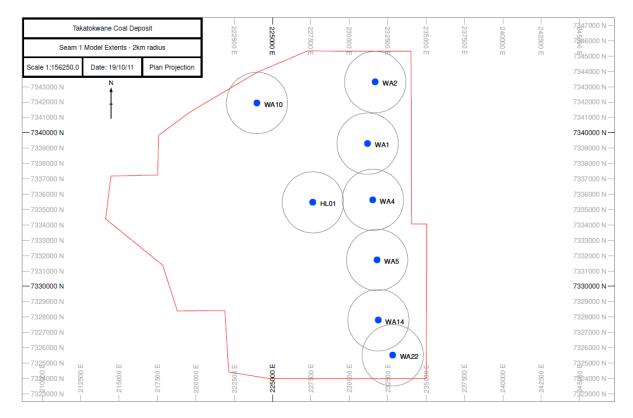


the creation of these surfaces. Seam fill blocks models were created for each individual seam, and a 1.5 m thickness cut-off was applied to each seam. A nearest neighbour model fill was used (based on a 3,000 m search radius) to populate the model for density, raw ash, raw sulphur, raw CV, Float 1.6 SG yield, Float 1.6 SG ash, Float 1.6 SG sulphur and Float 1.6 SG CV. The density values applied to the model were used to convert volumes to tonnage estimates.

## 6.3. OUTPUT

Based the widely separated nature of the drilling the resource has been classified as Inferred in accordance with the guidelines of the Australasian Code for Reporting of Exploration Results, Mineral Resources and Ore Reserves (the JORC Code 2004 edition) and the Australian Guidelines for the estimating and reporting of Inventory Coal, Coal Resources and Coal Reserves (2003). In Dr Blayden's opinion, there is sufficient seam continuity for resource estimation at distances of up to 2 km from individual drillholes.

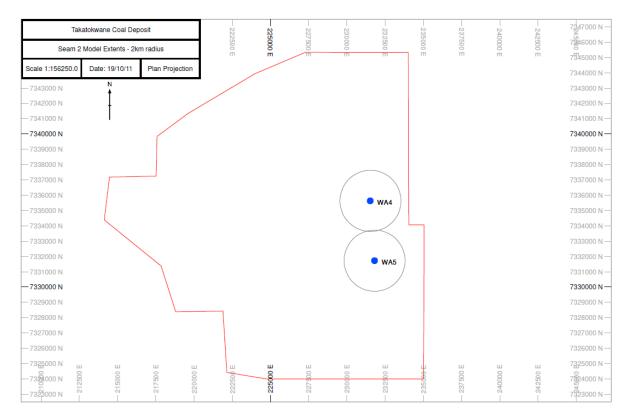
The individual masks generated for the resource estimates are shown in Figure 6.1 to Figure 6.6.



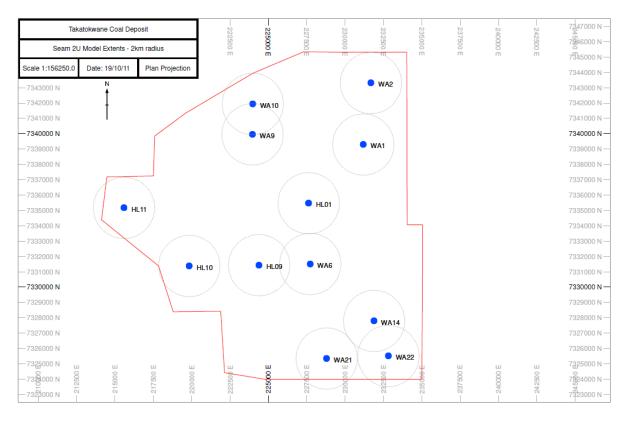
#### Figure 6.1 Seam 1 resource mask



#### Figure 6.2 Seam 2 resource mask

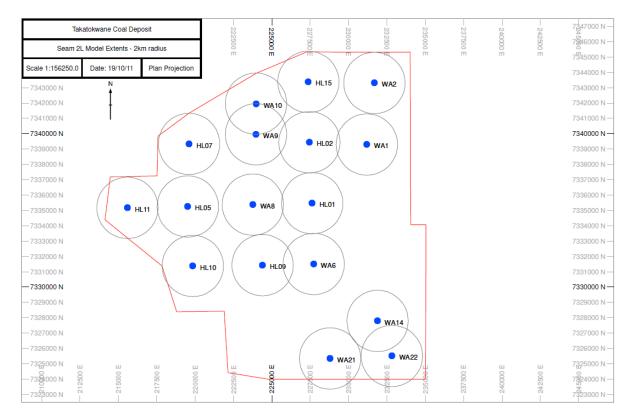


#### Figure 6.3 Seam 2 Upper resource mask

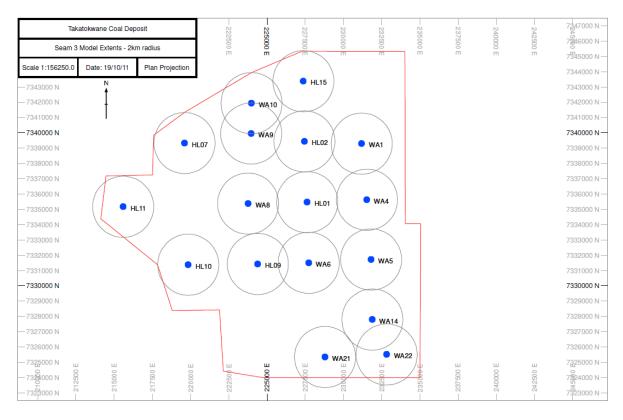




#### Figure 6.4 Seam 2 Lower resource mask

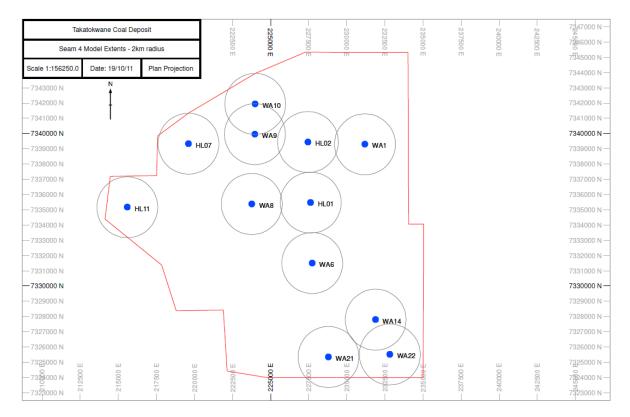


#### Figure 6.5 Seam 3 resource mask





#### Figure 6.6 Seam 4 resource mask



## 7. COAL RESOURCE

The summary of coal resource is included in Table 7.1. All values are calculated on an air dried basis (adb). The total raw coal resource is 4,230 Mt. At Floats 1.6 SG the average yield is 57% for a resource of 2,395 Mt. A detailed tablulation of the coal resource by seam is included in Appendix A.

		Raw coal					Floats 1.6 SG coal			
Seam	Inferred resource (Mt)	Density (t/m <sup>3</sup> )	Ash (%)	S (%)	CV (MJ/kg)	Yield (%)	Inferred resource (Mt)	Ash (%)	S (%)	CV (MJ/kg)
1	410.34	1.70	38.11	3.08	15.66	52	212.54	17.11	3.43	22.72
2	818.54	1.70	34.25	3.66	16.91	50	411.30	15.80	2.01	23.14
2 Upper	593.44	1.70	37.55	2.52	15.78	48	285.10	15.64	2.09	23.22
2 Lower	1,044.40	1.62	29.97	2.61	18.58	63	657.10	17.99	1.35	22.68
3	865.64	1.63	30.68	2.84	18.41	58	499.25	16.65	1.26	23.09
4	497.8	1.61	25.78	1.83	19.38	66	329.58	14.59	0.66	23.21
Total	4,230.16	1.65	32.31	2.80	17.64	57	2,394.86	16.48	1.69	23.0

 Table 7.1
 Summary of Inferred Coal Resource within the Takatokwane permit area



## 8. **RISK ASSESSMENT**

## 8.1. GEOLOGICAL RISK

## 8.1.1. CORRELATION

The drillholes in the permit area are nominally set at a spacing of 4 km. Though widely spaced there is a reasonable level of confidence in terms of the seam correlation that is not inconsistent with resources classified as Inferred.

## 8.1.2. COAL QUALITY

The average coal qualities have been estimated by compositing individual ply data for each seam and modelling the values. As for the seam correlation, the analytical data are believed to be generally representative

## 8.1.3. STRUCTURE

An initial structural interpretation of drillhole data indicates the seams to be distributed into a series of broad folds and subject to cross-faulting. The nature of the faulting has yet to be properly defined and whilst they may ultimately impact any proposed underground reserve estimate no allowance has been made for any losses in the current resource estimate.

## 8.1.4. INTRUSIONS

There is no evidence of intrusive activity in the drilling to date and risk of intrusions impacting on the resource estimate is believed to be low.

## 8.2. MODELLING RISK

## 8.2.1. DATABASE

There has been sufficient quality control to minimise errors in the database.

## 8.2.2. RESOURCE ASSESSMENT

A block model has been developed based on the established correlations and a simple arithmetic determination of cell values. The methodology is appropriate for the type of deposit and is in accordance with standard coalfield practice.

## 9. **DECLARATION**

## 9.1. QUALIFICATIONS AND EXPERIENCE

This report has been prepared by Dr Ian D. Blayden for and on behalf of Optiro. Ian is the Principal consultant for Geological and Management Services Pty Ltd (GMS). GMS has been operating since 1984 and Dr Blayden has had over 40 years experience in the Australian mining industry, particularly in exploration, prospect evaluation, independent audits and the preparation of independent expert reports and is Competent Person for coal as defined in the JORC Code (2004).



His principal qualifications are a BSc (Hons) from the University of NSW and PhD from Newcastle University. Ian is a member of the Australasian Institute of Mining and Metallurgy, Chartered Professional Geology, a member of the Australian Institute of Geoscientists and a Member of the Geological Society of Australia.

## 9.2. INDEPENDENCE

Neither Optiro nor GMS have a direct or indirect financial interest in, or association with, Nimrodel. In preparing this report Optiro and GMS have been paid a fee for time expended based on its standard daily rates. The present and past arrangements for services rendered to Nimrodel do not in any way compromise the independence of Optiro or GMS with respect to this review and resource estimate.

## 9.3. LIMITATIONS

The views expressed in this Statement of Resources are solely those of Optiro, Geological and Management Services Pty Ltd and Dr. Blayden, unless specifically identified within the report as those of other parties.



## **APPENDIX A**

Seam	Volume	Tonnes	Density	Raw Ash (%)	Raw S (%)	Raw C (%)	Raw Vol. Matter (%)	Raw CV	Raw Moisture (%)
1	241,485,547	410,335,305	1.70	38.11	3.08	29.98	25.22	15.66	6.71
2	481,881,641	818,539,688	1.70	34.25	3.66	33.11	25.84	16.91	6.80
2 Upper	349,787,109	593,438,465	1.70	37.55	2.52	31.24	24.85	15.78	6.35
2 Lower	644,000,000	1,044,398,867	1.62	29.97	2.61	36.35	26.92	18.58	6.75
3	532,252,344	865,641,746	1.63	30.68	2.84	36.98	26.45	18.41	6.91
4	308,914,063	497,801,590	1.61	25.78	1.83	42.20	24.67	19.38	7.34
Total	2,558,320,703	4,230,155,660	1.65	32.31	2.80	35.21	25.90	17.64	6.80

Seam	Float 1.6 Yield (%)	Float 1.6 Tonnes	Float 1.6 Ash (%)	Float 1.6 S (%)	Float 1.6 C (%)	Float 1.6 Vol. Matter (%)	Float 1.6 CV	Float 1.6 Moisture (%)
1	52	212,538,867	17.11	3.43	41.41	32.77	22.72	8.73
2	50	411,299,847	15.80	2.01	43.56	31.58	23.14	9.07
2 Upper	48	285,097,719	15.64	2.09	43.69	31.94	23.22	8.73
2 Lower	63	657,096,341	17.99	1.35	43.01	30.96	22.68	8.04
3	58	499,246,118	16.65	1.26	44.66	31.23	23.09	8.47
4	66	329,582,918	14.59	0.66	49.43	27.24	23.21	8.73
Total	57	2,394,861,806	16.48	1.69	44.15	31.01	23.00	8.57



Seam	Float 1.5 Yield (%)	Float 1.5 Tonnes	Float 1.5 Ash (%)	Float 1.5 S (%)	Float 1.5 C (%)	Float 1.5 Vol. Matter (%)	Float 1.5 CV	Float 1.5 Moisture (%)
1	43	175,000,958	13.92	3.58	42.92	34.06	23.75	9.12
2	47	382,652,947	12.99	1.95	45.07	32.55	24.05	9.41
2 Upper	39	230,671,181	12.69	2.09	45.24	32.97	24.19	9.11
2 Lower	48	496,796,593	14.47	1.36	44.76	32.33	23.83	8.44
3	46	401,217,739	13.14	1.30	46.15	32.38	24.17	8.82
4	52	259,216,478	11.36	0.76	50.50	28.98	24.33	9.19
Total	46	1,945,555,907	13.24	1.71	45.67	32.24	24.04	8.95

Seam	Float 1.4 Yield (%)	Float 1.4 Tonnes	Float 1.4 Ash (%)	Float 1.4 S (%)	Float 1.4 C (%)	Float 1.4 Vol. Matter (%)	Float 1.4 CV	Float 1.4 Moisture (%)
1	28	113,826,755	9.37	3.81	44.96	35.89	25.17	9.75
2	35	285,584,773	9.39	1.87	47.02	33.76	25.21	9.83
2 Upper	26	156,043,849	9.33	2.09	47.02	34.06	25.23	9.60
2 Lower	28	294,060,694	10.39	1.33	46.65	34.00	25.16	8.97
3	34	290,159,244	9.80	1.33	47.76	33.59	25.16	9.34
4	37	182,038,515	8.70	0.74	51.17	30.48	25.19	9.64
Total	31	1,321,713,828	9.63	1.71	47.37	33.65	25.18	9.46